

Personal Communications for Windows, Version 13.0



Emulator Programming

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Note

Before using this information and the product it supports, read the information in Appendix F, "Notices," on page 435.

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This edition applies to Version 13.0 of IBM Personal Communications for Windows (program number: 5639-I70) and to all subsequent releases and modifications until otherwise indicated in new editions.

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About This Book

This book provides necessary programming information for you to use the IBM® Personal Communications for Windows Emulator High-Level Language Application Program Interface (EHLLAPI), Dynamic Data Exchange (DDE), Personal Communications Session API (PCSAPI), and Server-Requester Programming Interface (SRPI). The Host Access Class Library is described in *Host Access Class Library*.

EHLLAPI/DDE/PCSAPI is used with Personal Communications to provide a way for users and programmers to access the host presentation space with a set of functions that can be called from an application program running in a workstation session.

In this book, *Windows* refers to Windows 7, Windows 8/8.1, Windows 10, Windows Server 2008, and Windows Server 2012. When information is relevant only to a specific operating system, this will be indicated in the text.

Who Should Read This Book

This book is intended for programmers who write application programs that use the APIs documented in this book.

A working knowledge of Windows is assumed. For information about Windows, refer to the list of publications under “Where To Find More Information.”

The programmer must also be familiar with connecting to a host system from a terminal or from a workstation with terminal emulation software.

This book assumes you are familiar with the language and the compiler that you are using. For information on how to write, compile, or link-edit programs, refer to Where To Find More Information for the appropriate references for the specific language you are using.

Where To Find More Information

The Personal Communications library includes the following publications:

- *Installation Guide*
- *Quick Beginnings*
- *Emulator User's Reference*
- *Administrator's Guide and Reference*
- *Emulator Programming*
- *Client/Server Communications Programming*
- *System Management Programming*
- *Host Access Class Library*
- *Configuration File Reference*

In addition to the printed books, there are Hypertext Markup Language (HTML) documents provided with Personal Communications:

Host Access Class Library

This HTML document describes how to write an ActiveX/OLE 2.0-compliant application to use Personal Communications as an embedded object.

Following is a list of related publications:

- *IBM 3270 Information Display System Data Stream Programmer's Reference*, GA23-0059
- *IBM 5250 Information Display System Functions Reference Manual*, SA21-9247

Refer to the IBM Glossary of Computing Terms at <http://www.networking.ibm.com/nsg/nsgmain.htm> for definitions of technical terms used throughout this book.

Notation

A table at the beginning of each section explains API or DDE functions in Chapter 3, "EHLLAPI Functions," on page 27, Chapter 5, "PCSAPI Functions," on page 197, Chapter 6, "DDE Functions in a 32-bit Environment," on page 221, and Appendix E, "DDE Functions in a 16-Bit Environment," on page 367. It shows whether a function is supported for the products that provide the function described in the section. Yes means it is supported for a host type, and No means not supported. For example, the following table indicates that a function is available for 3270 and VT sessions but not for 5250 sessions.

3270	5250	VT
Yes	No	Yes

Chapter 1. Introduction to Emulator APIs

The IBM Personal Communications product supplies several application programming interfaces (APIs). Each interface has a specific set of functions and may be used for different purposes. Choose the programming interface that best matches the functional requirements of your application. Some applications may use more than one interface to achieve the desired results. The programming interfaces are:

- **Emulator High Level Language API (EHLLAPI):** This interface provides functions to access emulator "presentation space" data such as characters on the host screen. It also provides functions for sending keystrokes to the host, intercepting user-entered keystrokes, querying the status of the host session, uploading and downloading files, and other functions. This interface is often used for *automated operator* applications which read host screens and enter keystrokes without direct user intervention. See Chapter 3, "EHLLAPI Functions," on page 27.
 - **IBM Standard HLLAPI Support:** This is a standard programming interface which allows programmatic access to a host emulator session. See Chapter 2, "Introduction to IBM Standard EHLLAPI, IBM Enhanced EHLLAPI and WinHLLAPI Programming," on page 5.
 - **IBM Enhanced HLLAPI Support:** This interface is based on the IBM Standard HLLAPI interface. It provides all of the existing functionality but uses modified data structures. See Chapter 2, "Introduction to IBM Standard EHLLAPI, IBM Enhanced EHLLAPI and WinHLLAPI Programming," on page 5.
 - **Windows High Level Language API (WinHLLAPI):** This interface provides much of the same functionality of IBM Standard EHLLAPI and adds some extensions that take advantage of the Windows environment. See Chapter 2, "Introduction to IBM Standard EHLLAPI, IBM Enhanced EHLLAPI and WinHLLAPI Programming," on page 5.
- **Dynamic Data Exchange (DDE):** This interface is similar to the EHLLAPI interface in that it provides a programmable means to read the host screen, send keystrokes, and perform related functions. It has some additional functions for access to the emulator clipping rectangle, intercepting mouse events, and adding/removing commands on the emulator menu bar. See Chapter 6, "DDE Functions in a 32-bit Environment," on page 221.
- **Personal Communications Session API (PCSAPI):** This interface is used to start, stop, and control emulator sessions and settings. See Chapter 5, "PCSAPI Functions," on page 197.

For Personal Communications Version 13.0, functions have been added to allow control and retrieval of page and printer settings. See "Page Setup Functions" on page 205 and "Printer Setup Functions" on page 211.
- **Server-Requestor Programming Interface (SRPI):** This interface is used in cooperation with an IBM Enhanced Connectivity Facility (ECF) application running on a host system. This API provides functions for writing synchronous call-return interfaces to remote server programs. See Chapter 8, "Server-Requestor Programming Interface (SRPI) Support," on page 329.
- **IBM Personal Communications Host Access Class Library (ECL):** ECL is a set of objects that allow application programmers and scripting language writers to access host applications easily and quickly. Personal Communications supports

three different ECL layers (C++ objects, ActiveAutomation (OLE), and LotusScript Extension (LSX)). Refer to *Host Access Class Library (HACL)* for more details.

Using API Header Files

The application program should include operating system header files before including API header files. For example:

```
#include <windows.h>      // Windows main header
#include "pcsapi.h"       // PComm PCSAPI header
...
```

Critical Sections

Use critical sections (**EnterCriticalSection** function) carefully when your program calls emulator APIs. Do not make emulator API calls within a critical section. If one thread of an application establishes a critical section and another thread is within an emulator API call, the call is suspended until you exit from the critical section.

During processing of an API call, all signals (except numeric coprocessor signals) are delayed until the call completes or until the call needs to wait for incoming data. Also, **TerminateProcess** issued from another process is held until the application completes an API call it might be processing.

Stack Size

Emulator APIs use the calling program's stack when they are executed. The operating system, the application, and the API all require stack space for dynamic variables and function parameters. At least 8196 bytes (8K) of stack space should be available at the time of an API call. It is the responsibility of the application program to ensure sufficient stack space is available for the API.

Running 16-bit Windows EHLLAPI programs

If you are running multiple 16-bit Windows EHLLAPI tasks that use any of the 16-bit EHLLAPI DLLs, each 16-bit EHLLAPI task must run under a separate NTVDM. You can use any of the following methods to accomplish this:

- Shortcuts used to start 16-bit EHLLAPI applications must specify that the program run in a separate memory space (NTVDM).
- To start a 16-bit EHLLAPI application such as hllapi16.exe from a command prompt or batch program, type the following command:
start /separate hllapi16.exe
- If a Win32 application spawns a 16-bit EHLLAPI application using the Windows API `CreateProcess`, it must use the Process creation flag named `CREATE_SEPARATE_WOW_VDM`.

Windows x64 Platform Support

The x64-based versions of Microsoft Windows Server 2008 and Microsoft Windows 8/8.1/10 x64 Edition are optimized to run native 64-bit programs, but do not support 32-bit drivers or 16-bit applications.

For these platforms, Personal Communications does not install the following libraries.

- DOS EHLLAPI
- 16-bit API support:
 - Standard EHLLAPI 16-bit interface
 - WinHLLAPI 16-bit interface
 - PCSAPI 16-bit interface
 - SRPI 16-bit interface

Sample Programs

Several sample programs are provided, each of which illustrates the use of one of the Personal Communications APIs. If you choose to install the sample programs, they will be installed in the \SAMPLES directory.

Note: International Business Machines Corporation provides these files as is, without warranty of any kind, either express or implied, including, but not limited to, the implied warranties of merchantability or fitness for a particular purpose.

The sample program files include source and supporting files for the following Personal Communications APIs:

- Emulator High-Level Language Programming Interface (EHLLAPI)
- Dynamic Data Exchange (DDE)
- Server-Requester Programming Interface (SRPI)
- PCSAPI Functions

The following files are installed in the \SAMPLES directory.

Table 1. Sample Program Files

File Name	Description
DDE_C.H	DDE include file
EHLAPI32.H	IBM standard 32-bit EHLLAPI include file
WHLLAPI.H	WinHLLAPI 16-bit include file
HAPI_C.H	EHLLAPI include file
PCSAPI.H	PCSAPI include file
PCSCALLS.LIB	Import library for standard interface
PCSCAL32.LIB	Import library for enhanced interface
EHLAPI32.LIB	Import library for IBM Standard 32-bit EHLLAPI interface
WHLLAPI.LIB	Import library for WinHLLAPI 16-bit interface
WHLAPI32.LIB	Import library for WinHLLAPI 32-bit interface
UCCPRB.H	SRPI include file

The following subdirectories are created in the \SAMPLES directory.

Table 2. Sample Program Subdirectories

File Name	Description
DDXFER	Shows how EHLLAPI can be used to create a “Drag and Drop” application; in this case, for file transfer
ECL	HACL sample files

Table 2. Sample Program Subdirectories (continued)

File Name	Description
HLLSMP	Shows how to use EHLLAPI to request a keystroke and log on to a VM system
LISTFILE	Illustrates how DDE can make use of the LOAD button to transfer files from the host
PCSMAN	Illustrates the use of PCSAPI to start and stop sessions, query the session status, and query the profile for the session
SPL2FILE	A program that uses DDE to save an iSeries, eServer™ i5, or System i5® spool file as an ASCII file on the PC
SRPSMP	Illustrates the use of the Server Requester Programming Interface (SRPI)
VBDDE	VBDDE sample files
VBHLLAPI	VBHLLAPI sample files
VBPCSAPI	VBPCSAPI sample files

Displaying Arabic data in the VBHLLAPI sample program

For proper display of Arabic data in the VBHLLAPI sample program, you should do the following:

1. Edit the VBHLLAPI sample program source code. For each form, change the default font property to a Windows True Type font that supports Arabic script (for example, Courier New).
2. Recompile the VBHLLAPI sample program.

Chapter 2. Introduction to IBM Standard EHLLAPI, IBM Enhanced EHLLAPI and WinHLLAPI Programming

This chapter provides information needed to incorporate IBM Standard EHLLAPI (16- and 32-bit), WinHLLAPI (16- and 32-bit), and IBM Enhanced 32-bit EHLLAPI (EHLAPI32) functions into applications written in a high level language. It provides details on call format, memory allocation considerations, initializing the interfaces, and compiling and linking applications. Also included is a short sample EHLLAPI program and the compile/link instructions used to build it. Finally, a set of possible uses for the EHLLAPI interface (scenarios) is described.

An EHLLAPI application is any application program which uses the EHLLAPI interface to access the host 3270/5250/VT presentation space. The presentation space includes the visible emulator character data, fields and attribute data, keystroke data, and other information.

EHLLAPI Overviews

Following are overviews for HLLAPI programming interfaces.

IBM Standard EHLLAPI

EHLLAPI is a standard programming interface which allows programmatic access to a host emulator session. Functions are provided for reading host screen data (such as the characters and attributes), for sending keystrokes, and performing other emulator-related functions.

The EHLLAPI interface is a single call-point interface. There is a single callable API through which all EHLLAPI functions are requested. On each call to the interface the application provides a function number which identifies the function requested, a pointer to a data buffer, a pointer to the length of the data buffer, and a pointer to a return code (see "EHLLAPI Call Format" on page 6).

WinHLLAPI

WinHLLAPI is based on the familiar EHLLAPI.API. It encompasses all of the existing functionality and adds extensions that take advantage of the Windows message driven environment. Users of the IBM Personal Communications EHLLAPI interface will notice no functional difference unless they incorporate the WinHLLAPI extensions.

The WinHLLAPI extension functions and any functions that deviate from the EHLLAPI form are described in Chapter 4, "WinHLLAPI Extension Functions," on page 185. For information on common functions, refer to Chapter 3, "EHLLAPI Functions," on page 27.

WinHLLAPI and IBM Standard EHLLAPI

The entry symbol for WinHLLAPI, is appropriately, **WinHLLAPI**. EHLLAPI users wishing to switch to the WinHLLAPI implementation must change from the **hllapi** standard entry. New users should follow all of the directions in Chapter 3, "EHLLAPI Functions," on page 27, and use the **WinHLLAPI** entry in place of the standard **hllapi** entry.

IBM Enhanced EHLLAPI and IBM Standard EHLLAPI

IBM Enhanced EHLLAPI is based on the familiar EHLLAPI API. It encompasses all of the existing functionality but takes advantage of the 32-bit environment and uses modified data structures. Standard interface users wishing to switch to IBM Enhanced 32-bit EHLLAPI need to change only the entry symbol from LPWORD to LPINT in the first, third, and fourth parameters. New users should use the procedures in the following sections.

Languages

Any programming language which can invoke an entry point in a DLL with the "Pascal" calling convention can be used to execute EHLLAPI functions. However, the Personal Communications EHLLAPI toolkit provides header files and function prototypes only for the C++ languages. A clear understanding of data structure layout and calling conventions is required to use any other language. The EHLLAPI toolkit supports the following C/C++ compilers:

- IBM VisualAge® for C/C++
- Microsoft Visual C/C++ Version 4.0 and higher

Most other C/C++ compilers will also work with the toolkit.

EHLLAPI C/C++ applications must include the Personal Communications EHLLAPI header file (HAPI_C.H). This file defines the layout of data structures and provides a prototype for the EHLLAPI entry point.

Note: The data structure layout for 16- and 32-bit applications are not the same (see "Standard and Enhanced Interface Considerations" on page 21).

EHLLAPI Call Format

The EHLLAPI entry point (**hllapi**) is always called with the following four parameters:

1. EHLLAPI Function Number (input)
2. Data Buffer (input/output)
3. Buffer Length (input/output)
4. Position (input); Return Code (output)

The prototype for IBM Standard EHLLAPI is:

```
[long hllapi (LPWORD, LPSTR, LPWORD, LPWORD);
```

The prototype for IBM Enhanced EHLLAPI is:

```
[long hllapi (LPINT, LPSTR, LPINT, LPINT);
```

Each parameter is passed by *reference* not by value. Thus each parameter to the function call must be a *pointer* to the value, not the value itself. For example, the following is a correct example of calling the EHLLAPI Query Session Status function:

```
#include "hapi_c.h"
struct HLDQuerySessionStatus QueryData;
int    Func, Len, Rc;
long   Rc;

memset(QueryData, 0, sizeof(QueryData)); // Init buffer
QueryData.qsst_shortcode = 'A';         // Session to query
Func = HA_QUERY_SESSION_STATUS;        // Function number
```

```

Len = sizeof(QueryData);           // Len of buffer
Rc  = 0;                           // Unused on input

hllapi(&Func, (char *)&QueryData, &Len, &Rc); // Call EHLLAPI
if (Rc != 0) {                       // Check return code
    // ...Error handling
}

```

All the parameters in the **hllapi** call are pointers and the return code of the EHLLAPI function is returned in the value of the 4th parameter, not as the value of the function. For example, the following is **not** correct:

```

if (hllapi(&Func, (char *)&QueryData, &Len, &Rc) != 0) { // WRONG!
    // ...Error handling
}

```

Although the **hllapi** function is defined to return a **long** data type for IBM Standard and Enhanced EHLLAPI, and **void** data type for WinHLLAPI, its value is undefined and should not be used.

The second through fourth parameters of the **hllapi** call can return information to the application. The description of each EHLLAPI function describes what, if any, information is returned in these parameters.

Data Structures

Many EHLLAPI functions use a formatted data structure to pass information to or from the application program. The description of each function shows the layout of the data structure. The data passed to or from the EHLLAPI function must exist in storage exactly as documented, byte for byte. Note that the structure layout is the same for all IBM Standard and WinHLLAPI 16- and 32-bit applications. Data structures for the IBM Enhanced 32-bit applications are packed to a 4-byte alignment.

It is *highly recommended* that the supplied header file and data structure definitions be used to ensure proper data alignment and layout. Although it is technically possible, the following is *not* recommended:

```

char QueryData[20]; // Not recommended
...
Func = HA_QUERY_SESSION_STATUS;
hllapi(&Func, QueryData, &Len, &Rc);
if (QueryData[13] == 'F') {
    // ...this is a 5250 session
}

```

The recommended way to write this function would be:

```

#include "hapi_c.h"
struct HLDQuerySessionStatus QueryData; // Recommended
...
Func = HA_QUERY_SESSION_STATUS;
hllapi(&Func, (char *)&QueryData, &Len, &Rc);
if (QueryData.qsst_sestype == 'F') {
    // ...this is a 5250 session
}

```

Memory Allocation

EHLLAPI functions do not allocate or free memory. The application program must preallocate buffer space for EHLLAPI functions which require it before calling the **hllapi** entry point. The buffer space may be pre-allocated as a dynamic variable such as:

```
struct HLDQuerySessionStatus QueryBuff;
```

or it may be allocated by a call to a C library or operating system function such as:

```
struct HLDQuerySessionStatus *QueryBuff;  
...  
QueryBuff = malloc(sizeof(struct HLDQuerySessionStatus));
```

In any case, the application is responsible for allocating sufficient buffer space before calling EHLLAPI functions and for freeing buffers when they are not needed.

EHLLAPI Return Codes

EHLLAPI functions return a completion code or return code in the 4th parameter of the **hllapi** function call (except for the **Convert Position** or **RowCol** (99) function). The return code indicates the success or failure of the requested function.

Unless indicated otherwise in the description of each function, the following table shows the meaning of each return code value. Some functions may have a slightly different interpretation of these return codes; refer to the individual function descriptions for details.

Table 3. EHLLAPI Return Codes

Return Code	Explanation
0	The function successfully executed, or no update since the last call was issued.
1	An incorrect host presentation space ID was specified. The specified session either was not connected, does not exist, or is a logical printer session.
2	A parameter error was encountered, or an incorrect function number was specified. (Refer to the individual function for details.)
4	The execution of the function was inhibited because the target presentation space was busy, in X CLOCK state (X []), or in X SYSTEM state.
5	The execution of the function was inhibited for some reason other than those stated in return code 4.
6	A data error was encountered due to specification of an incorrect parameter (for example, a length error causing truncation).
7	The specified presentation space position was not valid.
8	A functional procedure error was encountered (for example, use of conflicting functions or missing prerequisite functions).
9	A system error was encountered.
10	This function is not available for EHLLAPI.
11	This resource is not available.
12	This session stopped.
24	The string was not found, or the presentation space is unformatted.
25	Keystrokes were not available on input queue.

Table 3. EHLLAPI Return Codes (continued)

Return Code	Explanation
26	A host event occurred. See Query Host Update (24) for details.
27	File transfer was ended by a Ctrl+Break command.
28	Field length was 0.
31	Keystroke queue overflow. Keystrokes were lost.
32	An application has already connected to this session for communications.
33	Reserved.
34	The message sent to the host was canceled.
35	The message sent from the host was canceled.
36	Contact with the host was lost.
37	Inbound communication has been disabled.
38	The requested function has not completed its execution.
39	Another DDM session is already connected.
40	The disconnection attempt was successful, but there were asynchronous requests that had not been completed at the time of the disconnection.
41	The buffer you requested is being used by another application.
42	There are no outstanding requests that match.
43	The API was already locked by another EHLLAPI application (on LOCK) or API not locked (on UNLOCK).

Compiling and Linking

Applications using EHLLAPI functions must include the appropriate header file to obtain the proper function prototypes, constants, and data structure definitions. These header files may be used with any of the supported C/C++ compilers (see “Languages” on page 6). If a different compiler or language is used, then you must provide your own equivalent definitions and structures.

There are two possible ways to link the application program, depending on how the entry point is to be resolved. The simplest way is to statically link the application with the appropriate Personal Communications library. This will resolve the entry point at link time. The operating system will load the correct DLL with the application when it starts. Another way to link to the entry point is to perform dynamic linking. In this case, the application uses operating system calls to load the correct DLL and obtain the entry point address at run time.

The following table shows which header files to use, which .LIB should be used for static linking, and which .DLL should be used for dynamic loading.

Interface	Entry Point	Header File	LIB	DLL
IBM Standard (16-bit)	hllapi	hapi_c.h	PCSCALLS.DLL	PCSHLL.DLL
IBM Standard (32-bit)	hllapi	ehllapi32.h	EHLAPI32.LIB	EHLAPI32.DLL
IBM Enhanced (32-bit)	hllapi	hapi_c.h	PCSCAL32.LIB	PCSHLL32.DLL
WinHLLAPI (16-bit)	winhllapi	whllapi.h	WHLLAPI.LIB	WHLLAPI.DLL
WinHLLAPI (32-bit)	winhllapi	whllapi.h	WHLAPI32.LIB	WHLAPI32.DLL

Static Link Method

Using the static link method the application can simply call the **hllapi** entry point when needed such as:

```
#include "hapi_c.h"
int HFunc, HLen, HRc;           // Function parameters
char HBuff[1];                 // Function parameters
...
HFunc = HA_RESET_SYSTEM;      // Run EHLLAPI function
HLen = 0;
HRc = 0;
hllapi(&HFunc, HBuff, &HLen, &HRc);
if (HRc != 0) {
    // ... EHLLAPI access error
}
```

When the application is linked, the appropriate Personal Communications library files must be linked with the application executable code. For example, the following link command might be used (IBM VisualAge C/C++):

```
ilink /de /noe pcsca132.lib sample.obj
```

When the operating system loads an application constructed in this way, the Personal Communications EHLLAPI module is loaded automatically.

Dynamic Link Method

Using the dynamic link method the application makes calls to the operating system at run time to load the Personal Communications EHLLAPI module and to locate the **hllapi** entry point within it. This method requires more code in the application but gives the application greater control over error conditions. For example, the application can display a specific error message to the user if the Personal Communications EHLLAPI module cannot be found.

To use dynamic linking, the application needs to load the appropriate Personal Communications module and locate the entry point. It is recommended that the entry point be located by its ordinal number and not by name. The ordinal number is defined in the header file. The following 32-bit Windows code loads the IBM Standard 32-bit EHLLAPI module, locates the **hllapi** entry point, and makes an EHLLAPI function call.

```
#include "hapi_c.h"

HMODULE Hmod;                  // Handle of PCSHLL32.DLL
long (APIENTRY hllapi)(int *, char *, int *, int *); // Function pointer
int HFunc, HLen, HRc;         // Function parameters
char HBuff[1];               // Function parameters

Hmod = LoadLibrary("PCSHLL32.DLL"); // Load EHLLAPI module
if (Hmod == NULL) {
    // ... Error, cannot load EHLLAPI module
}

hllapi = GetProcAddress(Hmod, MAKEINTRESOURCE(ord_hllapi)); // Get EHLLAPI entry point
if (hllapi == NULL) {
    // ... Error, cannot find EHLLAPI entry point
}

HFunc = HA_RESET_SYSTEM;      // Run EHLLAPI function
HLen = 0;
HRc = 0;
```

```

(*hllapi)(&Func, HBuff, &HLen, &HRc);
if (HRc != 0) {
    // ... EHLLAPI access error
}

```

Multithreading

IBM Enhanced EHLLAPI (32-bit) and IBM Standard EHLLAPI 16-bit connect on a per process basis. All threads access the same connected host session. The thread that performs the connections must also perform the disconnection.

IBM Standard EHLLAPI (32-bit) and WinHLLAPI connect on a per thread basis. Each thread must maintain its own connections. This allows a multithreaded process to maintain connections to more than one connected host session at a time. This eliminates the need for multi-process schemes when using a WinHLLAPI program to coordinate data between different hosts. It also puts the burden of connecting and disconnecting as necessary on the individual thread.

Presentation Spaces

Many EHLLAPI functions require a *presentation space ID (PSID)* to indicate which host emulator session is to be used for the function. (This is also referred to as the *short session ID*). A presentation space ID is a single character in the range A to Z. There are a maximum of 26 sessions.

IBM Enhanced 32-Bit Interface Presentation Space IDs

For IBM Enhanced EHLLAPI applications, the session ID is extended with three additional bytes. These extended session bytes must be set to zero for future compatibility. This is most easily accomplished by setting the contents of EHLLAPI buffers to all binary zero before filling them in with the required information. For example, the following might be used to query the status of session B:

```

#include "hapi_c.h"
int HFunc, HLen, HRc; // Function parameters
struct HLDPMWindowStatus StatusData; // Function parameters

Func = HA_PM_WINDOW_STATUS;
HLen = sizeof(StatusData);
HRc = 0;

// Set data buffer to zeros and fill in request
memset(&StatusData, 0x00, sizeof(StatusData));
StatusData.cwin_shortcode = 'B'; // Short session ID
StatusData.cwin_option = 0x02; // Query command

hllapi(&Func, (char *)&StatusData, &HLen, &HRc);

```

Types of Presentation Spaces

An emulator session can be configured as a display session or a printer session. EHLLAPI applications cannot connect to printer or router sessions of PC400. The **Query Sessions (10)** function can be used to determine the type of a particular session.

Size of Presentation Spaces

An emulator display session can be configured for a range of screen sizes from 1920 bytes (24x80 screen size) to 9920 bytes (62x160 screen size). Some EHLLAPI functions such as **Copy PS to String (8)** require the application to allocate enough

storage to hold (possibly) the entire presentation space. The size of the presentation space for a given session can be obtained using the **Query Session Status (22)** function.

Presentation Space IDs

EHELLAPI functions interact with only one presentation space at a time. The presentation space ID (PSID) is used to identify the particular presentation space in which a function is to operate.

For some functions, the PSID is contained in a preceding call to the **Connect Presentation Space (1)** function. For other functions, the PSID is contained in the calling data string parameter.

Host-Connected Presentation Space

Connection to the host presentation space (or session) is controlled by using the **Connect Presentation Space (1)** and **Disconnect Presentation Space (2)** functions. The status of the connection determines whether some functions can be executed. It also affects how the PSID is defined. The following text explains how to control the status of the connection to the host presentation space:

- At any given time, there can be either no host-connected presentation space, or there can be one and only one host-connected presentation space.
- There is no default host-connected presentation space.
- Following a connect, there is one and only one host-connected presentation space. The host presentation space that is connected is identified in the calling data string parameter of the connect function.
- A subsequent call to connect can be executed with no intervening disconnect. In this case, there is still one and only one host-connected presentation space. Again, the host presentation space that is connected is identified in the calling data string parameter of the connect function.
- Following a disconnect, there is no host-connected presentation space. This rule applies following multiple consecutive calls to connect or following a single call to connect.
- You cannot connect to a logical printer session.

Presentation Space ID Handling

The PSID is used to specify the host presentation space (or session) in which you desire a function to operate. The way the PSID is handled is affected by two factors:

1. The method used to specify the PSID:
 - a. As the calling data string parameter of a preceding call to the **Connect Presentation Space (1)** function
 - b. As a character in the calling data string of the function being executed. Handling varies depending on whether the character is:
 - A letter *A* through *Z*
 - A blank or a null
2. The status of the connection to the host presentation space.

The following paragraphs describe how the PSID is handled for the various combinations of these two factors.

PSID Handling for Functions Requiring Connect

Some functions interact only with the host-connected presentation space. These functions require the **Connect Presentation Space (1)** function as a prerequisite call. The PSID for these functions is determined by the **Connect Presentation Space (1)** and the **Disconnect Presentation Space (2)** functions as follows:

- When there is no host-connected presentation space, these functions do not interact with any presentation space. A return code of 1 is generated.
- When there is one host-connected presentation space, these functions interact with the presentation space specified in the calling data string parameter of the most recent call to the **Connect Presentation Space (1)** function.

PSID Handling for Functions Not Requiring Connect

Some functions can interact with a host presentation space whether it is connected or not. These functions allow you to specify the PSID in the calling data string parameter. They are as follows:

- **Connect Presentation Space (1)**
- **Convert Position RowCol (99)**
- **Get Key (51)**
- **Post Intercept Status (52)**
- **Query Close Intercept (42)**
- **Query Host Update (24)**
- **Query Session Status (22)**
- **Start Close Intercept (41)**
- **Start Host Notification (23)**
- **Start Keystroke Intercept (50)**
- **Stop Close Intercept (43)**
- **Stop Host Notification (25)**
- **Stop Keystroke Intercept (53)**

All except the first two of these functions allow you to specify the PSID using either:

- A letter *A* through *Z*
- A blank or a null

The first two functions require that a letter be used to specify the PSID.

When there is no host-connected presentation space, the following rules apply:

- The function can interact with any host presentation space if a letter, not a blank or a null, is used to specify the PSID.
- If a blank or a null is used to specify the PSID, a return code of 1 is generated. The function does not execute.
- Using a letter to specify the PSID does not establish a host-connected presentation space, except on a connect PS request.

When there is one host-connected presentation space, the following rules apply:

- The function can interact with any host presentation space if a letter is used to specify the PSID.
- If a blank or a null is used to specify the PSID, the function operates in the presentation space identified in the most recent call to the **Connect Presentation Space (1)** function.

- Using a letter to specify the PSID does not change the established PSID of the host-connected presentation space, except on a connect PS request.

The following functions are available for printer sessions:

- **Start Host Notification** (23)
- **Query Host Update** (24)
- **Stop Host Notification** (25)

Sharing EHLLAPI Presentation Space between Processes

More than one EHLLAPI application can share a presentation space if the applications support sharing (that is, if they were developed to work together or if they exhibit predictable behavior¹). To determine which applications support sharing, EHLLAPI applications are specified as one of following types:

- Supervisory
- Exclusive write with read privilege allowed
- Exclusive write without read privilege allowed
- Super write
- Read

The type of shared access can be defined by setting the following read and write sharing options for each function in the **Set Session Parameters** (9) function call:

SUPER_WRITE

The application allows other applications that allow sharing and have write access permissions to concurrently connect to the same presentation space. The originating application performs supervisory-type functions but does not create errors for other applications that share the presentation space.

WRITE_SUPER

The application requires write access and allows only supervisory applications to concurrently connect to its presentation space. This is the default value.

WRITE_WRITE

The application requires write access and allows partner or other applications with predictable behavior to share the presentation space.

WRITE_READ

The application requires write access and allows other applications that perform read-only functions to share the presentation space. The application is also allowed to copy the presentation space and perform other read-only operations as usual.

WRITE_NONE

The application has exclusive use of the presentation space. No other applications are allowed to share the presentation space, including supervisory applications. The application is allowed to copy the presentation space and perform read-only operations as usual.

READ_WRITE

The application requires only read access to monitor the presentation space and allows other applications that perform read or write, or both, functions to share the

1. This means that two EHLLAPI programs will not be vying for the same Presentation Space at the same time; or that there is logic in those programs which will allow the program to wait until the PS is available; or that the applications never use the Session in a way which would lock out other applications.

presentation space. The application is also allowed to copy the presentation space and perform other read-only operations as usual.

Note: Sharing presentation space is not available between threads in a process.

Table 4. EHLLAPI Read and Write Sharing Option Combinations

Calling Application	Super_Write	Write_Super	Write_Write	Write_Read	Write_None	Read_Write
Super_Write	Yes	Yes	Yes	No	No	Yes
Write_Super (default)	Yes	No	No	No	No	No
Write_Write	Yes	No	Yes	No	No	Yes
Write_Read	No	No	No	No	No	Yes
Write_None	No	No	No	No	No	No
Read_Write	Yes	No	Yes	Yes	No	Yes

In addition to specifying compatible read and write access options, applications that are designed to work together but cannot allow others to work in the same presentation space can optionally define a keyword, KEY\$nnnnnnnn, in the **Set Session Parameters** (9) function call. This keyword allows only those applications that use the same keyword to share the presentation space.

Notes:

1. The **Start Keystroke Intercept** (50) function is non-shareable. Only one application at a time can trap keystrokes.
2. The **Connect To Presentation Space** (1) and **Start Keystroke Intercept** (50) functions share common subsystem functions. Successful requests by an application to share either of these functions can affect the requests of these two functions by other applications. For example, if application A successfully requests a **Connect To Presentation Space** (1) with Write_Read access and KEY\$abcdefgh as the keyword, a request by application B to **Connect To Presentation Space** (1) or **Start Keystroke Intercept** (50) is successful only if both applications have set compatible read and write options.

Table 5. Prerequisite Functions and Associated Dependent Functions

Prerequisite Call	Functions	Access
Allocate Communications Buffer (120)	Free Communication Buffer (120)	N/A
Connect Window Service (101)	Change PS Window Name (106) Change Switch List Name (105) Disconnect Window Service (102) Query Window Service (103) Window Status (104)	Write Read Query=Read Set=Write Write

Table 5. Prerequisite Functions and Associated Dependent Functions (continued)

Prerequisite Call	Functions	Access
Connect Presentation Space (1)	Copy Field to String (34) Copy OIA (13) Copy Presentation Space (5) Copy Presentation Space to String (8) Copy Presentation Space to Clipboard (35) Copy String to Field (33) Copy String to Presentation Space (15) Disconnect Presentation Space (2) Find Field Length (32) Find Field Position (31) Query Cursor Location (7) Query Field Attribute (14) Paste Clipboard to Presentation Space (36) Release (12) Reserve (11) Search Field (30) Search Presentation Space (6) Send key (3) Set Cursor (40) Start Playing Macro (110) Wait (4)	Read Read Read Read Read Write Write Write Read Read Read Read Read Write Write Write Read Read Read Write Write Read Read Write Write Read
Connect Structured Field (120)	Disconnect Structured Field (121) Get Request Completion (125) Read Structured Field (126) Write Structured Field (127)	N/A
Read Structured Field (126)	Get Request Completion (125)	N/A
Start Close Intercept (41)	Query Close Intercept (42) Stop Close Intercept (43)	N/A
Start Host Notification (23)	Query Host Update (24) Stop Host Notification (25)	
Start Keystroke Intercept (50)	Get Key (51) Post Intercept Status (52) Stop Keystroke Intercept (53) Send Key (3) if edit keystrokes are to be sent (edit keystroked support is available in Enhanced Mode)	N/A
Write Structured Field (127)	Get Request Completion (125)	N/A

Locking Presentation Space

An application, even if specified with shared presentation space, can obtain exclusive control of a presentation space by using the **Lock Presentation Space API** (60) or the **Lock Windows Services API** (61) functions. Requests by the other applications to use a presentation space locked by these functions are queued and processed in first-in-first-out (FIFO) order when the originating application unlocks the presentation space.

If the application that locked the presentation space does not unlock it by using the same call with an **Unlock** option or **Reset System** (21) call, the lock is removed when the application terminates or the session stops.

Using mouse actions to select, copy, and paste text in the Presentation Space

The following mouse actions can be used in the Presentation Space.

- Select a word by double-clicking the left mouse button.
- Copy a selected word by clicking the right mouse button.
- Paste a copied word by double-clicking the mouse right button.

ASCII Mnemonics

Keystrokes originating at a host keyboard might have a corresponding ASCII value. The response of the **Get Key** (51) function to a keystroke depends on whether the key is defined and also on whether the key is defined as an ASCII value or an ASCII mnemonic.

The keyboard for one session might not be capable of producing some codes needed by the another session. ASCII mnemonics that represent these codes can be included in the data string parameter of the **Send Key** (3) function.

The capabilities of the **Send Key** (3) function and the **Get Key** (51) function allow sessions to exchange keystrokes that might not be represented by ASCII values or by an available key. A set of mnemonics that can be generated from a keyboard is provided. These mnemonics let you use ASCII characters to represent the special function keys of the workstation keyboard.

Mnemonics for unshifted keys consist of the escape character followed by an abbreviation. This is also true for the shift keys themselves, Upper shift, Alt, and Ctrl. Mnemonics for shifted keys consist of the mnemonic for the shift key followed by the mnemonic for the unshifted key. Hence the mnemonic for a shifted key is a 4-character sequence of escape character, abbreviation, escape character, abbreviation.

The default escape character is @. You can change the value of the escape character to any other character with the ESC=c option of the **Set Session Parameters** (9) function. The following text uses the default escape character, however.

Shift indicators that are not part of the ASCII character set are represented to the host application by 2-byte ASCII mnemonics as follows:

Upper shift	@S
Alt	@A
Ctrl	@r

Mnemonics for these shift indicators are never received separately by an application. Likewise, they are never sent separately by an application. Shift indicator mnemonics are always accompanied by a non-shift-indicator character or mnemonic.

The abbreviations used make the mnemonics for special keys easy to remember. An alphabetic key code has been used for the most common keys. For example, the Clear key is C; the Tab key is T, and so on. Please note that the uppercase and lowercase alphabetic characters are mnemonic abbreviations for different keys.

The following text describes the use of these functions.

General

All defined keys are represented by either:

- A 1-byte ASCII value that is part of the 256-element ASCII character set, or
- A 2-, 4-, or 6-byte ASCII mnemonic

To represent a key defined as an ASCII character, a 1-byte ASCII value that corresponds to that character is used.

To represent a key defined as a function, a 2-, 4-, or 6-byte ASCII mnemonic that corresponds to that function is used. For example, to represent the backtab key, @B is used. To represent PF1, @1 is used. To represent Erase Input, @A@F is used. See the following lists:

@B	Left Tab	@0	Home	@h	PF17
@C	Clear	@1	PF1/F1	@i	PF18
@D	Delete	@2	PF2/F2	@j	PF19
@E	Enter	@3	PF3/F3	@k	PF20
@F	Erase EOF	@4	PF4/F4	@l	PF21
@H	Help (PC400)	@5	PF5/F5	@m	PF22
@I	Insert	@6	PF6/F6	@n	PF23
@J	Jump	@7	PF7/F7	@o	PF24
@L	Cursor Left	@8	PF8/F8	@q	End
@N	New Line	@9	PF9/F9	@u	Page UP (PC400)
@O	Space	@a	PF10/F10	@v	Page Down (PC400)
@P	Print	@b	PF11/F11	@x	PA1
@R	Reset	@c	PF12/F12	@y	PA2
@T	Right Tab	@d	PF13	@z	PA3
@U	Cursor Up	@e	PF14	@@	@ (at) symbol
@V	Cursor Down	@f	PF15	@\$	Alternate Cursor
@X	DBCS	@g	PF16	@<	Backspace
@Z	Cursor Right				

@A@C	Test (PC400)	@A@e	Pink (PC/3270)
@A@D	Word Delete	@A@f	Green (PC/3270)
@A@E	Field Exit	@A@g	Yellow (PC/3270)
@A@F	Erase Input	@A@h	Blue (PC/3270)
@A@H	System Request	@A@i	Turquoise (PC/3270)
@A@I	Insert Toggle	@A@j	White (PC/3270)
@A@J	Cursor Select	@A@l	Reset Host Color (PC/3270)
@A@L	Cursor Left Fast	@A@t	Print (Personal Computer)
@A@Q	Attention	@A@u	Rollup (PC400)
@A@R	Device Cancel	@A@v	Rolldown (PC400)
@A@T	Print Presentation Space	@A@y	Forward Word Tab
@A@U	Cursor Up Fast	@A@z	Backward Word Tab
@A@V	Cursor Down Fast	@A@-	Field - (PC400)
@A@Z	Cursor Right Fast	@A@+	Field + (PC400)
@A@9	Reverse Video	@A@<	Record Backspace (PC400)
@A@b	Underscore (PC/3270)	@S@E	Print Presentation Space on Host (PC400)
@A@c	Reset Reverse Video (PC/3270)	@S@x	Dup
@A@d	Red (PC/3270)	@S@y	Field Mark

Notes:

1. The first @ symbol in the first table represents the escape character. The first and second @ symbol in the second table is the escape character. The @ symbol is the default escape character. You can change the value of the escape character using the ESC=c option of the **Set Session Parameters** (9) function.
If you change the escape character to #, the literal sequences used to represent the Backtab, Home, and Erase Input keys become #B, #0, and #A#F, respectively. Also, the literal sequence used to represent the @ symbol becomes #@.
2. If you send the mnemonic for print screen (that is, either @P or @A@T), place it at the end of the calling data string.
3. If you send the mnemonic for device cancel (that is, @A@R), it is passed through with no error message; however, local copy is not stopped.

Get Key (51) Function

If the terminal operator types a key defined as an ASCII character, the host application receives a 1-byte ASCII value that corresponds to that character.

If the operator types a key defined as a function, the host application receives a 2-, 4-, or 6-byte ASCII mnemonic that corresponds to that function. For example, if the **Backtab** key is typed, @B is received. If **PF1** is pressed, @1 is received. If **Erase Input** is pressed, @A@F is received.

If the operator types a defined shift key combination, the host application receives the ASCII character, or the 2-, 4-, or 6-byte ASCII mnemonic that corresponds to the defined character or function.

If the operator types an individual key that is not defined, the **Get Key** (51) function returns a return code of 20 and nothing is sent to the host application.

The **Get Key** (51) function prefixes all characters and mnemonics sent to the host application with two ASCII characters. The first ASCII character is the PSID of the host presentation space to which the keystrokes are sent. The other character is an A, S, or M for ASCII, special shift, or mnemonic, respectively. See "Return Parameters" on page 94.

Send Key (3) Function

To send an ASCII character to another session, include that character in the data string parameter of the **Send Key** (3) function.

To send a function key to another session, include the ASCII mnemonic for that function in the data string parameter of the **Send Key** (3) function.

If the **Send Key** (3) function sends an unrecognized mnemonic to the host session a return code rejecting the key might result.

Debugging

As an aid in debugging EHLLAPI applications, the Trace Facility of Personal Communications may be used. This facility will produce a log of all EHLLAPI calls, parameters, return values, and return codes. For more information on using the Trace Facility, refer to *Administrator's Guide and Reference*.

A Simple EHLLAPI Sample Program

The following sample Windows application will enter the character string "Hello World!" in the first input field of host session 'A'.

```

#include <stdlib.h>
#include <stdio.h>
#include <windows.h>
#include "hapi_c.h"

int main(char **argv, int argc) {
    int HFunc, HLen, HRc;
    char HBuff[1];
    struct HLDConnectPS ConnBuff;
    // Send Key string for HOME+string+ENTER:
    char SendString[] = "@@Hello World!@E";

    HFunc = HA_RESET_SYSTEM;
    HLen = 0;
    HRc = 0;
    hllapi(&HFunc, HBuff, &HLen, &HRc);
    if (HRc != HARC_SUCCESS) {
        printf("Unable to access EHLAPI.\n");
        return 1;
    }

    HFunc = HA_CONNECT_PS;
    HLen = sizeof(ConnBuff);
    HRc = 0;
    memset(&ConnBuff, 0x00, sizeof(ConnBuff));
    ConnBuff.steps_shortcode = 'A';
    hllapi(&HFunc, (char *)&ConnBuff, &HLen, &HRc);
    switch (HRc) {
        case HARC_SUCCESS:
        case HARC_BUSY:
        case HARC_LOCKED: // All these are OK
            break;
        case HARC_INVALID_PS:
            printf("Host session A does not exist.\n");
            return 1;
        case HARC_UNAVAILABLE:
            printf("Host session A is in use by another EHLAPI application.\n");
            return 1;
        case HARC_SYSTEM_ERROR:
            printf("System error connecting to session A.\n");
            return 1;
        default:
            printf("Error connecting to session A.\n");
            return 1;
    }

    HFunc = HA_SENDKEY;
    HLen = strlen(SendString);
    HRc = 0;
    hllapi(&HFunc, SendString, &HLen, &HRc);
    switch (HRc) {
        case HARC_SUCCESS:
            break;
        case HARC_BUSY:
        case HARC_LOCKED:
            printf("Send failed, host session locked or busy.\n");
            break;
        default:
            printf("Send failed.\n");
            break;
    }

    HFunc = HA_DISCONNECT_PS;
    HLen = 0;
    HRc = 0;
    hllapi(&HFunc, HBuff, &HLen, &HRc);
}

```

```

    printf("EHLLAPI program ended.\n");
    return 0;
}

```

The following MAKEFILE file could be used to build this application with the IBM VisualAge C/C++ for Windows compiler (assuming the source file is named SAMPLE.C):

```

all: sample.exe

hllldir = C:\PCOMWIN\SAMPLES
hlllib = C:\PCOMWIN\SAMPLES

.SUFFIXES: .C .OBJ

.c.obj:
    icc.exe /Ti /Gh /Gm /Gd /C /I $(hllldir) /Tc $*.c

sample.exe: sample.obj
    ilink.exe /de /noe $(hlllib)\pcscal32.lib $**

sample.obj: sample.c

```

The application could be built with the following command:

```
nmake /a all
```

Standard and Enhanced Interface Considerations

There is no functional difference between the standard and enhanced EHLLAPI interfaces on a given platform. However there are other important differences:

- The enhanced EHLLAPI interface extends the presentation space ID (PSID) from 1 byte to 4 bytes. Currently the additional bytes are not used, but your application should set them to binary zeros to ensure compatibility with future versions of enhanced EHLLAPI.
- The position (offset) of data elements in memory buffers passed to and from EHLLAPI functions are different. Data elements in enhanced EHLLAPI are aligned to double-word boundaries. Data elements in standard EHLLAPI are not aligned in any particular way. EHLLAPI applications should not be coded to set or retrieve data in the buffers by offset (byte) values. Instead, the supplied data structures in the HAPI_C.H file should be used to set and retrieve data elements. This will ensure that data is set and retrieved from the correct position for both 16- and 32-bit programs.

By prefilling EHLLAPI data buffers with binary zeros, and using the data structures supplied in HAPI_C.H, an application can be compiled for standard or enhanced operation without any source code changes. For example, the following section of code would work for standard EHLLAPI but would fail for enhanced EHLLAPI:

```

#include "hapi_c.h"
...
int Func, Len, Rc;
char Buff[18];
char SessType;

Func = HA_QUERY_SESSION_STATUS; // Function
Len = 18; // Buffer length
Rc = 0;
Buff[0] = 'A' // Session to query

```

```

hllapi(&Func, Buff, &Len, &Rc); // Execute function

SessType = Buff[9];           // Get session type
...

```

The above example would fail if compiled as an enhanced EHLLAPI application because:

- The application does not set the extended session ID bytes to zero.
- The buffer length for this function is 20, not 18.
- The session type indicator is not at offset 9 in the data buffer, it is at offset 12.

The following is the same function written to work correctly if compiled for standard or enhanced operation. Changed lines are indicated with a >:

```

#include "hapi_c.h"
...
int Func, Len, Rc;
> struct HLDQuerySessionStatus Buff;
char SessType;

Func = HA_QUERY_SESSION_STATUS; // Function
> Len = sizeof(Buff);           // Buffer length
Rc = 0;
> memset(&Buff, 0x00, sizeof(Buff)); // Zero buffer
> Buff.qsst_shortcode = 'A';     // Session to query
hllapi(&Func, (char *)&Buff, &Len, &Rc); // Execute function

> SessType = Buff.qsst_sesstype; // Get session type
...

```

Host Automation Scenarios

The sample scenarios presented here provide conceptual information about activities that can be facilitated by using EHLLAPI. The scenarios deal with the duties your EHLLAPI programmed operator can perform in these areas:

- Host system operation, including:
 - Search function
 - Sending keystrokes
- Distributed processing, including:
 - Data extraction
 - File transfer
- Integrating interfaces

Scenario 1. A Search Function

There are four phases in a typical host system transaction:

1. Starting the transaction
2. Waiting for the host system to respond
3. Analyzing the response to see if it is the expected response
4. Extracting and using the data from the response

Your programmed operator can use a series of EHLLAPI functions to mimic these actions. After determining the correct starting point for the host system transaction, the programmed operator can call the **Search Presentation Space** (6) function to determine which keyword messages or prompting messages are on the display screen.

Next, the programmed operator can use the **Send Key** (3) function to type data into a host system session and enter a host system transaction. Then the programmed operator can:

- Use the **Wait** (4) function that waits for the X CLOCK, X [], or X SYSTEM condition to end (or returns a keyboard-locked condition if the terminal has locked up).

If the keyboard is inhibited, your EHLLAPI program can call the **Copy OIA** (13) function to get more information about the error condition.

- Use the **Search Presentation Space** (6) function to look for an expected keyword to validate that the proper response had been received.
- Use the **Copy Presentation Space to String** (8) function (or any of several data access functions) to extract the desired data.

The **Search Presentation Space** (6) function is critical to simulate another task of the terminal operator. Some host systems do not stay locked in X CLOCK, X [], or X SYSTEM mode until they respond; instead, they quickly unlock the keyboard and allow the operator to stack other requests. In this environment, the terminal operator depends on some other visual prompt to know that the data has returned (perhaps a screen title or label). The **Search Presentation Space** (6) function allows your EHLLAPI program to search the presentation space while waiting. Also, while waiting for a response, calling the **Pause** (18) function allows other DOS sessions to share the central processing unit resource. The **Pause** (18) function has an option that allows your EHLLAPI program to wait for a host system update event to occur.

If no host system event occurs after a reasonable time-out period, your EHLLAPI program could call a customized error message such as:

No Response From Host. Retry?

In this environment, program revisions become very important considerations, because the programmed operator must be reprogrammed for even minor changes in the display messages.

For example, if a terminal operator expects the message:

Enter Part Number:

as a prompt, he or she will probably be able to respond properly to an application change that produces the message:

Enter Component Number:

However, because the programmed operator is looking for a literal keyword string, subtle changes in message syntax, even as trivial as uppercase versus lowercase, can make the program take a preprogrammed error action.

Scenario 2. Sending Keystrokes

There are several considerations that demand attention in designing programs that send keystrokes to the host system. In some application environments, issuing a command is as simple as typing a string and pressing Enter. Other applications involve more complex formatted screens in which data can be entered into any one of several fields. In this environment you must understand the keystrokes required to fill in the display screen.

The Tab key mnemonic (@T; see “General” on page 18 for a full list of mnemonics) can be used to skip between fields. When sending keystrokes to a field using the **Send Key** (3) function, you should be aware of the field lengths and contents. If

you fill the fields completely and the next attribute byte is autoskip, your cursor will then be moved to the next field. If you then issued a tab, you would skip to yet another field.

Likewise, if your keystrokes do not completely fill the field, there might be data left from prior input. You should use the Erase End of Field (EOF) command to clear this residual data.

Scenario 3. Distributed Processing

Some applications fall into the category called *collaborative*. These applications provide a single end-user interface, but their processing is performed at two or more different physical locations.

An EHLLAPI application can interact with host system applications by intercepting the communication between the host system and the terminal user. The host system presentation space is the vehicle used to intercept this data. The local application can request to be notified each time the presentation space is updated or whenever an AID key is pressed by the operator.

This workstation application can then cooperate with a host system application in any of the following ways:

- On a field or presentation space basis using either the copy functions that address fields (**Copy String to Field** (33) function or **Copy Field to String** (34) function) or the functions that let you copy from and into presentation spaces (for example, **Copy String to Presentation Space** (15) function or **Copy Presentation Space to String** (8) function).
- On a keystroke basis, using the **Send Key** (3) function.
- On a file basis, for large blocks of data. You can have your application use the EHLLAPI file transfer capability (using **Send File** (90) function or **Receive File** (91) function) to transfer data or functions (such as load modules) and have it processed locally or remotely.

Scenario 4. File Transfer

In this scenario, assume that you want to automate a file transfer:

- You could begin by using the procedure discussed in the search scenario earlier to log on to a host system session.
- Instead of using one of the copy functions (which are inefficient for copying many screens of data), your EHLLAPI program could call file transfer functions **Send File** (90) and **Receive File** (91) to transfer data.
- Upon successful completion:
 - If the **Send File** (90) function finished executing, your EHLLAPI program could submit a batch job using either a copy function or the **Send Key** (3) function before logging off.
 - If the **Receive File** (91) function finished executing, your EHLLAPI program could start up a local application.

Scenario 5. Automation

An application can provide all the keystrokes for another application or can intersperse keystrokes to the target destination with those from the keyboard. Sometimes, to do this, the application must lock out other sources of keystroke input that might be destined for a target application or presentation space (using the **Reserve** (11) function) and the later unlock it (using the **Release** (12) function).

The origin of keystrokes presented to any application is determined by the design of the application. Keystrokes can originate from:

- The keyboard
- Data integrated into the source application
- Secondary storage retrieved through the DOS interface
- The Personal Communications interface

In all cases the keystrokes that are provided to the target application are indistinguishable from the ordinary operator input.

Scenario 6. Keystroke Filtering

An application that acts as a filter can intercept a keystroke coming from EHLLAPI (either from the keyboard or a source application) that is targeted for another destination. The keystroke can then be:

- Ignored (that is, deleted)
- Redirected to another application
- Validated
- Converted (for example, uppercase to lowercase)
- Enhanced (through keyboard macros)

Figure 1 provides a simplified representation of the keystroke flow and the objects within a keyboard enhancement environment.

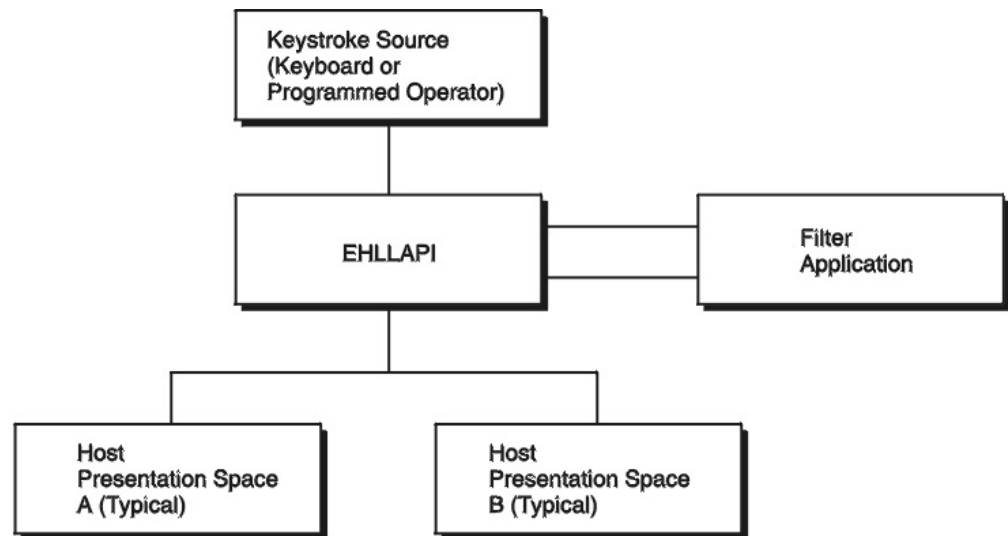


Figure 1. Keystroke Flow

Scenario 7. Keyboard Enhancement

This scenario makes use of filtering to create an **enhancer application program**. An enhancer application program is one that monitors the data coming in from the keyboard and changes it in some specified way. Typically, these application programs use instructions called **keyboard macros**, which tell them what keystrokes to look for and what changes to make. The change might involve suppressing a keystroke (so it appears to the target application as though it was never sent), replacing a keystroke with another, or replacing single keystroke with a series of keystrokes.

To do this using EHLLAPI, you might construct this scenario:

1. Your EHLLAPI application program calls the **Connect Presentation Space** (1) function to connect to the presentation space whose keystrokes are to be filtered.
2. Your EHLLAPI program next calls the **Start Keystroke Intercept** (50) function specifying the L option. This causes all keystrokes to be routed to the filtering application program.
3. The filtering application program can now define a loop in which:
 - a. The **Get Key** (51) function intercepts all keystrokes being sent to the target presentation space.
 - b. The filtering application examines each keystroke and performs a keyboard macro task, such as:
 - Abbreviating program commands so that three- or four-keystroke command can be condensed into a single keystroke
 - Customizing commands so that they are easier to remember or consistent with other software packages
 - Creating **boiler plates** for contracts or frequently used letters
 - Rearranging the keyboard for concurrent applications that use the same keys for differing functions
 - c. If a keystroke is rejected, your EHLLAPI program can cause a beep to be sounded, using the **Post Intercept Status** (52) function.
4. After your EHLLAPI program exits the filtering loop, **Stop Keystroke Intercept** (53) function to end the filtering process.

Chapter 3. EHLLAPI Functions

This chapter describes each individual Personal Communications EHLLAPI function in detail and explains how to use the EHLLAPI program sampler. The functions are arranged alphabetically by name. The functions are explained for both the standard and enhanced interfaces.

Note: Throughout this chapter WinHLLAPI, IBM Standard 32-bit HLLAPI and 16-bit EHLLAPI are referred to as Standard Interface, and IBM Enhanced 32-bit EHLLAPI is referred to as Enhanced Interface.

Unicode Support for Code Pages 1390/1399 and 1137

The following EHLLAPI functions are enabled for Japanese code page 1390/1399 and Hindi code page 1137 support on a Unicode session:

- Convert Position or Convert RowCol (1137 only)
- Copy Field to String
- Copy Presentation Space
- Copy Presentation Space to String
- Copy String to Field
- Copy String to Presentation Space
- Get Key
- Search Field
- Search Presentation Space
- Send Key
- Set Cursor (1137 only)
- Set Session Parameters

See the specific section for each function for details on Japanese code page 1390/1399 and Hindi code page 1137.

Notes:

1. The string containing the Unicode characters to be sent to the PCOMM session should be typecast to `WCHAR *` for code page 1390/1399 and to `char *` for code page 1137.
2. EHLLAPI 1390/1399 Unicode functionality is available only for 3270 and 5250 sessions. EHLLAPI 1137 Unicode functionality is available only for 5250 sessions.

Page Layout Conventions

All EHLLAPI function calls are presented in the same format so that you can quickly retrieve the information you need. The format is:

Function Name (Function Number)
Prerequisite Calls
Call Parameters
Return Parameters
Notes on Using This Function

Prerequisite Calls

“Prerequisite Calls” lists any calls that must be made prior to calling the function being discussed.

Call Parameters

“Call Parameters” lists the parameters that must be defined in your program to call the discussed EHELLAPI function and explains how those parameters are to be defined. If a parameter is never used by a function, then *NA* (not applicable) is listed. If a parameter can be overridden by certain values of session parameters defined with calls to the **Set Session Parameters** (9) function, such session parameters are named.

Return Parameters

“Return Parameters” lists the parameters that must be received by your program after a call to the discussed EHELLAPI function and explains how to interpret those parameters.

Notes on Using This Function

“Notes on Using This Function” lists any session options that affect the function under discussion. It also provides technical information about using the function and application development tips.

Summary of EHELLAPI Functions

Table 6 is the summary of the EHELLAPI functions:

Table 6. EHELLAPI Functions Summary

Function	3270	5250	VT
“Connect Presentation Space (1)” on page 36	Yes	Yes	Yes
“Disconnect Presentation Space (2)” on page 86	Yes	Yes	Yes
“Send Key (3)” on page 140	Yes	Yes	Yes
“Wait (4)” on page 174	Yes	Yes	Yes
“Copy Presentation Space (5)” on page 57	Yes	Yes	Yes
“Search Presentation Space (6)” on page 134	Yes	Yes	Yes
“Query Cursor Location (7)” on page 112	Yes	Yes	Yes
“Copy Presentation Space to String (8)” on page 65	Yes	Yes	Yes
“Set Session Parameters (9)” on page 152	Yes	Yes	Yes
“Query Sessions (10)” on page 117	Yes	Yes	Yes
“Reserve (11)” on page 128	Yes	Yes	Yes
“Release (12)” on page 128	Yes	Yes	Yes
“Copy OIA (13)” on page 48	Yes	Yes	Yes
“Query Field Attribute (14)” on page 112	Yes	Yes	Yes
“Copy String to Presentation Space (15)” on page 77	Yes	Yes	Yes
“Pause (18)” on page 105	Yes	Yes	Yes
“Query System (20)” on page 118	Yes	Yes	Yes
“Reset System (21)” on page 129	Yes	Yes	Yes
“Query Session Status (22)” on page 115	Yes	Yes	Yes
“Start Host Notification (23)” on page 165	Yes	Yes	Yes
“Query Host Update (24)” on page 114	Yes	Yes	Yes
“Stop Host Notification (25)” on page 173	Yes	Yes	Yes

Table 6. EHLLAPI Functions Summary (continued)

Function	3270	5250	VT
"Search Field (30)" on page 130	Yes	Yes	Yes
"Find Field Position (31)" on page 91	Yes	Yes	Yes
"Find Field Length (32)" on page 90	Yes	Yes	Yes
"Copy String to Field (33)" on page 73	Yes	Yes	Yes
"Copy Field to String (34)" on page 40	Yes	Yes	Yes
"Copy Presentation Space to Clipboard (35)" on page 81	Yes	Yes	Yes
"Paste Clipboard to Presentation Space (36)" on page 84	Yes	Yes	Yes
"Set Cursor (40)" on page 151	Yes	Yes	Yes
"Start Close Intercept (41)" on page 161	Yes	Yes	Yes
"Query Close Intercept (42)" on page 109	Yes	Yes	Yes
"Stop Close Intercept (43)" on page 171	Yes	Yes	Yes
"Query Additional Field Attribute (45)" on page 108	No	Yes	No
"Start Keystroke Intercept (50)" on page 168	Yes	Yes	Yes
"Get Key (51)" on page 94	Yes	Yes	Yes
"Post Intercept Status (52)" on page 107	Yes	Yes	Yes
"Stop Keystroke Intercept (53)" on page 173	Yes	Yes	Yes
"Lock Presentation Space API (60)" on page 102	Yes	No	No
"Lock Window Services API (61)" on page 104	Yes	No	No
"Start Communication Notification (80)" on page 163	Yes	Yes	Yes
"Query Communication Event (81)" on page 111	Yes	Yes	Yes
"Stop Communication Notification (82)" on page 172	Yes	Yes	Yes
"Send File (90)" on page 189	Yes	Yes	No
"Receive File (91)" on page 126	Yes	Yes	No
"Cancel File Transfer (92)" on page 31	Yes	Yes	Yes
"Convert Position or Convert RowCol (99)" on page 38	Yes	Yes	Yes
"Connect Window Services (101)" on page 37	Yes	Yes	Yes
"Disconnect Window Service (102)" on page 87	Yes	Yes	Yes
"Query Window Coordinates (103)" on page 120	Yes	Yes	Yes
"Window Status (104)" on page 175	Yes	Yes	Yes
"Change Switch List LT Name (105)" on page 33	Yes	Yes	Yes
"Change PS Window Name (106)" on page 32	Yes	Yes	Yes
"Start Playing Macro (110)" on page 170	Yes	Yes	Yes
"Connect for Structured Fields (120)" on page 34	Yes	No	No
"Disconnect from Structured Fields (121)" on page 85	Yes	No	No
"Query Communications Buffer Size (122)" on page 109	Yes	No	No
"Allocate Communications Buffer (123)" on page 30	Yes	No	No

Table 6. EHLAPI Functions Summary (continued)

Function	3270	5250	VT
“Free Communications Buffer (124)” on page 93	Yes	No	No
“Get Request Completion (125)” on page 99	Yes	No	No
“Read Structured Fields (126)” on page 121	Yes	No	No
“Write Structured Fields (127)” on page 178	Yes	No	No

Allocate Communications Buffer (123)

3270	5250	VT
Yes	No	No

The **Allocate Communications Buffer** function obtains a buffer from the operating system. A buffer address must be passed on both the **Read Structured Fields** (126) and **Write Structured Fields** (127) functions.

Prerequisite Calls

There are no prerequisite calls for this function.

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 123	
Data String	See the following table	
Length	Must be 6	Must be 8
PS Position	NA	

The calling data string can contain:

Byte		Definition
Standard	Enhanced	
1-2	1-4	32-bit or 16-bit buffer length. (0 < size ≤ (64 KB-256 bytes)=X'FF00')
3-6	5-8	32-bit allocated buffer address (returned)

Return Parameters

Return Code	Explanation
0	The Allocate Communications Buffer function was successful.
2	An error was made in specifying parameters.
9	A system error occurred.
11	Resource unavailable (memory unavailable).

Notes on Using This Function

1. The EHLAPI obtains a buffer from the operating system memory management and places the buffer address into the return parameter string. The requested

buffer size (length) is also passed in the parameter string. The buffer size can be from 1 byte to 64 KB minus 256 bytes (X'FF00' bytes) in length.

See “**Query Communications Buffer Size (122)**” for information regarding buffer size.

2. Buffers obtained using this function must not be shared among different processes. If this is attempted, the applications will experience unpredictable results.
3. An EHLLAPI application must issue a **Free Communications Buffer (124)** function to free the allocated memory.
4. A maximum of 10 buffers can be allocated to an application. If this limit is reached, a return code for resource unavailable (RC=11) will be returned.
5. The **Reset System (21)** function frees buffers allocated by this function.

Cancel File Transfer (92)

3270	5250	VT
Yes	Yes	Yes

The **Cancel File Transfer** function causes any current EHLLAPI initiated **Send File** or **Receive File** for the specified session to immediately return.

Prerequisite Calls

Send File (90) or **Receive File (91)**

Call Parameters

	Enhanced Interface
Function Number	Must be 92
Data String	1-character short name of the host presentation space. A blank or null indicates request for updates to the host-connected presentation space
Length	4 is implied
PS Position	NA

The calling data structure contains these elements

Byte	Definition
1	A 1-character presentation space short name (PSID)
2-4	Reserved

Return Parameters

Return Code	Definition
0	The function was successful
1	An incorrect PSID was specified
8	No prior call to Start Communication Notification (80) function was called for the PSID
9	A system error was encountered

Notes on Using This Function

Since both **Send File** (90) and **Receive File** (91) are blocking calls, this function must always be issued on a different thread.

Change PS Window Name (106)

3270	5250	VT
Yes	Yes	Yes

The **Change PS Window Name** function allows the application to specify a new name for the presentation space window or reset the presentation space window to the default name.

Prerequisite Calls

Connect Window Services (101)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 106	
Data String	See the following table	
Length	Must be specified (See note.)	Must be 68
PS Position	NA	

Note: The data string length must be specified (normally 3–63 for PC/3270, 4–63 for PC400, 68 for enhanced interface).

The calling data string can contain:

Byte		Definition
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID)
	2–4	Reserved
2	5	A change request option value, select one of: <ul style="list-style-type: none">• 'X'01' for changing the presentation space window name.• 'X'02' for resetting the presentation space window name.
3–63	6–66	An ASCII string of from 1 (for PC/3270) or 2 (for PC400) to 61 bytes including a terminator byte. The ASCII string must end with a NULL character. This string must contain at least one non-NULL character followed by a NULL character.
	67–68	Reserved

Return Parameters

Return Code	Explanation
0	The Change PS Window Name function was successful.

Return Code	Explanation
1	An incorrect host presentation space short session ID was specified, or the host presentation space was not connected.
2	An error was made in specifying parameters.
9	A system error occurred.
12	The session stopped.

Notes on Using This Function

A string is ended at the first NULL character found. The NULL character overrides the specified string length. If the NULL character is not at the end of the specified length, the last byte at the specified length is replaced by a NULL character, and the remainder of the data string is lost. If the NULL character is found before the specified length, the string is truncated at that point, and the remainder of the data string is lost.

If the application fails to reset the presentation space name before exiting, the exit list processing resets the name.

Change Switch List LT Name (105)

3270	5250	VT
Yes	Yes	Yes

The **Change Switch List LT Name** function allows the application to change or reset a switch list for a selected logical terminal (LT). The application must specify on the call the name to be inserted in the switch list.

Note: This is for compatibility with Communication Manager EHLLAPI, and has the same result as the **Change PS Window Name** (106) function.

Prerequisite Calls

Connect Window Services (101)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 105	
Data String	See the following table	
Length	Normally 4–63	Must be 68
PS Position	NA	

The calling data string can contain:

Byte		Definition
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID)
	2–4	Reserved

Byte		Definition
2	5	A change request option; select: <ul style="list-style-type: none"> • X'01' for changing a switch list LT name • X'02' for resetting a switch list LT name
3–63	6–66	An ASCII string of 2 to 61 bytes including a terminator byte. The ASCII string must end with a NULL character. This string must contain at least one non-NULL character followed by a NULL character.
	67–68	Reserved

Return Parameters

Return Code	Explanation
0	The Change Switch List LT Name function was successful.
1	An incorrect host presentation space short session ID was specified, or the host presentation space was not connected.
2	An error was made in specifying parameters.
9	A system error occurred.
12	The session stopped.

Notes on Using This Function

A string is ended at the first NULL character found. The NULL character overrides the specified string length. If the NULL character is not at the end of the specified length, the last byte at the specified length is replaced by a NULL character, and the remainder of the data string is lost. If the NULL character is found before the specified length, the string is truncated at that point, and the remainder of the data string is lost.

If the application fails to reset the switch list LT name before exiting, the exit list processing resets the name.

Connect for Structured Fields (120)

3270	5250	VT
Yes	No	No

The **Connect for Structured Fields** function allows an application to establish a connection to the emulation program to exchange structured field data with a host application. The workstation application must provide the Query Reply data field and must point to it with in the parameter string. The destination/origin ID returned by the emulator will be returned to the application.

Prerequisite Calls

There are no prerequisite calls for this function.

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 120	
Data String	See the following table	

	Standard Interface	Enhanced Interface
Length	7 or 11	Must be 16
PS Position	NA	

The calling data string can contain:

Byte		Definition
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID)
	2-4	Reserved
2-5	5-8	Address of the Query Reply data buffer
6-7	9-10	Destination/origin unique ID. (16-bit word, returned)
	11-12	Reserved
8-11	13-16	The data in these position is ignored by EHLLAPI. However, no error is caused if the migrating program has data in these positions. This data is accepted to provide compatibility with migrating applications.

Return Parameters

Return Code	Explanation
0	The Connect for Structured Fields function was successful.
1	A specified host presentation space short session ID was not valid, or the host presentation space was not connected.
2	An error was made in specifying parameters.
9	A system error occurred.
10	The function is not supported by the emulation program.
32	An application has already connected to this session for communications (successful connect).
39	One DDM session is already connected to this session.

Notes on Using This Function

- EHLLAPI scans the query reply buffers for the destination/origin ID (DOID) self-defining parameter (SDP) to determine the contents of the DOID field of the query reply. If this value is X'0000', the emulator will assign a DOID to the application and EHLLAPI will fill in the DOID field of the query reply with the assigned ID. If the value specified by the application in the DOID field of the query reply is a nonzero value, the emulator will assign the specified value as the application's DOID, assuming that the ID has not been previously assigned. If the specified DOID is already in use, a return code of 2 will be returned by EHLLAPI.
- The application should build the Query Reply Data structures in the application's private memory. Refer to Appendix A, "Query Reply Data Structures Supported by EHLLAPI," on page 341, for the detailed formats and usages of the query reply data structures supported by EHLLAPI.
- Only cursory checking is performed on the Query Reply Data. Only the ID and the length of the structure are checked for validity.

4. Only one DDM base type connect is allowed per host session. If the DDM connection supports the self-defining parameter (SDP) for the destination origin ID (DOID), then multiple connects are allowed.
5. If return code RC=32 or RC=39 is received, an application is already connected to the selected session and use of that presentation space should be approached with caution. Conflicts with SRPI, file transfer, and other EHLLAPI applications might result.

Connect Presentation Space (1)

3270	5250	VT
Yes	Yes	Yes

The **Connect Presentation Space** function establishes a connection between your EHLLAPI application program and the host presentation space.

Prerequisite Calls

There are no prerequisite calls for this function.

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 1	
Data String	1-character short name of the host presentation space	
Length	1 is implied	Must be 4
PS Position	NA	

The calling data string can contain:

Byte		Definition
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID)
	2-4	Reserved

Return Parameters

The **Connect Presentation Space** function sets the return code to indicate the status of the attempt and, if successful, the status of the host presentation space.

Return Code	Explanation
0	The Connect Presentation Space function was successful; the host presentation space is unlocked and ready for input.
1	An incorrect host presentation space ID was specified. The specified session either does not exist or is a logical printer session. This return code could also mean that the API Setting for DDE/EHLLAPI is not set on.
4	Successful connection was achieved, but the host presentation space is busy.
5	Successful connection was achieved, but the host presentation space is locked (input inhibited).
9	A system error was encountered.

Return Code	Explanation
11	This resource is unavailable. The host presentation space is already being used by another system function.

Notes on Using This Function

1. The **Connect Presentation Space** function is affected by the CONLOG/CONPHYS session option.
2. An EHLLAPI application cannot be connected to multiple presentation spaces concurrently. Calls requiring the **Connect Presentation Space** function as a prerequisite use the currently connected presentation space. For example, if an application is connected to presentation space A, B, and C in that order, the application must connect to B or A again to issue functions.
3. Each thread that requests a **Connect Presentation Space** must have a corresponding **Disconnect Presentation Space** (2), or one of the threads must issue a **Reset System** (21), which affects all threads and disconnects any remaining connections.
4. More than one EHLLAPI application can share a presentation space, if the applications support sharing (that is, if they were developed to work together and if they exhibit predictable behavior) and have compatible read/write access and keyword options as set in the **Set Sessions Parameters** (9) function. For more information, see "Set Session Parameters (9)" on page 152.
5. Because the **Connect Presentation Space** and **Start Keystroke Intercept** (50) functions share common subsystem functions, successful requests by an application to share either of these functions for the same session can affect the request of these two functions by other applications. For example, if application A successfully requests a **Connect Presentation Space** for a session with Write_Read access and KEY\$abcdefgh as the keyword, a request by application B to **Connect Presentation Space** for a session and **Start Keystroke Intercept** is successful only if both applications have set compatible read/write options.
6. You cannot connect to a session that is defined as a logical printer session. Refer to *Administrator's Guide and Reference* for more information.

Connect Window Services (101)

3270	5250	VT
Yes	Yes	Yes

The **Connect Window Services** function allows the application to manage the presentation space windows. Only one EHLLAPI application at a time can be connected to a presentation space for window services.

An EHLLAPI application can connect to more than one presentation space concurrently for window services.

Prerequisite Calls

There are no prerequisite calls for this function.

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 101	

	Standard Interface	Enhanced Interface
Data String	1-character short session ID of the host presentation space	
Length	1 is implied	Must be 4
PS Position	NA	

The calling data string can contain:

Byte		Definition
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID)
	2-4	Reserved

Return Parameters

Return Code	Explanation
0	The Connect Window Services function was successful.
1	An incorrect host presentation space short session ID was specified, or the Sessions Window Services manager was not connected. This return code could also mean that the API Setting for DDE/EHLLAPI is not set on.
9	A system error occurred.
10	The function is not supported by the emulation program.
11	This resource is unavailable. The host presentation space is already being used by another system function.

Notes on Using This Function

1. An EHLLAPI application can be connected to multiple presentation space windows at the same time. The application can go back and forth between the connected presentation space windows without having to disconnect. For example, if an application is connected to presentation space windows A, B, and C, the application can access all of A, B, and C at the same time, and the other applications cannot access A, B, or C.
2. A **Connect Window Services** function is sufficient for the process. However, each thread that requests a **Connect Window Services** must have a corresponding **Disconnect Window Services** (102), or one of the threads must issue a **Reset System** (21), which affects all threads and disconnects any remaining connections.

Convert Position or Convert RowCol (99)

3270	5250	VT
Yes	Yes	Yes

The **Convert Position** or **Convert RowCol** function converts the host presentation space positional value into the display row and column coordinates or converts the display row and column coordinates into the host presentation space positional value. This function does not change the cursor position.

Prerequisite Calls

There are no prerequisite calls for this function.

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 99	
Data String	Host presentation space short name <i>and</i> P for the Convert Position function (for example, AP converts the presentation space position of session A); <i>or</i> Host presentation space short name and R for the Convert RowCol function (for example, AR converts the row and column coordinates of session A).	
Length	Row, when R is specified as the second character in the data string parameter. The lower limit for valid input is 1. The upper limit for valid input depends on how your host presentation space is configured. See "Notes on Using This Function" on page 40. NA when P is specified as the second character in the data string parameter.	
PS Position	Column, when R is specified as the second character in the data string parameter. The lower limit for valid input is 1. The upper limit for valid input ranges from 24 to 43 depending on how your host presentation space is configured. See "Notes on Using This Function" on page 40. Host presentation space position, when P is specified as the second character in the data string parameter. The lower limit for valid input is 1. The upper limit for valid input ranges from 1920 to 3564 depending on how your host presentation space is configured. See "Notes on Using This Function" on page 40.	

The calling data string can contain:

Byte		Definition
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID)
	2–4	Reserved
2	5	Convert option P or R
	6–8	Reserved

Return Parameters

This function returns a length and a return code.

Length:

For the **Convert Position** function (P as the second character in the calling data string), a number between 1 and 43 (for PC/3270) or 27 (for PC400) is returned. This value is the number of the row that contains the PS position contained in the calling PS position parameter. The upper limit can be smaller than 43 (for PC/3270) or 27 (for PC400) depending on how the host presentation space is configured.

For the **Convert RowCol** function (R as the second character in the calling data string), a value of 0 indicates an error in the input value for row (calling length parameter).

Return Code:

The **Convert Position or RowCol** function is the exception to the rule that the fourth return parameter always contains a return code. For this function, the value returned in the fourth parameter is called a status code. This status code can contain data or a return code. Your application must provide for processing of this status code to prevent unpredictable results or an error.

- If the value of the fourth parameter is 0, 9998, or 9999, it is a return code.
- For the **Convert Position** function (P as the second character of the calling data string), a value in the range of 1–132 is the number of the column that contains the PS position passed in the calling PS Position parameter. The upper limit can be smaller than 132 depending on how the host presentation space is configured.
- For the **Convert RowCol** function (R as the second character of the calling data string), a value in the range of 1–3564 represents the host presentation space position that corresponds to the row and column values passed in the calling length and PS position parameters, respectively. The upper limit can be smaller than 3564 depending on how the host presentation space is configured.

The following status codes are defined:

Status Code	Explanation
0	This is an incorrect PS position or column.
>0	This is the PS position or column.
9998	An incorrect host presentation space ID was specified or a system error occurred.
9999	Character 2 in the data string is not P or R.

Notes on Using This Function

1. To configure your presentation space, refer to *Administrator’s Guide and Reference*
2. To find out how many rows and columns are in your presentation space, examine the returned data string parameter for the **Query Session Status (22)** function. See “Query Session Status (22)” on page 115.

1137 Code Page Support

Unicode functionality is supported only on 5250 sessions.

Convert Position or Convert RowCol is Hindi enabled in order to return the beginning of the cluster. The usage of **Convert Position or Convert RowCol** is the same as the SBCS session.

Copy Field to String (34)

3270	5250	VT
Yes	Yes	Yes

The **Copy Field to String** function transfers characters from a field in the host-connected presentation space into a string.

The **Copy Field to String** function translates the characters in the host source presentation space into American National Standard Code for Information Interchange (ASCII). Attribute bytes and other characters not represented in ASCII normally are translated into blanks.

Prerequisite Calls

Connect Presentation Space (1)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 34	
Data String	<p>Preallocated target data string. When the Set Session Parameters (9) function with Extended Attribute Bytes (EAB) option is issued, the length of the data string must be at least twice the length of the field.</p> <p>DBCS Only: When Extended Attributes Double-byte (EAD) option is specified, the length of the data string must be at least three times the length of the field. When both EAB and EAD options are specified, the length of the data string must be at least four times the length of the field.</p>	
Length	Number of bytes to copy (the length of the data string).	
PS Position	Identifies the target field. This can be the PS position of any byte within the target field. Copy always starts at the beginning of the field.	

Return Parameters

This function returns a data string, length, and a return code.

Data String:

A string containing data from the identified field in the host presentation space. The first byte in the returned data string is the beginning byte of the identified field in the host presentation space. The number of bytes in the returned data string is determined by the smaller of:

- Number of bytes specified in the calling length parameter
- Number of bytes in the identified field in the host presentation space

Length:

The length of the data returned.

Return Code:

The following codes are defined:

Return Code	Explanation
0	The Copy Field to String function was successful.
1	Your program is not connected to a host session.
2	An error was made in specifying parameters.
6	The data to be copied and the target field are not the same size. The data is truncated if the string length is smaller than the field copied.
7	The host presentation space position is not valid.

Return Code	Explanation
9	A system error was encountered.
24	Unformatted host presentation space.

Notes on Using This Function

- The field position and length information can be found by using the **Find Field Position** (31) and **Find Field Length** (32) functions. The **Copy Field to String** function can be used with either protected or unprotected fields, but only in a *field-formatted* host presentation space.
- The copy is ended when one of the following conditions is encountered:
 - When the end of the field is reached
 - When the length of the target string is exceeded
- DBCS Only:** If the target string is ended at the higher byte of the DBCS character, the byte is translated into a blank. If the EAD option is set to on, three bytes are returned for each character. If both the EAB and EAD options are set to on, four bytes are returned for each character.

Note: When the field wraps at the end of the presentation space, wrapping occurs when the end of the presentation space is reached.

- DBCS Only:** The **Set Session Parameters** (9) function EAD option is used with this function to return a 2-byte EAD. If the EAD option is specified instead of the EAB option, EAD is returned preceding each character. If both the EAB and EAD options are specified, EAD is returned preceding the EAB.
- An EAB can be returned when the **Set Session Parameters** (9) function EAB option is used. EAB is related to each character in the presentation space and is returned preceding each character.
- The **Copy Field to String** function is affected by the ATTRB/NOATTRB/NULLATTRB, the EAB/NOEAB, the XLATE/NOXLATE, the DISPLAY/NODISPLAY, the DISPLAY/NODISPLAY, the EAD/NOEAD (for DBCS only), and the NOS0/SPACES0/S0 (for DBCS only) session options. Refer to items 5 on page 154; 13 and 14 on page 157; 17 on page 158; and 20 and 21 on page 159 for more information.

As previously stated, the return of attributes by the various **Copy** (5, 8, and 34) functions is affected by the **Set Session Parameters** (9) function. The involved set session parameters have the following effect:

Set Session Parameter Effect on the COPY Function

NOEAB and NOEAD

Attributes are not returned. Only text is copied from the presentation space to the user buffer.

EAB and NOXLATE

Attributes are returned as defined in the following tables.

EAB and XLATE

The colors used for the presentation space display are returned. Colors can be remapped; so the attribute colors are not the ones returned by the **COPY** functions when XLATE and EAB are on at the same time.

EAD

Double-byte character set attributes are returned as shown in the following tables.

The returned character attributes are defined in the following tables. The attribute bit positions are in IBM format with bit 0 the left most bit in the byte.

3270 character attributes are returned from the host to the emulator. The following table applies when EAB and NOXLATE are set.

Bit Position	Meaning
0-1	Character highlighting 00 = Normal 01 = Blink 10 = Reverse video 11 = Underline
2-4	Character color (Color remap can override this color definition.) 000 = Default 001 = Blue 010 = Red 011 = Pink 100 = Green 101 = Turquoise 110 = Yellow 111 = White
5-6	Character attributes 00 = Default value 11 = Double byte character
7	Reserved

5250 character attributes are returned from the host to the emulator. The following table applies when EAB and NOXLATE are set.

Bit Position	Meaning
0	Reverse image 0 = Normal image 1 = Reverse image
1	Underline 0 = No underline 1 = Underline
2	Blink 0 = Not blink 1 = Blink
3	Separator of columns 0 = No separator 1 = Separator
4-7	Reserved

The following table shows Personal Communications character color attributes. The following table applies when EAB and XLATE are set.

Bit Position	Meaning
0-3	Background character colors 0000 = Black 0001 = Blue 0010 = Green 0011 = Cyan 0100 = Red 0101 = Magenta 0110 = Brown (3270), Yellow (5250) 0111 = White
4-7	Foreground character colors 0000 = Black 0001 = Blue 0010 = Green 0011 = Cyan 0100 = Red 0101 = Magenta 0110 = Brown (3270), Yellow (5250) 0111 = White 1000 = Gray 1001 = Light blue 1010 = Light green 1011 = Light cyan 1100 = Light red 1101 = Light magenta 1110 = Yellow 1111 = White (high intensity)

- Double-byte character set attributes (for DBCS only)
 - The first byte

Bit Position	Character Position	Field Attribute Position
0	Double-byte character	Reserved
1	The first byte of the double-byte character	Reserved
2	SO	Reserved

Bit Position	Character Position	Field Attribute Position
3–4	SI (Bit position 3)	5250 DBCS related field When the value of bit position 7 is 0: 00 = Default 01 = DBCS only 10 = Either DBCS or SBCS 11 = Mixture of DBCS and SBCS When the value of bit position 7 is 1: 00 = Reserved 01 = DBCS only without SO/SI 10 = Reserved 11 = Reserved
5	Reserved	SO/SI enable (3270 only)
6	Reserved	Character attributes exist (3270 only)
7	Reserved	5250 DBCS related extended field 0 = Basic double-byte field 1 = Extended double-byte field

– The second byte

Bit Position	Character Position	Field Attribute Position
0	Reserved	Left grid line (3270 only)
1	Reserved	Upper grid line (3270 only)
2	Reserved	Right grid line (3270 only)
3	Reserved	Under grid line (3270 only)
4	Left grid line	Left grid line
5	Upper grid line	Upper grid line
6–7	Reserved	Reserved

For a PS/2 monochrome display, the characters in the application (workstation) session appear as various shades of gray. This is required to give users their remapped colors in the EHLLAPI application session so they can get what they see in their host application presentation spaces.

- To use this function, preallocate memory to receive the returned data string parameter. The statements required to preallocate this memory vary depending on the language in which your application is written. Refer to “Memory Allocation” on page 8 for more information.

Note: 5250 emulation supports a presentation space of 24 rows by 80 columns. In some instances, Communication Manager 5250 emulation displays a 25th row. This occurs when either an error message from the host is displayed or

when the operator selects the SysReq key. Personal Communications displays 25th row information on the status bar. By **EXTEND_PS** option, an EHLLAPI application can use the same interface with Communication Manager EHLLAPI and valid presentation space is extended when this condition occurs.

1390/1399 Code Page Support

Unicode functionality is supported only on 3270 and 5250 sessions.

In a Unicode session, the characters in the host source presentation space are translated into Unicode. Attribute bytes are normally translated into blanks.

The XLATE option (that can be specified using the **Set Session Parameters** function) is not supported in a Unicode session. This means that even if this option is issued, the EABs will not be translated to the PC color graphics adapter (CGA) format.

Prerequisite Calls: **Connect Presentation Space (1)**

Call Parameters:

	Standard Interface	Enhanced Interface
Function Number	Must be 34	
Data String	Preallocated target data string. When the Set Session Parameters (9) function with Extended Attribute Bytes (EAB) option is issued, the length of the data string must be at least twice the length of the EBCDIC field.	
Length	The length of the target data string in Unicode characters.	
PS Position	Identifies the target field. This can be the PS position of any byte within the target field. Copy always starts at the beginning of the field.	

Return Parameters: This function returns a data string, length, and a return code.

Data String:

String containing the Unicode data is returned.

Length:

Number of Unicode characters copied into string.

Return Code:

The following codes are defined:

Return Code	Explanation
0	The Copy Field to String function was successful.
1	Your program is not connected to a host session.
2	An error was made in specifying parameters.
6	The data to be copied and the target field are not the same size. The data is truncated if the string length is smaller than the field copied.
7	The host presentation space position is not valid.
9	A system error was encountered.
24	Unformatted host presentation space.

Notes on Using This Function: The following options are supported in a Unicode session for **Copy Field To String** (34) and function in the same way as in DBCS:

- NOATTRB
- ATTRB
- NULLATTRB
- EAB
- NOEAB
- NOXLATE
- DISPLAY
- NODISPLAY

1137 Code Page Support

Unicode functionality is supported only on 5250 sessions.

In a Unicode session, the characters in the host source presentation space are translated into Unicode. Attribute bytes are normally translated into blanks.

The XLATE option (that can be specified using the **Set Session Parameters** function) is not supported in a Unicode session. This means that even if this option is issued, the EABs will not be translated to the PC color graphics adapter (CGA) format.

Prerequisite Calls: **Connect Presentation Space** (1)

Call Parameters:

	Standard Interface	Enhanced Interface
Function Number	Must be 34	
Data String	Preallocated target data string. The length should be twice the number of EBCDIC bytes required to be copied from the presentation space. When the Set Session Parameters (9) function with Extended Attribute Bytes (EAB) option is issued, the length of the data string must be at least four times the length of the EBCDIC field.	
Length	The length of the target data string in bytes. This length should be at least 2 in a Unicode session. If not, an error code of 2 is returned.	
PS Position	Identifies the target field. This can be the PS position of any byte within the target field. Copy always starts at the beginning of the field.	

Return Parameters: This function returns a data string, length, and a return code.

Data String:

String containing the Unicode data is returned.

Length:

Number of Unicode characters copied into string. To get the number of bytes, multiply by 2.

Return Code:

The following codes are defined:

Return Code	Explanation
0	The Copy Field to String function was successful.
1	Your program is not connected to a host session.
2	An error was made in specifying parameters.
6	The data to be copied and the target field are not the same size. The data is truncated if the string length is smaller than the field copied.
7	The host presentation space position is not valid.
9	A system error was encountered.
24	Unformatted host presentation space.

Notes on Using This Function: The following options are supported in a Unicode session for **Copy Field To String** and function in the same way as in SBCS:

- NOATTRB
- ATTRB
- NULLATTRB
- EAB
- NOEAB
- NOXLATE
- DISPLAY
- NODISPLAY

Copy OIA (13)

3270	5250	VT
Yes	Yes	Yes

The **Copy OIA** function returns the current operator information area (OIA) data from the host-connected presentation space.

The OIA is located under the bottom dividing line of the screen and is used to display session status information about the connection between the workstation and the host.

Prerequisite Calls

Connect Presentation Space (1)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 13	
Data String	Preallocated target data string	
Length	103	104
PS Position	NA	

Return Parameters

This function returns a data string and a return code.

Data String:

A 103-byte string for 16-bit and 104-byte string for 32-bit. See “Format of the Returned OIA Data String” for more information.

Return Code:

The following codes are defined:

Return Code	Explanation
0	OIA data is returned. The target presentation space is unlocked.
1	Your program is not connected to a host session.
2	An error was made in specifying string length. OIA data was not returned.
4	OIA data is returned. The target presentation space is busy.
5	OIA data is returned. The target presentation space is locked. (Input inhibited)
9	An internal system error was encountered. OIA data was not returned.

Notes on Using This Function

1. The OIA Group consists of the bits that show the status of the connected sessions. The group is categorized by the represented host function. (For example, Group 8 consists of the bits that show all conditions of the input inhibit in the session.) The states of each group are ordered so that the high-order bits represent the indicators of higher priority. That is, bit 7 has priority over bit 0. Therefore, if more than one state is active within a group, the state with the highest priority is the active state within that group.
2. To use this function, preallocate memory to receive the returned data string parameter. The statements required to preallocate this memory vary depending on the language in which your application is written. Refer to “Memory Allocation” on page 8 for more information.

Format of the Returned OIA Data String

The OIA data string contains the following information:

Byte		Definition
Standard	Enhanced	
1	1	The OIA format byte. The value is 1 (PC/3270), 9 (PC400), or 5 (VT).
2–81	2–81	The OIA image in the host code points.
82–103	82–103	OIA group indicator meanings.
	104	Reserved.

PC/3270 OIA Group Indicator Meanings and Its Image: The OIA image group consists of an 80-byte ASCII character string with no attribute bytes that contains the OIA image in host code points. Figure 2 on page 51 shows the hexadecimal codes found in the host presentation space, and the characters they represent. The returned data can be translated into OIA graphics characters. Refer to *Quick Beginnings* for information on the OIA indicators.

To translate the returned data into OIA graphics characters, proceed as follows:

1. Print the data returned in bytes 2 through 81 to the screen or to a printer.

2. Using the code page chart applicable to the device on which the output appears, find the hexadecimal value corresponding to each character.
3. Using Figure 2 on page 51, find the OIA graphics character corresponding to each hexadecimal value found in step 2.

Note: Group 8 (byte 0) machine, communications, and program check images are followed by a three-digit number related to the type of check.

The online and screen ownership group images are for non-SNA 3274 controller configurations. For SNA, the CD hex value is translated by CD (see Figure 2 on page 51). If running on a 3174 controller or SDLC connection, the hex value X'F4' is replaced by X'B2' or X'22'. The highlight indicator is a corresponding image (in the first 80 bytes of the data string) of the "Group 5 (offset 86: Highlight group 1" byte. The highlight indicator is followed by either X'F9' (blink), X'FC' (underscore), X'D2' (reverse video), or X'80' (host default).

The short session ID followed by X'20' is in column 7.

All group images are represented by Main Frame Interactive (MFI) hex code points.

Note: The OIA image data string position minus 1 position equals the OIA column.

	0x	1x	2x	3x	4x	5x	6x	7x	8x	9x	Ax	Bx	Cx	Dx	Ex	Fx	
x0	NUL	SP	0	&	à	ã	À	Ä	a	q	A	Q	ˆ	^	P	⊠	
x1	EM	=	1	–	è	ë	È	Ë	b	r	B	R	–	|	S	?	
x2	FF	'	2	.	ì	ï	Ì	Ï	c	s	C	S	z	ⓐ	➔	↔	
x3	NL	”	3	,	ò	ö	Ò	Ö	d	t	D	T	–	◦	↑	↗	
x4	STP	/	4	:	ù	ü	Ù	Ü	e	u	E	U	◌	♀	⊠	4	
x5	CR	\	5	+	ã	â	Ã	Â	f	v	F	V	˙	+	↓	–	
x6		|	6	–	õ	ê	Õ	Ê	g	w	G	W	✕	⌋	⌋	–	
x7		|	7	–	ÿ	î	Y	Î	h	x	H	X	–	⌋	⌋	➤	
x8	>	?	8	◦	à	ô	À	Ô	i	y	I	Y	←	⌋	μ	¿	
x9	<	|	9		è	û	E	Û	j	z	J	Z	➡	⌋	2	☀	
xA	[	\$	β	^	é	á	E	Á	k	æ	K	Æ	◊	⌋	3	□
xB	]	¢	§	~	ì	é	I	É	l	ø	L	Ø	⌋	⌋	▶	↘
xC	)	£	#	..	ò	í	O	Í	m	'a	M	À	⌋	⌋	□	≡
xD	(	¥	@	`	ù	ó	U	Ó	n	ç	N	Ç	⌋	⌋	↔	□
xE	}	Pts	%	'	Ü	Ú	Y	Ú	o	;	O	;	•	+	+	□	i
xF	{	☀	–	ç	Ç	ñ	C	Ñ	p	*	P	*	█	×	█	Not Supported	

Figure 2. Host Presentation Space Characters

- Group 1 (Offset 82): Online and Screen Ownership

Bit	Meaning
0–1	Reserved
2	SSCP-LU session owns screen
3	LU-LU session owns screen
4	Online and not owned
5	Subsystem ready
6–7	Reserved

- Group 2 (Offset 83): Character Selection

Bit	Meaning
0	Reserved
1	APL
2	Katakana (Japan only)
3	Alphanumeric
4–5	Reserved

Bit	Meaning
6	Hiragana (Japan only)
7	Double-byte character

- Group 3 (Offset 84): Shift State

Bit	Meaning
0	Upper shift
1	Numeric
2	CAPS
3-7	Reserved

- Group 4 (Offset 85): PSS Group 1

Bit	Meaning
0-7	Reserved

- Group 5 (Offset 86): Highlight Group 1

Bit	Meaning
0	Operator selectable
1	Field inherit
2-7	Reserved

- Group 6 (Offset 87): Color Group 1

Bit	Meaning
0	Operator selectable
1	Field inherit
2-7	Reserved

- Group 7 (Offset 88): Insert

Bit	Meaning
0	Insert mode
1-7	Reserved

- Group 8 (Offset 89-93): Input Inhibited (5 bytes)
 - Byte 1 (Offset 89)

Bit	Meaning
0	Non-resettable machine check
1	Reserved
2	Machine check
3	Communications check
4	Program check
5-7	Reserved

- Byte 2 (Offset 90)

Bit	Meaning
0	Device busy
1	Terminal wait
2	Minus symbol
3	Minus function
4	Too much entered
5-7	Reserved

– Byte 3 (Offset 91)

Bit	Meaning
0-2	Reserved
3	Incorrect dead key combination, limited key.
4	Wrong place
5-7	Reserved

– Byte 4 (Offset 92)

Bit	Meaning
0-1	Reserved
2	System wait
3-7	Reserved

– Byte 5 (Offset 93)

Bit	Meaning
0-7	Reserved

• Group 9 (Offset 94): PSS Group 2

Bit	Meaning
0-7	Reserved

• Group 10 (Offset 95): Highlight Group 2

Bit	Meaning
0-7	Reserved

• Group 11 (Offset 96): Color Group 2

Bit	Meaning
0-7	Reserved

• Group 12 (Offset 97): Communication Error Reminder

Bit	Meaning
0-6	Communications error
1-7	Reserved

• Group 13 (Offset 98): Printer State

Bit	Meaning
0-7	Reserved

- Group 14 (Offset 99): Graphics

Bit	Meaning
0-7	Reserved

- Group 15 (Offset 100): Reserved
- Group 16 (Offset 101): Automatic Key Play/Record State

Bit	Meaning
0-7	Reserved

- Group 17 (Offset 102): Automatic Key Quit/Stop State

Bit	Meaning
0-7	Reserved

- Group 18 (Offset 103): Expanded State

Bit	Meaning
0-7	Reserved

PC400 OIA Group Indicator Meanings and Its Image: Details of the OIA group are listed in the following tables.

- Group 1 (Offset 82): Online and Screen Ownership

Bit	Meaning	Beginning Position of Data String
0-2	Reserved	
3	System available	1
4	Reserved	
5	Subsystem ready	
6-7	Reserved	

- Group 2 (Offset 83): Character Selection

Bit	Meaning	Beginning Position of Data String
0-1	Reserved	
2	Katakana (Japan only)	
3	Alphanumeric	
4-5	Reserved	
6	Hiragana (Japan only)	
7	Double-byte character	

- Group 3 (Offset 84): Shift State

Bit	Meaning	Beginning Position of Data String
0	Reserved	
1	Keyboard shift	39
2	CAPS	
3–6	Reserved	
7	Double-byte character input available	

- Group 4 (Offset 85): PSS Group 1

Bit	Meaning	Beginning Position of Data String
0–7	Reserved	

- Group 5 (Offset 86): Highlight Group 1

Bit	Meaning	Beginning Position of Data String
0–7	Reserved	

- Group 6 (Offset 87): Color Group 1

Bit	Meaning	Beginning Position of Data String
0–7	Reserved	

- Group 7 (Offset 88): Insert

Bit	Meaning	Beginning Position of Data String
0	Insert mode	68
1–7	Reserved	

- Group 8 (Offset 89–93): Input Inhibited (5 bytes)
 - Byte 1 (Offset 89)

Bit	Meaning	Beginning Position of Data String
0–7	Reserved	

- Byte 2 (Offset 90)

Bit	Meaning	Beginning Position of Data String
0–7	Reserved	

- Byte 3 (Offset 91)

Bit	Meaning	Beginning Position of Data String
0–4	Reserved	
5	Operator input error	64
6–7	Reserved	

- Byte 4 (Offset 92)

Bit	Meaning	Beginning Position of Data String
0-1	Reserved	
2	System wait	64
3-7	Reserved	

– Byte 5 (Offset 93)

Bit	Meaning	Beginning Position of Data String
0-7	Reserved	

• Group 9 (Offset 94): PSS Group 2

Bit	Meaning	Beginning Position of Data String
0-7	Reserved	

• Group 10 (Offset 95): Highlight Group 2

Bit	Meaning	Beginning Position of Data String
0-7	Reserved	

• Group 11 (Offset 96): Color Group 2

Bit	Meaning	Beginning Position of Data String
0-7	Reserved	

• Group 12 (Offset 97): Communication Error Reminder

Bit	Meaning	Beginning Position of Data String
0	Communications Error	
1-5	Reserved	
7	Message wait	3

• Group 13 (Offset 98): Printer State

Bit	Meaning	Beginning Position of Data String
0-7	Reserved	

• Group 14 (Offset 99): Graphics

Bit	Meaning	Beginning Position of Data String
0-7	Reserved	

• Group 15 (Offset 100): Reserved

• Group 16 (Offset 101): Automatic Key Play/Record State

Bit	Meaning	Beginning Position of Data String
0-7	Reserved	

• Group 17 (Offset 102): Automatic Key Quit/Stop State

Bit	Meaning	Beginning Position of Data String
0-7	Reserved	

- Group 18 (Offset 103): Expanded State

Bit	Meaning	Beginning Position of Data String
0-7	Reserved	

VT Host OIA Group Indicator Meanings and Its Image: Details of the VT Host OIA group are listed in the following tables.

- Group 1 (Offset 82): Online and Screen Ownership

Bit	Meaning
5	Subsystem ready

- Group 2 (Offset 83): Character Selection

Bit	Meaning
0	Upper shift
2	CAPS

- Group 7 (Offset 88): Insert

Bit	Meaning
0	Insert mode

Some columns on the OIA line display different messages for VT than those messages displayed for 3270/5250. See the following table for specific details.

Column	Symbol
1-7	VT220 7
	VT220 8
	VT100
	VT52
	VTANSI
9 - 12	LOCK
61 - 64	HOLD

Copy Presentation Space (5)

3270	5250	VT
Yes	Yes	Yes

The **Copy Presentation Space** function copies the contents of the host-connected presentation space into a data string that you define in your EHLLAPI application program.

The **Copy Presentation Space** function translates the characters in the host source presentation space into ASCII. Attribute bytes and other characters not represented in ASCII normally are translated into blanks. If you do not want the attribute bytes translated into blanks, you can override this translation with the **ATTRB** option under the **Set Session Parameters (9)** function.

Prerequisite Calls

Connect Presentation Space (1)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 5	
Data String	Preallocated target string the size of your host presentation space. This can vary depending on how your host presentation space is configured. When the Set Session Parameters (9) function with the EAB option is issued, the length of the data string must be at least twice the length of the presentation space. DBCS Only: When the EAD option is specified, the length of the data string must be at least three times the length of the presentation space. When both the EAB and EAD options are specified, the length of the data string must be at least four times the length of the presentation space.	
Length	NA (the length of the host presentation space is implied).	
PS Position	NA.	

Return Parameters

This function returns a data string, length, and a return code.

Data String:

Contents of the connected host presentation space.

Length:

Length of the data copied.

Return Code:

The following codes are defined:

Return Code	Explanation
0	The host presentation space contents were copied to the application program. The target presentation space was active, and the keyboard was unlocked.
1	Your program is not connected to a host session.
4	The host presentation space contents were copied. The connected host presentation space was waiting for host response.
5	The host presentation space was copied. The keyboard was locked.
9	A system error was encountered.

Notes on Using This Function

1. An **EAB** can be returned when the **Set Session Parameters (9)** function **EAB** option is used. **EAB** is related to each character in the presentation space and is returned preceding each character.

2. **DBCS Only:** The **Set Session Parameters** (9) function EAD option is used with this function to return a 2-byte EAD. If the EAD option is specified instead of the EAB option, EAD is returned preceding each character. If both the EAB and EAD options are specified, EAD is returned preceding the EAB.

If the start position of the copy is at the second byte in the double-byte character, or the end position is at the first byte in the double-byte character, the bytes are translated into blanks.

3. The **Copy Presentation Space** function is affected by the following session options:
 - ATTRB/NOATTRB/NULLATTRB
 - EAB/NOEAB
 - XLATE/NOXLATE
 - BLANK/NOBLANK
 - DISPLAY/NODISPLAY
 - EAD/NOEAD (for DBCS only)
 - NOSO/SPACESO/SO (for DBCS only)
 - EXTEND_PS/NOEXTEND_PS

Refer to items 5 on page 154; 13, 14, 15 and 17 on page 158; and 20 and 21 on page 159 for more information.

If the target data string provided is not long enough to hold the requested data, unpredictable results can occur.

As previously stated, the return of attributes by the various **Copy** (5, 8, and 34) functions is affected by the **Set Session Parameters** (9) function. The involved set session parameters have the following effect:

Set Session Parameter
Effect on the COPY Function

NOEAB and NOEAD

Attributes are not returned. Only text is copied from the presentation space to the user buffer.

EAB and NOXLATE

Attributes are returned as defined in the following tables.

EAB and XLATE

The colors used for the presentation space display are returned. Colors can be remapped; so the attribute colors are not the ones returned by the **Copy** functions when XLATE and EAB are on at the same time.

EAD Double-byte character set attributes are returned as shown in the following tables.

NOSO/SPACESO/SO

When NOSO is specified, it works as SPACESO. The size of the presentation space is not changed.

The returned character attributes are defined in the following tables. The attribute bit positions are in IBM format with bit 0 the left most bit in the byte.

3270 character attributes are returned from the host to the emulator. The following table applies when EAB and NOXLATE are set.

Bit Position	Meaning
0-1	Character highlighting 00 = Normal 01 = Blink 10 = Reverse video 11 = Underline
2-4	Character color (Color remap can override this color definition.) 000 = Default 001 = Blue 010 = Red 011 = Pink 100 = Green 101 = Turquoise 110 = Yellow 111 = White
5-6	Character attribute 00 = Default value 11 = Double-byte character
7	Reserved

5250 character attributes are returned from the host to the emulator. The following table applies when EAB and NOXLATE are set.

Bit Position	Meaning
0	Reverse image 0 = Normal image 1 = Reverse image
1	Underline 0 = No underline 1 = Underline
2	Blink 0 = Not blink 1 = Blink
3	Separator of columns 0 = No separator 1 = Separator
4-7	Reserved

The following table shows Personal Communications character color attributes. The following table applies when EAB and XLATE are set.

Bit Position	Meaning
0-3	Background character colors 0000 = Black 0001 = Blue 0010 = Green 0011 = Cyan 0100 = Red 0101 = Magenta 0110 = Brown (3270), Yellow (5250) 0111 = White
4-7	Foreground character colors 0000 = Black 0001 = Blue 0010 = Green 0011 = Cyan 0100 = Red 0101 = Magenta 0110 = Brown (3270), Yellow (5250) 0111 = White 1000 = Gray 1001 = Light blue 1010 = Light green 1011 = Light cyan 1100 = Light red 1101 = Light magenta 1110 = Yellow 1111 = White (high intensity)

- Double-byte character set attributes (for DBCS only)
 - The first byte

Bit Position	Character Position	Field Attribute Position
0	Double-byte character	Reserved
1	The first byte of the double-byte character	Reserved
2	SO	Reserved

Bit Position	Character Position	Field Attribute Position
3-4	SI (Bit position 3)	5250 DBCS related field <ul style="list-style-type: none"> When the value of bit position 7 is 0: <ul style="list-style-type: none"> 00 = Default 01 = DBCS only 10 = Either DBCS or SBCS 11 = Mixture of DBCS and SBCS When the value of bit position 7 is 1: <ul style="list-style-type: none"> 00 = Reserved 01 = DBCS only without SO/SI 10 = Reserved 11 = Reserved
5	Reserved	SO/SI enabled (3270 only)
6	Reserved	Character attributes exist (3270 only)
7	Reserved	5250 DBCS related extended field <ul style="list-style-type: none"> 0 = Basic double-byte field 1 = Extended double-byte field

– The second byte

Bit Position	Character Position	Field Attribute Position
0	Reserved	Left grid line (3270 only)
1	Reserved	Upper grid line (3270 only)
2	Reserved	Right grid line (3270 only)
3	Reserved	Under grid line (3270 only)
4	Left grid line	Left grid line
5	Upper grid line	Upper grid line
6-7	Reserved	Reserved

For a PS/2 monochrome display, the characters in the application (workstation) session appear as various shades of gray. This is required to give users their remapped colors in the EHLAPI application session so they can get what they see in their host application presentation spaces.

If you want to copy only a portion of the host presentation space, use the **Copy Presentation Space to String (8)** function.

To use this function, preallocate memory to receive the returned data string parameter. The statements required to preallocate this memory vary depending on the language in which your application is written. Refer to “Memory Allocation” on page 8 for more information.

Note: 5250 emulation supports a presentation space of 24 rows by 80 columns. In some instances, Communication Manager 5250 emulation displays a 25th row. This occurs when either an error message from the host is displayed or when the operator selects the SysReq key. Personal Communications displays 25th row information on row 24, or on the status bar. For

information to be displayed on the status bar, the status bar must be configured. Refer to *Quick Beginnings* for information on configuring the status bar. By the **EXTEND_PS** option, an EHLLAPI application can use the same interface with Communication Manager EHLLAPI and valid presentation space is extended when this condition occurs.

1390/1399 Code Page Support

Unicode functionality is supported only on 3270 and 5250 sessions.

In a Unicode session, the characters in the host source presentation space are translated into Unicode. Attribute bytes are normally translated into blanks.

The XLATE option (that can be specified using the **Set Session Parameters (9)** function) is not supported in a Unicode session. This means that even if this option is issued, the EABs will not be translated to the PC color graphics adapter (CGA) format.

Prerequisite Calls: **Connect Presentation Space (1)**

Call Parameters:

	Standard Interface	Enhanced Interface
Function Number	Must be 5	
Data String	Preallocated target Unicode string. When the Set Session Parameters (9) function with Extended Attribute Bytes (EAB) option is issued, the length of the data string must be twice the size of the presentation space.	
Length	NA (the length of the host presentation space is implied).	
PS Position	NA	

Return Parameters: This function returns a data string and a return code.

Data String:

String containing the Unicode representation of the contents of presentation space is returned

Return Code:

The following codes are defined:

Return Code	Explanation
0	The host presentation space contents were copied to the application program. The target presentation space was active, and the keyboard was unlocked.
1	Your program is not connected to a host session.
4	The host presentation space contents were copied. The connected host presentation space was waiting for host response.
5	The host presentation space was copied. The keyboard was locked.
9	A system error was encountered.

Notes on Using This Function: The following options are supported in a Unicode session for **Copy Presentation Space (5)** and function in the same way as in DBCS:

- NOATTRB
- ATTRB

- NULLATTRB
- EAB
- NOEAB
- NOXLATE
- DISPLAY
- NODISPLAY
- BLANK
- NOBLANK

1137 Code Page Support

Unicode functionality is supported only on 5250 sessions.

In a Unicode session, the characters in the host source presentation space are translated into Unicode. Attribute bytes are normally translated into blanks.

The XLATE option (that can be specified using the **Set Session Parameters (9)** function) is not supported in a Unicode session. This means that even if this option is issued, the EABs will not be translated to the PC color graphics adapter (CGA) format.

Prerequisite Calls: **Connect Presentation Space (1)**

Call Parameters:

	Standard Interface	Enhanced Interface
Function Number	Must be 5	
Data String	Preallocated target Unicode data string. The length (in bytes) should be twice the size (in bytes) of the presentation space. When the Set Session Parameters (9) function with Extended Attribute Bytes (EAB) option is issued, the length of the data string must be at least four times the size of the presentation space.	
Length	NA (the length of the host presentation space is implied).	
PS Position	NA	

Return Parameters: This function returns a data string and a return code.

Data String:

String containing the Unicode representation of the contents of presentation space is returned

Return Code:

The following codes are defined:

Return Code	Explanation
0	The host presentation space contents were copied to the application program. The target presentation space was active, and the keyboard was unlocked.
1	Your program is not connected to a host session.
4	The host presentation space contents were copied. The connected host presentation space was waiting for host response.
5	The host presentation space was copied. The keyboard was locked.

Return Code	Explanation
9	A system error was encountered.

Notes on Using This Function: The following options are supported in a Unicode session for **Copy Presentation Space (5)** and function in the same way as in SBCS:

- NOATTRB
- ATTRB
- NULLATTRB
- EAB
- NOEAB
- NOXLATE
- DISPLAY
- NODISPLAY
- BLANK
- NOBLANK

Copy Presentation Space to String (8)

3270	5250	VT
Yes	Yes	Yes

The **Copy Presentation Space to String** function is used to copy all or part of the host-connected presentation space into a data string that you define in your EHLLAPI application program.

The input PS position is the offset into the host presentation space. This offset is based on a layout in which the upper-left corner (row 1/column 1) is location 1 and the bottom-right corner is 3564, which is the maximum screen size for the host presentation space. The value of PS Position + (Length - 1) cannot exceed the configured size of your host presentation space.

The **Copy Presentation Space to String** function translates the characters in the host source presentation space into ASCII. Attribute bytes and other characters not represented in ASCII normally are translated into blanks. If you do not want the attribute bytes translated into blanks, you can override this translation with the ATTRB option under the **Set Session Parameters (9)** function.

Prerequisite Calls

Connect Presentation Space (1).

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 8	

	Standard Interface	Enhanced Interface
Data String	Preallocated target string the size of your host presentation space. When the Set Session Parameters (9) function with the EAB option is issued, the length of the data string must be at least twice the length of the presentation space. DBCS Only: When the EAD option is specified, the length of the data string must be at least three times the length of the presentation space. When both the EAB and EAD options are specified, the length of the data string must be at least four times the length of the presentation space.	
Length	Length of the target data string.	
PS Position	Position within the host presentation space of the first byte in your target data string.	

Return Parameters

This function returns a data string and a return code.

Data String:

Contents of the host presentation space.

Return Code:

The following codes are defined:

Return Code	Explanation
0	The host presentation space contents were copied to the application program. The target presentation space was active, and the keyboard was unlocked.
1	Your program is not connected to a host session.
2	An error was made in specifying string length, or the sum of (Length - 1) + PS position is greater than the size of the connected host presentation space.
4	The host presentation space contents were copied. The host presentation space was waiting for host response.
5	The host presentation space was copied. The keyboard was locked.
7	The host presentation space position is not valid.
9	A system error was encountered.

Notes on Using This Function

1. An EAB can be returned when the **Set Session Parameters** (9) function EAB option is used. EAB is related to each character in the presentation space and is returned following each character.
2. **DBCS Only:** The **Set Session Parameters** (9) function EAD option is used with this function to return a 2-byte EAD. If the EAD option is specified instead of the EAB option, EAD is returned preceding each character. If both the EAB and EAD options are specified, EAD is returned following the EAB.
 If the start position of the copy is at the second byte in the double-byte character, or the end position is at the first byte in the double-byte character, the bytes are translated into blanks. If the EAD option is set to on, three bytes are returned for each character. If both the EAB and EAD options are set to on, four bytes are returned for each character.
3. The **Copy Presentation Space to String** function is affected by the following options:

- ATTRB/NOATTRB/NULLATTRB
- EAB/NOEAB
- XLATE/NOXLATE
- BLANK/NOBLANK
- DISPLAY/NODISPLAY
- EAD/NOEAD (for DBCS only)
- NOSO/SPACESO/SO (for DBCS only)
- EXTEND_PS/NOEXTEND_PS

Refer to items 5 on page 154; 13 and 14 on page 157; 15 on page 157; 17 on page 158; and 20 and 21 on page 159

If the target data string provided is not large enough to hold the requested number of bytes, the copy ends successfully (RC=0, 4, or 5) when the end of the target data string is reached.

As previously stated, the return of attributes by the various **Copy** (5, 8, and 34) functions is affected by the **Set Session Parameters** (9) function. The involved set session parameters have the following effect:

**Set Session Parameter
Effect on the Copy Function**

NOEAB and NOEAD

Attributes are not returned. Only text is copied from the presentation space to the user buffer.

EAB and NOXLATE

Attributes are returned as defined in the following tables.

EAB and XLATE

The colors used for the presentation space display are returned. Colors can be remapped, so the attribute colors are not the ones returned by the **Copy** functions when XLATE and EAB are on at the same time.

EAD Double-byte character set attributes are returned as shown in the following tables.

The returned character attributes are defined in the following tables. The attribute bit positions are in IBM format with bit 0 the left most bit in the byte.

- 3270 character attributes are returned from the host to the emulator. The following table applies when EAB and NOXLATE are set.

Bit Position	Meaning
0-1	Character highlighting 00 = Normal 01 = Blink 10 = Reverse video 11 = Underline

Bit Position	Meaning
2-4	Character color (Color remap can override this color definition.) 000 = Default 001 = Blue 010 = Red 011 = Pink 100 = Green 101 = Turquoise 110 = Yellow 111 = White
5-7	Reserved

- 5250 character attributes are returned from the host to the emulator. The following table applies when EAB and NOXLATE are set.

Bit Position	Meaning
0	Reverse image 0 = Normal image 1 = Reverse image
1	Underline 0 = No underline 1 = Underline
2	Blink 0 = Not blink 1 = Blink
3	Separator of columns 0 = No separator 1 = Separator
4-7	Reserved

- VT character attributes are returned from the host to the emulator. The following table applies when EAB and NOXLATE are set.

Bit Position	Meaning
0-3	Reserved
4	Bold 1 = On 0 = Off
5	Underscore 1 = On 0 = Off
6	Blink 1 = On 0 = Off
7	Reverse 0 = On 1 = Off

- The following table shows Personal Communications character color attributes. The following table applies when EAB and XLATE are set.

Bit Position	Meaning
0-3	Background character colors 0000 = Black 0001 = Blue 0010 = Green 0011 = Cyan 0100 = Red 0101 = Magenta 0110 = Brown (3270), Yellow (5250) 0111 = White
4-7	Foreground character colors 0000 = Black 0001 = Blue 0010 = Green 0011 = Cyan 0100 = Red 0101 = Magenta 0110 = Brown (3270), Yellow (5250) 0111 = White 1000 = Gray 1001 = Light blue 1010 = Light green 1011 = Light cyan 1100 = Light red 1101 = Light magenta 1110 = Yellow 1111 = White (high intensity)

- Double-byte character set attributes
 - The first byte

Bit Position	Character Position	Field Attribute Position
0	Double-byte character	Reserved
1	The first byte of the double-byte character	Reserved
2	SO	Reserved

Bit Position	Character Position	Field Attribute Position
3-4	SI (Bit position 3)	5250 DBCS related field When the value of bit position 7 is 0: 00 = Default 01 = DBCS only 10 = Either DBCS or SBCS 11 = Mixture of DBCS and SBCS When the value of bit position 7 is 1: 00 = Reserved 01 = DBCS only without SO/SI 10 = Reserved 11 = Reserved
5	Reserved	SO/SI enable (3270 only)
6	Reserved	Character Attributes exist (3270 only)
7	Reserved	5250 DBCS related extended field 0 = Basic double-byte field 1 = Extended double-byte field

– The second byte

Bit Position	Character Position	Field Attribute Position
0	Reserved	Left grid line (3270 only)
1	Reserved	Upper grid line (3270 only)
2	Reserved	Right grid line (3270 only)
3	Reserved	Under grid line (3270 only)
4	Left grid line	Left grid line
5	Upper grid line	Upper grid line
6-7	Reserved	Reserved

For a PS/2 monochrome display, the characters in the application (workstation) session appear as various shades of gray. This is required to give users their remapped colors in the EHLLAPI application session so they can get what they see in their host application presentation spaces.

- To use this function, preallocate memory to receive the returned data string parameter. The statements required to preallocate this memory vary depending on the language in which your application is written. Refer to "Memory Allocation" on page 8 for more information.

Note: 5250 emulation supports a presentation space of 24 rows by 80 columns. In some instances, Communication Manager 5250 emulation displays a 25th row. This occurs when either an error message from the host is displayed or

when the operator selects the SysReq key. Personal Communications displays 25th row information on row 24, or on the status bar. For information to be displayed on the status bar, the status bar must be configured. Refer to *Quick Beginnings* for information on configuring the status bar. By the **EXTEND_PS** option, an EHLAPI application can use the same interface with Communication Manager EHLAPI and valid presentation space is extended when this condition occurs.

1390/1399 Code Page Support

Unicode functionality is supported only on 3270 and 5250 sessions.

In a Unicode session, the characters in the host source presentation space are translated into Unicode. Attribute bytes are normally translated into blanks.

The XLATE option (that can be specified using the **Set Session Parameters** (9) function) is not supported in a Unicode session. This means that even if this option is issued, the EABs will not be translated to the PC color graphics adapter (CGA) format.

Prerequisite Calls: **Connect Presentation Space** (1)

Call Parameters:

	Standard Interface	Enhanced Interface
Function Number	Must be 8	
Data String	Preallocated target Unicode string. When the Set Session Parameters (9) function with Extended Attribute Bytes (EAB) option is issued, the length of the data string must be at least twice the length of the presentation space.	
Length	The length of the target Unicode string in Unicode characters.	
PS Position	Position within the host presentation space of the first byte in your target data string.	

Return Parameters: This function returns a data string and a return code.

Data String:

String containing the Unicode data is returned

Return Code:

The following codes are defined:

Return Code	Explanation
0	The host presentation space contents were copied to the application program. The target presentation space was active, and the keyboard was unlocked.
1	Your program is not connected to a host session.
2	An error was made in specifying string length, or the sum of (Length - 1) + PS position is greater than the size of the connected host presentation space.
4	The host presentation space contents were copied. The host presentation space was waiting for host response.
5	The host presentation space was copied. The keyboard was locked.
7	The host presentation space position is not valid.

Return Code	Explanation
9	A system error was encountered.

Notes on Using This Function: The following options are supported in a Unicode session for **Copy Presentation Space to String** and function in the same way as in DBCS:

- NOATTRB
- ATTRB
- NULLATTRB
- EAB
- NOEAB
- NOXLATE
- DISPLAY
- NODISPLAY
- BLANK
- NOBLANK

1137 Code Page Support

Unicode functionality is supported only on 5250 sessions.

In a Unicode session, the characters in the host source presentation space are translated into Unicode. Attribute bytes are normally translated into blanks.

The XLATE option (that can be specified using the **Set Session Parameters (9)** function) is not supported in a Unicode session. This means that even if this option is issued, the EABs will not be translated to the PC color graphics adapter (CGA) format.

Prerequisite Calls: **Connect Presentation Space (1)**

Call Parameters:

	Standard Interface	Enhanced Interface
Function Number	Must be 8	
Data String	Preallocated target data string. The length should be at least twice the number of EBCDIC bytes required to be copied from the presentation space. When the Set Session Parameters (9) function with Extended Attribute Bytes (EAB) option is issued, the length of the data string must be at least four times the length of the EBCDIC string that is to be copied from the presentation space.	
Length	The length of the target Unicode string in bytes. This length should be at least 2 in a Unicode session. If not, an error code of 2 is returned.	
PS Position	Position within the host presentation space of the first byte in your target data string.	

Return Parameters: This function returns a data string and a return code.

Data String:

Contents of the host presentation space.

Return Code:

The following codes are defined:

Return Code	Explanation
0	The host presentation space contents were copied to the application program. The target presentation space was active, and the keyboard was unlocked.
1	Your program is not connected to a host session.
2	An error was made in specifying string length, or the sum of (Length - 1) + PS position is greater than the size of the connected host presentation space.
4	The host presentation space contents were copied. The host presentation space was waiting for host response.
5	The host presentation space was copied. The keyboard was locked.
7	The host presentation space position is not valid.
9	A system error was encountered.

Notes on Using This Function: The following options are supported in a Unicode session for **Copy Presentation Space to String** and function in the same way as in SBCS:

- NOATTRB
- ATTRB
- NULLATTRB
- EAB
- NOEAB
- NOXLATE
- DISPLAY
- NODISPLAY
- BLANK
- NOBLANK

Copy String to Field (33)

3270	5250	VT
Yes	Yes	Yes

The **Copy String to Field** function transfers a string of characters into a specified field in the host-connected presentation space. This function can be used only in a *field-formatted* host presentation space.

Prerequisite Calls

Connect Presentation Space (1)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 33	
Data String	String containing the data to be transferred to a target field in the host presentation space.	

	Standard Interface	Enhanced Interface
Length	Length, in number of bytes, of the source data string. Overridden if in EOT mode.	
PS Position	Identifies the target field. This can be the PS position of any byte within the target field. Copy always starts at the beginning of the field.	

Return Parameters

Return Code	Explanation
0	The Copy String to Field function was successful.
1	Your program is not connected to a host session.
2	Parameter error or zero length for copy.
5	The target field was protected or inhibited, or incorrect data was sent to the target field (such as a field attribute).
6	Copy was completed, but data is truncated.
7	The host presentation space position is not valid.
9	A system error was encountered.
24	Unformatted host presentation space.

Notes on Using This Function

1. The **Copy String to Field** function is affected by the following options:

- STRLEN/STREOT
- EOT
- EAB/NOEAB
- XLATE/NOXLATE
- PUTEAB/NOPUTEAB

Refer to items 1 and 2 on page 154; 13 and 14 on page 157; 18 on page 158; and 20 and 21 on page 159 for more information.

2. The string to be transferred is specified with the calling data string parameter. The string ends when one of these three conditions is encountered:

- When an end-of-text (EOT) delimiter is encountered in the string if EOT mode was selected using the **Set Session Parameters** (9) function. (See “Set Session Parameters (9)” on page 152).
- When the number specified in the length is reached if not in EOT mode.
- When an end-of-field is encountered in the field.

Note: If the field at the end of the host presentation space wraps, wrapping occurs when the end of the presentation space is reached.

3. The keyboard mnemonics (see **Send Key** (3) function) cannot be sent using the **Copy String to Field** function.

4. The first byte of the data to be transferred is always placed at the beginning of the field that contains the specified PS position.

5. **DBCS Only:** Double-byte characters can be included as a part of the string.

Note: PC400 does not add SO and SI to the string. When you write the strings, including double-byte characters at the DBCS mixed field, generate SO

and SI and create the area where double-byte characters are written by using the **Send Key (3)** function in advance.

If both single-byte and double-byte characters exist in a string, the data might be truncated because the data length in EBCDIC is longer than in JISCI. In this case, only the first byte or the second byte of the double-byte character is not written.

If the last character in the original string is the first byte of the double-byte character, the character is not written and not counted in the length.

A control character is converted from single-byte character to double-byte character, or from double-byte character to single-byte character depending on the field condition. A pair of NULL+Control Character between SO and SI is treated as a double-byte control character. For example, the following strings are copied into the single-byte character field or the double-byte character field:

String	Meanings	Single-byte character field	Double-byte character field
X'000C'	(NULL)(FF) X'00'X'0C'	(SB NULL)(SB FF) X'00'X'0C'	(DB NULL)(DB FF) X'0000'X'000C'
X'0E000C0F'	(SO)(DB FF)(SI) X'0E'X'000C'X'0F'	-S error	(DB FF) X'000C'

Note: SB means single-byte characters and DB means double-byte characters.

Note: 5250 emulation supports a presentation space of 24 rows by 80 columns. In some instances, Communication Manager 5250 emulation displays a 25th row. This occurs when either an error message from the host is displayed or when the operator selects the SysReq key. Personal Communications displays 25th row information on row 24, or on the status bar. For information to be displayed on the status bar, the status bar must be configured. Refer to *Quick Beginnings* for information on configuring the status bar. By the **EXTEND_PS** option, an EHLLAPI application can use the same interface with Communication Manager EHLLAPI and valid presentation space is extended when this condition occurs.

1390/1399 Code Page Support

Unicode functionality is supported only on 3270 and 5250 sessions.

STREOT option is not supported in a Unicode session. Please refer to "Set Session Parameters (9)" on page 152 for details.

The XLATE option (that can be specified using the **Set Session Parameters (9)** function) is not supported in a Unicode session. This means that even if this option is issued, the EABs will not be translated to the PC color graphics adapter (CGA) format.

Prerequisite Calls: **Connect Presentation Space (1)**

Call Parameters:

	Standard Interface	Enhanced Interface
Function Number	Must be 33	
Data String	String containing the Unicode data to be transferred to a target field in the host presentation space.	

	Standard Interface	Enhanced Interface
Length	Length, in number of Unicode characters, of the source Unicode string. Note: The EOT mode is not supported in a Unicode session; therefore, length should be specified for proper functioning of this function in a Unicode session.	
PS Position	Identifies the target field. This can be the PS position of any byte within the target field. Copy always starts at the beginning of the field.	

Return Parameters:

Return Code	Explanation
0	The Copy String to Field function was successful.
1	Your program is not connected to a host session.
2	Parameter error or zero length for copy.
5	The target field was protected or inhibited, or incorrect data was sent to the target field (such as a field attribute).
6	Copy was completed, but data is truncated.
7	The host presentation space position is not valid.
9	A system error was encountered.
24	Unformatted host presentation space.

Notes on Using This Function: The following options are supported in a Unicode session for **Copy String to Field** and function in the same way as in DBCS:

- STRLEN
- EAB
- NOEAB
- NOXLATE
- PUTEAB
- NOPUTEAB

1137 Code Page Support

Unicode functionality is supported only on 5250 sessions.

STREOT option is not supported in a Unicode session. Please refer to “Set Session Parameters (9)” on page 152 for details.

The XLATE option (that can be specified using the **Set Session Parameters (9)** function) is not supported in a Unicode session. This means that even if this option is issued, the EABs will not be translated to the PC color graphics adapter (CGA) format.

Prerequisite Calls: **Connect Presentation Space (1)**

Call Parameters:

	Standard Interface	Enhanced Interface
Function Number	Must be 33	

	Standard Interface	Enhanced Interface
Data String	String containing the Unicode data to be transferred to a target field in the host presentation space.	
Length	Length, in number of bytes, of the source Unicode string. The length should be at least 2 bytes. If not, an error code of 2 is returned. Note: The EOT mode is not supported in a Unicode session; therefore, length should be specified for proper functioning of this function in a Unicode session.	
PS Position	Identifies the target field. This can be the PS position of any byte within the target field. Copy always starts at the beginning of the field.	

Return Parameters:

Return Code	Explanation
0	The Copy String to Field function was successful.
1	Your program is not connected to a host session.
2	Parameter error or zero length for copy.
5	The target field was protected or inhibited, or incorrect data was sent to the target field (such as a field attribute).
6	Copy was completed, but data is truncated.
7	The host presentation space position is not valid.
9	A system error was encountered.
24	Unformatted host presentation space.

Notes on Using This Function: The following options are supported in a Unicode session for **Copy String to Field** and function in the same way as in SBCS:

- STRLEN
- EAB
- NOEAB
- NOXLATE
- PUTEAB
- NOPUTEAB

Copy String to Presentation Space (15)

<i>3270</i>	<i>5250</i>	<i>VT</i>
Yes	Yes	Yes

The **Copy String to Presentation Space** function copies an ASCII data string directly into the host presentation space at the location specified by the PS position calling parameter.

Prerequisite Calls

Connect Presentation Space (1)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 15.	
Data String	String of ASCII data to be copied into the host presentation space.	
Length	Length, in number of bytes, of the source data string. Overridden if in EOT mode.	
PS Position	Position in the host presentation space to begin the copy, a value between 1 and the configured size of your host presentation space.	

Return Parameters

Return Code	Explanation
0	The Copy String to Presentation Space function was successful.
1	Your program is not connected to a host session.
2	Parameter error or zero length for copy.
5	The target presentation space is protected or inhibited, or incorrect data was sent to the target presentation space (such as a field attribute byte).
6	The copy was completed, but the data was truncated.
7	The host presentation space position is not valid.
9	A system error was encountered.

Notes on Using This Function

- The **Copy String to Presentation Space** function is affected by the following options:
 - STRLEN/STREOT
 - EOT
 - EAB/NOEAB
 - XLATE/NOXLATE
 - PUTEAB/NOPUTEAB
 - EAD/NOEAD (for DBCS only)
 - NOSO/SPACESO/SO (for DBCS only)
 - EXTEND_PS/NOEXTEND_PSRefer to items 1 and 2 on page 154; 13 and 14 on page 157; 18 on page 158; and 20 and 21 on page 159 for more information.
- The keyboard mnemonics (see **Send Key (3)** function) cannot be sent using the **Copy String to Presentation Space** function.
- The string ends when an end-of-text (EOT) delimiter is encountered in the string if EOT mode was selected using the **Set Session Parameters (9)** function. (See “Set Session Parameters (9)” on page 152).
- Although the **Send Key (3)** function accomplishes the same purpose, this function responds with the prompt and enters a command more quickly. Because the **Send Key (3)** function emulates the terminal operator typing the data from the keyboard, its process speed is slow for an application operating with a lot of data. This function provides a faster input path to the host.

5. The original data (the copied string) cannot exceed the size of the presentation space.
6. **DBCS Only:** Double-byte characters can be included as a part of the string.

Note: PC400 does not add SO and SI to the string. When you write the strings, including double-byte characters at the DBCS mixed field, generate SO and SI and create the area where double-byte characters are written by using the **Send Key (3)** function in advance.

If both single-byte and double-byte characters exist in a string, the data might be truncated because the data length in EBCDIC is longer than in JISCI. If only the first byte or the second byte of the double-byte character must be written into the string, a blank is written.

If the last character in the original string is the first byte of the double-byte character, the character is not written and not counted in the length.

If the character to be written into the last character of the target presentation space is SO/SI or the first byte of the double-byte character, the character is not written and truncated, and not counted in the length.

A control character is converted from single-byte character to double-byte character, or from double-byte character to single-byte character depending on the field condition. A pair of NULL+Control Character between SO and SI is treated as a double-byte control character. For example, the following strings are copied into the single-byte character field or the double-byte character field:

String	Meanings	Single-byte character field	Double-byte character field
X'000C'	(NULL)(FF) X'00'X'0C'	(SB NULL)(SB FF) X'00'X'0C'	(DB NULL)(DB FF) X'0000'X'000C'
X'0E000C0F'	(SO)(DB FF)(SI) X'0E'X'000C'X'0F'	-S error	(DB FF) X'000C'

Note: SB means single-byte characters and DB means double-byte characters.

Note: 5250 emulation supports a presentation space of 24 rows by 80 columns. In some instances, Communication Manager 5250 emulation displays a 25th row. This occurs when either an error message from the host is displayed or when the operator selects the SysReq key. Personal Communications always displays the same information on the 24th row. By the **EXTEND_PS** option, an EHLLAPI application can use the same interface with Communication Manager EHLLAPI and valid presentation space is extended when this condition occurs.

7. This function call may cause a cursor movement to an unexpected position with some host applications. A SendKey function may be a better choice for filling a field than this function.

Note: This only occurs with VT sessions or connections to an ASCII host.

1390/1399 Code Page Support

Unicode functionality is supported only on 3270 and 5250 sessions.

STREOT option is not supported in a Unicode session. Please refer to "Set Session Parameters (9)" on page 152 for details.

The XLATE option (that can be specified using the **Set Session Parameters (9)** function) is not supported in a Unicode session. This means that even if this option is issued, the EABs will not be translated to the PC color graphics adapter (CGA) format.

Prerequisite Calls: Connect Presentation Space (1)

Call Parameters:

	Standard Interface	Enhanced Interface
Function Number	Must be 15	
Data String	String containing the Unicode data to be transferred into the host presentation space.	
Length	Length, in number of Unicode characters, of the source Unicode string. Note: The EOT mode is not supported in a Unicode session; therefore, length should be specified for proper functioning of this function in a Unicode session.	
PS Position	Position in the host presentation space to begin the copy, a value between 1 and the configured size of your host presentation space.	

Return Parameters:

Return Code	Explanation
0	The Copy String to Presentation Space function was successful.
1	Your program is not connected to a host session.
2	Parameter error or zero length for copy.
5	The target presentation space is protected or inhibited, or incorrect data was sent to the target presentation space (such as a field attribute byte).
6	The copy was completed, but the data was truncated.
7	The host presentation space position is not valid.
9	A system error was encountered.

Notes on Using This Function: The following options are supported in a Unicode session for **Copy String to Presentation Space** and function in the same way as in DBCS:

- STRLEN
- EAB
- NOEAB
- NOXLATE
- PUTEAB
- NOPUTEAB

1137 Code Page Support

Unicode functionality is supported only on 5250 sessions.

STREOT option is not supported in a Unicode session. Please refer to “Set Session Parameters (9)” on page 152 for details.

The XLATE option (that can be specified using the **Set Session Parameters** (9) function) is not supported in a Unicode session. This means that even if this option is issued, the EABs will not be translated to the PC color graphics adapter (CGA) format.

Prerequisite Calls: Connect Presentation Space (1)

Call Parameters:

	Standard Interface	Enhanced Interface
Function Number	Must be 15	
Data String	String containing the Unicode data to be transferred into the host presentation space.	
Length	Length, in number of Unicode characters, of the source Unicode string. The length should be at least 2 bytes. If not, an error code of 2 is returned. Note: The EOT mode is not supported in a Unicode session; therefore, length should be specified for proper functioning of this function in a Unicode session.	
PS Position	Position in the host presentation space to begin the copy, a value between 1 and the configured size of your host presentation space.	

Return Parameters:

Return Code	Explanation
0	The Copy String to Presentation Space function was successful.
1	Your program is not connected to a host session.
2	Parameter error or zero length for copy.
5	The target presentation space is protected or inhibited, or incorrect data was sent to the target presentation space (such as a field attribute byte).
6	The copy was completed, but the data was truncated.
7	The host presentation space position is not valid.
9	A system error was encountered.

Notes on Using This Function: The following options are supported in a Unicode session for **Copy String to Presentation Space** and function in the same way as in SBCS:

- STRLEN
- EAB
- NOEAB
- NOXLATE
- PUTEAB
- NOPUTEAB

Copy Presentation Space to Clipboard (35)

3270	5250	VT
Yes	Yes	Yes

The **Copy Presentation Space to Clipboard** function is used to copy all or part of the host-connected presentation space into clipboard. The input PS position is the offset into the host presentation space. This offset is based on a layout in which the upper-left corner (row 1/column 1) is location 1 and the bottom-right corner is 3564, which is the maximum screen size for the host presentation space. The value of PS Position + (Length - 1) cannot exceed the configured size of your host presentation space.

The **Copy Presentation Space to Clipboard** translates the characters in the host source presentation space into ASCII. Attribute bytes and other characters not represented in ASCII normally are translated into blanks. If you do not want the attribute bytes translated into blanks, you can override this translation with the ATTRB option under the **Set Session Parameters (9)** function.

Prerequisite Calls

Connect Presentation Space (1)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 35.	
Data String	Preallocated target string the size of your host presentation space. When the Set Session Parameters (9) function with the EAB option is issued, the length of the data string must be at least twice the length of the presentation space. DBCS Only: When the EAD option is specified, the length of the data string must be at least three times the length of the presentation space. When both the EAB and EAD options are specified, the length of the data string must be at least four times the length of the presentation space.	
Length	Length of the target data string	
PS Position	Position within the host presentation space of the first byte in your target data string.	

Return Parameters

Return Code	Explanation
0	The host presentation space contents were copied to the clipboard. The target presentation space was active, and the keyboard was unlocked.
1	Your program is not connected to a host session.
2	An error was made in specifying string length, or the sum of (Length - 1) + PS position is greater than the size of the connected host presentation space.
4	The host presentation space contents were copied to clipboard. The host presentation space was waiting for host response.
5	The host presentation space was copied to clipboard. The keyboard was locked.
7	The host presentation space position is not valid.
9	A system error was encountered.

Notes on Using This Function

1. An EAB can be returned when the **Set Session Parameters (9)** function EAB option is used. EAB is related to each character in the presentation space and is returned following each character.
2. **DBCS Only:** The **Set Session Parameters (9)** function EAD option is used with this function to return a 2-byte EAD. If the EAD option is specified instead of the EAB option, EAD is returned preceding each character. If both the EAB and EAD options are specified, EAD is returned following the EAB. If the start position of the copy is at the second byte in the double-byte character, or the end position is at the first byte in the double-byte character, the bytes are translated into blanks. If the EAD option is set to on, three bytes are returned for each character. If both the EAB and EAD options are set to on, four bytes are returned for each character.
3. The **Copy Presentation Space to Clipboard** function is affected by the following options:
 - ATTRB/NOATTRB/NULLATTRB
 - EAB/NOEAB
 - XLATE/NOXLATE
 - BLANK/NOBLANK
 - DISPLAY/NODISPLAY
 - PUTEAB/NOPUTEAB
 - EAD/NOEAD (for DBCS only)
 - NOSO/SPACESO/SO (for DBCS only)
 - EXTEND_PS/NOEXTEND_PS
4. The data string buffer is used in processing the data retrieved from presentation space and copy to clipboard. If the data string buffer provided is not large enough to hold the requested number of bytes, the copy ends successfully (RC=0, 4, or 5) when the end of the data string buffer is reached. As previously stated, the return of attributes by the various **Copy (5, 8, and 34)** functions is affected by the **Set Session Parameters (9)** function. The involved set session parameters have the following effect:

Set Session Parameter

Effect on the Copy Function

NOEAB and NOEAD

Attributes are not returned. Only text is copied from the presentation space to the clipboard.

EAB and NOXLATE

Attributes are returned as defined in the following tables.

EAB and XLATE

The colors used for the presentation space display are returned. Colors can be remapped, so the attribute colors are not the ones returned by the **Copy** functions when XLATE and EAB are on at the same time.

EAD

Double-byte character set attributes are returned as shown in the following tables. The returned character attributes are defined in the following tables. The attribute bit positions are in IBM format with bit 0 the left most bit in the byte. v 3270 character attributes are returned from the host to the emulator. The following table applies when EAB and NOXLATE are set.

Paste Clipboard to Presentation Space (36)

3270	5250	VT
Yes	Yes	Yes

The **Paste Clipboard to Presentation Space** function pastes an ASCII data string directly into the host presentation space at the location specified by the PS position calling parameter.

Prerequisite Calls

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 36.	
Data String	String buffer that holds the data from clipboard to paste into the host presentation space.	
Length	Length, in number of bytes to be pasted	
PS Position	Position in the host presentation space to begin the copy, a value between 1 and the configured size of your host presentation space.	

Return Parameters

Return Code	Explanation
0	The Paste Clipboard to Presentation Space function was successful.
1	Your program is not connected to a host session.
2	Parameter error or zero length for copy
5	The target presentation space is protected or inhibited, or incorrect data was sent to the target presentation space (such as a field attribute byte).
6	The copy was completed, but the data was truncated.
7	The copy was completed, but the data was truncated.
9	A system error was encountered.

Notes on Using This Function

- The **Paste Clipboard to Presentation Space** function is affected by the following options:
 - STRLEN/STREOT
 - EAB/NOEAB
 - EOT
 - XLATE/NOXLATE
 - PUTEAB/NOPUTEAB
 - EAD/NOEAD (for DBCS only)
 - NOSO/SPACESO/SO (for DBCS only)
 - EXTEND_PS/NOEXTEND_PS

2. The string ends when an end-of-text (EOT) delimiter is encountered in the string if EOT mode was selected using the **Set Session Parameters (9)** function. (See "Set Session Parameters (9)" on page 147).
3. The original data (the copied string) cannot exceed the size of the presentation space.
4. **DBCS Only:** Double-byte characters can be included as a part of the string. **Note:** PC400 does not add SO and SI to the string. When you paste the strings, including double-byte characters at the DBCS mixed field, generate SO and SI and create the area where double-byte characters are written by using the **Send Key (3)** function in advance. If both single-byte and double-byte characters exist in a string, the data might be truncated because the data length in EBCDIC is longer than in JISCI. If only the first byte or the second byte of the double-byte character must be written into the string, a blank is written. If the last character in the original string is the first byte of the double-byte character, the character is not written and not counted in the length. If the character to be written into the last character of the target presentation space is SO/SI or the first byte of the double-byte character, the character is not written and truncated, and not counted in the length. A control character is converted from single-byte character to double-byte character, or from double-byte character to single-byte character depending on the field condition. A pair of NULL+Control Character between SO and SI is treated as a double-byte control character. For example, the following strings are copied into the single-byte character field or the double-byte character field:

String	Meanings	Single-byte character field	Double-byte character field
X'000C'	(NULL)(FF) X'00'X'0C'	(SB NULL)(SB FF) X'00'X'0C'	(DB NULL)(DB FF) X'0000'X'000C'
X'0E000C0F'	(SO)(DB FF)(SI) X'0E'X'000C'X'0F'	-S error	(DB FF) X'000C'
Note: SB means single-byte characters and DB means double-byte characters.			

Note: SB means single-byte characters and DB means double-byte characters.

Note: 5250 emulation supports a presentation space of 24 rows by 80 columns. In some instances, Communication Manager 5250 emulation displays a 25th row. This occurs when either an error message from the host is displayed or when the operator selects the SysReq key. Personal Communications always displays the same information on the 24th row. By the **EXTEND_PS** option, an EHLLAPI application can use the same interface with Communication Manager EHLLAPI and valid presentation space is extended when this condition occurs.

Disconnect from Structured Fields (121)

3270	5250	VT
Yes	No	No

The **Disconnect from Structured Fields** function drops the connection between the emulation program and the EHLLAPI application. The EHLLAPI application must disconnect from the emulation program before exiting from the system. The EHLLAPI application should issue this function request if a previous **Connect for Structured Fields** was issued.

The **Reset System (21)** function will also disconnect any outstanding SF connections.

Prerequisite Calls

Connect for Structured Fields (120)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 121	
Data String	See the following table	
Length	Must be 3	Must be 8
PS Position	NA	

Data String Contents

Byte		Definition
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID).
	2-4	Reserved.
2-3	5-6	Destination/origin unique ID returned by the Connect for structured field (120) functions.
	7-8	Reserved.

Return Parameters

Return Code	Explanation
0	The Disconnect from Structured Fields function was successful.
1	A specified host presentation space short session ID was not valid or was not connected.
2	An error was made in specifying parameters.
9	A system error occurred.
40	Disconnected with asynchronous requests pending.

Notes on Using This Function

1. When a **Disconnect from Structured Fields** function is called, any outstanding asynchronous **Read Structured Fields (126)** or **Write Structured Fields (127)** function requests are returned if the application issues the **Get Request Completion (125)** function call. Use the asynchronous form of this function when cleaning up after issuing a Disconnect call.
2. The **Reset System (21)** function will also free any outstanding asynchronous requests (requests that have not been retrieved by the application using the **Get Request Completion (125)** function).

Disconnect Presentation Space (2)

3270	5250	VT
Yes	Yes	Yes

The **Disconnect Presentation Space** function drops the connection between your EHLLAPI application program and the host presentation space. Also, if a host presentation space is reserved using the **Reserve (11)** function, it is released upon execution of the **Disconnect Presentation Space** function.

Prerequisite Calls

Connect Presentation Space (1)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 2	
Data String	NA	
Length	NA	
PS Position	NA	

Return Parameters

Return Code	Explanation
0	The Disconnect Presentation Space function was successful.
1	Your program was not currently connected to the host presentation space.
9	A system error was encountered.

Notes on Using This Function

1. After the **Disconnect Presentation Space** function is called, functions that interact with the host-connected presentation space are no longer valid (for example, the **Send Key (3)**, **Wait (4)**, **Reserve (11)** and **Release (12)** functions).
2. Your EHLLAPI application should disconnect from the host presentation space before exiting.
3. The **Disconnect Presentation Space** function does not reset the session parameters to the defaults. Your EHLLAPI application must call the **Reset System (21)** function to accomplish this.

Disconnect Window Service (102)

3270	5250	VT
Yes	Yes	Yes

The **Disconnect Window Service** function disconnects the window services connection between the EHLLAPI program and the specified host presentation space window.

Prerequisite Calls

Connect Window Services (101)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 102	
Data String	See the following table	

	Standard Interface	Enhanced Interface
Length	1	4
PS Position	NA	

Data String Contents

Byte		Definition
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID)
	2-4	Reserved

Return Parameters

Return Code	Explanation
0	The Disconnect Window Service function was successful.
1	Your program is not connected for Window Services.
9	A system error occurred.

Notes on Using This Function

After the **Disconnect Window Service** function has been called, your application no longer manages the presentation space window.

Before exiting the application, you should request a **Disconnect Window Service** function for all presentation spaces that have been connected for Presentation Manager services. If the application exits with an outstanding connection for window services, the subsystem cancels the outstanding connection.

EditKey Intercept

This feature enables you to intercept Edit keys in addition to the existing all keystrokes and send them to a session in a Windows 32-bit environment.

Prerequisites

1. Map the Edit functions in the Customize Keyboard window (for example Ctrl+C for edit copy function).
2. Call the Start Keystroke Intercept (50) EHLLAPI function with the call parameter data string value set. The values are as follows:

Byte Position	Contents
1	One of the following values: <ul style="list-style-type: none"> • A specific host presentation space short name (PSID) • A blank or null indicating a request for the host-connected host presentation space
2 to 4	Reserved

Byte Position	Contents
5	An option code character: <ul style="list-style-type: none"> • D for AID keystrokes only • L for all keystrokes • E for all keystrokes and Edit keys • M for requesting the asynchronous message mode of the notification (Windows only). If M is specified, a code character D or L, or E must be placed in position 13
6 to 8	Reserved
9 to 12	If M is specified in position 5, the window handle of the window that receives the message. The message is a non-zero return value of RegisterWindowMessage (PCSHLL).
13	If M is specified in position 5, one of the following values: <ul style="list-style-type: none"> • D for AID keystrokes only • L for all keystrokes • E for all keystrokes and Edit keys
14 to 16	Reserved

3. To get the intercepted Edit keys, use the Get Key (51) EHLLAPI function. The key mnemonic returned in the data string for the Edit keys will have M (keystroke type mnemonic) at the 5th byte position. The next 4 bytes will have one of the following Edit key mnemonics based on the Edit key intercepted:

Key mnemonic	Key intercepted
@W@C	Edit Copy
@W@D	Edit Clear
@W@E	Edit Copy Append
@W@L	Edit Copy Link
@W@N	Edit Paste Next
@W@V	Edit Paste
@W@X	Edit Cut
@W@Z	Edit Undo

4. To send Edit keys to the session, use the Send Key (3) EHLLAPI function. The data string passed as the call parameter can specify the following Edit key mnemonics:

Key mnemonic	Key sent
@W@C	Edit Copy
@W@D	Edit Clear
@W@E	Edit Copy Append
@W@L	Edit Copy Link
@W@N	Edit Paste Next
@W@V	Edit Paste

Key mnemonic	Key sent
@W@X	Edit Cut
@W@Z	Edit Undo

Notes:

1. You do not have to call the Get Key (51) EHLAPI function to use the Send Key (3) function. For both Get Key (51) and Send Key (3) functions to handle Edit keys, you must first call Start Keystroke Intercept (50) with the 5th byte position set to E. If the 5th byte contains M, then position 13 must contain E.
2. The expected return values for Start Keystroke Intercept (50), Get Key (51) and Send Key (3) functions have not changed.
3. Any prerequisites from the existing documentation should be followed as well as the prerequisites documented here.

Find Field Length (32)

3270	5250	VT
Yes	Yes	Yes

The **Find Field Length** function returns the length of a target field in the connected presentation space. This function can be used to find either protected or unprotected fields, but only in a *field-formatted* host presentation space.

This function returns the number of characters contained in the field identified using the call PS position parameter. This includes all characters from the beginning of the target field up to the character preceding the next attribute byte.

Prerequisite Calls

Connect Presentation Space (1)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 32	
Data String	See the following table	
Length	NA	NA
PS Position	See note	

Note: PS Position: Identifies the field within the host presentation space at which to start the **Find**. It can be the PS position of any byte within the field in which you desire the **Find** to start.

The calling 2-character data string can contain:

Code	Explanation
bb or Tb	This field
Pb	The previous field, either protected or unprotected.
Nb	The next field, either protected or unprotected
NP	The next protected field

Code	Explanation
NU	The next unprotected field
PP	The previous protected field
PU	The previous unprotected field

Note: The `b` symbol represents a required blank.

Return Parameters

This function returns a length and a return code.

Length:

The following lengths are valid:

Length	Explanation
= 0	When return code = 28, field length is 0. When return code = 24, host presentation space is not field formatted.
> 0	Required field length in the host presentation space.

Return Code:

The following codes are defined:

Return Code	Explanation
0	The Find Field Length function was successful.
1	Your program is not connected to a host session.
2	A parameter error was encountered.
7	The host presentation space position is not valid.
9	A system error was encountered.
24	No such field was found.
28	Field length of 0 bytes.

Notes on Using This Function

Except when `bb` or `Tb` is used as the calling data string, if the field found is the same as the field from which the **Find** started, a return code of 24 is returned.

Find Field Position (31)

3270	5250	VT
Yes	Yes	Yes

The **Find Field Position** function returns the beginning position of a target field in the host-connected presentation space. This function can be used to find either protected or unprotected fields but only in a *field-formatted* host presentation space.

Prerequisite Calls

Connect Presentation Space (1)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 31	
Data String	See the following table	
Length	NA	NA
PS Position	See note	

Note: PS Position: Identifies the field within the host presentation space at which to start the **Find**. It can be the PS position of any byte within the field in which you want the **Find** to start.

The calling 2-character data string can contain:

Code	Explanation
bb or Tb	This field
Pb	The previous field, either protected or unprotected
Nb	The next field, either protected or unprotected
NP	The next protected field
NU	The next unprotected field
PP	The previous protected field
PU	The previous unprotected field

Note: The b symbol represents a required blank.

Return Parameters

This function returns a length and a return code.

Length:

The following lengths are valid:

Length	Explanation
= 0	When return code = 28, field length is 0. When return code = 24, host presentation space is not field-formatted.
> 0	Relative position of the requested field from the origin of the host presentation space. This position is defined to be the first position after the attribute byte.

Return Code:

The following codes are defined:

Return Code	Explanation
0	The Find Field Position function was successful.
1	Your program is not connected to a host session.
2	A parameter error was encountered.
7	The host presentation space position is not valid.
9	A system error was encountered.

Return Code	Explanation
24	No such field was found.
28	Field length of 0 bytes.

Notes on Using This Function

Except when bb or Tb is used as the calling data string, if the field found is the same as the field from which the **Find** started, a return code of 24 is returned.

Free Communications Buffer (124)

3270	5250	VT
Yes	No	No

The **Free Communications Buffer** function returns to management memory a buffer that is no longer required by the application. The application should free the buffer prior to exiting the system.

Prerequisite Calls

Allocate Communications Buffer (123)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 124	
Data String	See the following table	
Length	Must be 6	Must be 8
PS Position	NA	

Data String Contents

Byte		Definition
Standard	Enhanced	
1-2	1-4	Must be 0
3-6	5-8	The address of the buffer

Return Parameters

Return Code	Explanation
0	The Free Communications Buffer function was successful.
2	An error was made in specifying parameters.
9	A system error occurred.
41	The buffer is in use.

Notes on Using This Function

1. If the application attempts to free an in use buffer, the free request will be denied and a return code of 41 will be returned.

2. An application should request the **Free Communications Buffer** (124) function before exiting for all communication buffers that have been allocated using the **Allocate Communications Buffer** (123) function.
3. The **Reset System** (21) function will free buffers allocated by the **Allocate Communications Buffer** (123) function.

Get Key (51)

3270	5250	VT
Yes	Yes	Yes

The **Get Key** function lets your EHLLAPI application program retrieve a keystroke from a session specified by the **Start Keystroke Intercept** (50) function and either process, accept, or reject that keystroke. By placing this function in a loop, you can use it to intercept a string.

Prerequisite Calls

Start Keystroke Intercept (50)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 51	
Data String	See the following table	
Length	8	12
PS Position	NA	

Data String Contents

Byte		Definition
Standard	Enhanced	
1	1	One of the following values: <ul style="list-style-type: none"> • A 1-character presentation space short name (PSID) • A blank or null indicating a function call for the host-connected presentation
	2-4	Reserved
2-8	5-11	Blanks that hold space for the symbolic representation of the requested data
	12	Reserved

Return Parameters

This function returns a data string and a return code.

Data String:

See the following table:

Byte		Definition
Standard	Enhanced	

Byte		Definition
1	1	One of the following values: <ul style="list-style-type: none"> • A 1-character presentation space short name (PSID) • A blank or null indicating a function call for the host-connected presentation
	2-4	Reserved
2	5	An option code character, one of the following characters: <ul style="list-style-type: none"> • A for ASCII returned • M for keystroke mnemonic • S for special mnemonic
3-8	6-11	These 6 bytes of the preallocated buffer space are used internally to enqueue and dequeue keystrokes. Possible combinations include: <ul style="list-style-type: none"> • Byte 3 contains an ASCII character and byte 4 contains X'00' • Bytes 3 and 4 contain a double-byte character • Byte 3 contains the escape character (either @ or another character specified using the ESC=c option of function 9) and byte 4 contains a 1-byte abbreviation for a function. (See "ASCII Mnemonics" on page 17) • Bytes 5 through 8 might be similar to bytes 3 and 4 if the returned ASCII mnemonic is longer than 2 bytes (for example, if the ASCII mnemonic represents Attn @A@Q, byte 5 contains @ and byte 6 contains Q). If not used, bytes 5 through 8 are set to zero (X'00').

For clarification, some examples of returned data strings are provided below:

Note: The @ symbol is the default escape character. The value of the escape character can be set to any keystroke represented in ASCII by using the ESC=c option of the **Set Session Parameters** (9) function. If the escape character has been changed to another character using this option, the @ symbol in the following examples is replaced by the other character.

16-Bit Interface

EAt E is the presentation space short name. The keystrokes are returned as ASCII (A), and the returned key is the lowercase letter t. (Bytes 4-8 = X'00').

EM@2 E is the presentation space short name. The keystrokes are returned as mnemonics, and the returned key is PF2 (Bytes 5-8 = X'00').

32-Bit Interface

EbbbAt E is the presentation space short name. The keystrokes are returned as ASCII (A), and the returned key is the lowercase letter t. (Bytes 7-11 = X'00').

EbbbM@2

E is the presentation space short name. The keystrokes are returned as mnemonics, and the returned key is PF2 (Bytes 8-11 = X'00').

Return Code:

The following codes are valid:

Return Code	Explanation
0	The Get Key function was successful.
1	An incorrect presentation space was specified.
5	You specified the AID only option under the Start Keystroke Intercept (50) function, and non-AID keys are inhibited by this session type when EHLLAPI tries to write incorrect keys to the presentation space.
8	No prior Start Keystroke Intercept (50) function was called for this presentation space.
9	A system error was encountered.
20	An undefined key combination was typed.
25	The requested keystrokes are not available on the input queue.
31	Keystroke queue overflowed and keystrokes were lost.

Notes on Using This Function

1. If a return code of 31 occurs for the **Get Key** function, either:
 - Increase the value of the calling length parameter for the **Start Keystroke Intercept (50)** function, or
 - Execute the **Get Key** function more frequently.

An intercepted keystroke occupies 3 bytes in the buffer. The next intercepted keystroke is placed in the adjacent three bytes. When the **Get Key** function retrieves a keystroke (first in first out, FIFO), the three bytes that it occupied are made available for another keystroke. By increasing the size of the buffer or the rate at which keystrokes are retrieved from the buffer, you can eliminate buffer overflow.

For the PC/3270, another way to eliminate return code 31 is to operate the PC/3270 emulator in the resume mode.

2. You can use the **Send Key (3)** function to pass both original keystrokes and any others that your EHLLAPI application might need to the host-connected presentation space.
3. Keystrokes arrive asynchronously and are enqueued in the keystroke queue that you have provided in your EHLLAPI application program using the **Start Keystroke Intercept (50)** function.
4. The **Get Key** function behaves like a read. When keystrokes are available, they are read into the data area that you have provided in your application.
5. In the case of field support for a session, the application might be interested only in AID keys, for example the Enter key. If so, the **Start Keystroke Intercept (50)** function option code should be set to D (meaning for AID Keys only).
6. To use this function, preallocate memory to receive the returned data string parameter. The statements required to preallocate this memory vary depending on the language in which your application is written. Refer to "Memory Allocation" on page 8 for more information.

1390/1399 Code Page Support

Unicode functionality is supported only on 3270 and 5250 sessions.

The session option ESC is not supported in a Unicode session; using this option you cannot set a Unicode character as an ESC character. Use the default ESC character @ in a Unicode session. See “Set Session Parameters (9)” on page 152 for details.

Prerequisite Calls: Start Keystroke Intercept (50)

Call Parameters:

	Standard Interface	Enhanced Interface
Function Number	Must be 51	
Data String	See the following table	
Length	8	12
PS Position	NA	

Data String Contents:

Byte		Definition
Standard	Enhanced	
1	1	One of the following values: <ul style="list-style-type: none"> • A 1-character presentation space short name (PSID) • A blank or null indicating a function call for the host-connected presentation
	2–4	Reserved
2–8	5–11	Blanks that hold space for the symbolic representation of the requested data
	12	Reserved

Return Parameters: This function returns a data string and a return code.

Data String:

See the following table for 32-bit interface:

Byte	Definition
1	One of the following values: <ul style="list-style-type: none"> • A 1-character presentation space short name (PSID) • A blank or null indicating a function call for the host-connected presentation
2–4	Reserved
5	U is the option code character for a Unicode session.
6–11	The definition of these bytes is similar to the DBCS session; the only difference is that the Unicode character value is stored in bytes 6 and 7 when the option code character is U. In a DBCS session, the ASCII character value is stored in byte 3 and byte 4 contains 0X'00' when the option code character is A.

Return Code:

The following codes are valid:

Return Code	Explanation
0	The Get Key function was successful.
1	An incorrect presentation space was specified.
5	You specified the AID only option under the Start Keystroke Intercept (50) function, and non-AID keys are inhibited by this session type when EHLLAPI tries to write incorrect keys to the presentation space.
8	No prior Start Keystroke Intercept (50) function was called for this presentation space.
9	A system error was encountered.
20	An undefined key combination was typed.
25	The requested keystrokes are not available on the input queue.
31	Keystroke queue overflowed and keystrokes were lost.

1137 Code Page Support

Unicode functionality is supported only on 5250 sessions.

The session option ESC is not supported in a Unicode session; using this option you cannot set a Unicode character as an ESC character. Use the default ESC character @ in a Unicode session. See “Set Session Parameters (9)” on page 152 for details.

Prerequisite Calls: **Start Keystroke Intercept** (50)

Call Parameters:

	Standard Interface	Enhanced Interface
Function Number	Must be 51	
Data String	See the following table	
Length	8	12
PS Position	NA	

Data String Contents:

Byte		Definition
Standard	Enhanced	
1	1	One of the following values: <ul style="list-style-type: none"> • A 1-character presentation space short name (PSID) • A blank or null indicating a function call for the host-connected presentation
	2–4	Reserved
2–8	5–11	Blanks that hold space for the symbolic representation of the requested data
	12	Reserved

Return Parameters: This function returns a data string and a return code.

Data String:

See the following table for 32-bit interface:

Byte	Definition
1	One of the following values: <ul style="list-style-type: none"> • A 1-character presentation space short name (PSID) • A blank or null indicating a function call for the host-connected presentation
2–4	Reserved
5	U is the option code character for a Unicode session.
6–11	The definition of these bytes is similar to the SBCS session, the only difference is that the Unicode character value is stored in bytes 6 and 7 when the option code character is U. In a DBCS session, the ASCII character value is stored in byte 3 and byte 4 contains 0X'00' when the option code character is A.

Return Code:

The following codes are valid:

Return Code	Explanation
0	The Get Key function was successful.
1	An incorrect presentation space was specified.
5	You specified the AID only option under the Start Keystroke Intercept (50) function, and non-AID keys are inhibited by this session type when EHLLAPI tries to write incorrect keys to the presentation space.
8	No prior Start Keystroke Intercept (50) function was called for this presentation space.
9	A system error was encountered.
20	An undefined key combination was typed.
25	The requested keystrokes are not available on the input queue.
31	Keystroke queue overflowed and keystrokes were lost.

Get Request Completion (125)

3270	5250	VT
Yes	No	No

The **Get Request Completion** function allows an application to determine the status of a previous asynchronous function request issued to the EHLLAPI and to obtain the function parameter list before using the data string again. This function is valid only if the user specified asynchronous (A) completion on a previous function call such as **Read Structured Fields** (126) or **Write Structured Fields** (127).

Each asynchronous request requiring the **Get Request Completion** function will return a unique ID from the asynchronous request. The application must save this ID. This ID is the identification used by the **Get Request Completion** function to identify the desired request. The user has three request options using this function:

1. The application can query or wait for a specific asynchronous function request by supplying the request ID of that function and a nonblank session short name.

- The application can query or wait for the first completed asynchronous function request for a specified session by supplying a request ID of X'0000' and a nonblank session short name.

Prerequisite Calls

Connect Structured Fields (120) and Allocate Communications Buffer (123)

and

Read Structured Fields (126) or Write Structured Fields (127)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 125	
Data String	See the following table	
Length	Must be 14	Must be 24
PS Position	NA	

Data String Contents

Byte		Definition
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID)
	2-4	Reserved
2	5	N or W N=NOWAIT is required W=WAIT is required
	6-8	Reserved
3-4	9-10	Function request ID.
5-6	11-12	Reserved
7-10	13-16	Reserved
11-12	17-20	Reserved
13-14	21-24	Reserved

The **Get Request Completion** function behaves differently depending upon the second character of the parameter string, which is one of the following characters:

- N** Nowait option: If a specific request ID was supplied and the function has completed, control will be returned to the application with a return code of zero and a completed data string as defined in "Return Parameters" on page 101. If a request ID of zero was supplied and any eligible asynchronous function has completed, control will be returned to the application with a return code of zero and a completed data string as defined in "Return Parameters" on page 101.
- W** Wait option: If a specific request ID was supplied and the function has not completed, the call will wait until the function has completed before returning to the application. If the supplied request ID was zero and no eligible asynchronous function has completed, the call will wait until a function completes before returning to the calling application. On return, the return code value will be zero and the data string will be completed as defined in "Return Parameters" on page 101.

Return Parameters

Byte		Definition
Standard	Enhanced	
5-6	11-12	Function number of the completed asynchronous function (126 or 127). (returned)
7-10	13-16	Address of the data string of the completed asynchronous function call. (The application must not reuse the data string until the request has completed). (returned)
11-12	17-20	Length of the data string of the completed asynchronous function call. (returned)
13-14	21-24	Return code of the completed asynchronous function call. (returned)

Return Code	Explanation
0	The Get Request Completion function was successful.
2	An error was made in specifying parameters.
9	A system error was encountered.
38	Requested function was not complete.
42	No matching request was found.

There are some differences between return codes 38 and 42:

1. Return code 38
 - a. If a specific request ID and session were requested, both the session and ID were found but the request is pending (not in a completed state).
 - b. If a zero request ID and a specific session were requested, the specified session has pending requests, but they are not satisfied (complete).
 - c. If a zero request ID and a blank session were requested, pending requests were found but none were satisfied (complete).
2. Return code 42
 - a. If a specific request ID and session were requested, the specific request ID was not found in either a pending or a completed state.
 - b. If a zero request ID and a specific session were requested, the specific session contains no pending or completed requests.
 - c. If a zero request ID and a blank session were requested, no pending or completed requests were found.

Notes on Using This Function

1. This function is valid only if the user specified asynchronous completion (A for Asynchronous) on a previous function call such as **Read Structured Fields** or **Write Structured Fields**.
2. If the return code is a 0, the application should check the returned data string for information pertaining to the completion of the requested asynchronous function.

Lock Presentation Space API (60)

3270	5250	VT
Yes	No	No

The **Lock Presentation Space API** function allows the application to obtain or release exclusive control of the presentation space window over other Windows 32-bit applications. While locked, no other application can connect to the presentation space window.

Successful processing of this function with the Lock causes EHLLAPI presentation space window functions requested from other EHLLAPI applications to be queued until the requesting application unlocks the presentation space. Requests from the locking application are processed normally.

Prerequisite Calls

Connect to Presentation Space (1)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 60	
Data String	See the following table	
Length	Must be 3	Must be 8
PS Position	NA	

Data String Contents

Byte		Definition
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID).
	2-4	Reserved.
2	5	One of the following characters: <ul style="list-style-type: none"> • L to lock the API. • U to unlock the API.
3	6	One of the following characters: <ul style="list-style-type: none"> • R to return if the presentation space is already locked by an application. • Q to queue the Lock request if the presentation space is already locked by an application.
	7-8	Reserved.

Return Parameters

Return Code	Explanation
0	The Lock Presentation Space API function was successful.
1	An incorrect host presentation space short session ID was specified or was not connected.
2	An error was made in specifying parameters.

Return Code	Explanation
9	A system error was encountered.
43	The API was already locked by another EHLLAPI application (on LOCK) or API not locked (on UNLOCK).

Notes on Using This Function

The following EHLLAPI functions are queued when a lock is in effect:

- **Send Key** (3)
- **Copy Presentation Space** (5)
- **Search Presentation Space** (6)
- **Copy Presentation Space to String** (8)
- **Release** (11)
- **Reserve** (12)
- **Query Field Attribute** (14)
- **Copy String to Presentation Space** (15)
- **Search Field** (30)
- **Find Field Position** (31)
- **Find Field Length** (32)
- **Copy String to Field** (33)
- **Copy Field to String** (34)
- **Set Cursor** (40)
- **Send File** (90)
- **Copy Presentation Space to Clipboard** (35)
- **Paste Clipboard to Presentation Space** (36)
- **Receive File** (91)
- **Connect to Presentation Space** (1) with the CONPHYS parameter set in a previous **Set Sessions Parameter** (9) function call.

These queued requests are not serviced until the lock is removed. When the lock is removed, the queued requests are processed in first-in-first-out (FIFO) order. EHLLAPI functions not listed are run as if there was no lock. The requesting application unlocks the presentation space window by one of the following methods:

- Disconnecting from the presentation space while still owning the Lock.
- Issuing the **Reset System** (21) function while still owning the Lock.
- Stopping the application while still owning the Lock.
- Stopping the session.
- Successfully issuing the **Lock Presentation Space API** with the Unlock option.

Before exiting the application, you should unlock any presentation space windows that have been locked with the **Lock Presentation Space API** function. If the application exits with outstanding locks, or a **Reset System** (21), or **Disconnect Presentation Space** (2) function is issued, the locks are released.

It is recommended that applications lock the presentation space only for short periods of time and only when exclusive use of the presentation space is required.

Lock Window Services API (61)

3270	5250	VT
Yes	No	No

The **Lock Window Services API** function allows the application to obtain or release exclusive control of the presentation space window over other Windows 32-bit applications. While locked, no other application can connect to the presentation space window.

Successful processing of this function with the Lock causes EHLLAPI presentation space window functions requested from other EHLLAPI applications to be queued until the requesting application unlocks the presentation space. Requests from the locking application are processed normally.

Prerequisite Calls

Connect Window Services (101)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 61	
Data String	See the following table.	
Length	Must be 3	Must be 8
PS Position	NA	

Data String Contents

Byte		Definition
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID).
	2-4	Reserved.
2	5	One of the following characters: <ul style="list-style-type: none"> • L to lock the API. • U to unlock the API.
3	6	One of the following characters: <ul style="list-style-type: none"> • R to return if the presentation space is already locked by an application. • Q to queue the Lock request if the presentation space is already locked by an application.
5-6	11-12	Function number of the completed asynchronous function (126 or 127). (returned)
	7-8	Reserved.

Return Parameters

Return Code	Explanation
0	The Lock Window Services API function was successful.

Return Code	Explanation
1	An incorrect host presentation space short session ID was specified or was not connected.
2	An error was made in specifying parameters.
9	A system error was encountered.
38	Requested function was not complete.
43	The API was already locked by another EHLLAPI application (on LOCK) or API not locked (on UNLOCK).

Notes on Using This Function

The following EHLLAPI functions are queued when a lock is in effect:

- **Window Status** (104)
- **Change Switch List Name** (105)
- **Change PS Window Name** (106)

These queued requests are not serviced until the lock is removed. When the lock is removed, the queued requests are processed in first-in-first-out (FIFO) order.

The requesting application unlocks the presentation space window by one of the following methods:

- Successfully issuing the **Lock Window Services API** with the UNLOCK option.
- Disconnecting from the presentation space while still owning the Lock.
- Issuing the **Reset System** (21) function while still owning the Lock.
- Stopping the application while still owning the Lock.
- Stopping the session.

Before exiting the application, you should Unlock any presentation space windows that have been locked with the **Lock Window Services API** function. If the application exits with outstanding locks, the subsystem releases the locks.

It is recommended that applications lock the presentation space only for short periods of time and only when exclusive use of the presentation space is required.

Pause (18)

3270	5250	VT
Yes	Yes	Yes

The **Pause** function waits for a specified amount of time. It should be used in place of *timing loops* to wait for an event to occur. A **Pause** function can be ended by a host event if a prior **Start Host Notification** (23) function has been called and the IPAUSE option is selected.

Prerequisite Calls

There are no prerequisite calls for this function.

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 18	

	Standard Interface	Enhanced Interface
Data String	NA	
Length	Contains the pause duration in half-second increments	
PS Position	NA	

Return Parameters

Return Code	Definition
0	The wait duration has expired.
9	An internal system error was encountered. The time results are unpredictable.
26	The host session presentation space or OIA has been updated. Use the Query Host Update (24) function to get more information.

Notes on Using This Function

1. Selecting the FPAUSE or IPAUSE option using the **Set Session Parameters** (9) function affects the length of the pause you get when you call this function. See item 6 on page 154 for more information.
2. The value entered in the calling length parameter is the maximum number of half-second intervals that the **Pause** function waits. For a pause of 20 seconds, a hex value of 0028 (decimal 40) must be passed in the calling length parameter.
3. If you use the IPAUSE option and the pause value is zero, then the function waits up to 2400 half-second intervals, unless interrupted sooner. If you use the FPAUSE option and the pause value is zero, then the function returns immediately.
4. If you use the IPAUSE option, once a pause has been satisfied by a host event, you should call the **Query Host Update** (24) function to clear the queue prior to the next **Pause** function. The **Pause** function will continue to be satisfied with the pending event until the **Query Host Update** (24) function is completed.
5. A practical maximum value for the **Pause** function is 2400. You should not use the **Pause** function for these kinds of tasks:
 - Delay for very long durations (of several hours, for example).
 - Delay for more than a moderate length of time (20 minutes) before checking the system time-of-day clock and proceeding with your EHLLAPI program execution.
 - With applications requiring a high-resolution timer because the time interval created by a **Pause** function is approximate.
 - Set the time interval to zero in a loop.
6. IPAUSE set and the interruptible pause allow an EHLLAPI application to determine whether the specified host presentation space (PS) or operator information area (OIA) is updated. The following three functions are used:
 - **Start Host Notification** (23)
 - **Query Host Update** (24)
 - **Stop Host Notification** (25)

By using IPAUSE when the **Start** function is called, you can make an application wait until the host presentation space or OIA (or both) receives an update. When the receive is completed and the application can issue the **Query**

function to determine the changes, **Pause** terminates. Then the application issues the **Search Presentation Space** (6) to check whether the expected update occurred.

Post Intercept Status (52)

3270	5250	VT
Yes	Yes	Yes

The **Post Intercept Status** function informs the Personal Communications emulator that a keystroke obtained through the **Get Key** (51) function was accepted or rejected. When the application rejects a keystroke, the **Post Intercept Status** function issues a beep.

Prerequisite Calls

Start Keystroke Intercept (50)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 52	
Data String	See the following table	
Length	Must be 2	Must be 8
PS Position	NA	

The calling data string can contain:

Byte		Definition
Standard	Enhanced	
1	1	One of the following values: <ul style="list-style-type: none"> The 1-letter short name of the presentation space. A blank or null indicating a function call for the host-connected presentation space.
	2-4	Reserved
2	5	One of the following characters: <ul style="list-style-type: none"> A for accepted keystroke. R for rejected keystroke.
	6-8	Reserved.

Return Parameters

Return Code	Explanation
0	The Post Intercept Status function was successful.
1	An incorrect presentation space was specified.
2	An incorrect session option was specified.
8	No prior Start Keystroke Intercept (50) function was called for this presentation space ID.
9	A system error was encountered.

Query Additional Field Attribute (45)

3270	5250	VT
No	Yes	No

The **Query Additional Field Attribute** function returns additional information about the 5250 field containing the input host presentation space position. This information is returned in the data string parameter in the form of a defined structure.

Prerequisite Calls

Connect Presentation Space (1)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 45.	
Data String	8 bytes long character string.	
Length	8 is implied.	
PS Position	Identifies the target. This can be the PS position of any byte within the target field.	

The calling data string can contain:

Byte	Definition
1-8	Reserved

Return Parameters

This function returns a data string and a return code.

Data String:

The function returns the following data string.

Byte	Definition
1-6	Reserved
7-8	Two 8-bit unsigned characters that return: <ul style="list-style-type: none"> • R if field is RTL and L if field is LTR. • U if field is upper case and L if field is a normal case field.

Return Code:

The following return codes are defined:

Return Code	Explanation
0	The Query Additional Field Attribute was successful.
1	Your program is not currently connected to a host session.
7	The host presentation space position is not valid.
9	No field was found in this position.
24	Field is unformatted.

Query Close Intercept (42)

3270	5250	VT
Yes	Yes	Yes

The **Query Close Intercept** function allows the application to determine if the close option was selected.

Prerequisite Calls

Start Close Intercept (41)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 42	
Data String	See the following table.	
Length	Must be 1	Must be 4
PS Position	NA	

The calling data string can contain:

Byte		Definition
Standard	Enhanced	
1	1	1-character short session ID of the host presentation space, or a blank or null indicating request for querying the host-connected session
	2-4	Reserved

Return Parameters

Return Code	Explanation
0	A close intercept event did not occur.
1	The presentation source was not valid.
2	An error was made in specifying parameters.
8	No prior Start Close Intercept (41) function was called for this host presentation space.
9	A system error occurred.
12	The session stopped.
26	A close intercept occurred since the last query close intercept call.

Query Communications Buffer Size (122)

3270	5250	VT
Yes	No	No

The **Query Communications Buffer Size** function allows an application to determine both the maximum and the optimum buffer sizes supported by the emulation program.

Prerequisite Calls

There are no prerequisite calls for this function.

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 122	
Data String	See the following table	
Length	Must be 9	Must be 20
PS Position	NA	

The calling data string can contain:

Byte		Definition
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID)
	2-4	Reserved
2-3	5-8	16- or 32-bit field for the optimum supported inbound buffer size (Returned value)
4-5	9-12	16- or 32-bit field for the maximum supported inbound buffer size (Returned value)
6-7	13-16	16- or 32-bit field for the optimum supported outbound buffer size (Returned value)
8-9	17-20	16- or 32-bit field for the maximum supported outbound buffer size (Returned value)

Return Parameters

Return Code	Explanation
0	The Query Communications Buffer Size function was successful.
1	A specified host presentation space short session ID was not valid or was not connected.
2	An error was made in specifying parameters.
9	A system error occurred.
10	The function was not supported by the emulation program.

Notes on Using This Function

1. There is no way to require the user to use this function. It is not a required function so that the application can be tailored to run on any system.
2. The buffer sizes returned represent the record sizes that are actually transmitted across the medium. For a DDM connection, the 8-byte header supplied in the **Read** and **Write Structured Fields** data buffer is stripped off and 1 byte containing the structured field AID value is prefixed. The application should compare the size of the actual data in the data buffer (which does not include the 8-byte header) with the buffer sizes returned by the **Query**

Communications Buffer Size minus 1 byte. For destination/origin connections, the 8-byte header supplied in the **Read** and **Write Structured Fields** data buffer is stripped off and 9 bytes are then prefixed to the data. The application should compare the size of the actual data in the data buffer (which does not include the 8-byte header) with the buffer size returned by the **Query Communications Buffer Size** minus 9 bytes.

3. The maximum buffer sizes returned represent the maximum number of bytes supported by the workstation hardware and by the emulator. The maximum buffer size can be used only if the host is also configured to accept at least these maximum sizes.
4. The optimum buffer sizes returned represent the optimum number of bytes supported by the both the workstation hardware and the emulator. Some network configurations might set transmission limits smaller than these values. In these cases, the data transfer buffer size override value in the emulator configuration profile will be used for structured field support. The **Query Communications Buffer Size** will reflect any buffer size override values entered in the emulator configuration profile.

Query Communication Event (81)

3270	5250	VT
Yes	Yes	Yes

The **Query Communication Event** function lets the EHLLAPI program determine whether any communication events have occurred.

Prerequisite Calls

Start Communication Notification (80)

Call Parameters

	Enhanced Interface
Function Number	Must be 81
Data String	1-character short name of the host presentation space or a blank or null indicating request for updates to the host-connected presentation space
Length	4 is implied
PS Position	NA

The calling data structure contains these elements:

Byte	Definition
1	A 1-character presentation space short name (PSID)
2-4	Reserved

Return Parameters

Return Code	Definition
0	The function was successful
1	An incorrect PSID was specified

8	No prior call to Start Communication Notification (80) function was called for the PSID
9	A system error was encountered
21	The indicated PSID was connected
22	The Indicated PSID was disconnected

Query Cursor Location (7)

3270	5250	VT
Yes	Yes	Yes

The **Query Cursor Location** function indicates the position of the cursor in the host-connected presentation space by returning the cursor position.

Prerequisite Calls

Connect Presentation Space (1)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 7	
Data String	NA	
Length	NA	
PS Position	NA	

Return Parameters

This function returns a length and a return code.

Length:

Host presentation space position of the cursor.

Return Code:

The following codes are defined:

Return Code	Explanation
0	The Query Cursor Location function was successful.
1	Your program is not currently connected to a host session.
9	A system error was encountered.

Query Field Attribute (14)

3270	5250	VT
Yes	Yes	Yes

The **Query Field Attribute** function returns the attribute byte of the field containing the input host presentation space position. This information is returned in the returned length parameter.

For the PC/3270, note also that:

- The returned length parameter is set to 0 if the screen is unformatted.
- Attribute bytes are equal to or greater than hex C0.

Prerequisite Calls

Connect Presentation Space (1)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 14.	
Data String	NA.	
Length	NA.	
PS Position	Identifies the target. This can be the PS position of any byte within the target field.	

Return Parameters

This function returns a length and a return code.

Length:

The attribute value if the screen is formatted, or 0 if the screen is unformatted.

Return Code:

The following codes are defined:

Return Code	Explanation
0	The Query Field Attribute was successful.
1	Your program is not currently connected to a host session.
7	The host presentation space position is not valid.
9	A system error was encountered.
24	Attribute byte not found or unformatted host presentation space.

Notes on Using This Function

The returned field attributes are defined in the following tables. The bit positions are in IBM format with bit 0 as the left most bit in the byte.

- 3270 field attribute:

Bit Position	Meaning
0-1	Both = 1, field attribute byte
2	Unprotected/protected 0 = Unprotected data field 1 = Protected field
3	A/N 0 = Alphanumeric data 1 = Numeric data only
4-5	I/SPD 00 = Normal intensity, pen not detectable 01 = Normal intensity, pen detectable 10 = High intensity, pen detectable 11 = Nondisplay, pen not detectable

Bit Position	Meaning
6	Reserved
7	MDT 0 = Field has not been modified 1 = Field has been modified

- 5250 field attributes:

Bit Position	Meaning
0	Field attribute flag 0 = Nonfield attribute flag 1 = Field attribute flag
1	Visibility 0 = Nondisplay 1 = Display
2	Unprotected/protected 0 = Unprotected data field 1 = Protected field
3	Intensity 0 = Normal intensity 1 = High intensity
4–6	Field type 000 = Alphanumeric data: All characters are available 001 = Alphabet only: Uppercase and lowercase, comma, period, hyphen, blank, or Dup key are available 010 = Numeric shift: Automatic shift for number 011 = Numeric data only: 0–9, comma, period, plus, minus, blank, or Dup key are available 101 = Numeric data only: 0–9, or Dup key are available 110 = Magnetic stripe reading device data only 111 = Signed-numeric data: 0–9, plus, minus, or Dup key are available
7	MDT 0 = Field has not been modified 1 = Field has been modified

Query Host Update (24)

3270	5250	VT
Yes	Yes	Yes

The **Query Host Update** function lets the programmed operator determine if the host has updated the host presentation space or OIA because:

- The **Start Host Notification** (23) function was called (on first call to the **Query Host Update** function only)
- The previous call to the **Query Host Update** function (for all calls to the **Query Host Update** function except the first).

Prerequisite Calls

Start Host Notification (23)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 24	
Data String	1-character short name of the host presentation space, or a blank or null indicating request for updates to host-connected presentation space	
Length	1 is implied	4 is implied
PS Position	NA	

The calling data string can contain:

Byte		Definition
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID)
	2-4	Reserved

Return Parameters

Return Code	Definition
0	No updates have been made since the last call.
1	An incorrect host presentation space was specified.
8	No prior Start Host Notification (23) function was called for the host presentation space ID.
9	A system error was encountered.
21	The OIA was updated.
22	The presentation space was updated.
23	Both the OIA and the host presentation space were updated.
44	Printing has completed in the printer session.

Notes on Using This Function

The target presentation space must be specified in the data string, even though a connection to the host presentation space is not necessary to check for updates.

Query Session Status (22)

3270	5250	VT
Yes	Yes	Yes

The **Query Session Status** function is used to obtain session-specific information.

Prerequisite Calls

There are no prerequisite calls for this function.

Call Parameters

	16-bit	32-bit
Function Number	Must be 22.	
Data String	An 18/20-byte string consisting of a 1-byte short name of the target presentation space plus 17 bytes for returned data. Position 1 can be filled with: <ol style="list-style-type: none"> 1. A blank or a null to indicate a request for the host_connected presentation space. 2. An * (asterisk) to indicate a request for the keyboard-owner presentation space. 	
Length	Must be 18	Must be 20
PS Position	NA	

Return Parameters

This function returns a data string and a return code.

Byte		Definition
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID)
	2-4	Reserved
2-9	5-12	Session long name (same as profile name; or, if profile not set, same as short name)
10	13	Session Type D 3270 display E 3270 printer F 5250 display G 5250 printer H ASCII VT
11	14	Session characteristics expressed by a binary number including the following session-characteristics bits Bit 0 EAB 0: Session has the basic attribute. 1: Session has the extended attribute Bit 1 PSS 0: Session does not support the programmed symbols 1: Session supports the programmed symbols Bits 2-7 Reserved
12-13	15-16	Number of rows in the host presentation space, expressed as a binary number
14-15	17-18	Number of columns in the host presentation space, expressed as a binary number
16-17	19-20	Host code page expressed as a binary number
18		Reserved

Return Code:

The following codes are defined:

Return Code	Explanation
0	The Query Session Status function was successful.
1	An incorrect host presentation space was specified.
2	An incorrect string length was made.
9	A system error was encountered.

Notes on Using This Function

- To use this function, preallocate memory to receive the returned data string parameter. The statements required to preallocate this memory vary depending on the language in which your application is written. See “Memory Allocation” on page 8 for more information.

Query Sessions (10)

3270	5250	VT
Yes	Yes	Yes

The **Query Sessions** function returns a 16-byte (12-byte for standard interface) data string describing each host session.

Prerequisite Calls

There are no prerequisite calls for this function.

Call Parameters

Function	Description	
	Standard Interface	Enhanced Interface
Function Number	Must be 10	
Data String	Preallocated string of $16n$ bytes long ($12n$ for 16-bit) (n =number of sessions) or more	
Length	$12n$ bytes	$16n$ bytes
PS Position	NA	

Note: When the length is not matched to the number of sessions, the return code is 2.

Return Parameters

This function returns a data string, a length, and a return code.

Data String:

The returned data string is $16n$ bytes long ($12n$ for standard interface), where n is the number of host sessions. The descriptors are concatenated into the data string and each session type, and presentation space size of a host session.

The format of each 16-byte (12-byte for standard interface) session descriptor is as follows:

Byte		Definition
Standard	Enhanced	

Byte		Definition
1	1	A 1-character presentation space short name (PSID)
	2-4	Reserved
2-9	5-12	Session long name (same as profile name; or, if profile not set, same as short name)
10	13	Connection type H=host
	14	Reserved
11-12	15-16	Host presentation space size (this is a binary number and is not in display format). If the session type is a print session, the value is 0.

Length:

The number of host sessions started.

Return Code:

The following codes are defined:

Return Code	Explanation
0	The Query Sessions function was successful.
2	An incorrect string length was made.
9	A system error was encountered.

Notes on Using This Function

1. If an application program receives RC=2 or RC=0, the number of the active sessions is returned in the length field. The application program can recognize the minimum string length by this number.
2. The **Query Sessions** function is affected by the CFGSIZE/NOCFGZISE session option (see item 16 on page 157 for more information) and by the EXTEND_PS/NOEXTEND_PS option (see item 22 on page 159 for more information).

Notes:

1. When NOCFGZISE is set in **Set Session Parameters** (9) for a 5250 session, the value of presentation space size returned in byte position 11 and 12 from **Query Sessions**(10) will be changed in accordance with the selection of EXTEND_PS or NOEXTEND_PS.
2. When EXTEND_PS is set in **Set Session Parameters** (9), presentation space size returned from **Query Sessions** (10) will include the size of the message line, if it exists.
3. When NOEXTEND_PS is set, the value will not change regardless of the existence of a message line. In the case of 25 row, 80 column presentation space, the value can be 1920 or 2000.

Query System (20)

3270	5250	VT
Yes	Yes	Yes

The **Query System** function can be used by an EHLLAPI application program to determine the level of Personal Communications support and other system-related values. This function returns a string that contains the appropriate system data.

Most of this information is for use by a service coordinator when you call the IBM Support Center after receiving a return code 9 (a system error was encountered).

The bytes in this returned string are defined in "Return Parameters."

Prerequisite Calls

There are no prerequisite calls for this function.

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 20	
Data String	Preallocated string of 35 bytes	36 bytes
Length	Must be 35	Must be 36
PS Position	NA	

Return Parameters

This function returns a data string and a return code.

Data String:

A data string of 35 bytes (for 16-bit) or 36 bytes (for 32-bit) is returned. The bytes are defined as follows:

Byte		Definition
Standard	Enhanced	
1	1	EHLLAPI version number
2-3	2-3	EHLLAPI level number
4-9	4-9	Reserved
10-12	10-12	Reserved
13	13	Hardware base, U=Unable to determine
14	14	Program type, where P=IBM Personal Communications
15-16	15-16	Reserved
17-18	17-18	Personal Communications version/level as a 2-byte ASCII value
19	19	Reserved
20-23	20-23	Reserved
24-27	24-27	Reserved
28-29	28-29	Reserved
	30	Reserved
30-31	31-32	NLS type expressed as a 2-byte binary number
33-35	34-36	Reserved

Return Code

The following codes are defined:

Return Code	Explanation
0	The Query System function was successful; data string has been returned.

Return Code	Explanation
1	EHLAPI is not loaded. (PC/3270 only)
2	An incorrect string length was specified. (PC/3270 only)
9	A system error was encountered.

Notes on Using This Function

To use this function, preallocate memory to receive the returned data string parameter. See “Memory Allocation” on page 8 for more information.

Query Window Coordinates (103)

3270	5250	VT
Yes	Yes	Yes

The **Query Window Coordinates** function requests the coordinates for the window of a presentation space. The window coordinates are returned in pels.

Note: (0,0) indicates the top-left of the window.

Prerequisite Calls

Connect Window Services (101)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 103	
Data String	1-character short session ID of the host presentation space	
Length	17 is implied	20 is implied
PS Position	NA	

The calling data string can contain:

Byte		Definition
Standard	Enhanced	
1	1	One of the following values: <ul style="list-style-type: none"> A 1-character presentation space short name (PSID) A blank or null indicating a function call for the current connection presentation space
	2-4	Reserved
2-17	5-20	Reserved

Return Parameters

This function returns a data string and a return code.

Byte		Definition
Standard	Enhanced	

Byte		Definition
1	1	One of the following values: <ul style="list-style-type: none"> • A 1-character presentation space short session ID • A blank or null indicating a function call for the current connection presentation space
	2–4	Reserved
2–17	5–20	Four 32-bit unsigned integers that return:
2–5	5–8	XLeft Long integer in pels of the left X coordinate of the rectangular window relative to the desktop window
6–9	9–12	YBottom Long integer in pels of the bottom Y coordinate of the rectangular window relative to the desktop window
10–13	13–15	XRight Long integer in pels of the right X coordinate of the rectangular window relative to the desktop window
14–17	16–20	YTop Long integer in pels of the top Y coordinate of the rectangular window relative to the desktop window

Return Code:

The following codes are defined:

Return Code	Explanation
0	The Query Window Coordinates function was successful.
1	Your program was not currently connected to the host session.
9	A system error occurred.
12	The session stopped.

Read Structured Fields (126)

3270	5250	VT
Yes	No	No

The **Read Structured Fields** function allows an application to read structured field data from the host application. If the call specifies S (for Synchronous), the application does not receive control until the **Read Structured Fields** is completed. If the call specifies A (for Asynchronous), the application receives control immediately after the call. If the call specifies M (for Asynchronous, message mode), the application receives control immediately after the call. The application can wait for the message. In any case (S, A, or M), the application provides the buffer address in which the data from the host is to be placed.

For a successful asynchronous completion of this function, the following statements apply:

The return code field in the parameter list might not contain the results of the requested I/O. If the return code is not 0, the request failed. The application must take the appropriate action based on the return code.

If the return code for this request is 0, the application must use the request ID returned with this function call to issue the **Get Request Completion** function call

to determine the completion results of the function associated with the request ID. The **Get Request Completion** function call returns the following information:

1. Function request ID
2. Address of the data string from the asynchronous request
3. Length of the data string
4. Return code of the completed function

Prerequisite Calls

Connect for Structured Fields (120) and **Allocate Communication Buffer (123)**

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 126	
Data String	See the following table	
Length	8, 10 or 14	20
PS Position	NA	

The calling data string can contain:

Byte		Definition
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID).
	2-4	Reserved.
2	5	S or A or M S = Synchronous. Control is not returned to the application until the read is satisfied. A = Asynchronous. Control is returned immediately to the application, can wait for the event object. M = Asynchronous. Control is returned immediately to the application, can wait for the message.
	6	Reserved.
3-4	7-8	2-byte destination/origin ID.
5-8	9-12	4-byte address of the buffer into which the data is to be read. The buffer must be obtained using the Allocate Communications Buffer (123) function.
9-10	13-16	Reserved.
11-12	17-20	When M is specified in position 2 the window handle of the window that receives the message should be set. The message is a return value of RegisterWindowMessage ("PCSHLL")(not equal 0).
13-14		The data in these positions is ignored by EHLLAPI. However, no error is caused if the migrating program has data in these positions. This data is accepted to provide compatibility with migrating applications.

Return Parameters

This function returns a data string and a return code.

Data String:

If A (asynchronous) is specified in position 5, (2 for standard interface) and the function is completed successfully, the following data string is returned:

Byte		Definition
Standard	Enhanced	
9–10	13–14	2-byte function request ID. It is used by the Get Request Completion (125) function to determine the completion of this function call.
	15–16	Reserved.
	17–20	4-byte value in which the event object address is returned by EHLLAPI. The application can wait for this event object. When the event object is cleared, the application must issue the Get Request Completion (125) function call (32-bit only).

Note: A event object address is returned for each successful asynchronous request. The event object should not be used again. A new event object is returned for each request and is valid for only the duration of that request.

Data String:

If “M” (asynchronous message mode) is specified in position 5 (2 for 16-bit applications) and the function is completed successfully, the following data string is returned:

Byte		Definition
9–10	13–14	A 2-byte function request ID. It is used by the Get Request Completion (125) function to determine the completion of this function call.
	15–16	Reserved.
11–12	17–18	Task ID of asynchronous message mode.
	19–20	Reserved.

Note: If the function is completed successfully, an application window receive a message. The message is a return value of RegisterWindowMessage (PCSHLL). The wParam parameter contains Task ID returned by the function call. The HIWORD of lParam parameter contains Return Code 0, which shows the function was successful, and LOWORD of lParam parameter contains function number 126.

Return Code:

The following codes are defined:

Return Code	Explanation
0	The Read Structured Fields function was successful.
1	A specified host presentation space short session ID was not valid or was not connected.
2	An error was made in specifying parameters.
9	A system error occurred.
11	Resource unavailable (memory unavailable).

Return Code	Explanation
35	Request rejected. An outbound transmission from the host was canceled.
36	Request rejected. Lost contact with the host.
37	The function was successful, but the host is inbound disabled.

Notes on Using This Function

1. Return code 35 will be returned when the first **Read Structured Fields** or **Write Structured Fields** is requested after an outbound transmission from the host is canceled. Corrective action is the responsibility of the application.
2. Return code 36 requires that the application disconnect from the emulation program and then reconnect to reestablish communication with the host. Corrective action is the responsibility of the application.
3. Return code 37 will be returned if the host is inbound disabled. The **Read Structured Fields** function was successfully requested.
4. The EHLLAPI allows for a maximum of 20 asynchronous requests per application to be outstanding. A return code for unavailable resources (RC=11) is returned if more than 20 asynchronous requests are attempted.
5. If you are using an IBM Global Network connection, the maximum number of asynchronous requests is 10.

The structured field data contains the application structured fields received from the host. Structured field headers are removed by the EHLLAPI before the structured field data reaches the application.

The structured field data format is as follows:

Offset	Length	Contents
0	1 word	X'0000'.
2	1 word	m (message length: The number of bytes of data in the message, the number does not include the buffer header prefix, which contains 8 bytes). This value is returned by EHLLAPI.
4	1 word	n (buffer size: the supplied length of the data buffer that does include the 8-byte message header). This value must be set by the application.
6	1 word	X'C000'.
8	8 bytes	Length of the first (or only) structured field message.
10	1 byte	First nonlength byte of the structured field message.
		:
		:
m+7	1 byte	Last byte in the structured field message.

Bytes 0 through 7 are the buffer header. These first 8 bytes are used by the emulation program. The user section of the buffer begins with offset 8. Bytes 8 and 9 contain the number of bytes in the first structured field (a structured field message can contain multiple structured fields), including 2 bytes for bytes 8 and 9. Bytes 8 through $m+7$ are used for the structured field message received from the host (which could contain multiple structured fields).

The using application must furnish the complete buffer with the word at offset 0 set to zero. The buffer length must be in the word at offset 4. The word at offset 6 must be 'X'C000'. The emulation program will place the data message beginning at offset 8 and place the length of the message in the word at offset 2. The buffer length is not disturbed by EHLLAPI.

Synchronous Requests: When **Read Structured Fields** is requested synchronously (the S option in the data string), control is returned to the application only after the request is satisfied. The application can assume:

- The return code is correct.
- The data in the communications buffer (read buffer) is correct.
- The host is no longer processing the **Read Structured Fields** request.

Asynchronous Requests: When **Read Structured Fields** is requested asynchronously (the A option in the data string), the application *cannot* assume:

- The return code is correct.
- The data in the communications buffer (read buffer) is correct.
- The host is no longer processing the **Read Structured Fields** request.

When requested asynchronously, EHLLAPI returns the following values:

- A 16-bit Request ID in positions 13–14 (9–10 for standard interface) of the data string
- The address of a event object in positions 17—20 of the data string

These are used to complete the asynchronous **Read Structured Fields** call.

The following steps must be completed to determine the outcome of an asynchronous **Read Structured Fields** function call:

- If the EHLLAPI return code is not zero, the request failed. No asynchronous request has been made. The application must take appropriate actions before attempting the call again.
- If the return code is zero, the application should wait until the event object is in the signaled state by using the **Get Request Completion** (125) function or **Wait For Single Object**. The event object should not be reused. The event object is valid only for the duration of the **Read Structured Fields** function call through the completion of the **Get Request Completion** (125) function call.
- Once the event object is in the signaled state, use the returned 16-bit Request ID as the Request ID parameter in a call to the **Get Request Completion** (125) function. The data string returned from the **Get Request Completion** (125) function call contains the final return code of the **Read Structured Fields** function call.

When **Read Structured Fields** is requested asynchronously (the M option in the data string), the application *cannot* assume:

- The return code is correct.
- The data in the communications buffer (read buffer) is correct.
- The host is no longer processing the **Read Structured Fields** request.

When requested asynchronously with the M option, EHLLAPI returns the following values:

- A 16-bit Request ID in positions 13–14 (9–10 for standard interface) of the data string

- Task ID of asynchronous message mode in positions 17–18 (11–12 for standard interface) of the data string.

These are used to complete the asynchronous **Read Structured Fields** call.

Receive File (91)

3270	5250	VT
Yes	Yes	No

The **Receive File** function is used to transfer a file from the host session to the workstation session. It is used the same way as the RECEIVE command is used in the PC/3270. The **Receive File** function can be called by an EHLLAPI application program.

Prerequisite Calls

There are no prerequisite calls for this function.

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 91.	
Data String	Refer to the examples.	
Length	Length, in number of bytes, of the data string. Overridden if in EOT mode.	

Following are examples of the data strings for a single-byte character set (SBSC):

3270 Session

- To receive the file from the VM/CMS host system:
pc_filename [id:]fn ft [fm] [(option)]
- To receive the file from the MVS™/TSO host system:
pc_filename[id:]dataset[(member)] [/password] [option]
- To receive the file from the CICS® host system:
pc_filename [id:]host_filename [(option)]

5250 Session

- To receive the file from the iSeries, eServer i5, or System i5 host system:
pc_filename [id:]library file member [option]

Following are examples of the data strings for a double-byte character set (DBCS):

3270 Session

- To receive the file from the VM/CMS host system:
pc_filename [id:]fn ft [fm] [(option)]
- To receive the file from the MVS/TSO host system:
pc_filename [id:]dataset[(member)] [/password] [(option)]
- To receive the file from the CICS host system:
pc_filename [id:]host_filename [(option)]

5250 Session

- To receive the file from the iSeries, eServer i5, or System i5 host system:
`pc_filename [id:]library file member [option]`

Note: Parameters within [] are optional. Available options are listed below.

Host System	Common Options
VM/CMS	ASCII, JISCI, CRLF, APPEND, TIME n, CLEAR, NOCLEAR, PROGRESS, QUIET
MVS/TSO	ASCII, JISCI, CRLF, APPEND, TIME (n), CLEAR, NOCLEAR, PROGRESS, QUIET, AVBLOCK|TRACKS|CYLINDERS
CICS	ASCII, JISCI, CRLF, NOCRLF, BINARY, TIME n, CLEAR, NOCLEAR, PROGRESS, QUIET
i5/OS or OS/400®	ASCII, JISCI, CRLF, APPEND, TIME n, CLEAR, NOCLEAR, PROGRESS, QUIET

Note: JISCI is valid in a DBCS session for Japan only and ASCII is valid for all other SBCS and DBCS sessions.

Other options specified will be passed to the host transfer program. The file transfer program on the host side either uses them, ignores them, or returns an error. Consult the host transfer program documentation to see a complete list of the options supported.

Return Parameters

Return Code	Explanation
2	Parameter error or you have specified a length that is too long (more than 255 bytes) for the EHLLAPI buffer. The file transfer was unsuccessful.
3	File transfer complete.
4	File transfer complete with segmented records.
9	A system error was encountered.
27	File transfer terminated because of either a Cancel button or the timeout set by the Set Session Parameter (9) function.
101	File transfer was successful (transfer to/from CICS).

If you receive return code 2 or 9, there is a problem with the system or with the way you specified your data string.

Other return codes can also be received, which relate to message numbers generated by the host transfer program. For transfers to a CICS host transfer program, subtract 100 from the return code to give you the numeric portion of the message. For example, a return code of 101 would mean that the message number INW0001 was issued by the host. For other host transfer programs, just use the return code as the numerical part of the message. For example, a return of 34 would mean that message TRANS34 was issued by the host transfer program. The documentation for your host transfer program should give more information about the meanings of the specific messages.

Operating system error codes reported by EHLLAPI are greater than 300. To determine the error code, subtract 300 and refer to the operating system documentation for return codes.

Notes on Using This Function

1. Four sets of parameters under the **Set Session Parameters** (9) function are related to this function. They are the STRLEN/STREOT, EOT=c, QUIET/NOQUIET and the TIMEOUT=c/TIMEOUT=0 session options. See items 1 and 2 on page 154 and items 7 and 8 on page 155 for more information.
2. If no path is specified when the **Receive File** function is executed, the received file is stored in the current subdirectory, which is the directory in which your application is running.

Release (12)

3270	5250	VT
Yes	Yes	Yes

The **Release** function unlocks the keyboard that is associated with the host presentation space reserved using the **Reserve** (11) function.

Prerequisite Calls

Connect Presentation Space (1)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 12	
Data String	NA	
Length	NA	
PS Position	NA	

Return Parameters

Return Code	Explanation
0	The Release function was successful.
1	Your program is not connected to a host session.
9	A system error was encountered.

Notes on Using This Function

If you do not **Release** a host presentation space reserved by using the **Reserve** (11) function, you are locked out of that session until you call the **Reset System** (21) function, you call the **Disconnect Presentation Space** (2) function, or you terminate the EHLLAPI application program.

Reserve (11)

3270	5250	VT
Yes	Yes	Yes

The **Reserve** function locks the keyboard that is associated with the host-connected presentation space to block input from the terminal operator.

The reserved host presentation space remains locked until one of the following occurs:

- **Connect** (1) function is executed to a new session.
- **Disconnect Presentation Space** (2) function is executed.
- **Release** (12) function is executed.
- **Reset System** (21) function is executed.
- **Start Keystroke Intercept** (50) function is executed.
- EHLLAPI application program is terminated.

Prerequisite Calls

Connect Presentation Space (1)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 11	
Data String	NA	
Length	NA	
PS Position	NA	

Return Parameters

Return Code	Explanation
0	The Reserve function was successful.
1	Your program is not connected to a host session.
5	Presentation space cannot be used.
9	A system error was encountered.

Notes on Using This Function

1. If your EHLLAPI application program is sending a series of transactions to the host, you might need to prevent the user from gaining access to that session until your application processing is complete.
2. The keyboard input that a user makes while the keyboard is locked by this function is enqueued and processed after the session is terminated.
3. This function locks both the mouse and the keyboard input. The application program must unlock the presentation space to enable either the mouse or the keyboard input.

Reset System (21)

3270	5250	VT
Yes	Yes	Yes

The **Reset System** function reinitializes EHLLAPI to its starting state. The session parameter options are reset to their defaults. Event notification is stopped. The reserved host session is released. The host presentation space is disconnected. Keystroke intercept is disabled.

You can use the **Reset System** function during initialization or at program termination to reset the system to a known initial condition.

Prerequisite Calls

There are no prerequisite calls for this function.

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 21	
Data String	NA	
Length	NA	
PS Position	NA	

Return Parameters

Return Code	Definition
0	The Reset System function was successful.
1	EHELLAPI is not loaded.
9	A system error was encountered.

Notes on Using this Function

For the PC/3270, this function can be used to check whether EHELLAPI is loaded. Place a call to this function at the start of your application and check for a return code of 1.

Search Field (30)

3270	5250	VT
Yes	Yes	Yes

The **Search Field** function examines a field within the connected host presentation space for the occurrence of a specified string. If the target string is found, this function returns the decimal position of the string numbered from the beginning of the host presentation space. (For example, in a 24-row by 80-column presentation space, the row 1, column 1 position is numbered 1 and the row 5, column 1 position is numbered 321.)

This function can be used to search either protected or unprotected fields, but only in a *field-formatted* host presentation space.

Note: If the field at the end of the host presentation space wraps, wrapping occurs when the end of the presentation space is reached.

Prerequisite Calls

Connect Presentation Space (1)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 30.	

	Standard Interface	Enhanced Interface
Data String	Target string for search.	
Length	Length of the target data string. Overridden in EOT mode.	
PS Position	Identifies the target field. For SRCHALL, this can be the PS position of any byte within the target field. For SRCHFROM, it is the beginning point of the search for SRCHFRWD or the ending point of the search for SRCHBKWD. See note 3.	

Return Parameters

This function returns a length and a return code.

Length:

The following codes are defined:

Length	Explanation
= 0	The string was not found.
> 0	The string was found at the indicated host presentation space position.

Return Code:

The following codes are defined:

Return Code	Explanation
0	The Search Field function was successful.
1	Your program is not connected to a host session.
2	Parameter error. Either the string length was zero, or EOT mode was specified but no EOT character was found in calling data string.
7	The host presentation space position is not valid.
9	A system error was encountered.
24	The search string was not found, or the host presentation space was unformatted.

Notes on Using This Function

- Four sets of parameters under the **Set Session Parameters** (9) function are related to this function. They are the SRCHALL/SRCHFROM, STRLEN/STREOT, SRCHFRWD/SRCHBKWD, and the EOT=c session options. See items 1 on page 153 through 4 on page 154 for more information.
- You can use the **Set Session Parameters** (9) function to determine whether your searches proceed forward (SRCHFRWD) or backward (SRCHBKWD) in a field.
- The **Search Field** function normally checks the entire field (SRCHALL default mode). However, you can use the function 9 to specify SRCHFROM. In this mode, the calling PS position parameter does more than identify the target field. It also provides a beginning or ending point for the search.
 - If the SRCHFRWD option is in effect, the search for the designated string begins at the specified PS position and proceeds toward the end of the field.
 - If the SRCHBKWD option is in effect, the search for the designated string begins at the end of the field and proceeds backward toward the specified PS position. If the target string is not found, the search ends at the PS position specified in the calling PS position parameter.

4. **DBCS Only:** If the start position of the specified search function is the second byte in a double-byte character, the search is started from the next character for SRCHFRWD and from the character for SRCHBKWD. If the last character of the specified string is the first byte of a double-byte character, the character is not searched for.

The search ignores a pair of SO and SI in the presentation space. When you search a double-byte control character, put SO (X'0E') before the character and SI (X'0F') after it. For example, X'0E000C0F' in the data string is treated as a double-byte character FF (X'000C').

Note: 5250 emulation supports a presentation space of 24 rows by 80 columns. In some instances, Communication Manager 5250 emulation displays a 25th row. This occurs when either an error message from the host is displayed or when the operator selects the SysReq key. Personal Communications displays 25th row information on row 24, or on the status bar. For information to be displayed on the status bar, the status bar must be configured. Refer to *Quick Beginnings* for information on configuring the status bar. By the **EXTEND_PS** option, an EHELLAPI application can use the same interface with Communication Manager EHELLAPI and valid presentation space is extended when this condition occurs.

1390/1399 Code Page Support

Unicode functionality is supported only on 3270 and 5250 sessions.

STREOT option is not supported in a Unicode session. Please see "Set Session Parameters (9)" on page 152 for details.

Prerequisite Calls: **Connect Presentation Space (1)**

Call Parameters:

	Standard Interface	Enhanced Interface
Function Number	Must be 30.	
Data String	Target Unicode string for searching.	
Length	Length of the target Unicode string in Unicode characters. Note: The EOT mode is not supported in a Unicode session; therefore, length should be specified for proper functioning of this function in a Unicode session.	
PS Position	Identifies the target field. For SRCHALL, this can be the PS position of any byte within the target field. For SRCHFROM, it is the beginning point of the search for SRCHFRWD or the ending point of the search for SRCHBKWD. See note 3 on page 131.	

Return Parameters: This function returns a length and a return code.

Length:

The following codes are defined:

Length	Explanation
= 0	The string was not found.
> 0	The string was found at the indicated host presentation space position.

Return Code:

The following codes are defined:

Return Code	Explanation
0	The Search Field function was successful.
1	Your program is not connected to a host session.
2	Parameter error. Either the string length was zero, or EOT mode was specified but no EOT character was found in calling data string.
7	The host presentation space position is not valid.
9	A system error was encountered.
24	The search string was not found, or the host presentation space was unformatted.

Notes on Using This Function: The following options are supported in a Unicode session for **Search Field** and function in the same way as in DBCS:

- STRLEN
- SRCHALL
- SRCHFROM
- SRCHFRWD
- SRCHBKWD

1137 Code Page Support

Unicode functionality is supported only on 5250 sessions.

STREOT option is not supported in a Unicode session. Please see “Set Session Parameters (9)” on page 152 for details.

Prerequisite Calls: **Connect Presentation Space (1)**

Call Parameters:

	Standard Interface	Enhanced Interface
Function Number	Must be 30.	
Data String	Target Unicode string for search.	
Length	Length of the target Unicode string in bytes. Note: The EOT mode is not supported in a Unicode session; therefore, length should be specified for proper functioning of this function in a Unicode session.	
PS Position	Identifies the target field. For SRCHALL, this can be the PS position of any byte within the target field. For SRCHFROM, it is the beginning point of the search for SRCHFRWD or the ending point of the search for SRCHBKWD. See note 3 on page 131.	

Return Parameters: This function returns a length and a return code.

Length:

The following codes are defined:

Length	Explanation
= 0	The string was not found.
> 0	The string was found at the indicated host presentation space position.

Return Code:

The following codes are defined:

Return Code	Explanation
0	The Search Field function was successful.
1	Your program is not connected to a host session.
2	Parameter error. Either the string length was zero, or EOT mode was specified but no EOT character was found in calling data string.
7	The host presentation space position is not valid.
9	A system error was encountered.
24	The search string was not found, or the host presentation space was unformatted.

Notes on Using This Function: The following options are supported in a Unicode session for **Search Field** and function in the same way as in SBCS:

- STRLEN
- SRCHALL
- SRCHFROM
- SRCHFRWD
- SRCHBKWD

Search Presentation Space (6)

3270	5250	VT
Yes	Yes	Yes

The **Search Presentation Space** function lets your EHLLAPI program examine the host presentation space for the occurrence of a specified string.

Prerequisite Calls

Connect Presentation Space (1)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 6.	
Data String	Target string for search.	
Length	Length of the target data string. Overridden in EOT mode.	
PS Position	Position within the host presentation space where the search is to begin (SRCHFRWD option) or to end (SRCHBKWD option). Overridden in SRCHALL (default) mode.	

Return Parameters

This function returns a length and a return code.

Length:

The following codes are defined:

Length	Explanation
= 0	The string was not found.
> 0	The string was found at the indicated host presentation space position.

Return Code:

The following codes are defined:

Return Code	Explanation
0	The Search Presentation Space function was successful.
1	Your program is not connected to a host session.
2	An error was made in specifying parameters.
7	The host presentation space position is not valid.
9	A system error was encountered.
24	The search string was not found.

Notes on Using This Function

- Four sets of parameters under the **Set Session Parameters** (9) function are related to this function. They are the SRCHALL/SRCHFROM, STRLEN/STREOT, SRCHFRWD/SRCHBKWD, and the EOT=c session options. See items 1 on page 153 through 4 on page 154 through for more information.
- You can use the **Set Session Parameters** (9) function to specify SRCHBKWD. When this option is in effect, the search operation locates the *last* occurrence of the string.
- The **Search Presentation Space** function normally checks the entire host presentation space. However, you can use the **Set Session Parameters** (9) function to specify SRCHFROM. In this mode, the calling PS position parameter specifies a beginning or ending point for the search.
 - If the SRCHFRWD option is in effect, the search for the designated string begins at the specified PS position and proceeds toward the end of the host presentation space.
 - If the SRCHBKWD option is in effect, the search for the designated string begins at the end of the PS and proceeds backward toward the specified PS position. If the target string is not found, the search ends at the PS position specified in the calling PS position parameter.
- The SRCHFROM option is also useful if you are looking for a keyword that might occur more than once in the host presentation space.
- The **Search Presentation Space** function is useful in determining when the host presentation space is available. If your EHLLAPI application is expecting a specific prompt or message before sending data, the **Search Presentation Space** function allows you to check for a prompt message before continuing.
- DBCS Only:** If the start position of the specified search function is the second byte in a double-byte character, the search is started from the next character for

SRCHFRWD and from the character for SRCHBKWD. If the last character of the specified string is the first byte of a double-byte character, the character is not searched for.

The search ignores a pair of SO and SI in the presentation space. When you search a double-byte control character, put SO (X'0E') before the character and SI (X'0F') after it. For example, X'0E00C0F' in the data string is treated as a double-byte character FF (X'00C').

Note: 5250 emulation supports a presentation space of 24 rows by 80 columns. In some instances, Communication Manager 5250 emulation displays a 25th row. This occurs when either an error message from the host is displayed or when the operator selects the SysReq key. Personal Communications displays 25th row information on row 24, or on the status bar. For information to be displayed on the status bar, the status bar must be configured. Refer to *Quick Beginnings* for information on configuring the status bar. By the **EXTEND_PS** option, an EHLLAPI application can use the same interface with Communication Manager EHLLAPI and valid presentation space is extended when this condition occurs.

1390/1399 Code Page Support

Unicode functionality is supported only on 3270 and 5250 sessions.

STREOT option is not supported in a Unicode session. Please refer to "Set Session Parameters (9)" on page 152 for details.

Prerequisite Calls: **Connect Presentation Space (1)**

Call Parameters:

	Standard Interface	Enhanced Interface
Function Number	Must be 6.	
Data String	Target Unicode string for search.	
Length	Length of the target Unicode string in Unicode characters. Note: The EOT mode is not supported in a Unicode session; therefore, length should be specified for proper functioning of this function in a Unicode session.	
PS Position	Position within the host presentation space where the search is to begin (SRCHFRWD option) or to end (SRCHBKWD option). Overridden in SRCHALL (default) mode.	

Return Parameters: This function returns a length and a return code.

Length:

The following codes are defined:

Length	Explanation
= 0	The string was not found.
> 0	The string was found at the indicated host presentation space position.

Return Code:

The following codes are defined:

Return Code	Explanation
0	The Search Presentation Space function was successful.
1	Your program is not connected to a host session.
2	An error was made in specifying parameters.
7	The host presentation space position is not valid.
9	A system error was encountered.
24	The search string was not found.

Notes on Using This Function: The following options are supported in a Unicode session for **Search Presentation Space** (6) and function in the same way as in DBCS:

- STRLEN
- SRCHALL
- SRCHFROM
- SRCHFRWD
- SRCHBKWD

1137 Code Page Support

Unicode functionality is supported only on 5250 sessions.

STREOT option is not supported in a Unicode session. Please refer to “Set Session Parameters (9)” on page 152 for details.

Prerequisite Calls: **Connect Presentation Space** (1)

Call Parameters:

	Standard Interface	Enhanced Interface
Function Number	Must be 6.	
Data String	Target Unicode string for search.	
Length	Length of the target Unicode data string in bytes. Note: The EOT mode is not supported in a Unicode session; therefore, length should be specified for proper functioning of this function in a Unicode session.	
PS Position	Position within the host presentation space where the search is to begin (SRCHFRWD option) or to end (SRCHBKWD option). Overridden in SRCHALL (default) mode.	

Return Parameters: This function returns a length and a return code.

Length:

The following codes are defined:

Length	Explanation
= 0	The string was not found.
> 0	The string was found at the indicated host presentation space position.

Return Code:

The following codes are defined:

Return Code	Explanation
0	The Search Presentation Space function was successful.
1	Your program is not connected to a host session.
2	An error was made in specifying parameters.
7	The host presentation space position is not valid.
9	A system error was encountered.
24	The search string was not found.

Notes on Using This Function: The following options are supported in a Unicode session for **Search Presentation Space** (6) and function in the same way as in SBCS:

- STRLEN
- SRCHALL
- SRCHFROM
- SRCHFRWD
- SRCHBKWD

Send File (90)

3270	5250	VT
Yes	Yes	No

The **Send File** function is used to transfer a file from the workstation session where EHLLAPI is running to a host session.

Prerequisite Calls

There are no prerequisite calls for this function.

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 90.	
Data String	Refer to the examples.	
Length	Length of the target data string. Overridden in EOT mode.	
PS Position	Must be 0.	

Following are examples of the data strings for SBCS

3270 Session

- To send the file to the VM/CMS host system:
pc_filename [id:]fn ft [fm] [(option)]
- To send the file to the MVS/TSO host system:
pc_filename [id:]dataset[(member)] [/password] [option]
- To send the file to the CICS host system:
pc_filename [id:]host_filename [(option)]

5250 Session

- To send the file to the iSeries, eServer i5, or System i5 host system:
`pc_filename [id:]library file member [option]`

Following are examples of the data strings for DBCS:

3270 Session

- To send the file to the VM/CMS host system:
`pc_filename [id:]fn ft [fm] [(option)]`
- To send the file to the MVS/TSO host system:
`pc_filename [id:]dataset[(member)] [/password]
 [(option)]`
- To send the file to the CICS host system:
`pc_filename [id:]host_filename [(option)]`

5250 Session

- To send the file to the iSeries, eServer i5, or System i5 host system:
`pc_filename [id:]library file member [option]`

Note: Parameters within [] are optional. Available options are listed below. For more information about the options, refer to *Administrator's Guide and Reference*.

Host System	Common Options
VM/CMS	ASCII, JISCII, CRLF, APPEND, LRECL n, RECFM v|f, TIME n, CLEAR, NOCLEAR, PROGRESS, QUIET
MVS/TSO	ASCII, JISCII, CRLF, APPEND, LRECL (n), RECFM (v|f|u), TIME (n), CLEAR, NOCLEAR, PROGRESS, QUIET, BLKSIZE (n), SPACE (n[,m]), AVBLOCK|TRACKS|CYLINDERS
CICS	ASCII, JISCII, CRLF, BINARY, TIME n, CLEAR, NOCLEAR, PROGRESS, QUIET
i5/OS or OS/400	ASCII, JISCII, CRLF, APPEND, SRC, LRECL n, TIME n, CLEAR, NOCLEAR, PROGRESS, QUIET
<p>Note:</p> <p>JISCII is valid in a DBCS session for Japan only and ASCII is valid for all other SBCS and DBCS sessions.</p> <p>Note: Time, if specified, overrides the value in Set Session parameters.</p> <p>Note:</p> <p>Other options specified will be passed to the host transfer program. The file transfer program on the host side either uses them, ignores them, or returns an error. Consult the host transfer program documentation to see a complete list of the options supported.</p>	

Return Parameters

Return Code	Explanation
2	Parameter error or you have specified a length that is too long (more than 255 bytes) for the EHLLAPI buffer. The file transfer was unsuccessful.
3	File transfer complete.
4	File transfer complete with segmented records.

Return Code	Explanation
5	Workstation file name is not valid or not found. File transfer was canceled.
9	A system error was encountered.
27	File transfer terminated because of either a Cancel button or the timeout set by the Set Session Parameter (9) function.
101	File transfer was successful (transfer to/from CICS).

If you receive return code 2 or 9, there is a problem with the system or with the way you specified your data string.

Other return codes can also be received which relate to message numbers generated by the host transfer program. For transfers to a CICS host transfer program, subtract 100 from the return code to give you the numeric portion of the message. For example, a return code of 101 would mean that the message number INW0001 was issued by the host. For other host transfer programs, just use the return code as the numerical part of the message. For example, a return of 34 would mean that message TRANS34 was issued by the host transfer program. The documentation for your host transfer program should give more information about the meanings of the specific messages.

Operating system error codes reported by EHLLAPI are greater than 300. To determine the error code, subtract 300 and refer to the operating system documentation for return codes.

Notes on Using This Function

- Four sets of parameters under the **Set Session Parameters (9)** function are related to this function. They are the QUIET/NOQUIET, STRLEN/STREOT, TIMEOUT=c/TIMEOUT=0, and the EOT=c session options. See items 1 and 2 on page 154 plus items 7 and 8 on page 155 for more information.

Send Key (3)

3270	5250	VT
Yes	Yes	Yes

The **Send Key** function is used to send either a keystroke or a string of keystrokes to the host presentation space.

You define the string of keystrokes to be sent with the calling data string parameter. The keystrokes appear to the target session as though they were entered by the terminal operator. You can also send all attention identifier (AID) keys such as Enter and so on. All host fields that are input protected or are numeric only must be treated accordingly.

Prerequisite Calls

Connect Presentation Space (1)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 3.	

	Standard Interface	Enhanced Interface
Data String	A string of keystrokes, maximum 255. Uppercase and lowercase ASCII characters are represented literally. Function keys and shifted function keys are represented by mnemonics. See "Keyboard Mnemonics" on page 142.	
Length	Length of the source data string. Overridden if in EOT mode.	
PS Position	NA	

Return Parameters

Return Code	Explanation
0	The keystrokes were sent; status is normal.
1	Your program is not connected to a host session.
2	An incorrect parameter was passed to EHLLAPI.
4	The host session was busy; all of the keystrokes could not be sent.
5	Input to the target session was inhibited or rejected; all of the keystrokes could not be sent.
9	A system error was encountered.

Notes on Using This Function

- The parameters under the **Set Session Parameters** (9) function are related to this function. They are the AUTORESET/NORESET, STRLEN/STREOT, EOT=c, ESC=c, and RETRY/NORETRY session options. See items 1 and 2 on page 154, 9 and 10 on page 156, and 19 on page 158 for more information.
- Keystrokes cannot be sent to the host session when the keyboard is locked or busy. You can check this condition with the **Wait** (4) function.
- If the host is busy, input might be rejected.
- The length of the data string must be explicitly defined by the default length parameter, but it can be defined implicitly by the EOT=c option of the **Set Session Parameters** (9) function.

When explicitly defining length (see item 1), the value for the length parameter passed by the application must be calculated. For this calculation, allow 2 bytes for compound keystrokes such as @E and allow 4 bytes for compound keystrokes such as @A@C.

- To send special control keys, a compound character coding scheme is used. In this coding scheme, one keystroke is represented by a sequence of two to four ASCII characters. The first and third character are always the escape character. The second and fourth character are always a keycode.

To send the sequence LOGON ABCDE followed by the Enter key, you would code the string LOGON ABCDE@E. A complete list of these keycodes is represented in "Keyboard Mnemonics" on page 142.

This compound coding technique allows an ASCII string representation of all necessary keystroke codes without requiring the use of complex hexadecimal key codes.

The default escape character is @. The value of the escape character can be changed to any other character with the ESC=c option of the **Set Session Parameters** (9) function.

- Users needing higher levels of performance should use the **Copy String to Field** (33) or **Copy String to Presentation Space** (15) function rather than send

keystrokes with the **Send Key (3)** function. But remember, only the **Send Key (3)** function can send the special control keys.

7. Refer to **Set Session Parameters (9)** session option 10 on page 156 (NORESET option) to improve the performance of this function.
Unless NORESET is required, the reset mnemonic is added to the keystroke strings as a prefix. Therefore, all resettable status except input inhibit are reset. The NORESET option is not the same as the **Reset System (21)** function.
8. The keystroke strings, including the AID key, are sent to the host via multiple paths. Each path sends the strings before the first AID key (or including the AID key). EHLLAPI adjusts the string length and the start position of each path. For a host application program, any keystroke might be lost by the AID key process. Therefore, you should not send a keystroke list that includes plural AID keys.
9. During the @P (Print) or @A@T (Print Presentation Space) process, all requests that update the presentation space are rejected. If the presentation space is busy or the interruption request occurs during the print request, the mnemonic @A@R (Device Reset – Cancel to print the Presentation Space) cancels the request and resets the status.

Keyboard Mnemonics

The keyboard mnemonics provide the ASCII characters representing the special function keys of the keyboard in the workstation. The abbreviation codes make the mnemonics for special keys easy to remember. An alphabetic key code is used for the most common keys. For example, the **Clear** key is *C*, and the **Tab** key is *T*.

Table 7 shows the mnemonics using uppercase alphabetic characters:

Table 7. Mnemonics with Uppercase Alphabetic Characters

Mnemonic	Meaning	3270	5250	VT
@B	Left Tab	Yes	Yes	No
@C	Clear	Yes	Yes	No
@D	Delete	Yes	Yes	No
@E	Enter	Yes	Yes	No
@F	Erase EOF	Yes	Yes	No
@H	Help	No	Yes	No
@I	Insert	Yes	Yes	No
@J	Jump (Set Focus)	Yes	Yes	No
@L	Cursor Left	Yes	Yes	Yes
@N	New Line	Yes	Yes	Yes
@O	Space	Yes	Yes	Yes
@P	Print	Yes	Yes	Yes
@R	Reset	Yes	Yes	No
@T	Right Tab	Yes	Yes	Yes
@U	Cursor Up	Yes	Yes	Yes
@V	Cursor Down	Yes	Yes	Yes
@X*	DBCS (Reserved)	Yes	Yes	No
@Z	Cursor Right	Yes	Yes	Yes

Table 8 shows the mnemonics using a number or lowercase alphabetic characters.

Table 8. Mnemonics with Numbers or Lowercase Characters

Mnemonic	Meaning	3270	5250	VT
@0	Home	Yes	Yes	No
@1	PF1/F1	Yes	Yes	No
@2	PF2/F2	Yes	Yes	No
@3	PF3/F3	Yes	Yes	No
@4	PF4/F4	Yes	Yes	No
@5	PF5/F5	Yes	Yes	No
@6	PF6/F6	Yes	Yes	Yes
@7	PF7/F7	Yes	Yes	Yes
@8	PF8/F8	Yes	Yes	Yes
@9	PF9/F9	Yes	Yes	Yes
@a	PF10/F10	Yes	Yes	Yes
@b	PF11/F11	Yes	Yes	Yes
@c	PF12/F12	Yes	Yes	Yes
@d	PF13	Yes	Yes	Yes
@e	PF14	Yes	Yes	Yes
@f	PF15	Yes	Yes	Yes
@g	PF16	Yes	Yes	Yes
@h	PF17	Yes	Yes	Yes
@i	PF18	Yes	Yes	Yes
@j	PF19	Yes	Yes	Yes
@k	PF20	Yes	Yes	Yes
@l	PF21	Yes	Yes	No
@m	PF22	Yes	Yes	No
@n	PF23	Yes	Yes	No
@o	PF24	Yes	Yes	No
@q	End	Yes	Yes	No
@u	Page Up	No	Yes	No
@v	Page Down	No	Yes	No
@x	PA1	Yes	Yes	No
@y	PA2	Yes	Yes	No
@z	PA3	Yes	Yes	No

Table 9 shows the mnemonics using the combination @A and @alphabetic uppercase (A–Z) key.

Table 9. Mnemonics with @A and @ Uppercase Alphabetic Characters

Mnemonic	Meaning	3270	5250	VT
@A@C	Test	No	Yes	No
@A@D	Word Delete	Yes	Yes	No
@A@E	Field Exit	Yes	Yes	No

Table 9. Mnemonics with @A and @ Uppercase Alphabetic Characters (continued)

Mnemonic	Meaning	3270	5250	VT
@A@F	Erase Input	Yes	Yes	No
@A@H	System Request	Yes	Yes	No
@A@I	Insert Toggle	Yes	Yes	No
@A@J	Cursor Select	Yes	Yes	No
@A@L	Cursor Left Fast	Yes	Yes	No
@A@Q	Attention	Yes	Yes	No
@A@R	Device Cancel (Cancels Print Presentation Space)	Yes	Yes	No
@A@T	Print Presentation Space	Yes	Yes	Yes
@A@U	Cursor Up Fast	Yes	Yes	No
@A@V	Cursor Down Fast	Yes	Yes	No
@A@Z	Cursor Right Fast	Yes	Yes	No

Table 10 shows the mnemonics using the combination @A and @number or @A and @alphabetic lowercase (a-z) key.

Table 10. Mnemonics with @A and @ Lowercase Alphabetic Characters

Mnemonic	Meaning	3270	5250	VT
@A@9	Reverse Video	Yes	Yes	No
@A@b	Underscore	Yes	No	No
@A@c	Reset Reverse Video	Yes	No	No
@A@d	Red	Yes	No	No
@A@e	Pink	Yes	No	No
@A@f	Green	Yes	No	No
@A@g	Yellow	Yes	No	No
@A@h	Blue	Yes	No	No
@A@i	Turquoise	Yes	No	No
@A@j	White	Yes	No	No
@A@l	Reset Host Colors	Yes	No	No
@A@t	Print (Personal Computer)	Yes	Yes	No
@A@y	Forward Word Tab	Yes	Yes	No
@A@z	Backward Word Tab	Yes	Yes	No

Table 11 shows the mnemonics using the combination @A and @special character.

Table 11. Mnemonics with @A and @ Alphanumeric (Special) Characters

Mnemonic	Meaning	3270	5250	VT
@A@-	Field -	No	Yes	No
@A@+	Field +	No	Yes	No
@A@<	Record Backspace	No	Yes	No

Table 12 shows the mnemonics using the combination @S , @W, and @alphabetic lowercase.

Table 12. Mnemonics with @S (Shift), @W (Edit) and @ Alphabetic Characters

Mnemonic	Meaning	3270	5250	VT
@S@E	Print Presentation Space on Host	No	Yes	No
@S@x	Dup	Yes	Yes	No
@S@y	Field Mark	Yes	Yes	No
@W@C	Edit Copy	Yes	Yes	Yes
@W@D	Edit Clear	Yes	Yes	Yes
@W@E	Edit Copy Append	Yes	Yes	Yes
@W@L	Edit Copy Link	Yes	Yes	Yes
@W@N	Edit Paste Next	Yes	Yes	Yes
@W@V	Edit Paste	Yes	Yes	Yes
@W@X	Edit Cut	Yes	Yes	Yes
@W@Z	Edit Undo	Yes	Yes	Yes

Note: @W Edit mnemonics are supported only in EHLLAPI functions in Enhanced mode. See Start Keystroke Intercept function under “Summary of EHLLAPI Functions” on page 28.

DBCS Only: Table 13 shows the mnemonics using the combination @X and @number or @alphabetic lowercase (a-z).

Table 13. Mnemonics Using @X and @Alphabetic Lowercase (For DBCS Only)

Mnemonic	Meaning	3270	5250	VT
@X@1	Display SO/SI	Yes	Yes	No
@X@5	Generate SO/SI	No	Yes	No
@X@6	Display Attribute	No	Yes	No
@X@7	Forward Character	No	Yes	No
@X@c	Split Vertical Bar	No	Yes	No

VT Only: Table 14 on page 146 shows the mnemonics using the combination @M and @number or @alphabetic lowercase (a-z)

Table 14. Mnemonics Using @M, @Q and @Alphabetic Lowercase (For VT Only)

Mnemonic	Meaning	3270	5250	VT
@M@0	VT Numeric Pad 0	No	No	Yes
@M@1	VT Numeric Pad 1	No	No	Yes
@M@2	VT Numeric Pad 2	No	No	Yes
@M@3	VT Numeric Pad 3	No	No	Yes
@M@4	VT Numeric Pad 4	No	No	Yes
@M@5	VT Numeric Pad 5	No	No	Yes
@M@6	VT Numeric Pad 6	No	No	Yes
@M@7	VT Numeric Pad 7	No	No	Yes
@M@8	VT Numeric Pad 8	No	No	Yes
@M@9	VT Numeric Pad 9	No	No	Yes
@M@-	VT Numeric Pad -	No	No	Yes
@M@,	VT Numeric Pad ,	No	No	Yes
@M@.	VT Numeric Pad .	No	No	Yes
@M@e	VT Numeric Pad Enter	No	No	Yes
@M@f	VT Edit Find	No	No	Yes
@M@i	VT Edit Insert	No	No	Yes
@M@r	VT Edit Remove	No	No	Yes
@M@s	VT Edit Select	No	No	Yes
@M@p	VT Edit Previous Screen	No	No	Yes
@M@n	VT Edit Next Screen	No	No	Yes
@M@a	VT PF1	No	No	Yes
@M@b	VT PF2	No	No	Yes
@M@c	VT PF3	No	No	Yes
@M@d	VT PF4	No	No	Yes
@M@h	VT HOld Screen	No	No	Yes
@M@(space)	Control Code NUL	No	No	Yes
@M@A	Control Code SOH	No	No	Yes

Table 14. Mnemonics Using @M, @Q and @Alphabetic Lowercase (For VT Only) (continued)

Mnemonic	Meaning	3270	5250	VT
@M@B	Control Code STX	No	No	Yes
@M@C	Control Code ETX	No	No	Yes
@M@D	Control Code EOT	No	No	Yes
@M@E	Control Code ENQ	No	No	Yes
@M@F	Control Code ACK	No	No	Yes
@M@G	Control Code BEL	No	No	Yes
@M@H	Control Code BS	No	No	Yes
@M@I	Control Code HT	No	No	Yes
@M@J	Control Code LF	No	No	Yes
@M@K	Control Code VT	No	No	Yes
@M@L	Control Code FF	No	No	Yes
@M@M	Control Code CR	No	No	Yes
@M@N	Control Code SO	No	No	Yes
@M@O	Control Code SI	No	No	Yes
@M@P	Control Code DLE	No	No	Yes
@M@Q	Control Code DC1	No	No	Yes
@M@R	Control Code DC2	No	No	Yes
@M@S	Control Code DC3	No	No	Yes
@M@T	Control Code DC4	No	No	Yes
@M@U	Control Code NAK	No	No	Yes
@M@V	Control Code SYN	No	No	Yes
@M@W	Control Code ETB	No	No	Yes
@M@X	Control Code CAN	No	No	Yes
@M@Y	Control Code EM	No	No	Yes
@M@Z	Control Code SUB	No	No	Yes

Table 14. Mnemonics Using @M, @Q and @Alphabetic Lowercase (For VT Only) (continued)

Mnemonic	Meaning	3270	5250	VT
@M@u	Control Code ESC	No	No	Yes
@M@v	Control Code FS	No	No	Yes
@M@w	Control Code GS	No	No	Yes
@M@x	Control Code RS	No	No	Yes
@M@y	Control Code US	No	No	Yes
@M@z	Control Code DEL	No	No	Yes
@Q@A	VT User Defined Key 6	No	No	Yes
@Q@B	VT User Defined Key 7	No	No	Yes
@Q@C	VT User Defined Key 8	No	No	Yes
@Q@D	VT User Defined Key 9	No	No	Yes
@Q@E	VT User Defined Key 10	No	No	Yes
@Q@F	VT User Defined Key 11	No	No	Yes
@Q@G	VT User Defined Key 12	No	No	Yes
@Q@H	VT User Defined Key 13	No	No	Yes
@Q@I	VT User Defined Key 14	No	No	Yes
@Q@J	VT User Defined Key 15	No	No	Yes
@Q@K	VT User Defined Key 16	No	No	Yes
@Q@L	VT User Defined Key 17	No	No	Yes
@Q@M	VT User Defined Key 18	No	No	Yes
@Q@N	VT User Defined Key 19	No	No	Yes
@Q@O	VT User Defined Key 20	No	No	Yes
@Q@a	VT Backtab	No	No	Yes
@Q@r	VT Clear Page	No	No	Yes
@Q@s	VT Edit	No	No	Yes

The following table shows the mnemonics using a special character.

Table 15. Mnemonics with Special Character Keys

Mnemonic	Meaning	3270	5250	VT
@@	@	Yes	Yes	Yes
@\$	Alternate Cursor (The Presentation Manager Interface only)	Yes	Yes	Yes
@<	Backspace	Yes	Yes	Yes

The following table shows BIDI key mnemonics:

Table 16. BIDI Key Mnemonics

Mnemonic	Meaning	3270	5250	VT
@:@s	Screen Reverse	Yes	Yes	Yes
@:@n	Bidi Layer	Yes	Yes	Yes
@:@l	Latin Layer	Yes	Yes	Yes
@:@F	Field Reverse	Yes	Yes	No
@:@p	Push	Yes	No	No
@:@e	End Push	Yes	No	No
@:@a	Auto Push	Yes	No	No
@:@r	Auto Reverse	Yes	No	No
@:@d	CSD	Yes	No	No
@:@f	Final	Yes	No	No
@:@i	Isolated	Yes	No	No
@:@m	Middle	Yes	No	No
@:@t	Initial	Yes	No	No
@:@h	Field Shape	Yes	No	No
@:@u	Field Base	Yes	No	No
@:@b	Base	No	Yes	No
@:@o	Close	No	Yes	No
@:@K	Column Heading	No	No	Yes
@:@B	Cursor Direction	No	No	Yes
@:@D	Encoding Mode	No	No	Yes
@:@M	VT Change Display Mode	No	No	Yes (Hebrew only)

The following character keys are interpreted as they are.

a-z	!	'	'	<	}
A-Z	\$	(	.	>	[
0-9	%)	/	=]
~	&	*	:	?	
#	"	+	;	{	

1390/1399 Code Page Support

Unicode functionality is supported only on 3270 and 5250 sessions.

STREOT option is not supported in a Unicode session. Please see “Set Session Parameters (9)” on page 152 for details.

The session option ESC is not supported in a Unicode session; using this option, you cannot set a Unicode character as an ESC character. Use the default ESC character @ in a Unicode session. Please see “Set Session Parameters (9)” on page 152 for details.

Prerequisite Calls: Connect Presentation Space (1)

Call Parameters:

	Standard Interface	Enhanced Interface
Function Number	Must be 3	
Data String	A Unicode string of keystrokes, maximum 255. Uppercase and lowercase ASCII characters are represented literally. Function keys and shifted function keys are represented by mnemonics. See “Keyboard Mnemonics” on page 142.	
Length	The length of the Unicode string in Unicode characters.	
PS Position	NA	

Return Parameters:

Return Code	Explanation
0	The keystrokes were sent; status is normal.
1	Your program is not connected to a host session.
2	An incorrect parameter was passed to EHLLAPI.
4	The host session was busy; all of the keystrokes could not be sent.
5	Input to the target session was inhibited or rejected; all of the keystrokes could not be sent.
9	A system error was encountered.

Notes on Using This Function: Before sending keystrokes to a PCOMM session, be sure that the session is a Unicode session and the Windows operating system supports Unicode. .

The string length should indicate the number of Unicode characters and not the number of ANSI characters to be sent.

1137 Code Page Support

Unicode functionality is supported only on 5250 sessions.

STREOT option is not supported in a Unicode session. Please see “Set Session Parameters (9)” on page 152 for details.

The session option ESC is not supported in a Unicode session; using this option, you cannot set a Unicode character as an ESC character. Use the default ESC character @ in a Unicode session. Please see “Set Session Parameters (9)” on page 152 for details.

Prerequisite Calls: Connect Presentation Space (1)

Call Parameters:

	Standard Interface	Enhanced Interface
Function Number	Must be 3	
Data String	A Unicode string of keystrokes, maximum 255. Uppercase and lowercase ASCII characters are represented literally. Function keys and shifted function keys are represented by mnemonics. See "Keyboard Mnemonics" on page 142.	
Length	Length of the Unicode data string in bytes. If the length is not a multiple of 2 then an error code of 2 is returned.	
PS Position	NA	

Return Parameters:

Return Code	Explanation
0	The keystrokes were sent; status is normal.
1	Your program is not connected to a host session.
2	An incorrect parameter was passed to EHLLAPI.
4	The host session was busy; all of the keystrokes could not be sent.
5	Input to the target session was inhibited or rejected; all of the keystrokes could not be sent.
9	A system error was encountered.

Notes on Using This Function: Before sending keystrokes to a PCOMM session, be sure that the session is a Unicode session. If the session is ANSI and a Unicode string is sent, junk characters will be displayed.

The string length should indicate the number bytes and not the number of Unicode characters to be sent. Therefore the length should be a multiple of 2. If not, a parameter error will be returned by the function.

Set Cursor (40)

3270	5250	VT
Yes	Yes	Yes

The **Set Cursor** function is used to set the position of the cursor within the host presentation space. Before using the **Set Cursor** function, a workstation application must be connected to the host presentation space.

Prerequisite Calls

Connect Presentation Space (1)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 40	
Data String	NA	

	Standard Interface	Enhanced Interface
Length	NA	
PS Position	Desired cursor position in the connected host presentation space	

Return Parameters

Return Code	Explanation
0	Cursor was successfully located at the specified position.
1	Your program is not connected to a host session.
4	The session is busy.
7	A cursor location less than 1 or greater than the size of the connected host presentation space was specified.
9	A system error occurred.

Notes on Using This Function

DBCS Only: If the specified cursor is the second byte of the double-byte character, the cursor moves to the first byte of the character and an error code is not returned.

1137 Code Page Support

The usage of **Set Cursor** in a Unicode session is the same as that for a SBCS session except:

- Unicode functionality is supported only on 5250 sessions.
- In a Unicode session only, if the specified cursor is in the middle of a cluster (for example, a Hindi language cluster), then the cursor is positioned to the beginning of the cluster automatically.

Set Session Parameters (9)

<i>3270</i>	<i>5250</i>	<i>VT</i>
Yes	Yes	Yes

The **Set Session Parameters** function lets you change certain default session options in EHLLAPI for all sessions. When EHLLAPI is loaded, the default settings for session options are as indicated by the underscored entries in the tables that appear in “Session Options” on page 153. Any, some, or all of these settings can be changed by including the desired option in the calling data string as explained below. Specified settings remain in effect until:

- Changed by a subsequent **Set Session Parameters** (9) function that specifies a new value.
- The **Reset System** (21) function is executed.
- The EHLLAPI application program is terminated.

The following table lists those EHLLAPI functions that are affected by session options. Functions not listed in the table are not affected by any of the session options. Session options that affect each function are indicated by corresponding entries in the “See Items” column. These entries are indexed to the list that follows “Call Parameters” on page 153.

Function Number	Function Name	See Items
1	Connect Presentation Space	11, 23, 24
3	Send Key	1, 2, 9, 10, 19
4	Wait	12
5	Copy Presentation Space	5, 13, 14, 15, 17, 20, 21, 22
6	Search Presentation Space	1, 2, 3, 4
8	Copy Presentation Space to String	5, 13, 14, 15, 17, 20, 21, 22
10	Query Sessions	16, 22
15	Copy String to Presentation Space	1, 2, 13, 14, 18, 20, 21, 22
18	Pause	6
30	Search Field	1, 2, 3, 4, 22
33	Copy String to Field	1, 2, 13, 14, 18, 20, 21, 22
34	Copy Field to String	5, 13, 14, 17, 20, 21, 22
35	Copy Presentation Space to Clipboard	5, 13, 14, 17, 20, 21, 22
36	Paste Clipboard to Presentation Space	1, 2, 13, 14, 18, 20, 21, 22
51	Get Key	9, 12
90	Send File	1, 2, 7, 8
91	Receive File	1, 2, 7, 8
101	Connect Window Services	23, 24

Note: Items 20 and 21 in this table are for DBCS only

Prerequisite Calls

There are no prerequisite calls for this function.

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 9.	
Data String	String containing the desired values of those session options that are to be changed. The data string can contain any of the values in the tables of "Session Options." The values should be placed on the data string line, separated by commas or blanks. The sets of parameters are explained in terms of the functions they affect.	
Length	Explicit length of the source data string (the STREOT option is not allowed).	
PS Position	NA.	

Session Options

The following tables show the session options. The default is underlined>.

- The values in the following table determine how the data string length is defined for functions **Send Key** (3), **Search Presentation Space** (6), **Copy String to Presentation Space** (15), **Search Field** (30), **Copy String to Field** (33), **Send File** (90), and **Receive File** (91).

Value	Explanation
<u>STRLEN</u>	An explicit length is passed for all strings.
STREOT	Lengths are not explicitly coded. Calling (source) data strings are terminated with an EOT character.

2. The statement in the following table is used to specify the character that is used as the end-of-text (EOT) delimiter in the calling (source) data string for EHLLAPI functions **Send Key** (3), **Search Presentation Space** (6), **Copy String to Presentation Space** (15), **Search Field** (30), **Copy String to Field** (33), **Send File** (90), and **Receive File** (91).

Value	Explanation
EOT=c	Allows you to specify the EOT character for string terminators (in STREOT mode). Binary zero is the default. Do not leave a blank after the equal sign.

To be valid, c must be entered as a 1-byte string literal character with no preceding blanks. The EOT character specified by this statement is used to determine the length of a calling data string only when the STREOT option (see item 1) is in effect.

3. The values in the following table affect the **Search Presentation Space** (6) and **Search Field** (30) search functions.

Value	Explanation
<u>SRCHALL</u>	The Search Presentation Space (6) function and Search Field (30) function scan the entire host presentation space or field.
SRCHFROM	The Search Presentation Space (6) function and Search Field (30) function start from a specified PS position (for SRCHFRWD) or end at a specified PS position (for SRCHBKWD).

4. The values in the following table affect the **Search Presentation Space** (6) and **Search Field** (30) search functions. They determine the direction for the search.

Value	Explanation
<u>SRCHFRWD</u>	The Search Presentation Space (6) function and Search Field (30) function perform in an ascending direction.
SRCHBKWD	The Search Presentation Space (6) function and Search Field (30) function perform in a descending direction. A search is satisfied if the first character of the requested string starts within the bounds specified for the search.

5. The values in the following table determine how attribute bytes are treated for functions **Copy Presentation Space** (5), **Copy Presentation Space to String** (8), and **Copy Field to String** (34).

Value	Explanation
<u>NOATTRB</u>	Convert all unknown values to blanks.
ATTRB	Pass back all codes that do not have an ASCII equivalent as their original values.
NULLATTRB	Convert all field attributes to null characters.

6. The values in the following table affect the **Pause** (18) function.

Value	Explanation
<u>FPAUSE</u>	A full-duration pause lasts for however long you specified in the Pause (18) function.
IPAUSE	Interruptible pause. After the Start Host Notification (23) function is executed, a host event satisfies a pause.

7. The values in the following table determine whether messages generated by file transfer functions **Send File** (90) and **Receive File** (91) are displayed.

Value	Explanation
<u>NOQUIET</u>	SEND and RECEIVE messages are displayed.
QUIET	SEND and RECEIVE messages are not displayed.

8. The statements in the following table determine how long Personal Communications EHLLAPI waits before it automatically issues a Cancel during execution of file transfer functions **Send File** (90) and **Receive File** (91). To be valid, c must be an Arabic number 0–9 or a capital letter J–N and must not be preceded by a blank.

Value	Explanation																														
<u>TIMEOUT=0</u>	A Cancel is automatically issued following a 20-second (approximate) delay.																														
TIMEOUT=c	A Cancel is automatically issued following a specified delay. A 1-character indicator from the table below tells Personal Communications how many 30-second cycles it should accept before issuing a Cancel itself. <table border="1"> <thead> <tr> <th>Character</th> <th>Value (in minutes)</th> </tr> </thead> <tbody> <tr><td>1</td><td>0.5</td></tr> <tr><td>2</td><td>1.0</td></tr> <tr><td>3</td><td>1.5</td></tr> <tr><td>4</td><td>2.0</td></tr> <tr><td>5</td><td>2.5</td></tr> <tr><td>6</td><td>3.0</td></tr> <tr><td>7</td><td>3.5</td></tr> <tr><td>8</td><td>4.0</td></tr> <tr><td>9</td><td>4.5</td></tr> <tr><td>J</td><td>5.0</td></tr> <tr><td>K</td><td>5.5</td></tr> <tr><td>L</td><td>6.0</td></tr> <tr><td>M</td><td>6.5</td></tr> <tr><td>N</td><td>7.0</td></tr> </tbody> </table>	Character	Value (in minutes)	1	0.5	2	1.0	3	1.5	4	2.0	5	2.5	6	3.0	7	3.5	8	4.0	9	4.5	J	5.0	K	5.5	L	6.0	M	6.5	N	7.0
Character	Value (in minutes)																														
1	0.5																														
2	1.0																														
3	1.5																														
4	2.0																														
5	2.5																														
6	3.0																														
7	3.5																														
8	4.0																														
9	4.5																														
J	5.0																														
K	5.5																														
L	6.0																														
M	6.5																														
N	7.0																														

9. The statement in the following table is used to define the escape character for keystroke mnemonics. This session option affects functions **Send Key** (3) and **Get Key** (51). The value of c must be entered as a 1-byte literal character string with no preceding blanks.

Value	Explanation
ESC=c	Specifies the escape character for keystroke mnemonics (@ is the default). Do not leave a blank after the equal sign. A blank is not a valid escape character.

10. The values in the following table determine whether EHLAPI automatically precedes strings sent using the **Send Key** (3) function with a reset.

Value	Explanation
<u>AUTORESET</u>	EHLAPI attempts to reset all inhibited conditions by prefixing all strings of keys sent using the Send Key (3) function with a reset.
NORESET	Do not AUTORESET.

11. The values in the following table affect the manner in which the **Connect Presentation Space** (1) command function.

Value	Explanation
<u>CONLOG</u>	Establishes a logical connection between the workstation session and a host session. During Connect, does not jump to the requested presentation space.
CONPHYS	Establishes a physical connection between the workstation session and a host session. During Connect, jumps to the requested presentation space.

12. The values in the following table affect the **Wait** (4) function and **Get Key** (51) function. For each value, there are two different effects, one for each function.

Value	Explanation
<u>TWAIT</u>	For the Wait (4) function, waits up to a minute before timing out on XCLOCK (X []) or XSYSTEM. For the Get Key (51) function, does not return control to your EHLAPI application program until it has intercepted a key (normal or AID key based on the option specified under the Start Keystroke Intercept (50) function).
LWAIT	For the Wait (4) function, waits until XCLOCK (X [])/XSYSTEM clears. This option is not recommended, because control does not return to your application until the host is available. For the Get Key (51) function, does not return control to your EHLAPI application program until it has intercepted a key (normal or AID key based on the option specified under the Start Keystroke Intercept (50) function).
NWAIT	For the Wait (4) function, checks status and returns immediately (no wait). For the Get Key (51) function, returns return code 25 (keystrokes not available) in the fourth parameter if nothing is queued matching the option specified under the Start Keystroke Intercept (50) function.

Note: Use of NWAIT is recommended.

13. The values in the following table affect **Copy Presentation Space** (5), **Copy Presentation Space to String** (8), **Copy String to Presentation Space** (15),

Copy String to Field (33), and **Copy Field to String (34)**. Extended attribute bytes (EAB) include extended character attributes and extended field attributes.

Value	Explanation
<u>NOEAB</u>	Pass data only, no EABs.
EAB	<p>Pass the presentation space data with extended attribute bytes. For each character that appears on the screen, 2 bytes of data are passed. Therefore, a buffer twice the size of the presentation space must be preallocated; for example $2 \times 1920 = 3840$ for a 24-row by 80-column presentation space.</p> <p>Extended attributes for a string of characters may be reported as attributes of the field byte, rather than as attributes of each individual character in the field. In this case, to tell if a particular character or set of characters on a screen is underscored, do a CopyPStoString specifying the position of the field attribute byte (the byte before the field that is displayed on the screen) to get the EAB information that applies to all of the characters in that field.</p>

Note: When using **EHLLAPI Copy PS to String**, text is copied which should be invisible to the operator. Use the EHLLAPI Set Session Parameters function to set the NODISPLAY option to determine if there is hidden data. This causes EHLLAPI to return nondisplay fields as nulls. Another common procedure for hiding data is to set the foreground and background colors the same (BLACK, for instance) so the text is displayed, but not visible to the human operator. The only way for your application to detect this is to use the EAB and XLATE session parameters and then copying the PS. The foreground/background color of each position is returned and you can determine which characters are invisible.

14. The values in the following table affect **Copy Presentation Space (5)**, **Copy Presentation Space to String (8)**, **Copy String to Presentation Space (15)**, **Copy String to Field (33)**, and **Copy Field to String (34)**.

Value	Explanation
<u>NOXLATE</u>	EABs are not translated.
XLATE	EABs are translated to the PC color graphics adapter (CGA) format.

15. The values in the following table affect **Copy Presentation Space (5)**, **Copy Presentation Space to String (8)** and **Copy Presentation Space to Clipboard (35)** if NOATTRB and NOEAB are specified.

Value	Explanation
<u>BLANK</u>	Convert all unknown values to X'20'.
NOBLANK	Convert all unknown values to X'00'.

The default value is BLANK. If you want to change the default value to NOBLANK, add the following statement in the PCSWIN.INI file located in the Personal Communications user-class application data directory:

```
[API]
NullToBlank=NO
```

16. The values in the following table affect the presentation space size that is returned by the **Query Sessions (10)**.

Value	Explanation
<u>CFGSIZE</u>	Returns the configured size of the connected presentation space. This option ignores any override of the configured size by the host.
NOCFGSIZE	Returns the current size of the connected presentation space.

17. The values in the following table affect **Copy Presentation Space (5)**, **Copy Presentation Space to String (8)**, **Copy Field to String (34)** and **Copy Presentation Space to Clipboard (35)**.

Value	Explanation
<u>DISPLAY</u>	Copy nondisplay fields in the presentation space to the target buffer area in the same manner as display fields. Current applications function normally.
NODISPLAY	Do not copy nondisplay fields in the presentation space to the target buffer area. Copy the nondisplay fields to the target buffer as a string of null characters. This allows applications to display the copied buffers in the presentation widow without displaying confidential information, such as passwords.

18. The values in the following table affect **Copy String to Presentation Space (15)**, **Copy String to Field (33)** and **Paste Clipboard to Presentation Space (36)**.

Value	Explanation
<u>NOPUTEAB</u>	EAB (or EAD for DBCS) is not contained in the data string of Copy String to Presentation Space or Copy String to Field .
PUTEAB	EAB is contained with character data in the data string of Copy String to Presentation Space or Copy String to Field .

This option is used for the compatibility with Communication Manager/2. For Communication Manager/2, the data string, which is specified in **Copy String to Presentation Space** or **Copy String to Field**, must be contain EAB (or EAD) with character data when EAB (or EAD) is valid in **Set Session Parameters**. Whereas, for the previous Personal Communications, the data string specified in these functions must consist of character data only even if EAB (or EAD) is valid. But Personal Communications allows that the data string contains EAB (or EAD) by setting PUTEAB to provide the compatibility with Communication Manager/2.

19. The values in the following table affect the **Send Key (3)** function. Keystrokes are not processed if the keyboard is blocked or in use. The options determine whether the function tries to resend the keystrokes until a 4-minute timeout occurs or if the function returns immediately after determining the keyboard is blocked or in use.

Value	Explanation
<u>RETRY</u>	Continues to attempt to send keystrokes until they are sent or until a 4-minute timeout occurs.
NORETRY	Returns immediately after determining the keyboard is blocked or in use.

20. **DBCS Only:** The values in the following table affect **Copy Presentation Space (5)**, **Copy Presentation Space to String (8)**, **Copy String to Presentation Space (15)**, **Copy String to Field (33)**, **Copy Field to String (34)**, **Copy Presentation Space to Clipboard (35)** and **Paste Clipboard to Presentation Space (36)**.

Value	Explanation
<u>NOEAD</u>	DBCS attribute characters are not passed.
EAD	Pass the presentation space data and two attribute characters for the double-byte character set (DBCS). (Users receive 2 bytes for each character other than the data. Therefore, a buffer twice the size of the presentation space must be preallocated.)

21. **DBCS Only:** The values in the following table affect **Copy Presentation Space** (5), **Copy Presentation Space to String** (8), **Copy String to Presentation Space** (15), **Copy String to Field** (33), **Copy Field to String** (34), **Copy Presentation Space to Clipboard** (35) and **Paste Clipboard to Presentation Space** (36).

Value	Explanation
<u>NOSO</u>	Pass the presentation space data except Shift-in (SI) and Shift-out (SO) control characters.
SO	Pass the presentation space data including translated SI control character to X'0E' and SO control character to X'0F'. The allocated buffer size depends on the length of the stored data.
SPACESO	Pass the presentation space data including translated SI and SO control characters to X'20' (blank). The allocated buffer size depends on the length of the stored data.

22. The values in the following table affect **Copy Presentation Space** (5), **Copy Presentation Space to String** (8), **Copy String to Presentation Space** (15), **Copy String to Field** (33), **Copy Field to String** (34) **Search Field** (30), **Query Sessions**. (10), **Copy Presentation Space to Clipboard** (35) and **Paste Clipboard to Presentation Space** (36).

Value	Explanation
EXTEND_PS	5250 emulation supports a presentation space of 24 rows by 80 columns. In some instances, Communication Manager 5250 emulation displays a 25th row. This occurs when either an error message from the host is displayed or when the operator selects the SysReq key. Personal Communications displays 25th row information on row 24, but EHLLAPI normally sees the <i>real</i> 24th row. By EXTEND_PS option, an EHLLAPI application can use the same interface with Communication Manager EHLLAPI and valid presentation space is extended when this condition occurs.
<u>NOEXTEND_PS</u>	The presentation space is not extended when the above condition occurs. This is the default value.

23. The values in the following table affect the **Connect Presentation Space** (1) and **Connect Window Services** (101) functions. The options specify whether an application can or will share the presentation space to which it is connected with another application. Only one of the following values can be specified with each **Set Session Parameter** call.

Value	Explanation
SUPER_WRITE	The application allows other applications that allow sharing and have write access permissions to concurrently connect to the same presentation space. The originating application performs supervisory-type functions but does not create errors for other applications that share the presentation space.

Value	Explanation
<u>WRITE_SUPER</u>	The application requires write access and allows only supervisory application to concurrently connect to its presentation space. This is the default value.
WRITE_WRITE	The application requires write access and allows partner or other applications with predictable behavior to share the presentation space.
WRITE_READ	The application requires write access and allows other applications that perform read-only functions to share the presentation space. The application is also allowed to copy the presentation space and perform other read-only operations as usual.
WRITE_NONE	The application has exclusive use of the presentation space. No other applications are allowed to share the presentation space, including supervisory applications. The application is allowed to copy the presentation space and perform read-only operations as usual.
READ_WRITE	The application requires only read access to monitor the presentation space and allows other applications that perform read or write, or both, functions to share the presentation space. The application is also allowed to copy the presentation space and perform other read-only operations as usual.

24. The values in the following table allow applications that have presentation space sharing requirements to limit the sharing to a partner application (an application that was developed to work with it).

Value	Explanation
NOKEY	Allows the application to be compatible with existing applications that do not specify the KEY parameter.
KEY\$ <i>nnnnnnnn</i>	Uses a keyword to restrict sharing access to the presentation space that it supports. The keyword must be exactly 8 bytes in length.

Return Parameters

This function returns a length and a return code.

Length:

Number of valid session parameters that are set.

Return Code:

The following codes are defined:

Return Code	Explanation
0	The session parameters have been set.
2	One or more parameters were not valid.
9	A system error was encountered.

1390/1399 and 1137 Code Page Support

Code page 1390/1399 Unicode functionality is available only for 3270 and 5250 sessions. Code page 1137 Unicode functionality is available only for 5250 sessions.

The following session option differences must be noted for 1390/1399 and 1137 code page support in a Unicode session:

- The session option STREOT should not be used for Unicode strings for the following reasons:
 - The session option STREOT specifies that the length of the string is not explicitly given. An EOT character indicates the end of the string. By scanning for the EOT character, the length of the string can be found. This EOT character is stored as a single-byte value. The single-byte EOT character cannot be used for Unicode strings.
 - *Scenario:* A user sets the EOT character as 'A' whose ASCII value is 0X'41'. If the string buffer that the user passes to the function contains a Unicode character, then the low byte of this Unicode character will be taken as the string delimiter. Therefore, a single-byte EOT character cannot be used as a string delimiter.
 - The EOT character cannot be stored as a Unicode character since the **Set Session Parameter** function is independent of the PCOMM session and the same setting applies to all the sessions of PCOMM. If the EOT is to be stored as a Unicode character, then SBCS and DBCS implementations will be affected by the way the EOT character is passed. At present, the EOT character is expected to be a single-byte value.
- Note:** If you use the session option STREOT, then the results may not be as expected. You can use a single-byte delimiter with the Unicode strings if you are certain that the single-byte delimiter will not be a part of the Unicode values that you are passing in the buffer.
- The session option ESC is not supported in a Unicode session for the same reason as listed for “STREOT” on page 160.
 - The session option XLATE is not supported in Unicode. Even if this option is set, it will be ignored.

Start Close Intercept (41)

3270	5250	VT
Yes	Yes	Yes

The **Start Close Intercept** function allows the application to intercept close requests generated when a user selects the close option from the emulator session window. This function intercepts the close request and discards it until a **Stop Close Intercept** (43) function is requested.

After using this function, your application program can use the **Query Close Intercept** (42) function to determine when a close request has occurred.

Prerequisite Calls

There are no prerequisite calls for this function.

Call Parameters

Byte	Definition	
	Standard Interface	Enhanced Interface
Function Number	Must be 41	
Data String	See the following table	
Length	5 or 6	Must be 12
PS Position	NA	

The data string contains the following items.

Byte		Definition
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID).
	2-4	Reserved.
4-5		The data in these positions is ignored by EHLLAPI. However, no error is caused if the migrating program has data in these positions. This data is accepted to provide compatibility with migrating applications.
6	5	Specify M to request asynchronous message mode (Windows only).
	6-8	Reserved.
2-3	9-12	When M is specified in position 5 (6 for 16-bit), the window handle of the window that receives the message should be set. The message is a return value of RegisterWindowMessage (PCSHLL) (not equal 0).

Return Parameters

This function returns a data string and a return code.

Data String:

If asynchronous message mode is not specified in position 5 (6 for standard interface) and the function is completed successfully, the following data string is returned.

Byte		Definition
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID).
	2-8	Reserved.
	9-12	4 byte value in which the event object address is returned by EHLLAPI. The application can wait for this event object. (32-bit only).

Data String:

If M (asynchronous message mode) is specified in position 5 (6 for standard interface) and the function is completed successfully, the following data string is returned.

Byte		Definition
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID)
	2-8	Reserved
2-3	9-10	Task ID of asynchronous message mode

Note: If a user selects the close option, an application window receives a message. The message is a return value of RegisterWindowMessage (PCSHLL). The wParam parameter will contain the Task ID returned by this function call. The HIWORD of the lParam parameter will contain the Return Code 26,

which shows a close intercept occurred, and the LOWORD of the IParam parameter will contain the function number 41.

Return Code:

The following codes are defined:

Return Code	Explanation
0	The Start Close Intercept function was successful.
1	An incorrect host presentation space was specified.
2	A parameter error occurred.
9	A system error occurred.
10	The function is not supported by the emulation program.

Notes on Using This Function

1. The returned event object or semaphore is in a non-signaled state when the start request function returns. The event object is in the signaled state each time a close request occurs. To receive notification of multiple close request events, put the event object into the signaled state each time using **SetEvent** or the **Query Close Intercept (42)** function.
2. After using this function, your application program can use the **Query Close Intercept (42)** function to determine when a close request has occurred. The application can wait on the returned event object to determine when the event has occurred.
3. This is not an exclusive call. Multiple applications can request this function for the same short session ID.
4. If there are no applications intercepting close requests for a session, any subsequent close requests selected by the user from the emulator operations dialog result in a normal stop requested for that session.

Start Communication Notification (80)

3270	5250	VT
Yes	Yes	Yes

The **Start Communication Notification** function begins the process by which your EHLLAPI application can determine whether the specified session is connected to a host.

After using this function, the application can use **Query Communication Event (81)** to determine whether the session is connected or disconnected.

Prerequisite Calls

There are no prerequisite calls for this function.

Call Parameters

	Enhanced Interface
Function Number	Must be 80
Data String	Preallocated structure; see the following table
Length	16
PSPosition	NA

The calling data structure contains these elements

Byte	Definition
1	A 1-character presentation space short name (PSID).
2-4	Reserved
5	One of the following values: <ul style="list-style-type: none"> • The character C asks for notification when the session either disconnects or connects to the host. • The character A requests the asynchronous mode of notification. When A is specified, position 9-12 returns the address of an event object (Windows). The character C must be placed in position 13. • The character M requests the asynchronous message mode of the notification. When M is specified, the event selection character C must be placed in position 13.
6-8	Reserved
9-12	When M is specified in position 5, the window handle of the window that receives the message should be set. The message is a return value of RegisterWindowMessage (PCSHLL)—(not zero).
13	This should contain the character C if position 5 is A or M.
14-16	Reserved

Data String

If A (asynchronous mode) is specified in position 5 of the calling data structure and the function is completed successfully, the following data string is returned:

Byte	Definition
1	A 1-character presentation space short-name (PSID)
2-8	Reserved
9-12	4-byte binary value in which the event object handle is returned by EHLLAPI. The application can wait for this event object.

If M (asynchronous message mode) is specified in position 5 of the calling data structure and the function is completed successfully, the following data string is returned:

Byte	Definition
1	A 1-character presentation space short-name (PSID)
2-8	Reserved
9-10	Task ID of asynchronous message mode

When the session connects or disconnects an application window receives a message. The message is the return value of RegisterWindow Message (PCSHLL). The wParam contains the Task ID returned by the function call. HIWORD of lParam contains a 21 if the session is connected to the host or a 22 if the session is disconnected. The LOWORD of lParam contains the function number 80.

Return Parameters

Return Code	Definition
0	The function was successful
1	An incorrect PSID was specified
2	An error was made in designating parameters
9	A system error was encountered

Notes on using this Function

1. An application program can issue this function for multiple host sessions. The **Query Communication Event** (81) function can be used to determine the session communication status.
2. If the application chooses the asynchronous option, it can use the Windows SDK call **WaitForSingleObject** to wait until the sessions communication status has changed.
3. The event object is initially in a non-signaled state. It is signaled each time an event occurs. To receive notification for multiple events the application must put the event object into the non-signaled state each time it is signaled, by using the Windows SDK call **ResetEvent**, or by using function 81 **Query Communications Event**.
4. Multiple calls to this function with the same options from the same application will be ignored.
5. This is not exclusive to one application. Several applications can request this function for the same Session ID.

Start Host Notification (23)

3270	5250	VT
Yes	Yes	Yes

The **Start Host Notification** function begins the process by which your EHLLAPI application program determines if the host presentation space or OIA have been updated.

After using this function, your application program can use the **Query Host Update** (24) function to determine when a host event has occurred.

Prerequisite Calls

There are no prerequisite calls for this function.

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 23	
Data String	Preallocated string; see the following table	
Length	6 or 7 implied	16
PS Position	NA	

The calling data string contains these elements:

Byte		Definition
Standard	Enhanced	
1	1	One of the following values: <ul style="list-style-type: none"> • A 1-character presentation space short name (PSID) • A blank or null indicating a request for the host-connected host presentation space
	2-4	Reserved.
2	5	One of the following values: <ul style="list-style-type: none"> • The character B asking for notification of both host presentation space and OIA updates. • The character O asking for notification of only OIA updates. • The character P asking for notification of only host presentation space updates. • The character A requesting the asynchronous mode of the notification When A is specified, position 9-12 returns the address of an event object. The event selection character B, O, or P must be placed in position 13. • The character M requesting the asynchronous message mode of the notification. When M is specified, the event selection character B, O, or P must be placed in position 13 (7 for 16-bit). • E The character E asking for notification of completion during a printer session.
	6-8	Reserved.
3-4	9-12	When M is specified in position 5 (2 for 16-bit), the window handle of the window that receives the message should be set. The message is a return value of RegisterWindowMessage (PCSHLL) (not equal 0).
7	13	One of the following values if position 5 (2 for 16-bit) is A or M: <ul style="list-style-type: none"> • The character B asking for notification of both host presentation space and OIA updates • The character O asking for notification of only OIA updates • The character P asking for notification of only host presentation update.
	14-16	Reserved.

Return Parameters

This function returns a data string and a return code.

Data String:

If A (asynchronous mode of notification) is specified in position 5 and the function is completed successfully, the following data string is returned:

Byte		Definition
Standard	Enhanced	

Byte		Definition
1	1	A 1-character presentation space short name (PSID).
	2–8	Reserved.
	9–12	4-byte value in which the event object address is returned by EHLLAPI. The application can wait for this event object (32-bit only).

Data String:

If M (asynchronous message mode) is specified in position 5 (2 for standard interface) and the function is completed successfully, the following data string is returned:

Byte		Definition
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID)
	2–8	Reserved
3–4	9–10	Task ID of asynchronous message mode

Note: If OIA or presentation space is updated, an application window receives a message. The message is a return value of RegisterWindowMessage (PCSHLL). The wParam parameter contains the Task ID returned by the function call. HIWORD of lParam contains Return Code 21 (shows the OIA is updated), 22 (shows the host presentation space is updated), or 23 (shows both the OIA and the host presentation space are updated), and LOWORD of lParam parameter contains function number 23.

Return Code:

The following codes are defined:

Return Code	Definition
0	The Start Host Notification function was successful.
1	An incorrect host presentation space was specified.
2	An error was made in designating parameters.
9	A system error was encountered.

Notes on Using This Function

1. An application program can issue this function for multiple host sessions. The **Pause** (18) function can notify the application when one or more host sessions (PS, OIA, or both of them) are updated. The **Query Host Update** (24) function can be used to determine whether a PS, OIA, or both of them have been updated.
2. If the application chooses the asynchronous option, it can wait for the returned event object or semaphore to determine when a host event has occurred.
3. The event object or semaphore is initially in a non-signaled state and is signaled each time an appropriate event occurs. To receive notification for multiple events, the application must put the event object into the non-signaled state each time it has been signaled using either the **ResetEvent** or the **Query Host Update** (24) function.
4. An application cannot request Start Host Notification more than once with the same options.

5. This is not an exclusive call. Multiple applications can request this function for the same short session ID.

Start Keystroke Intercept (50)

3270	5250	VT
Yes	Yes	Yes

The **Start Keystroke Intercept** function allows a workstation application to filter any keystrokes sent to a session by a terminal operator. After a call to this function, keystrokes are intercepted and saved until the keystroke queue overflows or until the **Stop Keystroke Intercept** (53) function or **Reset System** (21) function is called. The intercepted keystrokes can be:

- Received through the **Get Key** (51) function and sent to the same or another session with the **Send Key** (3) function
- Accepted or rejected through the **Post Intercept Status** (52) function
- Replaced by other keystrokes with the **Send Key** (3) function
- Used to trigger other processes

Prerequisite Calls

There are no prerequisite calls for this function.

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 50	
Data String	See the following table	
Length	Keystroke buffer size EHLLAPI allocates 32 bytes minimum for this buffer.	
PS Position	NA	

The calling data string contains:

Byte		Definition
Standard	Enhanced	
1	1	One of the following values: <ul style="list-style-type: none"> • A specific host presentation space short name (PSID) • A blank or null indicating a request for the host-connected host presentation space
	2-4	Reserved.

Byte		Definition
2	5	<p>An option code character:</p> <ul style="list-style-type: none"> • D for AID keystrokes only. • L for all keystrokes. • E for edit keys and all keystrokes (Available in Enhanced mode only) • M for requesting the asynchronous message mode of the notification (Windows only). <p>When M is specified, a code character D, or L, or E (Enhanced Monde) must be placed in position 13 (7 for 16-bit).</p> <p>Prerequisite: keyboard keys must be mapped to edit functions, e.g. Ctrl+C mapped to edit copy function. See Table 12 on page 145 for edit functions supported.</p>
	6–8	Reserved.
3–4	9–12	When M is specified in position 5 (2 for 16-bit), the window handle of the window that receives the message should be set. The message is a return value of RegisterWindowMessage (PCSHLL) (not equal 0).
7	13	<p>One of the following values if position 5 (2 for 16-bit) is M:</p> <ul style="list-style-type: none"> • D for AID keystrokes only. • L for all keystrokes. • E for edit keys and all keystrokes. (Available in Enhanced mode only.)
	14–16	Reserved.

Data String:

If M (asynchronous message mode) is specified in position 5 (2 for standard interface) and the function is completed successfully, the following data string is returned:

Byte		Definition
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID)
	2–8	Reserved
3–4	9–10	Task ID of asynchronous message mode

Note: If a user sends keystrokes to a session, an application window receives a message. The message is a return value of RegisterWindowMessge (PCSHLL). The wParam parameter contains the Task ID returned by the function call. HIWORD of lParam parameter contains return code 0, which shows that the function was successful, and LOWORD of lParam parameter contains function number 50.

Return Parameters

Return Code	Explanation
0	The Start Keystroke Intercept function was successful.
1	An incorrect presentation space was specified.

Return Code	Explanation
2	An incorrect option was specified.
4	The execution of the function was inhibited because the target presentation space was busy.
9	A system error was encountered. Release is being used.

Notes on Using This Function

- If a return code of 31 occurs for the **Get Key (51)** function, either:
 - Increase the value of the calling length parameter for this function, or
 - Execute the **Get Key (51)** function more frequently.

An intercepted keystroke occupies 3 bytes in the buffer. The next intercepted keystroke is placed in the adjacent 3 bytes. When the **Get Key (51)** function retrieves a keystroke (first-in first-out, or FIFO), the 3 bytes that it occupied are made available for another keystroke. By increasing the size of the buffer or the rate at which keystrokes are retrieved from the buffer, you can eliminate buffer overflow.

In the PC/3270, another way to eliminate return code 31 is to operate the PC/3270 emulator in the resume mode.

- If option code D is provided, EHLLAPI writes intercepted non-AID keys to the presentation space to which they were originally intended, and returns only AID keys to the application.
- Call the **Stop Keystroke Intercept (53)** function before exiting your EHLLAPI application. Otherwise, keystroke interception remains enabled with unpredictable results.

Start Playing Macro (110)

3270	5250	VT
Yes	Yes	Yes

The **Start Playing Macro** function invokes a macro. The macro will be executed in the connected session.

Note: This macro must exist in the Personal Communications user-class application data directory and no extension should be specified in the function call for the macro name.

Prerequisite Calls

Connect Presentation Space (1)

Call Parameters

	Standard Interface
Function Number	Must be 110
Data String	See the following table
Length	Length of macro name, plus 3
PS Position	NA

Byte		Definition
Standard	Enhanced	
1-2		Reserved
3-n		Null terminated macro name

Return Parameters

Return Code	Explanation
0	The Start Playing Macro function was successful.
1	The programs is not connected to a host session.
2	An error was made in specifying parameters.
9	A system error was encountered.

Stop Close Intercept (43)

3270	5250	VT
Yes	Yes	Yes

The **Stop Close Intercept** function allows the application to turn off the **Start Close Intercept** (41) function. After the application has issued the **Stop Close Intercept** function, subsequent close requests result in a normal stop sent to the logical terminal session.

Prerequisite Calls

Start Close Intercept (41)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 43	
Data String	1-character short session ID of the host presentation space	
Length	1	Must be 4
PS Position	NA	

The calling data string can contain:

Byte		Definition
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID)
	2-4	Reserved

Return Parameters

Return Code	Explanation
0	The Stop Close Intercept function was successful.
1	An incorrect host presentation space was specified.

Return Code	Explanation
2	An error was made in specifying parameters.
8	No previous Start Close Intercept (41) function was issued.
9	A system error occurred.
12	The session stopped.

Stop Communication Notification (82)

3270	5250	VT
Yes	Yes	Yes

The **Stop Communication Notification** function disables the capability of the **Query Communication Event (81)** function to determine whether any communication events have occurred in the specified Session.

Prerequisite Calls

Start Communication Notification (80)

Call Parameters

	Enhanced Interface
Function Number	Must be 82
Data String	1-character short name of the host presentation space, or a blank or null indicating request for updates to the host-connected presentation space
Length	4 is implied
PSPosition	NA

The calling data structure contains these elements:

Byte	Definition
1	A 1-character presentation space short name (PSID)
2-4	Reserved

Return Parameters

Return Code	Definition
0	The function was successful
1	An incorrect PSID was specified
8	No prior call to Start Communication Notification (80) function was called for the PSID
9	A system error was encountered

Stop Host Notification (25)

3270	5250	VT
Yes	Yes	Yes

The **Stop Host Notification** function disables the capability of the **Query Host Update** (24) function to determine if the host presentation space or OIA has been updated. This function also stops host events from affecting the **Pause** (18) function.

Prerequisite Calls

Start Host Notification (23)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 121	
Data String	See the following note	
Length	1 is implied	Must be 4
PS Position	NA	

The calling data string can contain:

Byte		Definition
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID)
	2-4	Reserved

Note: 1-character short name of the target presentation space ID, or a blank or a null to indicate a request for the host-connected presentation space.

Return Parameters

Return Code	Definition
0	The Stop Host Notification function was successful.
1	An incorrect host presentation space was specified.
8	No previous Start Host Notification (23) function was issued.
9	A system error was encountered.

Stop Keystroke Intercept (53)

3270	5250	VT
Yes	Yes	Yes

The **Stop Keystroke Intercept** function ends your application program's ability to intercept keystrokes.

Prerequisite Calls

Start Keystroke Intercept (50)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 53	
Data String	Short name of the target presentation space (PSID)	
Length	1 is implied	Must be 4
PS Position	NA	

The calling data string can contain:

Byte		Definition
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID)
	2-4	Reserved

Return Parameters

Return Code	Explanation
0	The Stop Keystroke Intercept function was successful.
1	An incorrect presentation space was specified.
8	No prior Start Keystroke Intercept (50) function was called for this presentation space.
9	A system error was encountered.

Wait (4)

3270	5250	VT
Yes	Yes	Yes

The **Wait** function checks the status of the host-connected presentation space. If the session is waiting for a host response (indicated by XCLOCK (X []) or XSYSTEM), the **Wait** function causes EHLLAPI to wait up to 1 minute to see if the condition clears.

Prerequisite Calls

Connect Presentation Space (1)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 4	
Data String	NA	
Length	NA	
PS Position	NA	

Return Parameters

Return Code	Definition
0	The keyboard is unlocked and ready for input.
1	Your application program is not connected to a valid session.
4	Timeout while still in XCLOCK (X []) or XSYSTEM.
5	The keyboard is locked.
9	A system error was encountered.

Notes on Using This Function

1. The **Wait** function is used to give host requests like those made by the **Send Key** (3) function the time required to be completed. Using the **Set Session Parameters** (9) function, you can request the TWAIT, LWAIT, or the NWAIT option. See item 12 on page 156.
2. You can use this function to see if the host OIA is inhibited.
3. The **Wait** function is satisfied by the host unlocking the keyboard. Therefore, a return code of 0 does not necessarily mean that the transaction has been completed. To verify completion of the transaction, you should use the **Search Field** (30) function or **Search Presentation Space** (6) function combined with the **Wait** function to look for expected keyword prompts.

Window Status (104)

3270	5250	VT
Yes	Yes	Yes

The **Window Status** function allows the application to query or change a window's presentation space size, location, or visible state.

Prerequisite Calls

Connect Window Services (101)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 104	
Data String	See the following table	
Length	16 or 20	24 or 28
PS Position	NA	

The calling data string can contain:

Byte		Definition
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID)
	2-4	Reserved

Byte		Definition
2	5	A request option value, select one of the following values: <ul style="list-style-type: none"> • X'01' for set status Note: When the session is embedded In-Place in a compound OLE document, the set form of this function (byte 5 = X'01') always returns 0 but has no effect. • X'02' for query for status • X'03' for query for extended status
	6	Reserved

If the request option value is X'01' (set status):

Byte		Definition
Standard	Enhanced	
3-4	7-8	A 16- or 32-bit word containing the status set bits if the request option is 1 (set status). The following codes are valid return values if the request option is set status: <p>X'0001' Change the window size. (Not valid with minimize, maximize, restore, or move.)</p> <p>X'0002' Move the window. (Not valid with minimize, maximize, size, or restore.)</p> <p>X'0004' ZORDER window replacement.</p> <p>X'0008' Set the window to visible.</p> <p>X'0010' Set the window to invisible.</p> <p>X'0080' Activate the window. (Sets focus to window and places it in the foreground unless ZORDER is specified. In this case, the ZORDER placement is used.)</p> <p>X'0100' Deactivate the window. (Deactivates the window and makes the window the bottom window unless ZORDER is also specified. In this case, the ZORDER placement is used.)</p> <p>X'0400' Set the window to minimized. (Not valid with maximize, restore, size, or move.)</p> <p>X'0800' Set the window to maximized. (Not valid with minimize, restore, size, or move.)</p> <p>X'1000' Restore the window. (Not valid with minimize, maximize, size, or move.)</p>
5-6	9-12	A 16- or 32-bit word containing the X window position coordinate. (Ignored if the move option is not set.)
7-8	13-16	A 16- or 32-bit word containing the Y window position coordinate. (Ignored if the move option is not set.)
9-10	17-20	A 16- or 32-bit word containing the X window size in device units. (Ignored if the size option is not set.)
11-12	21-24	A 16- or 32-bit word containing the Y window size in device units. (Ignored if the size option is not set.)

Byte		Definition
13–16	25–28	A 16- or 32-bit word containing a window handle for relative window placement. These two words are only for the set option. (Ignored if the ZORDER option is not set.) Valid values are as follows: X'00000003' Place in front of all sibling windows. X'00000004' Place behind all sibling windows.

If the request option value is X'02' (query for status):

Byte		Definition
Standard	Enhanced	
3–4	7–8	A 16- or 32-bit word containing X'0000' if the request option is 2 (query for status). The following codes are possible return values if the request option is query for status. More than one state is possible. X'0008' The window is visible. X'0010' The window is invisible. X'0080' The window is activated. X'0100' The window is deactivated. X'0400' The window is minimized. X'0800' The window is maximized.
5–6	9–12	A 16- or 32-bit word containing the X window position coordinate. (Ignored if the move option is not set.)
7–8	13–16	A 16- or 32-bit word containing the Y window position coordinate. (Ignored if the move option is not set.)
9–10	17–20	A 16- or 32-bit word containing the X window size in device units. (Ignored if the size option is not set.)
11–12	21–24	A 16- or 32-bit word containing the Y window size in device units. (Ignored if the size option is not set.)
13–16	25–28	A 16- or 32-bit word containing a window handle for relative window placement. These two words are only for the set option. (Ignored if the ZORDER option is not set.) Valid values are as follows: X'00000003' Place in front of all sibling windows. X'00000004' Place behind all sibling windows.

If the request option value is X'03' (query for extended status):

Byte		Definition
Standard	Enhanced	

Byte		Definition
3-4	7-8	A 16- or 32-bit word containing X'0000' if the request option is 3 (query for extended status). The following codes are possible return values if the request option is query for extended status. More than one state is possible. X'0008' The window is visible. X'0010' The window is invisible. X'0080' The window is activated. X'0100' The window is deactivated. X'0400' The window is minimized. X'0800' The window is maximized.
5-6	9-10	A 16- or 32-bit word containing the current font size in the X-dimension. The value is in screen pels.
7-8	11-12	A 16- or 32-bit word containing the current font size in the Y-dimension. The value is in screen pels.
9-12	13-16	Reserved. This value is always zero.
13-14	17-18	A 16- or 32-bit word containing the row number of the first visible character of the presentation space. This value is usually one, unless the Fixed Size font option is in effect, and the window has been resized such that some of the presentation space is hidden.
15-16	19-20	A 16- or 32-bit word containing the column number of the first visible character of the presentation space.
17-20	21-24	A 16- or 32-bit word containing the presentation space window handle of the session.

Return Parameters

Return Code	Explanation
0	The Window Status function was successful.
1	The presentation space was not valid or not connected.
2	An incorrect option was specified.
9	A system error occurred.
12	The session stopped.

Notes on Using This Function

The logical terminal (LT) windows use character cells. When resizing the LT windows, the LT rounds the number to prevent character cell truncation. The requested size and position might be slightly different from what was requested. Follow the set option with a query option to determine the final Presentation Manager window position and size. All x and y coordinate positions and sizes are in pels.

Write Structured Fields (127)

3270	5250	VT
Yes	No	No

The **Write Structured Fields** function allows an application to write structured field data to the host application. If the call specifies S (for Synchronous), the application does not receive control until the **Write Structured Fields** function is completed. If the call specifies A (for Asynchronous), the application receives control immediately after the call. If the call specifies M, the application receives control immediately after the call. The application may wait for the message. In any case (S, A or M), the application provides the buffer address in which data to the host is to be placed.

For a successful asynchronous completion of this function, the following statements apply:

The return code field in the parameter list might not contain the results of the requested I/O. If the return code is not 0, then the request failed. The application must take the appropriate action based on the return code.

If the return code for this request is 0, the application must use the request ID returned with this function call to issue the **Get Request Completion** function call to determine the completion results of the function associated with the request ID. The **Get Request Completion** function call returns the following information:

1. Function request ID
2. Address of the data string from the asynchronous request
3. Length of the data string
4. Return code of the completed function

Prerequisite Calls

Connect for Structured Fields (120) Allocate Communication Buffer (123)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 127	
Data String	See the following table	
Length	8, 10, or 14	Must be 20
PS Position	NA	

The calling data string can contain:

Byte		Definition
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID).
	2-4	Reserved.
2	5	S or A or M S = Synchronous. Control is not returned to the application until the read is satisfied. A = Asynchronous. Control is returned immediately to the application, can wait for the event object. M = Asynchronous. Control is returned immediately to the application, can wait for the message.
	6	Reserved.

Byte		Definition
3–4	7–8	2-byte destination/origin ID.
5–8	9–12	4-byte address of the buffer from which the data is to be written. The buffer must be obtained using the Allocate Communications Buffer (123) function.
9–10	13–16	Reserved.
11–12	17–20	When “M” is specified in position 5 (2 for 16-bit), the window handle of the window that receives the message should be set. The message is a return value of RegisterWindowMessage (“PCSHLL”) (not equal 0).
13–14		The data in these positions is ignored by EHLLAPI. However, no error is caused if the migrating program has data in these positions. This data is accepted to provide compatibility with migrating applications.

Return Parameters

This function returns a data string and a return code.

Data String:

If A (asynchronous) is specified in position 5 (2 for standard interface) and the function is completed successfully, the following data string is returned:

Byte		Definition
9–10	13–14	2-byte Function Request ID. It is used by the Get Request Completion (125) function to determine the completion of this function call.
	15–16	Reserved.
	17–20	4-byte value in which the event object address is returned by EHLLAPI. The application can wait for this event object. When the event object is cleared, the application must issue the Get Request Completion (125) function call to get results of the Write Structured Fields request. (32-bit only).

Note: An event object is returned for each successful asynchronous request. The event object should not be used again. A new event object is returned for each request and is valid for only the duration of that request.

Data String:

If M (asynchronous message mode) is specified in position 5 (2 for standard interface) and the function is completed successfully, the following data string is returned:

Byte		Definition
9–10	13–14	2-byte Function Request ID. It is used by the Get Request Completion (125) function to determine the completion of this function call.
	15–16	Reserved.
11–12	17–18	Task ID of asynchronous message mode.
	19–20	Reserved.

Note: If the function is completed successfully, an application window receive a message. The message is a return value of RegisterWindowMessage (PCSHLL). The wParam parameter contains the Task ID returned by the function call. HIWORD of lParam parameter contains return code 0, which shows the function was successful, and LOWORD of lParam parameter contains function number 127.

Return Code:

The following codes are defined:

Return Code	Explanation
0	The Write Structured Fields function was successful.
1	A specified host presentation space short session ID was not valid or was not connected.
2	An error was made in specifying parameters.
9	A system error occurred.
11	Resource unavailable (memory unavailable).
34	The message sent inbound to the host was canceled.
35	An outbound transmission from the host was canceled.
36	Request rejected. Lost contact with the host.
37	Failed. The host is inbound disabled.

Notes on Using This Function

- Return code 35 will be returned when the first **Read Structured Fields** or **Write Structured Fields** is requested after an outbound transmission from the host is canceled. Corrective action is the responsibility of the application.
- Return code 36 requires that the application disconnect from the emulation program and then reconnect to reestablish communications with the host. Corrective action is the responsibility of the application.
- Return code 37 will be returned if the host is inbound disabled.
- The EHLLAPI allows for a maximum of 20 asynchronous requests per application to be outstanding. A return code for unavailable resources (RC=11) is returned if more than 20 asynchronous requests are attempted.
- If you are using IBM Global Network connections, the maximum number of asynchronous requests is 10.

The structured field data format is as follows:

Offset	Length	Contents
0	1 word	X'0000'
2	1 word	m (message length: the number of bytes of data in the message, the number does not include the buffer header prefix, which contains 8 bytes) This value must be set by the application.
4	1 word	X'0000'
6	1 word	X'0000'
8	8 bytes	Length of the first (or only) structured field message.
10	1 byte	First nonlength byte of the structured field message.

Offset	Length	Contents
		:
		:
m+7	1 byte	Last byte in the structured field message.

Bytes 0 through 7 are the buffer header. These first 8 bytes are used by the emulation program. The user section of the buffer begins with offset 8. Bytes 8 and 9 contain the number of bytes in the first structured field (a structured field message can contain multiple structured fields) including 2 bytes for bytes 8 and 9. Bytes 8 through $m+7$ are used for the structured field message sent to the host.

Synchronous Requests: When **Write Structured Fields** is requested synchronously (the S option in the data string), control is returned to the application only after the request is satisfied. The application can assume:

- The return code is correct.
- The data in the communications buffer (read buffer) is correct.
- The host is no longer processing the **Write Structured Fields** request.

Asynchronous Requests: When **Write Structured Fields** is requested asynchronously (the A option in the data string), the application *cannot* assume:

- The return code is correct.
- The data in the communications buffer (write buffer) is correct.
- The host is no longer processing the **Write Structured Fields** request.

When requested asynchronously, EHLLAPI returns the following values:

- A 16-bit Request ID in positions 13–14 (9–10 for standard interface) of the data string
- The address of a event object in positions 17–20 of the data string.

These are used to complete the asynchronous **Write Structured Fields** call.

The following steps must be completed to determine the outcome of an asynchronous **Write Structured Fields** function call:

- If the EHLLAPI return code is not zero, the request failed. No asynchronous request has been made. The application must take appropriate actions before attempting the call again.
- If the return code is zero, the application should wait until the event object is in the signaled state by using the **Get Request Completion** (125) function. The event object **Get Request Completion** (125) function) and should not be reused. The event object is valid only for the duration of the **Write Structured Fields** function call through the completion of the **Get Request Completion** (125) function call.
- Once the event object is in the signaled state use the returned 16-bit Request ID as the Request ID parameter in a call to the **Get Request Completion** (125) function. The data string returned from the **Get Request Completion** (125) function call contains the final return code of the **Write Structured Fields** function call.

Asynchronous Requests: When **Write Structured Fields** is requested asynchronously (the M option in the data string), the application cannot assume:

- The return code is correct

- The data in the communications buffer (write buffer) is correct
- The host is no longer processing the **Write Structured Fields** request

When requested asynchronously with the M option, EHLLAPI returns the following values:

- A 16-bit request ID in positions 13–14 (9–10 for standard interface) of the data string
- Task ID of asynchronous message mode in position 17–18 (11–12 for standard interface)

These are used to complete the asynchronous **Write Structured Fields** call.

Chapter 4. WinHLLAPI Extension Functions

This chapter describes the extension functions provided when using WinHLLAPI programming support.

Summary of WinHLLAPI Functions

The following WinHLLAPI functions are available for 3270, 5250, and VT:

- “Wait (4)”
- “Start Host Notification (23)” on page 186
- “Start Close Intercept (41)” on page 187
- “Start Keystroke Intercept (50)” on page 188
- “Send File (90)” on page 189
- “Receive File (91)” on page 190

WinHLLAPI Asynchronous Functions

The following sections describe the WinHLLAPI asynchronous functions.

WinHLLAPIAsync

This entry point is used for six WinHLLAPI functions that often take a long time to complete. With WinHLLAPIAsync, the function will be launched asynchronously and will not interfere with the continued progression of the calling application. These functions are: **Wait (04)**, **Start Host Notify (23)**, **Start Close Intercept (41)**, **Start Keystroke Intercept (50)**, **Send File (90)**, and **Receive File (91)**, and are described in Chapter 4, “WinHLLAPI Extension Functions.”

HANDLE WinHLLAPIAsync (HWND hWnd, LPWORD *lpnFunction*, LPBYTE *lpData*, LPWORD *lpnLength*, LPWORD *lpnRetC*)*

The parameter list is the same as WinHLLAPI except a window handle is required before the function number. Since the function operates asynchronously, its completion is signaled by a registered message. The window handle is required as the target of the message.

There are two messages that must be registered by the WinHLLAPI application through calls to **RegisterWindowsMessage()** with the strings **WinHLLAPIAsync** (for all functions except 90 and 91) and **WinHLLAPIAsyncFileTransfer** (for functions 90 and 91). The standard format is as follows:

WPARAM

contains the Task Handle returned by the original function call.

LPARAM

the high word contains the error code and the low word contains the original function number.

Wait (4)

This function determines whether the Host session is in an inhibited state. If, for some reason, the session is in an inhibited state, this function will signal your

application with a message when either the inhibited state expires or your wait period has expired. The amount of time to wait is set with the **Set Session Parameters (9)** function.

Prerequisite Functions: Connect Presentation Space (1)

WinHLLAPIAsync(*hWnd, lpwFunction, lpbyString, lpwLength, lpwReturnCode*)

Call Parameters:

Parameter	Description
<i>Data String</i>	NA
<i>Data Length</i>	NA
<i>PS Position</i>	NA

Return Codes:

Code	Description
WHLLOK	The PS is uninhibited and ready for input.
WHLLNOTCONNECTED	Your WinHLLAPI application is not connected to a valid host session.
WHLLPSBUSY	Function timed out while still inhibited.
WHLLNHIBITED	The PS is inhibited.
SHLLSYSERROR	The function failed due to a system error.
WHLLCANCEL	The asynchronous function was cancelled.

Remarks: Asynchronous Wait is used to notify the calling application when the inhibited state of the PS is expired. When inhibited state has expired, this version of **Wait** will post a **WinHLLAPIAsync** message to the window specified by the *hWnd*. The session options **TWAIT**, **LWAIT**, and **NWAIT** affect the length of time that this function will wait. See “Set Session Parameters (9)” on page 152 for details on these session options.

Note: If **NWAIT** is specified in the session parameters and the application registers using revision 1.1 of the WinHLLAPI implementation, the **WinHLLAPIAsync** call will work the same as the **WinHLLAPI** call and not send a message. If revision 1.0 is being used then **Wait** will return a message immediately with the inhibited status of the PS.

Start Host Notification (23)

This function enables you to notify your WinHLLAPI application of changes in the Host Session Presentation Space (PS) or Operation Information Area (OIA).

Prerequisite Functions: There are no prerequisite functions for this function.

WinHLLAPIAsync (*hWnd, lpwFunction, lpbyString, lpwLength, lpwReturnCode*)

Call Parameters:

Parameter	Description
<i>Data String</i>	A 7-byte string in the following format: Byte 1 Short name session ID of the desired Host session, or space or null for the current Host session. Byte 2 Notification mode. "P" for presentation space update only, "O" for OIA update only, "B" for both presentation space and OIA updates. When calling WinHLLAPIAsync, this position can be "A". Byte 3-6 Not used. Provided for compatibility with older applications. Byte 7 Reserved or replaced with one of the following if using WinHLLAPIAsync and A in byte 2: P for presentation space update only, O for OIA update only; and B for both presentation space and OIA updates.
<i>Data Length</i>	Length of Host event buffer (256 recommended).
<i>PS Position</i>	NA

Return Parameters:

Parameter	Description
<i>Data String</i>	Same as <i>Data String</i> on the call.

Return Codes:

Code	Description
WHLLOK	Host notification enabled.
WHLLNOTCONNECTED	The specified Host session is invalid.
WHLLPARAMETERERROR	One of more parameters are invalid.
WHLLSYSERROR	The function failed due to a system error.
WHLLCANCEL	The asynchronous function was cancelled.

Remarks: Once enabled, Host notification is enabled until you call **Stop Host Notification (25)** or **WinHLLAPICancelAsyncRequest()**. The function initiates host notification and immediately returns control to your Windows HLLAPI application. This frees your application to perform other tasks while waiting for host updates. When an update occurs, the function will notify the window specified by *hWnd* with the registered message **WinHLLAPIAsync**.

Start Close Intercept (41)

This function intercepts user requests to close Personal Communications.

Prerequisite Functions: There are no prerequisite functions for this function.

WinHLLAPIAsync (*hWnd*, *lpwFunction*, *lpbyString*, *lpwLength*, *lpwReturnCode*)

Call Parameters:

Parameter	Description
<i>Data String</i>	A 5-byte string for returned semaphore address. The first byte is the session short name of the session to query, or space or null for the current session.
<i>Data Length</i>	Must be specified.
<i>PS Position</i>	NA

Return Parameters:

Parameter	Description
<i>Data String</i>	A 5-byte string with the following format: Byte 1 Session short name, or space or null for the current session Bytes 2-5 Semaphore address.

Return Code:

Code	Description
WHLLOK	The function was successful.
WHLLNOTCONNECTED	An invalid presentation space was specified.
WHLLPARAMETERERROR	An invalid option was specified.
WHLLSYSERROR	The function failed due to a system error.
WHLLCANCEL	The asynchronous function was cancelled.

Remarks: Once enabled, Host notification remains enabled until you call **Stop Close Intercept (43)** or **WinHLLAPICancelAsyncRequest (0)**. Initially, the semaphore is set. After using this function, close requests from the user are discarded and the semaphore is cleared.

The function initiates close intercept and immediately returns control to your Windows HLLAPI application. This frees your application to perform other tasks while waiting for close requests. When a close request occurs, the function will notify the window specified by *hWnd* with the registered message **WinHLLAPIAsync**.

Start Keystroke Intercept (50)

This function intercepts keystrokes sent to a session by the user.

Prerequisite Functions: There are no prerequisite functions for this function.

WinHLLAPIAsync (*hWnd*, *lpwFunction*, *lpbyString*, *lpwLength*, *lpwReturnCode*)

Call Parameters:

Parameter	Description
<i>Data String</i>	A 6-byte string in the following format: Byte 1 Session short name, or space or null for the current Host session. Byte 2 Keystroke intercept code. "D" causes only AID keystrokes to be intercepted; "L" causes all keystrokes to be intercepted. Bytes 3-6 Reserved
<i>Data Length</i>	Variable (256 is recommended)
<i>PS Position</i>	NA

Return Code:

Code	Description
WHLLOK	Keystroke intercept has been initiated.
WHLLNOTCONNECTED	The Host session presentation space is invalid.
WHLLPARAMETERERROR	One or more parameters are invalid.
WHLLPSBUSY	Session is busy.
WHLLSYSERROR	Function failed due to a system error.
WHLLCANCEL	Asynchronous function was cancelled.

Remarks: The function initiates keystroke intercept and immediately returns control to your Windows HLLAPI application. This frees your application to perform other tasks while waiting for keystrokes. Once initiated, the function will post a **WinHLLAPIAsync** message to the window specified by *hWnd* whenever the user sends a key to the PS. After notification, the intercepted keystrokes can be handled in any way that is allowed by a normal EHLLAPI application. Take note that the keystroke buffer is of limited size so each keystroke should be handled and removed from the buffer.

Send File (90)

This function transfers a file from the PC to the Host.

Prerequisite Functions: There are no prerequisite functions for this function.

WinHLLAPIAsync (*hWnd, lpwFunction, lpbyString, lpwLength, lpwReturnCode*)

Call Parameters:

Parameter	Description
<i>Data String</i>	SEND command parameters.
<i>Data Length</i>	Length of <i>Data String</i> . NA if session option EOT is specified.
<i>PS Position</i>	NA

Return Codes:

Code	Description
WHLLOK	File transfer started successfully.
WHLLPARAMETERERROR	Parameter error or <i>Data Length</i> is zero or greater than 255.
WHLLFTXCOMPLETE	File transfer complete.
WHLLFTXSEGMENTED	Transfer is complete with segmented records.
WHLLSYSERROR	The function failed due to a system error.
WHLLTRANSABORTED	File transfer aborted, either due to the user clicking the cancel button or because the timeout period has elapsed.
WHLLFILENOTFOUND	PC file not found.
WHLLFTXCOMPLETECICS	File transfer was successful (transfer to CICS).
WHLLACCESSDENIED	Access denied to PC file.
WHLLMEMORY	Insufficient memory.
WHLLINVALIDENVIRONMENT	Invalid environment.

Remarks: Only one file transfer operation is supported per connected Host session.

The function initiates the file transfer and immediately returns control to your Windows HLLAPI application. This frees your application to perform other tasks while the file transfer is occurring. Once initiated the function will regularly post **WinHLLAPIAsyncFileTransfer** messages to the window specified by *hWnd*. These messages will notify the WinHLLAPI application of the status of the transfer and send a final message when the transfer is complete.

wParm

Is the status indicator: the high byte contains the Session ID, the low byte contains the status. If the low byte is zero, the file transfer is still in progress. If the low byte is one, the file transfer has completed.

IParm If the low byte of *wParm* is zero (in progress), *IParm* is the number of bytes transferred. If the low byte *wParm* is one (completed), *IParm* is the completion code.

Receive File (91)

This function transfers a file from the PC to the Host.

Prerequisite Functions: There are no prerequisite functions for this function.

WinHLLAPIAsync (*hWnd*, *lpwFunction*, *lpbyString*, *lpwLength*, *lpwReturnCode*)

Call Parameters:

Parameter	Description
<i>Data String</i>	RECEIVE command parameters.

Parameter	Description
<i>Data Length</i>	Length of <i>Data String</i> . NA if session option EOT is specified.
<i>PS Position</i>	NA

Return Codes:

Code	Description
WHLLOK	File transfer started successfully.
WHLLPARAMETERERROR	Parameter error or <i>Data Length</i> is zero or greater than 255.
WHLLFTXCOMPLETE	File transfer complete.
WHLLFTXSEGMENTED	Transfer is complete with segmented records.
WHLLSYSERROR	The function failed due to a system error.
WHLLTRANSABORTED	File transfer aborted, either due to the user clicking the cancel button or because the timeout period has elapsed.
WHLLFILENOTFOUND	PC file not found.
WHLLFTXCOMPLETECICS	File transfer was successful (transfer to CICS).
WHLLACCESSDENIED	Access denied to PC file.
WHLLMEMORY	Insufficient memory.
WHLLINVALIDENVIRONMENT	Invalid environment.

Remarks: Only one file transfer operation is supported per connected Host session.

The function initiates the file transfer and immediately returns control to your Windows HLLAPI application. This frees your application to perform other tasks while the file transfer is occurring. Once initiated the function will regularly post **WinHLLAPIAsyncFileTransfer** messages to the window specified by *hWnd*. These messages will notify the WinHLLAPI application of the status of the transfer and send a final message when the transfer is complete.

wParm

Is the status indicator: the high byte contains the Session ID, the low byte contains the status. If the low byte is zero, the file transfer is still in progress. If the low byte is one, the file transfer has completed.

lParm If the low byte of *wParm* is zero (in progress), *lParm* is the number of bytes transferred. If the low byte *wParm* is one (completed), *lParm* is the completion code.

WinHLLAPICancelAsyncRequest

This function cancels an outstanding asynchronous function launched by a call to **WinHLLAPIAsync()**.

Syntax

int WinHLLAPICancelAsyncRequest (HANDLE *hAsyncTask*, WORD *wFunction*)

Parameters

hAsyncTask

The handle returned by WinHLLAPIAsync() when the function was initiated.

wFunction

The function number of the asynchronous task to cancel. Because this parameter is required for revision 1.1 but not in 1.0, it is optional.

With this function, any asynchronous task previously initiated by a call to WinHLLAPIAsync() may be canceled while still outstanding.

Returns

The return value indicates if the specified function was, in fact, canceled. If the function was canceled then the return value is WHLLOK (0). If the outstanding asynchronous function was not cancelled, one of the following codes will be returned.

WHLINVALID

hAsyncTask is not a valid task handle.

WHLALREADY

The asynchronous task specified by *hAsyncTask* has already completed.

Initialization and Termination Functions

The following section describes the initialization and termination functions of WinHLLAPI programming support.

WinHLLAPI Startup

This function is used to register the application with the WinHLLAPI implementation and should be called before any other call to the WinHLLAPI implementation. This implementation supports Versions 1.0 and 1.1 of the WinHLLAPI specification. The WinHLLAPI application should negotiate version compatibility with this function.

Syntax

int WinHLLAPIStartup(WORD *wVersionRequired*, LPWHLAPIDATA *lpData*)

Parameters

wVersionRequired

This is the version required by the WinHLLAPI application. The low byte contains the major version number and the high byte contains the minor version (or revision) number.

lpData

This is a pointer to a WHLLAPIDATA structure which will receive the implementations version number and a string describing the WinHLLAPI implementation provider. The WHLLAPIDATA structure is defined as:

```
#define WHLLDESCRIPTION_LEN 127
typedef struct tagWHLAPIDATA
{
    WORD wVersion;
    Char szDescription[WHLLDESCRIPTION_LEN + 1];
}WHLAPIDATA, * PWHLAPIDATA, FAR *LPWHLAPIDATA;
```


Returns

The return value indicates success or failure of registering the WinHLLAPI application with the implementation. If registration was successful, the return value is WHLLOK (zero). Otherwise, it is one of the following:

WHLLSYSNOTREADY

Indicates that the underlying network subsystem is unavailable.

WHLLVERNOTSUPPORTED

Indicates that the version requested is not provided by this implementation. This implementation supports Versions 1.0 and 1.1 only.

WinHLLAPI Cleanup

The WinHLLAPI specification recommends that this function be used by the WinHLLAPI application to de-register from the WinHLLAPI implementation.

Syntax

BOOL WinHLLAPICleanup()

Returns

Returns TRUE if the unregistration was successful. Otherwise, it returns FALSE.

Blocking Routines

The following sections describe the blocking routines supported by WinHLLAPI programming.

Note: Although blocking routines are supported for WinHLLAPI compliance, use of them is not recommended. Use of the WinHLLAPIAsync functions are the recommended method for asynchronous processing.

WinHLLAPIIsBlocking

This function tells the calling WinHLLAPI application thread whether it is in the process of executing a blocking call. A blocking call is any synchronous function that takes a long time to execute and does not return until complete. There are five blocking calls in this implementation of WinHLLAPI. The blocking calls are: **Get Key (51)**, **Wait (4)**, **Pause (18)**, **Send File (90)**, and **Receive File (91)**.

Syntax

BOOL WinHLLAPIIsBlocking()

Returns

If the WinHLLAPI application thread is in the middle of a blocking call, the function returns TRUE, otherwise, it returns FALSE.

Remarks

Because the default blocking-hook allows messages to be processed during blocking calls, it is possible to call the blocking call again.

WinHLLAPISetBlockingHook

This function sets an application-defined procedure to be executed while waiting for the completion of a blocking call. A blocking call is any synchronous function that takes a long time to execute and does not return until complete. There are five blocking calls in this implementation of WinHLLAPI. The blocking calls are: **Get Key (51)**, **Wait (4)**, **Pause (18)**, **Send File (90)**, and **Receive File (91)**.

Syntax

FARPROC WinHLLAPISetBlockingHook(**FARPROC** *lpfnBlockingHook*)

Parameters

lpfnBlockingHook

This is a pointer to the new blocking procedure.

Description

The WinHLLAPI implementation has a default blocking procedure that consists of nothing more than a message handler. This default mechanism is shown in the following example:

```
BOOL DefaultBlockingHook
{
    MSG msg;

    if (PeekMessage (&msg, NULL, 0, 0, xFPM_NOREMOVE))
    {
        if(msg.message == WM_QUIT)
        {
            return FALSE;
        }
        PeekMessage (&msg, NULL, 0, 0, PM_REMOVE);
        TranslateMessage (&msg);
        DispatchMessage (&msg);
    }
    return TRUE;
}
```

The blocking hook is implemented on a per-thread basis. A blocking hook set by this function will stay in effect for the thread until it is replaced by another call to **WinHLLAPISetBlockingHook()** or until the default is restored by a call to **WinHLLAPIUnhookBlockingHook()**.

The Blocking function must return **FALSE** if it receives a **WM_QUIT** message so WinHLLAPI can return control to the application to process the message and terminate gracefully. Otherwise, the function should return **TRUE**.

Returns

This function returns a pointer to the blocking function being replaced.

WinHLLAPIUnhookBlockingHook

This function restores the default blocking-hook for the calling thread.

Syntax

BOOL WinHLLAPIUnhookBlockingHook()

Returns

This function returns **TRUE** if the default blocking mechanism was successfully restored, otherwise it returns **FALSE**.

WinHLLAPICancelBlockingCall

This function cancels an executing blocking call in the *current thread*. A blocking call is any synchronous function that takes a long time to execute and does not return until complete. There are five blocking calls in this implementation of WinHLLAPI. The blocking calls are **Get Key** (51), **Wait** (4), **Pause** (18), **Send File** (90), and **Receive File** (91). If one of these is blocking calls are cancelled, the cancelled function will return **WHLLCANCELL**.

Syntax

int WinHLLAPICancelBlockingCall()

Returns

The return value indicates if the specified function was, in fact, canceled. If the function was canceled, then the return value is WHLLOK (0). If there are no outstanding blocking functions, then the following return code will be returned:

WHELLINVALID

Indicates that there is no blocking call currently executing.

Chapter 5. PCSAPI Functions

Personal Communications provides an API set, which is defined here and called *PCSAPI*. Whereas EHLLAPI is used to manage the interaction between a workstation application program and host systems after the session is established, the PCSAPI can be used to control the Personal Communications session itself.

How to Use PCSAPI

You can write application programs using the PCSAPI in C or C++. To develop a PCSAPI application, do the following:

1. Prepare source code and add the appropriate PCSAPI calls.
2. Include the header file PCSAPI.H in the application program.
3. Compile the source code.
4. Link the resultant .OBJ files with the appropriate object file or libraries.

You must also link it with the PCSAPI import library, PCSCALLS.LIB for 16-bit and PCSCAL32.LIB for 32-bit.

Page Layout Conventions

All PCSAPI function calls are presented in the same format so that you can quickly retrieve the information you need. The format is:

Function Name
Function Type
Parameter Type and Description
Return Code

Function Type

“Function Type” shows the type of the function in the following format:

TYPE **FunctionName**(*TYPE Parameter1, ...*)

Parameter Type and Description

“Parameter Type and Description” lists the type and describes each of the parameters to be specified in the PCSAPI function call.

Return Code

“Return Code” lists the codes that must be received by your program after a call to the PCSAPI function.

pcsConnectSession

3270	5250	VT
Yes	Yes	Yes

The **pcsConnectSession** function starts the communications with a host session specified by the short session ID. The session must already be started. This call is equivalent to the **Communications → Connect** menu item on the emulator session panel.

Function Type

BOOL WINAPI pcsConnectSession(*char cShortSessionID*)

Parameter Type and Description

char cShortSessionID
Presentation space short session ID.

Return Code

Return Code	Meaning
TRUE	Function ended successfully.
FALSE	It means one of the following things: <ul style="list-style-type: none"> • The session has not started. • An incorrect session ID was specified. • Call failed.

pcsDisconnectSession

3270	5250	VT
Yes	Yes	Yes

The **pcsDisconnectSession** function stops the communications link with a host session specified by the short session ID. This only disconnects the link; it does not stop the session. This call is equivalent to the **Communications → Disconnect** menu item on the emulator session panel.

Function Type

BOOL WINAPI pcsDisconnectSession(*char cShortSessionID*)

Parameter Type and Description

char cShortSessionID
Presentation space short session ID.

Return Code

Return Code	Meaning
TRUE	Function ended successfully.
FALSE	It means one of the following things: <ul style="list-style-type: none"> • The session has not started. • An incorrect session ID was specified. • Call failed.

pcsQueryConnectionInfo

3270	5250	VT
Yes	No	No

The **pcsQueryConnectionInfo** function returns information about the Telnet connection of the specified host session. The resulting information is returned into the buffer supplied by the application.

Function Type

BOOL WINAPI **pcsQueryConnectionInfo**(*char cShortSessionID*,
*CONNECTIONINFO *ConnectionInfo*)

Parameter Type and Description

char cShortSessionID

Presentation space short session ID.

CONNECTIONINFO *ConnectionInfo

Pointer to a CONNECTIONINFO structure where the connection info data will be returned.

Return Code

Return Code	Meaning
TRUE	Function ended successfully.
FALSE	It means one of the following things: <ul style="list-style-type: none">• The session has not started.• An incorrect session ID was specified.• The session specified was not a supported connection type for this API (not Telnet).

ConnectionInfo

The CONNECTIONINFO structure will be filled with the information about the host connection, consisting of the following information:

Structure	Information
Host name	States the name of the currently connected Telnet host.
LU name	States the LU name currently assigned.
Port number	States the host port number being used for the connection.
SSL indicator	Indicates a Secure Connection (1 = secure; 0 = not secure).

Note: This API is valid only with the 32-bit version of PCSAPI, and only works for Telnet connections.

Example

```
typedef struct_CONNECTIONINFO
{ //Description of a connection @WD06A
  char hostName[63]; //telnet host name @WD06A
  char reserved[1]; //reserved @WD06A
```

```

int portNumber; //host port number @WD06A
char luName[17]; //LU name @WD06A
char reserved2[3]; //reserved @WD06A
BOOL sslIndicator; //Secure Connection @WD06A
indicator
char reserved3[256]; //reserved @WD06A
}CONNECTIONINFO;

```

pcsQueryEmulatorStatus

3270	5250	VT
Yes	Yes	Yes

The **pcsQueryEmulatorStatus** function returns the status of the host session specified by the short session ID.

Function Type

ULONG WINAPI pcsQueryEmulatorStatus(char cShortSessionID)

Parameter Type and Description

char cShortSessionID
Presentation space short session ID.

Return Code

The return code value should be processed bit-significantly, that is, by either one of the following values or an ORed value out of the following values:

Return Code	Value	Meaning
PCS_SESSION_STARTED	0x00000001	Specified session has started. When this bit is off, the specified session has not started or an incorrect session ID was specified.
PCS_SESSION_ONLINE	0x00000002	Specified session is online (connected). When this bit is off, the specified session is offline (disconnected).
PCS_SESSION_API_ENABLED	0x00000004	API (EHLLAPI, DDE) is enabled on the specified session. If this bit is off, API is disabled on this session.

pcsQuerySessionList

3270	5250	VT
Yes	Yes	Yes

The `pcsQuerySessionList` function returns a list of all the current host sessions. The application must supply an array of `SESSINFO` structures as defined in the `PCSAPI.H` file, and a count of the number of elements in the array. This function fills in the structures with information about each session and returns the number of sessions found.

If the array has fewer elements than there are host sessions, then only the supplied elements of the array are filled in. The function always returns the actual number of sessions, even if the array is too small.

An application can call this function with zero array elements to determine how many sessions exist. A second call can then be made to obtain the session information.

Function Type

`ULONG WINAPI pcsQuerySessionList(ULONG Count, SESSINFO *SessionList)`

Parameter Type and Description

`ULONG Count`

Number of elements in the `SessionList` array.

`SESSINFO *SessionList`

Pointer to an array of `SESSINFO` structures as defined in `PCSAPI.H`.

Return Parameters

Return Code

Total number of Personal Communications sessions. This may be greater than or less than the `Count` parameter.

SessionList

The array of `SESSINFO` structures is filled with information about the host sessions. Sessions may be placed in the list in any order. Each `SESSINFO` structure contains the following fields (defined in `PCSAPI32.H`)

Name A union of `char` and `ULONG` which contains the session ID (A–Z). In the current implementation of Personal Communications, only the lower byte (`char`) is used, the other bytes are returned as zero.

Status A combination of bit flags which indicate the current status of the session. The flags (`PCS_SESSION_*`) are defined in the following table.

The status value should be processed bit-significantly, that is, by either one of the following values or an ORed value out of the following values:

Return Code	Meaning
<code>PCS_SESSION_STARTED</code>	The session is running. If this flag is not set, all others are undefined.
<code>PCS_SESSION_ONLINE</code>	The session has established a communications link to the host (this is, the session is connected).
<code>PCS_SESSION_API_ENABLED</code>	The session is enabled for programming APIs. If this flag is not set, the <code>EHLAPI</code> and <code>Host Access Class Library</code> APIs cannot be used on this session.

Example

```
ULONG      NumSessions, i; // Session counters
SESSINFO  *SessList;      // Array of session information structures
// Find out number of sessions that exist
NumSessions = pcsQuerySessionList (0,NULL);
if (NumSessions == 0) {
    printf("There are no sessions.");
    exit;
}

// Allocate array large enough for all sessions
SessList = (SESSINFO *)malloc(NumSessions * sizeof(SESSINFO));
memset(SessList, 0x00, NumSessions * sizeof(SESSINFO));

// Now read actual session info
pcsQuerySessionList(NumSessions, SessList);

for (i=0; i<NumSessions; i++) {
    if ((SessList[i].Status & PCS_SESSION_STARTED) &&
        (SessList[i].Status & PCS_SESSION_ONLINE)) {

        printf("Session %c is started and connected.",
            SessList[i].Name.ShortName);
    }
}

exit;
```

pcsQueryWorkstationProfile

3270	5250	VT
Yes	Yes	Yes

The **pcsQueryWorkstationProfile** function returns the workstation profile name that has been used to invoke the host session. To specify the host session, the short session ID must be used. The workstation profile name is copied to the work buffer supplied by the application.

Function Type

BOOL WINAPI **pcsQueryWorkstationProfile**(char cShortSessionID, PSZ lpBuffer)

Parameter Type and Description

char cShortSessionID

Presentation space short session ID.

PSZ lpBuffer

Work buffer to copy a null-terminated workstation profile name. The buffer must be large enough to contain a fully qualified file name.

Return Code

Return Code	Meaning
TRUE	Function ended successfully.
FALSE	It means one of the following things: <ul style="list-style-type: none">• The session has not started.• An incorrect session ID was specified.

pcsSetLinkTimeout

3270	5250	VT
Yes	Yes	Yes

The **pcsSetLinkTimeout** function sets the idle timeout of a Telnet link which is SSCP owned. This function has no effect on non-TN connections or connections which are not in SSCP owned state. If the timeout value is set to zero the link will not time out. Otherwise the link will time out (disconnect) after being idle in SSCP-owned state for the number of minutes specified.

Function Prototype

ULONG WINAPI **pcsSetLinkTimeout**(*char cShortSessionID, USHORT Timeout*)

Parameter Type and Description

char cShortSessionID

Presentation space short session ID.

USHORT Timeout

Timeout value in minutes. A value of zero disables timeout.

Return Code

Return Code	Meaning
PCS_SUCCESSFUL	The function ended successfully.
PCS_SYSTEM_ERROR	A system error occurred.

pcsStartSession

3270	5250	VT
Yes	Yes	Yes

The **pcsStartSession** function starts a host session by using a specified workstation profile. A short session ID can also be specified.

Function Type

ULONG WINAPI **pcsStartSession**(*PSZ lpProfile, char cShortSessionID, USHORT fuCmdShow*)

Parameter Type and Description

PSZ lpProfile

Path and complete filename of the profile to load. Path is optional but complete filename must be specified (.ws extension is not assumed).

char cShortSessionID

Presentation space short session ID. Space or NULL indicates the next available session ID.

USHORT fuCmdShow

Specifies how the window is to be displayed. One of the following values from PCSAPI.H:

- PCS_HIDE
- PCS_SHOW
- PCS_MINIMIZE
- PCS_MAXIMIZE

Return Code

Return Code	Value	Meaning
PCS_SUCCESSFUL	0	The function ended successfully.
PCS_INVALID_ID	1	An incorrect session ID was specified.
PCS_USED_ID	2	The specified short session ID is already used.
PCS_INVALID_PROFILE	3	An error was made in specifying the workstation profile, or the window parameter was not valid.
PCS_SYSTEM_ERROR	9	A system error occurred.

pcsStopSession

3270	5250	VT
Yes	Yes	Yes

The **pcsStopSession** function stops a host session specified by the short session ID.

Function Type

BOOL WINAPI **pcsStopSession**(*char cShortSessionID, USHORT fuSaveProfile*)

Parameter Type and Description

char cShortSessionID

Presentation space short session ID.

USHORT fuSaveProfile

This parameter can be one of the following values:

fuSaveProfile	Value	Meaning
PCS_SAVE_AS_PROFILE	0	Save the profile as specified in the current profile.
PCS_SAVE_ON_EXIT	1	Save the profile on exit.
PCS_NOSAVE_ON_EXIT	2	Do not save the profile on exit.

Return Code

Return Code	Meaning
TRUE	The function ended successfully.

Return Code	Meaning
FALSE	It means one of the following things: <ul style="list-style-type: none"> • The session has not started. • An incorrect session ID was specified.

Page Setup Functions

The PCSAPI functions listed in this section enable you to control and retrieve the Personal Communications emulator session **Page Setup** settings.

Restrictions

If the following restrictions are not satisfied, the API will fail. The return code indicates the reason for the failure.

- The host session specified in the argument `cShortSessionID` should not be in PDT mode.
- The host session should not be printing when the API is invoked.
- The **File** → **Page Setup** dialog should not be in use.

Some members in the PAGEINFO structure might be valid or supported only for specific session types. If a restriction is not specified, then that member is valid or supported for the following session types:

- 3270 display
- 3270 printer
- 5250 display
- ASCII VT

5250 printer sessions are not supported.

Note: These functions are not currently supported for DBCS and bidirectional sessions.

pcsGetPageSettings

3270	5250	VT
Yes	Yes	Yes

The **pcsGetPageSettings** function retrieves the host session page settings values (similar to the **File** → **Page Setup** dialog settings). Only the settings in the **Text** tab of the dialog are supported.

Function Type

ULONG WINAPI **pcsGetPageSettings**(*char cShortSessionID, PAGEINFO * const pPageInfo, ULONG * const pErrorInfo*)

Parameter Type and Description

char cShortSessionID

Presentation space short session ID.

PAGEINFO * const pPageInfo

Pointer to PAGEINFO structure, where the page settings are returned.

nFlags Combination of bit flags that indicates which members in the

structure are valid. These flags can be used independently or by ORing them together to restore the property page (defined in PCSAPI32.H). The flags, along with the corresponding valid members in the structure, are as follows:

Flag	Valid members in the structure
PCS_PAGE_CPI	nCPI
PCS_PAGE_LPI	nLPI
PCS_PAGE_FACE_NAME	szFaceName
PCS_PAGE_MPL	nMPL
PCS_PAGE_MPP	nMPP

nCPI The number of characters printed per inch.
LOWORD is the actual CPI value.

If Font CPI is configured in the session, HIWORD is 1. If Font CPI is not configured, HIWORD is 0.

nLPI The number of lines printed per inch.
LOWORD is the actual LPI value.

If Font LPI is configured in the session, HIWORD is 1. If Font LPI is not configured, HIWORD is 0.

szFaceName
Face name of the printer font. This must be a null-terminated string.

nFontSize
Size of the printer font.

Note: This is supported only for DBCS host sessions. This is ignored for SBCS host sessions.

nMPL Maximum number of lines that can be printed per page.
This is also called MPL (Maximum Print Lines). Supported range is 1 to 255.

nMPP Maximum number of characters that can be printed per line.
This is also called MPP (Maximum Print Position). Supported range is 1 to 255.

ULONG * const pErrorInfo
Not used. This must be set to NULL by the caller.

Return Code

Return Code	Value	Meaning
PCS_SUCCESSFUL	0	Function ended successfully.
PCS_INVALID_ID	1	Incorrect session ID was specified.
PCS_INVALID_SESS_TYPE	2	Not supported for the host session type.
PCS_DIALOG_IN_USE	3	Failed because the host session Page Setup or Printer Setup dialog was in use.
PCS_PRINTING	4	Page settings cannot be obtained because host session was printing.

Return Code	Value	Meaning
PCS_PDT_MODE	5	Page settings cannot be obtained because host session is in PDT mode.
PCS_SYSTEM_ERROR	9	A system error occurred.

Example

```

{
    ULONG Rc = 0;
    PAGEINFO *PageInfo;

    PageInfo = (PAGEINFO *) malloc(sizeof(PAGEINFO));
    memset(PageInfo, 0, sizeof(PAGEINFO));

    PageInfo->nFlags = PCS_PAGE_CPI | PCS_PAGE_LPI | PCS_PAGE_FACE_NAME |
                     PCS_PAGE_MPL | PCS_PAGE_MPP;

    Rc = pcsGetPageSettings('A', PageInfo, NULL);

    if (Rc == PCS_SUCCESSFUL) {
        printf("CPI = %d,
              LPI = %d,
              FaceName = %s,
              MPL = %d,
              MPP = %d\n",
              LOWORD(PageInfo->nCPI),
              LOWORD(PageInfo->nLPI),
              PageInfo->szFaceName,
              PageInfo->nMPL,
              PageInfo->nMPP);

        if (HIWORD(PageInfo->nCPI))
            printf("FontCPI\n");
        else
            printf("No FontCPI\n");

        if (HIWORD(PageInfo->nLPI))
            printf("FontLPI\n");
        else
            printf("No FontLPI\n");

    } else
        printf("Failure. Return code = %d\n", Rc);
    free(PageInfo);
}

```

pcsRestorePageDefaults

3270	5250	VT
Yes	Yes	Yes

The **pcsRestorePageDefaults** function restores the system default values of the Page Setup property pages defined in the *nFlags* field. This is equivalent to clicking **Default** in the property pages of the **File → Page Setup** dialog. Only the settings in the **Text** tab are supported.

Function Type

ULONG WINAPI **pcsRestorePageDefaults**(*char cShortSessionID, ULONG nFlags*)

Parameter Type and Description

char cShortSessionID

Presentation space short session ID.

ULONG nFlags

The following flag describes the name of the specified **Page Setup** dialog property page. This flag can be bitwise ORed to restore the property page (defined in PCSAPI32.H).

PCS_PAGE_TEXT

This flag describes the Text property page. This is the only property page currently supported.

Return Code

Return Code	Value	Meaning
PCS_SUCCESSFUL	0	Function ended successfully.
PCS_INVALID_ID	1	Incorrect session ID was specified.
PCS_INVALID_SESS_TYPE	2	The nFlags parameter has one or more options that are not valid for the host session type. No settings were restored.
PCS_DIALOG_IN_USE	3	Failed because the host session Page Setup or Printer Setup dialog was in use.
PCS_PRINTING	4	Page settings cannot be changed because host session was printing.
PCS_PDT_MODE	5	Page settings cannot be changed because host session is in PDT mode.
PCS_SYSTEM_ERROR	9	A system error occurred.

Example

```
{
    ULONG Rc = 0;

    Rc = pcsRestorePageDefaults('A', PCS_PAGE_TEXT);

    if (Rc != PCS_SUCCESSFUL)
        printf("Failure. Return code = %d\n", Rc);
}
```

pcsSetPageSettings

3270	5250	VT
Yes	Yes	Yes

The **pcsSetPageSettings** function sets the host session page settings. This is similar to configuring the **File → Page Setup** dialog settings. Only the settings in the **Text** tab are supported.

Notes:

1. CPI, LPI, and FontSize are dependent on the FaceName configured in the host session. If this API is used to set CPI, LPI, FontSize, and FaceName together, FaceName is set first, then the dependent properties.

2. If this API is used to set `FaceName` and the dependent properties in separate invocations, set `FaceName` first, then set `CPI`, `LPI` and `FontSize`. Otherwise, each time `FaceName` is set, query `CPI`, `LPI` and `FontSize` and ensure that they have the desired values.
3. If `CPI`, `LPI`, or `FontSize` are set before `FaceName`, then different values for `CPI`, `LPI`, or `FontSize` might be configured in the host session. This might occur if the current `CPI`, `LPI`, or `FontSize` values are not valid for the new `FaceName` set.

Function Type

ULONG WINAPI pcsSetPageSettings(*char cShortSessionID, const PAGEINFO * const pPageInfo, ULONG * const pErrorInfo*)

Parameter Type and Description

char cShortSessionID

Presentation space short session ID.

const PAGEINFO * const pPageInfo

Pointer to `PAGEINFO` structure, where the page settings are mentioned.

nFlags Combination of bit flags that indicates which members in the structure are valid. These flags can be used independently or by ORing them together to restore the property page (defined in `PCSAPI32.H`). The flags, along with the corresponding valid members in the structure, are as follows:

Flag	Valid members in the structure
<code>PCS_PAGE_CPI</code>	<code>nCPI</code>
<code>PCS_PAGE_LPI</code>	<code>nLPI</code>
<code>PCS_PAGE_FACE_NAME</code>	<code>szFaceName</code>
<code>PCS_PAGE_MPL</code>	<code>nMPL</code>
<code>PCS_PAGE_MPP</code>	<code>nMPP</code>

nCPI The number of characters printed per inch.

To select Font `CPI`, set the `HIWORD` of `nCPI` to 1. `LOWORD` of `nCPI` will be ignored.

To select a particular `CPI` value, do the following:

1. Set the `HIWORD` of `nCPI` to 0.
2. Set the `LOWORD` of `nCPI` to the actual `CPI` value.

nLPI The number of lines printed per inch.

To select Font `LPI`, set the `HIWORD` of `nLPI` to 1. `LOWORD` of `nLPI` will be ignored

To select a particular `LPI` value, do the following:

1. Set the `HIWORD` of `nLPI` to 0.
2. Set the `LOWORD` of `nLPI` to the actual `LPI` value.

szFaceName

Face name of the printer font. This must be a null-terminated string.

nFontSize

Size of the printer font.

Note: This is supported only for DBCS host sessions. This is ignored for SBCS host sessions.

nMPL Maximum number of lines that can be printed per page.

This is also called MPL (Maximum Print Lines). Supported range is 1 to 255.

nMPP Maximum number of characters that can be printed per line.

This is also called MPP (Maximum Print Position). Supported range is 1 to 255.

ULONG * const pErrorInfo

Contains the extended error info when the API fails with the return code of PCS_FAILURE. If the detailed error information is not needed, this flag must be set to NULL by the caller.

This is a combination of bit flags that describe which members of the PAGEINFO structure could not be set successfully. The flags that are defined in PCSAPI32.H are as follows:

Flag	Valid members in the structure
PCS_PAGE_CPI	Only nCPI is not valid.
PCS_PAGE_LPI	Only nLPI is not valid.
PCS_PAGE_FACE_NAME	Only szFaceName is not valid.
PCS_PAGE_MPL	Only nMPL is not valid.
PCS_PAGE_MPP	Only nMPP is not valid.

Return Code

Return Code	Value	Meaning
PCS_SUCCESSFUL	0	Function ended successfully.
PCS_INVALID_ID	1	Incorrect session ID was specified.
PCS_INVALID_SESS_TYPE	2	Not supported for the host session type.
PCS_DIALOG_IN_USE	3	Failed because the host session Page Setup or Printer Setup dialog was in use.
PCS_PRINTING	4	Page settings cannot be changed because host session was printing.
PCS_PDT_MODE	5	Page settings cannot be changed because host session is in PDT mode.
PCS_FAILURE	6	Host session page settings are not fully applied. This could be because invalid data was given for some or all fields in the PAGEINFO structure. Examine pErrorInfo for details about settings that are not applied.
PCS_SYSTEM_ERROR	9	A system error occurred.

Example

```
{
    ULONG Rc = 0, Error = 0;
    PAGEINFO *PageInfo;

    PageInfo = (PAGEINFO *) malloc(sizeof(PAGEINFO));
```

```

memset(PageInfo, 0, sizeof(PAGEINFO));

PageInfo->nFlags = PCS_PAGE_CPI | PCS_PAGE_LPI |
                 PCS_PAGE_FACE_NAME | PCS_PAGE_MPL |
                 PCS_PAGE_MPP;
PageInfo->nCPI = MAKELONG(10, 0);
PageInfo->nLPI = MAKELONG(8, 0);
PageInfo->nMPL = 40;
PageInfo->nMPP = 60;
strcpy(PageInfo->szFaceName, "CourierPS");

Rc = pcsSetPageSettings('A', PageInfo, &Error);

if (Rc != PCS_SUCCESSFUL) {
    printf("Failure. Return code = %d\n", Rc);
    printf("Following members could not be set : ");

    if (Rc == PCS_FAILURE) {
        if (Error & PCS_PAGE_CPI) printf(" nCPI");
        if (Error & PCS_PAGE_LPI) printf(" nLPI");
        if (Error & PCS_PAGE_FACE_NAME) printf(" szFaceName");
        if (Error & PCS_PAGE_MPL) printf(" nMPL");
        if (Error & PCS_PAGE_MPP) printf(" nMPP");
        printf("\n");
    }
}
free(PageInfo);
}

```

Printer Setup Functions

The PCSAPI functions listed in this section enable you to control and retrieve the Personal Communications emulator session **Printer Setup** settings.

Restrictions

If the following restrictions are not met, the API will fail. The return code indicates the reason for the failure.

- The host session should not be printing when the API is invoked.
- The **File** → **Printer Setup** dialog should not be in use.

Note: These functions are not currently supported for DBCS and bidirectional sessions.

pcsGetPrinterSettings

3270	5250	VT
Yes	Yes	Yes

The **pcsGetPrinterSettings** function retrieves the host session printer settings (similar to the **File** → **Printer Setup** dialog settings).

Function Type

ULONG WINAPI **pcsGetPrinterSettings**(*char cShortSessionID*, *PRINTINFO * const pPrintInfo*, *ULONG * const pErrorInfo*)

Parameter Type and Description

char cShortSessionID

Presentation space short session ID.

PRINTINFO * const pPrintInfo

Pointer to PRINTINFO structure, where the printer settings are specified.

nFlags Must be set to 0. This is ignored.

nBufSize

Size of the buffer allocated for the following fields:

- lpPDTFile
- lpPrtToDskAppFile
- lpPrtToDskSepFile
- lpPrinterName

If more than one of these members is retrieved in a single API call, then the caller must allocate the same size for all the buffers and pass that size in this member.

If this member is set to 0, the fields are ignored. The maximum size required for the buffers of the fields is returned in nSizeNeeded.

nSizeNeeded

The value of this member is determined by conditions related to the following fields:

- lpPDTFile
- lpPrtToDskAppFile
- lpPrtToDskSepFile
- lpPrinterName

The conditions are as follows:

- The value is the number of bytes needed, if the size of the buffer allocated by the caller is not big enough to return the fields listed above.
- The value is the maximum size of the required buffer, if more than one of the fields listed above are obtained by the caller.
- If nBufSize is set to 0 by the caller, this member contains the maximum size required for the buffers of the fields listed above.

bPromptDialog

Possible values are as follows:

- If TRUE, the Printer Setup dialog is shown before printing.
- If FALSE, the Printer Setup dialog is not shown before printing.

bPDTMode

Possible values are as follows:

- If TRUE, the host session is in PDT mode.
- If FALSE, the host session is in non-PDT mode (GDI mode).

lpPDTFile

Must be set to NULL if the caller is not interested in getting this member. The PDT file is returned if this is not a null pointer. This must point to the buffer of size nBufSize allocated by the caller.

When the API returns, this member contains one of the following:

- The fully qualified path name of the session PDT file.
- An empty string ("") if no PDT file is configured in the session.

- A truncated file name if the buffer size is not sufficient. The member `nSizeNeeded` contains the size of the buffer needed.

nPrtMode

This is an enumerated value that indicates the `PrintMode` of the connection. The enum data type `PRINTMODE` is defined in `PCSAPI32.H`. The `nPrtMode` setting must be one of the following:

- **PrtToDskAppend (Print to Disk-Append mode)**
This is equivalent to selecting the **Append** option in the host session **Printer Setup** → **Printer** → **Print to Disk** dialog.
- **PrtToDskSeparate (Print to Disk-Separate mode)**
This is equivalent to selecting the **Separate** option in the host session **Printer Setup** → **Printer** → **Print to Disk** dialog.
- **WinDefaultPrinter (Windows Default Printer mode)**
This is equivalent to selecting the **Use Windows Default Printer** option in the host session **Printer Setup** dialog.
- **SpecificPrinter (Specific Printer mode)**
This is equivalent to selecting a printer in the host session **Printer Setup** dialog, while leaving **Use Windows Default Printer** unchecked.

lpPrtToDskAppFile

Must be set to `NULL` if the caller is not interested in getting this member. The **Print to Disk-Append** file is returned if this is not a null pointer. This must point to the buffer of size `nBufSize` allocated by the caller.

When the API returns, this member contains one of the following:

- The fully qualified path name of the session **Print to Disk-Append** file.
- An empty string (""), if no **Print to Disk-Append** file is configured for the session.
- A truncated file name if the buffer size is not sufficient. The `nSizeNeeded` member contains the size of the buffer needed.

lpPrtToDskSepFile

Must be set to `NULL` if the caller is not interested in getting this member. The **Print to Disk-Separate** file is returned if this is not a null pointer. This must point to the buffer of size `nBufSize` allocated by the caller.

When the API returns, this member contains one of the following:

- The fully qualified path name of the session **Print to Disk-Separate** file.
- An empty string (""), if no **Print to Disk-Separate** file is configured for the session.
- A truncated file name if the buffer size is not sufficient. The `nSizeNeeded` member contains the size of the buffer needed.

lpPrinterName

Must be set to `NULL` if the caller is not interested in getting this member. The name of the printer is returned if this is not a null pointer. This must point to the buffer of size `nBufSize` allocated by the caller.

When the API returns, this member has one of the following:

- The name of the specific printer configured in the session, if the host session nPrtMode is SpecificPrinter.
- The name of the Windows default printer configured in the session, if the host session nPrtMode is WinDefaultPrinter.
- An empty string (""), if the host session nPrtMode is PrtToDskAppend or PrtToDskSeparate.
- A truncated printer name, if the buffer size is not sufficient. nSizeNeeded has the size of the buffer needed.

PrinterName must have the following format:

<Printer name> on <Port Name>

For example:

- IBM InfoPrint 40 PS on Network Port
- HP LaserJet 4050 Series PCL 6 on LPT1

ULONG * const pErrorInfo

This is filled with the extended error info when the API fails with the return code of PCS_FAILURE. pErrorInfo must be set to NULL by the caller, if the details of errors are not needed.

The following section describes the flags that are defined in PCSAPI32.H.

Flags for the pErrorInfo member of the PRINTINFO structure

PCS_PRINT_PRINTMODE_ERROR

PrintMode is not configured in the host session.

PCS_PRINT_PDTFILE_SIZEERR

The buffer size is not sufficient for lpPDTFile, so the file name is truncated. The nSizeNeeded member contains the actual size of the buffer required to return the PDT file.

PCS_PRINT_DSKAPPPFILE_SIZEERR

The buffer size is not sufficient for lpPrtToDskAppFile, so the file name is truncated. The nSizeNeeded member contains the actual size of the buffer required to return the **Print to Disk-Append** file.

PCS_PRINT_DSKSEPFFILE_SIZEERR

The buffer size is not sufficient for lpPrtToDskSepFile, so the file name is truncated. The nSizeNeeded member contains the actual size of the buffer required to return the **Print to Disk-Separate** file.

PCS_PRINT_PRINTERNAME_SIZEERR

The buffer size is not sufficient for lpPrinterName, so the printer name is truncated. The nSizeNeeded member contains the actual size of the buffer required to return the printer name.

Return Code

Return Code	Value	Meaning
PCS_SUCCESSFUL	0	The function ended successfully.
PCS_INVALID_ID	1	An incorrect session ID was specified.
PCS_DIALOG_IN_USE	3	Failed because the host session Page Setup or Printer Setup dialog was in use.
PCS_PRINTING	4	The printer settings could not be changed because the host session was printing. The application must retry later

Return Code	Value	Meaning
PCS_FAILURE	6	Some printer settings could not be retrieved successfully. pErrorInfo contains detailed error information on which settings could not be retrieved.
PCS_SYSTEM_ERROR	9	A system error occurred.

Example

```

{
    ULONG Rc = 0, Error=0, Size;
    PRINTINFO *PrintInfo;

    PrintInfo = (PRINTINFO *) malloc(sizeof(PRINTINFO));
    memset(PrintInfo, 0, sizeof(PRINTINFO));

    PrintInfo->nBufSize = 0;

    Rc = pcsGetPrinterSettings('A', PrintInfo, &Error);
    if (Rc != PCS_SUCCESSFUL)
        printf("Failure. Return code = %d\n", Rc);
    else {
        Size = PrintInfo->nSizeNeeded;
        PrintInfo->nBufSize = Size;
        PrintInfo->lpPDTFile = (char *)malloc(sizeof(char) * Size);
        PrintInfo->lpPrtToDskAppFile = (char *)malloc(sizeof(char) * Size);
        PrintInfo->lpPrtToDskSepFile = (char *)malloc(sizeof(char) * Size);
        PrintInfo->lpPrinterName = (char *)malloc(sizeof(char) * Size);
        Rc = pcsGetPrinterSettings('A', PrintInfo, &Error);

        if (Rc != PCS_SUCCESSFUL)
            printf("Failure. Return code = %d, Extended Error = 0x%08x\n", Rc, Error);
        else {
            if (PrintInfo->bPromptDialog)
                printf("PromptDialog\n");
            else
                printf("No PromptDialog\n");
            if (PrintInfo->bPDTMode)
                printf("PDT Mode\n");
            else
                printf("Not PDT Mode\n");

            switch(PrintInfo->nPrtMode) {

            case PrtToDskAppend:
                printf("Print to Disk-Append Mode\n");
                break;
            case PrtToDskSeparate:
                printf("Print to Disk-Separate Mode\n");
                break;
            case SpecificPrinter:
                printf("Specific Printer Mode\n");
                break;
            case WinDefaultPrinter:
                printf("Windows Default Printer Mode\n");
                break;
            }
            if (PrintInfo->lpPDTFile[0] == '\0')
                printf("No PDT File configured\n");
            else
                printf("PDT File = %s\n", PrintInfo->lpPDTFile);
            if (PrintInfo->lpPrtToDskAppFile[0] == '\0')
                printf("No Disk Append File configured\n");
            else
                printf("DiskAppend File=%s\n", PrintInfo->lpPrtToDskAppFile);
        }
    }
}

```

```

    if (PrintInfo->lpPrtToDskSepFile[0] == '\0')
        printf("No Disk Separate File configured\n");
    else
        printf("DiskSeparate File=%s\n", PrintInfo->lpPrtToDskSepFile);
    if ((PrintInfo->nPrtMode == SpecificPrinter) ||
        (PrintInfo->nPrtMode == WinDefaultPrinter))
        printf("Printer = %s\n", PrintInfo->lpPrinterName);
}
free(PrintInfo->lpPDTFile);
free(PrintInfo->lpPrtToDskAppFile);
free(PrintInfo->lpPrtToDskSepFile);
free(PrintInfo->lpPrinterName);
}
free(PrintInfo);
}

```

pcsSetPrinterSettings

3270	5250	VT
Yes	Yes	Yes

The `pcsSetPrinterSettings` function controls the host session printer settings (similar to the **File** → **Printer Setup** dialog settings).

Function Type

ULONG WINAPI `pcsSetPrinterSettings`(*char cShortSessionID, const PRINTINFO * const pPrintInfo, ULONG * const pErrorInfo*)

Parameter Type and Description

char cShortSessionID

Presentation space short session ID.

const PRINTINFO * const pPrintInfo

Pointer to PRINTINFO structure, where the printer settings are mentioned.

nFlags Combination of bit flags that indicates which members in the structure are valid. These flags can be used independently or by ORing them together to restore the property page (defined in PCSAPI32.H). The flags, along with the corresponding valid members in the structure, are as follows:

Flag	Valid members in the structure
PCS_PRINT_PDT	bPDTMode, lpPDTFile
PCS_PRINT_PRINTMODE	nPrtMode, lpPrtToDskAppFile, lpPrtToDskSepFile, lpPrinterName
PCS_PRINT_PROMPT_DIALOG	bPromptDialog

nBufSize

Must be set to 0. This is ignored.

nSizeNeeded

Must be set to 0. This is ignored.

bPromptDialog

Possible values are as follows:

- If TRUE, the Printer Setup dialog is shown before printing.
- If FALSE, the Printer Setup dialog is not shown before printing.

bPDTMode

Possible values are as follows:

- If **TRUE**, the connection is set to PDT mode.
- If **FALSE**, the connection is set to non-PDT mode (GDI mode).

lpPDTFile

Used only if **bPDTMode** is set to **TRUE**. This is ignored if **bPDTMode** is set to **FALSE**.

This is a null-terminated string containing the name of the PDT file and must be one of the following:

- **NULL**
The PDT file that is currently configured in the connection is used. If there is no PDT file already configured in the connection, the API fails with an exception.
- File name, without the path
lpPDTFile in the PDFPDT subfolder in the Personal Communications installation path is used.
- Fully qualified path name of the file
If lpPDTFile does not exist, the API fails.

nPrtMode

This is an enumerated value that indicates the **PrintMode** of the connection. The enum data type **PRINTMODE** is defined in **PCSAPI32.H**. The **nPrtMode** setting must be one of the following:

- **PrtToDskAppend (Print to Disk-Append mode)**
This is equivalent to selecting the **Append** option in the host session **Printer Setup** → **Printer** → **Print to Disk** dialog.
- **PrtToDskSeparate (Print to Disk-Separate mode)**
This is equivalent to selecting the **Separate** option in the host session **Printer Setup** → **Printer** → **Print to Disk** dialog.
- **WinDefaultPrinter (Windows Default Printer mode)**
This is equivalent to selecting the **Use Windows Default Printer** option in the host session **Printer Setup** dialog.
- **SpecificPrinter (Specific Printer mode)**
This is equivalent to selecting a printer in the host session **Printer Setup** dialog, while leaving the **Use Windows Default Printer** option unchecked.

lpPrtToDskAppFile

This is used only if **nPrtMode** is set to **PrtToDskAppend**.

This is a null-terminated string containing the name of the **Print to Disk-Append** file and must be one of the following:

- **NULL**
The file that is currently configured for the **PrtToDskAppend** mode in the connection is used. If there is no PDT file already configured in the connection, the API will fail.
- File name, without the path
The user-class application data directory path is used to locate the file. If the file exists, it is used. Otherwise, it will be created when printing is complete.
- Fully qualified path name of the file

The directory must exist in the path, or the API will fail. It is not necessary that the file exist in the path.

lpPrtToDskSepFile

The possible values are as follows:

- Fully qualified path name of the **Print to Disk-Separate** file for the session.
- An empty string (""), if no **Print to Disk-Separate** file is configured for the session.
- A truncated file name if the buffer size is not sufficient. The `nSizeNeeded` member contains the size of the buffer needed.

lpPrinterName

This is used only if `nPrtMode` is set to `SpecificPrinter`. It is ignored otherwise. This is a null-terminated string containing the printer name. If the printer does not exist, this member fails.

PrinterName must have the following format:

<Printer name> on <Port Name>

For example:

- IBM InfoPrint 40 PS on Network Port
- HP LaserJet 4050 Series PCL 6 on LPT1

ULONG * const pErrorInfo

This is filled with the extended error info when the API fails with the return code of `PCS_FAILURE`. `pErrorInfo` must be set to `NULL` by the caller, if the details of errors are not needed.

The following section describes the flags that are defined in `PCSAPI32.H`.

Flags for the pErrorInfo member of the PRINTINFO structure

PCS_PRINT_PDTMODE_ERROR

This can occur for one of the following reasons:

- `bPDTMode` is set to `TRUE`, `lpPDTFile` is set to `NULL`, and there is no PDT file already configured for the host session.
- `nPrtMode` is set to `PrtToDskAppend` or `PrtToDskSeparate`, `PCS_PRINT_PDT` is not set in `nFlags`, and the host session is not already in PDT mode.
- `nPrtMode` is set to `PrtToDskAppend` or `PrtToDskSeparate` and `bPDTMode` is set to `FALSE`.

PCS_PRINT_PDTFILE_ERROR

The file or the path specified in `lpPDTFile` was not found.

PCS_PRINT_PRTTODSK_FILE_ERROR

This can occur for one of the following reasons:

- The folder specified in the field `lpPrtToDskAppFile` or `lpPrtToDskSepFile` does not exist or does not have write access.
- An extension is specified in the field `lpPrtToDskSepFile`.

PCS_PRINT_PRINTMODE_ERROR

`nPrtMode` cannot be set successfully. This can occur for one of the following reasons:

- The value of `nPrtMode` is not one of the enumerated constants of the `PRINTMODE` enum data type.

- nPrtMode is set to PrtToDskAppend, lpPrtToDskAppFile is set to NULL, and there is no **Print to Disk-Append** file already configured in the host session.
- nPrtMode is set to PrtToDskSeparate, lpPrtToDskSepFile is set to NULL, and there is no **Print to Disk-Separate** file already configured in the host session.
- nPrtMode is set to SpecificPrinter and the printer given in the lpPrinterName field was not found.
- nPrtMode is set to WinDefaultPrinter and there is no default Windows printer configured in the system.
- bPDMode is set to FALSE and PCS_PRINT_PRINTMODE is not set in nFlags, but the host session PrintMode is PrtToDskAppend or PrtToDskSeparate.

Return Code

Return Code	Value	Meaning
PCS_SUCCESSFUL	0	The function ended successfully.
PCS_INVALID_ID	1	An incorrect session ID was specified.
PCS_DIALOG_IN_USE	3	Failed because the host session Page Setup or Printer Setup dialog was in use.
PCS_PRINTING	4	The printer settings could not be changed because the host session was printing. The application must retry later.
PCS_FAILURE	6	No host session printer settings were applied. This might occur because invalid data was given for some or all of the fields in the PRINTINFO structure. pErrorInfo contains details about the errors.
PCS_SYSTEM_ERROR	9	A system error occurred.

Example

```

{
    ULONG Rc = 0, Error=0;
    PRINTINFO *PrintInfo;
    char PDTFile[] = "epson.pdt";
    char SepFile[] = "DiskSep";

    PrintInfo = (PRINTINFO *) malloc(sizeof(PRINTINFO));
    memset(PrintInfo, 0, sizeof(PRINTINFO));

    PrintInfo->nFlags = PCS_PRINT_PDT | PCS_PRINT_PRINTMODE |
        PCS_PRINT_PROMPT_DIALOG;
    PrintInfo->nBufSize = 0;
    PrintInfo->nSizeNeeded = 0;
    PrintInfo->bPDMode = TRUE;
    PrintInfo->lpPDTFile =
        (char *)malloc(sizeof(char) * (strlen(PDTFile)+1));
    strcpy(PrintInfo->lpPDTFile, PDTFile);
    PrintInfo->nPrtMode = PrtToDskSeparate;
    PrintInfo->lpPrtToDskSepFile =
        (char *)malloc(sizeof(char) * (strlen(SepFile)+1));
    strcpy(PrintInfo->lpPrtToDskSepFile, SepFile);
    PrintInfo->bPromptDialog = TRUE;
    Rc = pcsSetPrinterSettings('A', PrintInfo, &Error);
    if (Rc != PCS_SUCCESSFUL)
        printf("Failure. Return code = %d, Extended Error = 0x%08x\n", Rc, Error);
}

```

```
    free(PrintInfo->lpPDFFile);  
    free(PrintInfo->lpPrtToDskSepFile);  
    free(PrintInfo);  
}
```

Chapter 6. DDE Functions in a 32-bit Environment

This chapter contains information for DDE functions, as used in a Windows 32-bit environment.

Personal Communications provides a 32-bit dynamic data exchange (DDE) interface that allows applications to exchange data. The exchange of data between two Windows applications can be thought of as a conversation between a client and a server. The *client* initiates DDE conversations. The *server* in turn responds to the client. Personal Communications is a DDE server for the open sessions that Personal Communications is managing. For more information about DDE, refer to *Microsoft Windows Software Development Kit Guide to Programming*.

Note: If you use DDE functions with Visual Basic, see Chapter 7, “Using DDE Functions with a DDE Client Application,” on page 297.

Personal Communications also supports 16-bit DDE applications. See Appendix E, “DDE Functions in a 16-Bit Environment,” on page 367.

Personal Communications DDE Data Items

Microsoft Windows DDE uses a three-level naming scheme to identify data items: application, topic, and item. Table 17 describes these levels.

Table 17. Naming Scheme for Data Items

Level	Description	Example
Application	A Windows task or a particular task of an application. In this book, the application is Personal Communications.	IBM327032
Topic	A specific part of an application.	SessionA
Item	A data object that can be passed in a data exchange. An item is an application-defined data item that conforms to one of the Windows clipboard formats or to a private, application-defined, clipboard format. For more information regarding Windows clipboard formats, refer to <i>Microsoft Windows Software Development Kit Guide to Programming</i> .	PS (presentation space)

Personal Communications supports IBM327032 and IBM525032 applications as Win32 DDE server.

You can use the following topics:

- System
- SessionA, SessionB, ..., SessionZ
- LUA_xxxx, LUB_xxxx, ..., LUZ_xxxx

In DDE, *atoms* identify application names, topic names, and data items. Atoms represent a character string that is reduced to a unique integer value. The character string is added to an atom table, which can be referred to for the value of the string associated with an atom. Atoms are created with the GlobalAddAtom

function call. Refer to *Microsoft Windows Software Development Kit Guide to Programming* for more information about how to create and use atoms.

Using System Topic Data Items

Applications that provide a DDE interface should also provide a special topic SYSTEM. This topic provides a context for items of information that might be of general interest to an application. The SYSTEM topic for Personal Communications contains these associated data items:

Item	Function
Formats	Returns the list of clipboard formats (numbers) that Personal Communications is capable of rendering.
Status	Returns information about the status of each Personal Communications session.
SysCon	Returns the level of Personal Communications support and other system related values.
SysItems	Returns the list of data items that are available when connected to the Personal Communications system topic.
Topics	Returns the list of Personal Communications topics that are available.

Using Session Topic Data Items

For each Session topic, the following data items are supported:

Item	Function
CLOSE	Retrieves the window close requests.
CONV	Requests Code Conversion from ASCII to EBCDIC and EBCDIC to ASCII.
EPS	Retrieves the session presentation space with additional data.
EPSCOND	Retrieves the presentation space service condition.
FIELD	Retrieves the field in the presentation space of the session.
KEYS	Retrieves the keystrokes.
MOUSE	Retrieves the mouse input.
OIA	Retrieves the operator information area status line.
PS	Retrieves the session presentation space.
PSCOND	Retrieves the session advise condition.
SSTAT	Retrieves the session status.
STRING	Retrieves the ASCII string data.
TRIMRECT	Retrieves the session presentation space within the current trim rectangle.

Using LU Topic Data Items (3270 Only)

For each LU topic, the following data items are supported:

Item	Function
SF	Retrieves the destination/origin structured field data.
SFCOND	Retrieves the query reply data.

DDE Functions

Table 18 lists the DDE functions that are available for use with Personal Communications.

Table 18. DDE Functions Available for Personal Communications

Function	3270	5250	VT
"Code Conversion" on page 224	Yes	Yes	Yes
"Find Field" on page 226	Yes	Yes	Yes
"Get Keystrokes" on page 228	Yes	Yes	Yes
"Get Mouse Input" on page 229	Yes	Yes	Yes
"Get Number of Close Requests" on page 232	Yes	Yes	Yes
"Get Operator Information Area" on page 233	Yes	Yes	Yes
"Get Partial Presentation Space" on page 234	Yes	Yes	Yes
"Get Presentation Space" on page 236	Yes	Yes	Yes
"Get Session Status" on page 238	Yes	Yes	Yes
"Get System Configuration" on page 240	Yes	Yes	Yes
"Get System Formats" on page 241	Yes	Yes	Yes
"Get System Status" on page 242	Yes	Yes	Yes
"Get System SysItems" on page 243	Yes	Yes	Yes
"Get System Topics" on page 244	Yes	Yes	Yes
"Get Trim Rectangle" on page 244	Yes	Yes	Yes
"Initiate Session Conversation" on page 245	Yes	Yes	Yes
"Initiate Structured Field Conversation" on page 246	Yes	No	No
"Initiate System Conversation" on page 246	Yes	Yes	Yes
"Put Data to Presentation Space" on page 247	Yes	Yes	Yes
"Search for String" on page 248	Yes	Yes	Yes
"Send Keystrokes" on page 249	Yes	Yes	Yes
"Session Execute Macro" on page 250	Yes	Yes	Yes
"Set Cursor Position" on page 257	Yes	Yes	Yes
"Set Mouse Intercept Condition" on page 259	Yes	Yes	Yes
"Set Presentation Space Service Condition" on page 261	Yes	Yes	Yes
"Set Session Advise Condition" on page 263	Yes	Yes	Yes
"Set Structured Field Service Condition" on page 264	Yes	No	No
"Start Close Intercept" on page 265	Yes	Yes	Yes
"Start Keystroke Intercept" on page 266	Yes	Yes	Yes
"Start Mouse Input Intercept" on page 267	Yes	Yes	Yes
"Start Read SF" on page 270	Yes	No	No
"Start Session Advise" on page 272	Yes	Yes	Yes
"Stop Close Intercept" on page 273	Yes	Yes	Yes
"Stop Keystroke Intercept" on page 274	Yes	Yes	Yes
"Stop Mouse Input Intercept" on page 274	Yes	Yes	Yes
"Stop Read SF" on page 275	Yes	No	No
"Stop Session Advise" on page 276	Yes	Yes	Yes
"Terminate Session Conversation" on page 276	Yes	Yes	Yes
"Terminate Structured Field Conversation" on page 277	Yes	No	No
"Terminate System Conversation" on page 277	Yes	Yes	Yes
"Write SF" on page 278	Yes	No	No

Refer to "Summary of DDE Functions in a Windows 32-Bit Environment" on page 291 for a summary of the DDE functions.

Naming Conventions for Parameters

Most DDE parameter names have local variables. These variables have a prefix that indicates the general type of the parameter, followed by one or more words that describe the content of the parameter. Prefixes presented in this book are:

a	Atom
c	Character (a 1-byte value)
f	Bit flags packed into a 16-bit integer
h	16-bit handle
p	Short (16-bit) pointer
lp	Long (32-bit) pointer
w	Short (16-bit) unsigned integer
u	Unsigned integer
sz	Null-terminated character string

Code Conversion

3270	5250	VT
Yes	Yes	Yes

The **Code Conversion** function allows a client application to convert ASCII to EBCDIC or EBCDIC to ASCII. This function is only available to 32-bit applications.

Send the message as follows:

```
PostMessage (hServerWnd,  
            WM_DDE_POKE,  
            hClientWnd,  
            PackDDEIPParam (WM_DDE_POKE, hData, aCONV));
```

where:

hDATA

```
typedef struct tagWCDDDE_CONV  
{  
    BYTE        ddepoke[(sizeof(DDEPOKE)-1)];  
    char        szSourceName[256];    // name of memory-mapped file  
    char        szTargetName[256];   // name of memory-mapped file  
    BYTE        ConvType;             // Conversion method  
    WORD        uSourceLength;        // Length of source buffer  
    WORD        uTargetLength;       // Length of target buffer  
}WCDDDE_CONV;  
  
typedef union tagDDE_CONV  
{  
    DDEPOKE     DDEpoke;  
    WCDDDE_CONV DDEConv;  
}DDE_CONV;  
  
typedef DDE_CONV FAR *LPDDE_CONV;
```

Conversion Types

```
ConvType = 0x01  ASCII to EBCDIC  
ConvType = 0x02  EBCDIC to ASCII
```


Note: The string to be converted must be stored in a memory block that is accessible across processes. In Win32, this can only be accomplished by use of memory-mapped files. The global memory is created and named in the client application and the names are sent to Personal Communications through the DDE message. The steps required to implement this are demonstrated in the following example:

```
//Steps for a Source Buffer (done in client application)
HANDLE hMapFile;
LPVOID lpMapAddress;
ATOM aCONV;

hMapFile = CreateFileMapping((HANDLE)0xFFFFFFFF, // not a real file
    NULL, // Default security.
    PAGE_READWRITE, // Read/write
    (DWORD)0, // Ignored
    (DWORD)nStringLength, // Length of string
    (LPCTSTR)szSourceName); // Name of
                                // mapping object.

If (hMapFile == NULL)
{
    MessageBox ("Could not create file-mapping Source object.");
    return;
}
// Now treat buffer like local memory
strcpy((LPSTR)lpMapAddress, szConcersionString);

// Repeat steps for a Target Buffer
.....
.....
// Set up ATOM information

aCONV = GlobalAddAtom("CONV"); // MUST be this string

// Post DDE Message Now ....

// When done with memory blocks, clean up
if (!UnmapViewOfFile(lpMapAddress))
{
    MessageBox ("Could not unmap view of Target.");
}

CloseHandle(hMapSFile);

// CODE ENDS
```

Personal Communications Response

The function responds with a WM_DDE_ACK message for DDE_POKE. A result value is returned in the high-order byte of the fsStatus word. The following return codes are valid:

Return Code	Explanation
0x0000	Normal End
0x0200	An incorrect conversion type or incorrect parameter was specified
0x0600	An incorrect format was specified
0x0900	A system error occurred
0x1000	The destination buffer was exceeded
0x1100	An internal translation error occurred

Find Field

3270	5250	VT
Yes	Yes	Yes

The **Find Field** function returns information about the specified field to the client. It can be used in two ways.

Send the message as follows:

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELPARAM(cfFormat, aFIELD) );
```

where:

cfFormat

Identifies the format for the field information. This value can be **CF_DSPTEXT** or **CF_TEXT**.

aFIELD

Is the atom that specifies the **Find Field** function. The string identified by the atom can have different values depending on the value of **cfFormat**.

CF_DSPTEXT

If **CF_DSPTEXT** is specified for **cfFormat** then **aFIELD** must be an atom that represents the string, **FIELD**. The PS position must be specified in a previous call to the **Set Presentation Space Service Condition** function. This version will return information only about the field which contains that position. The information will be returned in a **WM_DDE_DATA(hData, aFIELD)** message where:

hData Represents

```
typedef struct tagFINDFIELD
{
    unsigned char
    data[sizeof(DDEDATA)-1];
    unsigned short uFieldStart; //Field start position
    unsigned short uFieldLength; //Field Length
    unsigned char cAttribute; //Attribute character value
    unsigned char ubReserved; //reserved, no information for client
} FINDFIELD;

typedef union tagDDE_FINDFIELD
{
    DDEDATA DDEdata;
    FINDFIELD DDEfield;
} DDE_FINDFIELD, *lpDDE_FINDFIELD;
```

CF_TEXT

If **CF_TEXT** is specified for **cfFormat** then **aFIELD** must be an atom that represents the string, **FIELD (pos, "XX")** where:

pos Is the PS position

XX Is a code representing which field relative to **pos** for which information will be returned. These codes are described below:

Type	Meaning
bb or Tb	The field containing pos .
Pb	The field previous to pos , either protected or unprotected.
PP	The previous protected field to pos .
PU	The previous unprotected field to pos .
Nb	The next field after pos , either protected or unprotected.
NP	The next protected field after pos .
NU	The next unprotected field after pos .

Note: The **b** symbol represents a required blank.

These codes must appear in quotes as demonstrated above. The information will be returned in a `WM_DDE_DATA(hData, aFIELD)` message where:

hData Represents

```
typedef struct tagFINDFIELD_CF_TEXT
{
    uchar data[sizeof(DDEDATA)-1];
    uchar Fielddata[80];
} FINDFIELD_CF_TEXT;

typedef FINDFIELD_CF_TEXT FAR *LPFINDFIELD_CF_TEXT;

typedef union tagDDE_FIELD
{
    DDEDATA DDEdata;
    FINDFIELD DDEFindField;
    FINDFIELD_CF_TEXT DDEFindField_cftext;
} DDE_FIELD;

typedef DDE_FIELD FAR *LPDDE_FIELD;
```

Personal Communications Response

If the function is successful, it will respond with a `WM_DDE_DATA` message with information as described above. If it fails, it will return with a `WM_DDE_ACK(wStatus, aFIELD)`. A result value is returned in the low-order byte of the `wStatus` word. The following return codes are valid:

Return Code	Explanation
0x0001	PS position is not valid.
0x0002	PS is unformatted.
0x0006	The specified format is not valid.
0x0009	A system error occurred.

Structure of the Field Information

The field information will be returned in the `Fielddata` member of the `FINDFIELD_CF_TEXT` structure as a string in the following formats.

For 3270:

"Formatted\t%01d\t%01d\t%01d\t%01d\t%04d\t%04d"

FA bit 2	Unprotected / Protected	0 or 1
FA bit 3	Alphanumeric / Numeric	0 or 1
FA bit 4-5	Intensity / High / Normal	1, 2 or 3
FA bit 7	Unmodified / Modified	0 or 1
Start Pos	Field Start Position (excluding FA)	
Length	Field Length (excluding FA)	

Note: FA = Field Attribute

For 5250:

"Formatted\t%01d\t%01d\t%01d\t%01d\t%01d\t%01d\t%04d\t%04d"

FA bit 0	Field Attribute Flag	0 or 1
FA bit 1	Invisible / Visible	0 or 1
FA bit 2	Unprotected / Protected	0 or 1
FA bit 3	Intensity Low/High	0 or 1
FA bit 4-6	Field Type 0 = Alphanumeric 1 = Alphabetic 2 = Numeric Shift 3 = Numeric 4 = Default 5 = Digits only 6 = Mag-Stripe Reader Data 7 = Signed Numeric	0 — 7
FA bit 7	Unmodified / Modified	0 or 1
Start Pos	Field Start Position (excluding FA)	
Length	Field Length (excluding FA)	

Note: FA = Field Attribute

Get Keystrokes

3270	5250	VT
Yes	Yes	Yes

The **Get Keystrokes** function returns to the client the keystrokes that are intercepted by the **Start Keystroke Intercept** function. The client sends the following message to receive the keystroke information.

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELPARAM(cfFormat, aKEYS) );
```

where:

cfFormat

Identifies the format for the keystroke information. This must be CF_DSPTEXT.

aKEYS

Identifies a keystroke data item.

Personal Communications Response

Personal Communications either returns the keystrokes in a DDE data message, or responds with one of these ACK messages containing status information:

- WM_DDE_DATA(hData, aKEYS)
- WM_DDE_ACK(wStatus, aKEYS)

If Personal Communications cannot return the keystroke information, one of the following status codes is returned in the low-order byte of the wStatus word:

Return Code	Explanation
2	No keystroke was intercepted.
6	The specified format is not valid.
9	A system error occurred.

Structure of the Keystroke Information

Personal Communications returns the keystroke information in the following structure:

```
typedef struct tagKEYSTROKE
{
    unsigned char data[(sizeof(DDEDATA)-1)];
    unsigned short uTextType; /* Type of keystrokes
    unsigned char szKeyData_1; /* Keystrokes
} KEYSTROKE;

typedef union tagDDE_GETKEYSTROKE
{
    DDEDATA DDEdata;
    KEYSTROKE DDEkey;
} DDE_GETKEYSTROKE, *lpDDE_GETKEYSTROKE;
```

The format for the keystrokes parameters is the same as for the **Session Execute Macro** function SENDKEY command.

The following key text types are supported:

```
PCS_PURETEXT 0 /* Pure text, no HLLAPI commands
PCS_HLLAPITEXT 1 /* Text, including HLLAPI tokens
```

Get Mouse Input

3270	5250	VT
Yes	Yes	Yes

The **Get Mouse Input** function returns the latest mouse input intercepted by the **Start Mouse Input Intercept** function to the client.

Note: The client must call the **Start Mouse Input Intercept** function before using this function.

The client sends the following command to receive the mouse input information.

```
PostMessage( hServerWnd,
            WM_DDE_REQUEST,
            hClientWnd,
            MAKELPARAM(cfFormat, aMOUSE) );
```

where:

cfFormat

Identifies the format for the presentation space. Valid values are CF_TEXT or CF_DSPTEXT. The structure of the mouse input data, in these two formats, is shown below.

aMOUSE

Identifies the mouse input as the item.

Personal Communications Response

Personal Communications either returns the mouse input data in a DDE data message, or responds with one of these ACK messages:

- WM_DDE_DATA(hData, aMOUSE)
- WM_DDE_ACK(wStatus, aMOUSE)

If Personal Communications cannot return the mouse input information, one of the following status codes is returned in the low-order byte of the wStatus word:

Return Code	Explanation
2	No mouse input information was intercepted.
6	The specified format is not valid.
9	A system error occurred.

Structure of the Mouse Input Information

If the format is CF_TEXT, Personal Communications returns the mouse input information in the following format:

```
typedef struct tagMOUSE_CF_TEXT
{
    unsigned char data[(sizeof(DDEDATA)-1)];
    unsigned char PSPos[4];          /* PS Offset - Mouse position
    unsigned char Tab1[1];          /* Tab character
    unsigned char PSRowPos[4];      /* ROW number of Mouse position
    unsigned char Tab2[1];          /* Tab character
    unsigned char PSColPos[4];      /* Col number of Mouse position
    unsigned char Tab3[1];          /* Tab character
    unsigned char PSSize[4];        /* Size of Presentation Space
    unsigned char Tab4[1];          /* Tab character
    unsigned char PSRows[4];        /* Row number of PS
    unsigned char Tab5[1];          /* Tab character
    unsigned char PSCols[4];        /* Column number of PS
    unsigned char Tab6[1];          /* Tab character
    unsigned char Button[1];        /* Type of clicked mouse button
    unsigned char Tab7[1];          /* Tab character
    unsigned char Click[1];         /* Type of clicking
    unsigned char Tab8[1];          /* Tab character
    unsigned char zClickString[1]; /* Retrieved string
} MOUSE_CF_TEXT;
```

```
typedef union tagDDE_MOUSE_CF_TEXT
{
    DDEDATA      DDEdata;
    MOUSE_CF_TEXT DDEmouse;
} DDE_MOUSE_CF_TEXT, *lpDDE_MOUSE_CF_TEXT;
```

The following table shows the values in the parameters:

Parameter Name	Meaning	Value
PSPos	PS offset of the position where the mouse was clicked	0 ... (PSSize - 1)
PSRowPos	Row number of the position where the mouse was clicked	0 ... (PSRows - 1)
PSColPos	Column number of the position where the mouse was clicked	0 ... (PSCols - 1)
PSSize	Size of the presentation space	
PSRows	Number of rows of presentation space	
PSCols	Number of columns of presentation space	
ButtonType	Type of the clicked mouse button	L Left button M Middle button R Right button
ClickType	Type of clicking	S Single click D Double click
ClickString	Retrieved string to which the mouse pointed	A character string terminated with a '\0'
Tab1-8	A tab character for delimiter	'\t'

If the format is CF_DSPTEXT, Personal Communications returns the mouse input information in the following format:

```
typedef struct tagMOUSE_CF_DSPTEXT
{
    unsigned char data[(sizeof(DDEDATA)-1)];
    unsigned short uPSPos;           /* PS Offset of the Mouse position
    unsigned short uPSRowPos;        /* ROW number of Mouse position
    unsigned short uPSColPos;        /* Column number of Mouse position
    unsigned short uPSSize;          /* Size of Presentation Space
    unsigned short uPSRows;          /* Row number of PS
    unsigned short uPSCols;          /* Column number of PS
    unsigned short uButtonType;      /* Type of clicked mouse button
    unsigned short uClickType;       /* Type of clicking
    unsigned char zClickString[1];   /* Retrieved string
} MOUSE_CF_DSPTEXT;
```

```
typedef union tagDDE_MOUSE_CF_DSPTEXT
{
    DDEDATA      DDEdata;
    MOUSE_CF_DSPTEXT DDEmouse;
} DDE_MOUSE_CF_DSPTEXT, *lpDDE_MOUSE_CF_DSPTEXT;
```

The following table shows the values in the parameters:

Parameter Name	Meaning	Value
uPSPos	PS offset of the position where the mouse was clicked	0 ... (uPSSize - 1)
uPSRowPos	Row number of the position where the mouse was clicked	0 ... (uPSRows - 1)
uPSColPos	Column number of the position where the mouse was clicked	0 ... (uPSCols - 1)
uPSSize	Size of the presentation space	
uPSRows	Number of rows of the presentation space	
uPSCols	Number of columns of the presentation space	
uButtonType	Type of the clicked mouse button	0x0001 Left button 0x0002 Middle button 0x0003 Right button
uClickType	Type of clicking	0x0001 Single click 0x0002 Double click
szClickString	Retrieved string that the mouse pointed to	A character string terminated with a '\0'

Get Number of Close Requests

3270	5250	VT
Yes	Yes	Yes

The **Get Number of Close Requests** function returns to the client the number of the close requests that are intercepted by the **Start Close Intercept** function. The client sends the following message to receive the number of the close requests.

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELPARAM(cfFormat, aCLOSE) );
```

where:

cfFormat

Identifies the format for the close intercept information. This must be CF_DSPTEXT.

aCLOSE

Identifies a close intercept data item.

Personal Communications Response

Personal Communications either returns the number of the close requests in a DDE data message, or responds with one of these ACK messages:

- WM_DDE_DATA(hData, aCLOSE)
- WM_DDE_ACK(wStatus, aCLOSE)

If Personal Communications cannot return the close intercept information, one of the following status codes is returned in the low order byte of the wStatus word:

Return Code	Explanation
6	The specified format is not valid.
9	A system error occurred.

Structure of the Number of the Close Requests Information

Personal Communications returns the close intercept information in the following structure:

```
typedef struct tagCLOSEREQ
{
    unsigned char data[(sizeof(DDEDATA)-1)];
    unsigned short uCloseReqCount; /* Number of the close requests.
} CLOSEREQ;

typedef union tagDDE_CLOSEREQ
{
    DDEDATA DDEdata;
    CLOSEREQ DDEclose;
} DDE_CLOSEREQ, *lpDDE_CLOSEREQ;
```

Get Operator Information Area

3270	5250	VT
Yes	Yes	Yes

The **Get Operator Information Area** (OIA) function returns a copy of the OIA to the client. The client sends the following message to request the OIA.

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELPARAM(cfFormat, aOIA) );
```

where:

cfFormat

Identifies the format for the OIA. For the OIA, this format must be CF_DSPTEXT.

aOIA Identifies the operator information area as the item.

Personal Communications Response

Personal Communications either returns the OIA in a DDE data message, or responds with one of these ACK messages:

- WM_DDE_DATA(hData, aOIA)
- WM_DDE_ACK(wStatus, aOIA)

If Personal Communications cannot return the OIA, one of the following status codes is returned in the low-order byte of the wStatus word:

Return Code	Explanation
6	The specified format is not valid.

Return Code	Explanation
9	A system error occurred.

Structure of the Operator Information Area

Personal Communications returns the operator information area in the following structure:

```
typedef struct tagOIADATA
{
    unsigned char data[(sizeof(DDEDATA)-1)];
    unsigned char OIA[80];
} OIADATA;

typedef union tagDDE_OIADATA
{
    DDEDATA DDEdata;
    OIADATA DDEoia;
} DDE_OIADATA, *lpDDE_OIADATA;
```

Get Partial Presentation Space

3270	5250	VT
Yes	Yes	Yes

The **Get Partial Presentation Space** function returns all or part of the session presentation space to the client.

Note: The client must set the start PS position and either the PS length or End of Field (EOF) flag by using the **Set Presentation Space Service Condition** function before using this function. If the EOF flag is set to PCS_EFFECTEOF, the function will return the entire field specified by the start PS position

The client sends the following command to get the presentation space.

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELPARAM(cfFormat, aEPS) );
```

where:

cfFormat

Identifies the format for the presentation space. Valid values are CF_TEXT or CF_DSPTEXT. The structure of the presentation space, in these two formats, is shown below.

aEPS Identifies the session presentation space as the item.

Personal Communications Response

Personal Communications either returns the presentation space data, or responds with one of these ACK messages containing an error code in the low order byte of the wStatus word:

- WM_DDE_DATA(hData, aEPS)
- WM_DDE_ACK(wStatus, aEPS)

If Personal Communications cannot return the presentation space, one of the following status codes is returned in the low-order byte of the wStatus word:

Return Code	Explanation
1	No prior Set Presentation Space Service Condition function was called, or an incorrect parameter was set.
6	The specified format is not valid.
9	A system error occurred.

Structure of the Presentation Space

Personal Communications returns the part of the presentation space in the format specified in the **Get Partial Presentation Space** request.

If the format is CF_DSPTTEXT, Personal Communications returns the presentation space in the following format:

```
typedef struct tagEPS_CF_DSPTTEXT
{
    unsigned char  data[(sizeof(DDEDATA)-1)];
    unsigned short uPSPosition;      /* Position of the part of PS
    unsigned short uPSLength;        /* Length of the part of the PS
    unsigned short uPSRows;         /* PS number of rows
    unsigned short uPSCols;         /* PS number of columns
    unsigned short uPSOffset;       /* Offset to the presentation space
    unsigned short uFieldCount;     /* Number of fields
    unsigned short uFieldOffset;    /* Offset to the field array
    unsigned char  PSData[1];      /* PS + Field list Array(1pPSFIELDS)
} EPS_CF_DSPTTEXT;

typedef union tagDDE_EPS_CF_DSPTTEXT
{
    DDEDATA      DDEdata;
    EPS_CF_DSPTTEXT DDEeps;
} DDE_EPS_CF_DSPTTEXT, *lpDDE_EPS_CF_DSPTTEXT;

# The PSFIELDS structure is replaced with below structure.

typedef struct tagPSFIELDS
{
    unsigned short uFieldStart;     /* Field start offset
    unsigned short uFieldLength;   /* Field Length
    unsigned char  cAttribute;     /* Attribute character
    unsigned char  ubReserved;     /* *** Reserved ***
} PSFIELDS, *lpPSFIELDS;
```

Note: The following examples show how to obtain long pointers to the PS and the PSFIELDS array.

```
lpDDE = (lpDDE_EPS_CF_DSPTTEXT)GlobalLock(hData);
lpps = lpDDE->DDEeps.PSData + lpDDE->DDEeps.uPSOffset;
lppsfields = lpDDE->DDEeps.PSData + lpDDE->DDEeps.uFieldOffset;
```

If the format is CF_TEXT, Personal Communications returns the part of the presentation space in the following format:

```
typedef struct tagEPS_CF_TEXT
{
    unsigned char  data[(sizeof(DDEDATA)-1)];
    unsigned char  PSPOSITION[4]; /* Position of part of the PS
    unsigned char  Tab1[1];       /* Tab character
    unsigned char  PSLENGTH[4];  /* Length of the part of the PS
    unsigned char  Tab2[1];       /* Tab character
```

```

    unsigned char  PSROWS[4];    /* Number of rows in the PS
    unsigned char  Tab3[1];     /* Tab character
    unsigned char  PSCOLS[4];   /* Number of Cols in the PS
    unsigned char  Tab4[1];     /* Tab character
    unsigned char  PS[1];      /* PS
} EPS_CF_TEXT;

typedef union tagDDE_EPS_CF_TEXT
{
    DDEDATA      DDEdata;
    EPS_CF_TEXT  DDEeps;
} DDE_EPS_CF_TEXT, *lpDDE_EPS_CF_TEXT;

```

Following the PS in the buffer is the following additional structure of fields that compose the field list.

```

typedef struct tagFL_CF_TEXT
{
    unsigned char  Tab5[1];     /* Tab character
    unsigned char  PSFldCount[4]; /* Number of fields in the PS
    unsigned char  Tab6[1];     /* Tab character
    PS_FIELD      Field[1];     /* Field List Array
} FL_CF_TEXT, *lpFL_CF_TEXT;

typedef struct tagPS_FIELD
{
    unsigned char  FieldStart[4];
    unsigned char  TabF1[1];
    unsigned char  FieldLength[4];
    unsigned char  TabF2[1];

```

Note: The following examples show how to obtain long pointers to the PS and the PS_FIELD array.

```

lpDDE = (lpDDE_EPS_CF_TEXT)GlobalLock(hData);
lpPS = lpDDE->DDEeps.PS;
lpPS_field = lpDDE->DDEeps.PS
             + atoi(lpDDE->DDEeps.PSLENGTH)
             + ((atoi(lpDDE->DDEeps.PSROWS) - 1) * 2) // CR/LF
             + 1 + 1 + 4 + 1; // Tabs + size of field count

```

Get Presentation Space

3270	5250	VT
Yes	Yes	Yes

The **Get Presentation Space** function returns the session presentation space to the client. The client sends the following command to get the presentation space.

```

PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELPARAM(cfFormat, aPS) );

```

where:

cfFormat

Identifies the format for the presentation space. Valid values are CF_TEXT or CF_DSPTEXT. The structure of the presentation space, in these two formats, is shown below.

aPS Identifies the session presentation space as the item.

Personal Communications Response

Personal Communications either returns the presentation space and a list of the fields that comprise the presentation space, or responds with one of these ACK messages containing an error code in the low-order byte of the wStatus word:

- WM_DDE_DATA(hData, aPS)
- WM_DDE_ACK(wStatus, aPS)

If Personal Communications cannot return the presentation space, one of the following status codes is returned in the low-order byte of the wStatus word:

Return Code	Explanation
6	The specified format is not valid.
9	A system error occurred.

Structure of the Presentation Space

Personal Communications returns the presentation space in the format specified in the **Get Presentation Space** request.

If the format is CF_DSPTEXT, Personal Communications returns the presentation space in the following format:

```
typedef struct tagPS_CF_DSPTEXT
{
    unsigned char data[(sizeof(DDEDATA)-1)];
    unsigned short uPSSize;          /* Size of the presentation space */
    unsigned short uPSRows;         /* PS number of rows */
    unsigned short uPSCols;         /* PS number of columns */
    unsigned short uPSOffset;       /* Offset to the presentation space */
    unsigned short uFieldCount;     /* Number of fields */
    unsigned short uFieldOffset;    /* Offset to the field array */
    unsigned char PSData_1;        /* PS and Field list Array(1pPSFIELDS) */
} PS_CF_DSPTEXT;

typedef union tagDDE_PS_CF_DSPTEXT
{
    DDEDATA DDEdata;
    PS_CF_DSPTEXT DDEps;
} DDE_PS_CF_DSPTEXT, *lpDDE_PS_CF_DSPTEXT;

typedef struct tagPSFIELDS
{
    unsigned short uFieldStart;     /* Field start offset */
    unsigned short uFieldLength;   /* Field Length */
    unsigned char cAttribute;      /* Attribute character */
    unsigned char ubReserved;      /* *** Reserved *** */
} PSFIELDS, *lpPSFIELDS;
```

Note: The following examples show how to obtain long pointers to the PS and the PSFIELDS array.

```
lpDDE = (lpDDE_PS_CF_DSPTEXT)GlobalLock(hData);
lpps = lpDDE->DDEps.PSData + lpDDE->DDEps.uPSOffset;
lppsfields = lpDDE->DDEps.PSData + lpDDE->DDEps.uFieldOffset;
```

If the format is CF_TEXT, Personal Communications returns the presentation space in the following format:

```
typedef struct tagPS_CF_TEXT
{
    unsigned char data[(sizeof(DDEDATA)-1)];
```

```

    unsigned char PSSIZE[4];      /* Size of the PS
    unsigned char Tab1[1];       /* Tab character
    unsigned char PSROWS[4];    /* Number of rows in the PS
    unsigned char Tab2[1];       /* Tab character
    unsigned char PSCOLS[4];    /* Number of Cols in the PS
    unsigned char Tab3[1];       /* Tab character
    unsigned char PS[1];        /* PS
} PS_CF_TEXT;

typedef union tagDDE_PS_CF_TEXT
{
    DDEDATA DDEdata;
    PS_CF_TEXT DDEps;
} DDE_PS_CF_TEXT, *lpDDE_PS_CF_TEXT;

```

Following the PS in the buffer is the following additional structure of fields that compose the field list.

```

typedef struct tagPS_FIELD
{
    unsigned char FieldStart[4];
    unsigned char TabF1[1];
    unsigned char FieldLength[4];
    unsigned char TabF2[1];
    unsigned char Attribute;
    unsigned char TabF3[1];
} PS_FIELD, *lpPS_FIELD;

```

Note: The following example shows how to obtain long pointers to the PS and the PS_FIELD array.

```

lpDDE = (lpDDE_PS_CF_TEXT)GlobalLock(hData);
lpPs = lpDDE->DDEps.PS;
lpPs_field = lpDDE->DDEps.PS
              + atoi(lpDDE->DDEps.PSSIZE)
              + ((atoi(lpDDE->DDEps.PSROWS) - 1) * 2) // CR/LF
              + 1 + 1 + 4 + 1; // Tabs + size of field count

```

Get Session Status

3270	5250	VT
Yes	Yes	Yes

The **Get Session Status** function returns the status of the connected session. The client sends the following message to request session status:

```

PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELPARAM(cfFormat, aSSTAT) );

```

where:

cfFormat

Identifies the DDE format for the status information. The value used is CF_TEXT.

aSSTAT

Identifies session status as the data item requested.

Personal Communications Response

Personal Communications either returns the session status in a DDE data message, or responds with one of these ACK messages containing status information:

- WM_DDE_DATA(hData, aSSTAT)
- WM_DDE_ACK(wStatus, aSSTAT)

If Personal Communications cannot return the session status, one of the following status codes is returned in the low-order byte of the wStatus word:

Return Code	Explanation
6	The specified format is not valid.
9	A system error occurred.

Format of Status Information

Personal Communications returns the session status as text in CF_TEXT format. The following fields are returned with the following possible values:

Fields	Returned Values	Description
Status	Closed, Invisible, Maximized, Minimized, Normal	The window is in one of these states.
Usage	DDE, User	The session is connected in either a DDE session or a user session.
ScreenX	NN	Defines the horizontal size of the screen.
ScreenY	NN	Defines the vertical size of the screen.
CursorX	NN	Defines the horizontal position of the cursor. (0 ... ScreenX - 1)
CursorY	NN	Defines the vertical position of the cursor. (0 ... ScreenY - 1)
TrimRect Status	Closed, Moved, Sized	The current status of the trim rectangle.
Trim Rectangle X1	N	The top-left corner X position of the trim rectangle in character coordinates.
Trim Rectangle Y1	N	The top-left corner Y position of the trim rectangle in character coordinates.
Trim Rectangle X2	N	The lower-right corner X position of the trim rectangle in character coordinates.
Trim Rectangle Y2	N	The lower-right corner Y position of the trim rectangle in character coordinates.

Fields	Returned Values	Description
Session Presentation Space Status	N	The current status of the presentation space. The following values are possible: 0: The presentation space is unlocked. 4: The presentation space is busy. 5: The presentation space is locked.
Session Window Handle	XXXX	Window handle of the session.

Note:

- The status of each field is updated each time the status is requested.
- A new field might be added in a future version of Personal Communications.

Get System Configuration

3270	5250	VT
Yes	Yes	Yes

The **Get System Configuration** function returns the level of Personal Communications support and other system-related values. Most of this information is for use by a service coordinator when a customer calls the IBM Support Center after receiving a system error.

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELPARAM(cfFormat, aSYSCON) );
```

where:

cfFormat

Identifies the DDE format for the data item requested. The value used is CF_TEXT.

aSYSCON

Identifies system configuration as the data item requested.

Personal Communications Response

Personal Communications either returns the system configuration data item in a DDE DATA message, or responds with one of these ACK messages containing status information:

- WM_DDE_DATA(hData, aSYSCON)
- WM_DDE_ACK(wStatus, aSYSCON)

If Personal Communications cannot return the system configuration, a DDE ACK message is returned with an error code in the low-order byte of the wStatus word:

```
WM_DDE_ACK(wStatus, aSYSCON)
```


Return Code	Explanation
9	A system error occurred.

Format of System Configuration Information

Personal Communications returns the system configuration as text in CF_TEXT format. The following fields are returned with the following possible values:

Fields	Returned values	Description
Version	N	The version of Personal Communications
Level	NN	The level of Personal Communications
Reserved	XXXXXX	Reserved
Reserved	XXXX	Reserved
Monitor Type	MONO, CGA, EGA, VGA, XGA	Type of the monitor
Country Code	NNNN	Country code used with 3270 or 5250

Get System Formats

<i>3270</i>	<i>5250</i>	<i>VT</i>
<i>Yes</i>	<i>Yes</i>	<i>Yes</i>

The **Get System Formats** function returns the list of Windows clipboard formats supported by Personal Communications. The client application sends the following message to retrieve the format list supported by Personal Communications:

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELPARAM(cfFormat, aFORMATS) );
```

where:

cfFormat

Identifies the DDE format for the data item requested. The value used is CF_TEXT.

aFORMATS

Identifies formats as the data item requested.

Personal Communications Response

Personal Communications returns the list of supported Windows clipboard formats in CF_TEXT format in a DDE DATA message.

```
WM_DDE_DATA(hData, aFORMATS)
```

The following Windows clipboard formats are supported by Personal Communications:

- CF_TEXT
- CF_DSPTXT

If Personal Communications cannot return the formats data item, a DDE ACK message is returned with an error code in the low-order byte of the wStatus word:
 WM_DDE_ACK(wStatus, aFORMATS)

Return Code	Explanation
9	A system error occurred.

Get System Status

3270	5250	VT
Yes	Yes	Yes

The **Get System Status** function returns the status of each 3270 or 5250 session that is available with the current Personal Communications configuration. The client application sends the following message to retrieve the status data item:

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELPARAM(cfFormat, aSTATUS) );
```

where:

cfFormat

Identifies the DDE format for the data item requested. The value used is CF_TEXT.

aSTATUS

Identifies status as the data item requested.

Personal Communications Response

Personal Communications returns the status data item in CF_TEXT format in a DDE DATA message:

```
WM_DDE_DATA(hData, aSTATUS)
```

For each opened session, Personal Communications returns a line of status information. Each line contains a series of fields with the following range of values:

Fields	Range of values	Description
Session ID	A, B, ..., Z	The short ID of the session.
Host Type	370, 400, ASCII	The host system currently supported by Personal Communications.
Emulation Type	3270, 5250, VT	The emulation type supported by Personal Communications.
Session Status	Closed, Invisible, Normal, Minimized, Maximized	The current status of the session's window.

If Personal Communications cannot return the status data item, a DDE ACK message is returned with an error code in the low-order byte of the wStatus word:
 WM_DDE_ACK(wStatus, aSTATUS)

Return Code	Explanation
9	A system error occurred.

Get System Systems

3270	5250	VT
Yes	Yes	Yes

Personal Communications supports the DDE system topic so that a client application can connect to the system topic and retrieve information about Personal Communications and the status of the sessions that Personal Communications is managing.

The **Get System SysItems** function returns the list of data items available in the Personal Communications system topic. The client application sends the following message to get the system topic data items:

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELPARAM(cfFormat, aSYSITEMS) );
```

where:

cfFormat

Identifies the DDE format for the data item requested. The value used is CF_TEXT.

aSYSITEMS

Identifies SysItems as the data item requested.

Personal Communications Response

Personal Communications returns the list of system topic data items in CF_TEXT format in a DDE DATA message.

```
WM_DDE_DATA(hData, aSYSITEMS)
```

The following data items are supported by Personal Communications:

- SysItems
- Topics
- Status
- Formats
- SysCon

If Personal Communications cannot return the system data items, a DDE ACK message is returned with an error code in the low-order byte of the wStatus word:

```
WM_DDE_ACK(wStatus, aSYSITEMS)
```

Return Code	Explanation
9	A system error occurred.

Get System Topics

3270	5250	VT
Yes	Yes	Yes

The **Get System Topics** function returns the list of active DDE topics currently supported by Personal Communications. The client application sends the following message to the system topic to retrieve the list of topics that are currently active:

```
PostMessage( hServerWnd,  
             WM_DDE_REQUEST,  
             hClientWnd,  
             MAKELPARAM(cfFormat, aTOPICS) );
```

where:

cfFormat

Identifies the DDE format for the data item requested. The value used is CF_TEXT.

aTOPICS

Identifies topics as the data item requested.

Personal Communications Response

Personal Communications returns the list of DDE topics in CF_TEXT format in a DDE DATA message.

```
WM_DDE_DATA(hData, aTOPICS)
```

The following list of topics are supported by Personal Communications:

- System – System Topic
- SessionA – Session A Topic
- ⋮
- SessionZ – Session Z Topic

Note: The actual number of session topics supported depends on the number of sessions currently opened. The client program should always query the topics data item of the system topic to obtain the list of sessions currently opened.

If Personal Communications cannot return the list of topics, a DDE ACK message will be returned with an error code in the low-order byte of the wStatus word:

```
WM_DDE_ACK(wStatus, aTOPICS)
```

Return Code	Explanation
9	A system error occurred.

Get Trim Rectangle

3270	5250	VT
Yes	Yes	Yes

The **Get Trim Rectangle** function returns to the client the area of the presentation space that is within the current trim rectangle. The client sends the following message to receive the trim rectangle.

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELPARAM(cfFormat, aTRIMRECT) );
```

where:

cfFormat

Identifies the format for the trim rectangle. This is CF_TEXT.

aTRIMRECT

Identifies trim rectangle as the data item requested.

Personal Communications Response

Personal Communications either returns trim rectangle in a DDE data message, or responds with one of these ACK messages:

- WM_DDE_DATA(hData, aTRIMRECT)
- WM_DDE_ACK(wStatus, aTRIMRECT)

If Personal Communications cannot return the trim rectangle, one of the following status codes is returned in the low-order byte of the wStatus word:

Return Code	Explanation
6	The specified format is not valid.
9	A system error occurred.

Initiate Session Conversation

3270	5250	VT
Yes	Yes	Yes

The **Initiate Session Conversation** function connects a client application to an available session of Personal Communications. Once a session conversation has been established, the session is reserved for exclusive use by the client until the conversation is terminated.

The client application sends the following message to initiate a DDE conversation with a session:

```
SendMessage( -1,
             WM_DDE_INITIATE,
             hClientWnd,
             MAKELPARAM(aIBM327032, aSessionN) );
```

where:

aIBM327032

Identifies the application atom. The string used to create atom aIBM327032 is IBM327032. In the PC400, the application atom is aIBM525032 and the string IBM525032 is used to create it.

aSessionN

Identifies the topic atom. The string used to create atom aSessionN is either NULL or Session appended with the session ID A, B, ..., Z.

Personal Communications Response

If a specific topic is selected and Personal Communications can support a conversation with the client application, Personal Communications acknowledges the INITIATE transaction with:

```
WM_DDE_ACK(aIBM327032, aSessionN)
```

If a topic is not selected (aSessionN = NULL), Personal Communications responds by acknowledging all topics that are currently available:

```
WM_DDE_ACK(aIBM327032, aSystem)
WM_DDE_ACK(aIBM327032, aSessionA)
⋮
WM_DDE_ACK(aIBM327032, aSessionZ)
```

The client application selects the conversation it wishes to communicate with from the returned list of topics and terminates all other unwanted conversations.

Initiate Structured Field Conversation

<i>3270</i>	<i>5250</i>	<i>VT</i>
<i>Yes</i>	<i>No</i>	<i>No</i>

The **Initiate Structured Field Conversation** function connects a client application and a host application. This allows the applications to send data to each other and to receive data from each other.

The client sends the following command to initiate a structured field conversation:

```
SendMessage( -1,
             WM_DDE_INITIATE,
             hClientWnd,
             MAKELPARAM(aIBM327032, aLUN_xxxx) );
```

Where:

aIBM327032

Identifies the application atom.

aLUN_xxxx

Identifies the topic atom. The string used to create atom aLUN_xxxx is LU appended with the session ID A, B, ..., Z, appended with an underscore (_), and appended with the user-defined string of any length.

PC/3270 Response

If PC/3270 can support a structured field conversation with the client application, it returns an acknowledgment message with the following parameter:

```
WM_DDE_ACK(aIBM327032, aLUN_xxxx)
```

Initiate System Conversation

<i>3270</i>	<i>5250</i>	<i>VT</i>
-------------	-------------	-----------

Yes	Yes	Yes
-----	-----	-----

The **Initiate System Conversation** function connects a client application to the system conversation. Only one client can be connected to the system conversation at a given time. The client sends the following command to initiate a system conversation:

```
SendMessage( -1,
             WM_DDE_INITIATE,
             hClientWnd,
             MAKELPARAM(aIBM327032, aSystem) );
```

where:

aIBM327032

Identifies the application atom.

aSystem

Identifies the topic atom.

Personal Communications Response

If Personal Communications can support a system topic conversation with the client application, it returns an acknowledgment message with the following parameters:

```
WM_DDE_ACK(aIBM327032, aSystem)
```

Put Data to Presentation Space

3270	5250	VT
Yes	Yes	Yes

The **Put Data to Presentation Space** function sends an ASCIIZ data string to be written into the host presentation space at the location specified by the calling parameter. The client sends the following message to the session to send the string.

```
PostMessage( hServerWnd,
             WM_DDE_POKE,
             hClientWnd,
             PackDDE1Param(WM_DDE_POKE,
                           hdata, aEPS) );
```

where:

hData Identifies a handle to a Windows global memory object that contains the string to be sent to the session. The global memory object contains the following structure:

```
typedef struct tagPutString
{
    unsigned char poke[(sizeof(DDEPOKE)-1)];
    unsigned short uPSStart;           /* PS Position
    unsigned short uEOFflag;          /* EOF effective switch
    unsigned char szStringData[1];    /* String Data
} PUTSTRING;

typedef union tagDDE_PUTSTRING
{
    DDEPOKE DDEpoke;
    PUTSTRING DDEputstring;
} DDE_PUTSTRING, *lpDDE_PUTSTRING;
```

These values are valid at the uEOFflag field:

```
PCS_UNEFFECTEOF 0 /* The string is not truncated at EOF.  
PCS_EFFECTEOF 1 /* The string is truncated at EOF.
```

aEPS Identifies the presentation space atom as the item.

Personal Communications Response

Personal Communications receives the string data and sends them to the presentation space, and returns a positive ACK message.

If the presentation space does not accept the string data, Personal Communications returns a negative ACK message containing one of the following status codes in the low-order byte of the wStatus word:

WM_DDE_ACK(wStatus, aEPS)

Return Code	Explanation
1	PS position is not valid.
2	Length is not valid.
3	The value of EOF flag is not valid.
5	Input to the target PS was inhibited.
6	The specified format is not valid.
7	The string was truncated (successful putting).
9	A system error occurred.

Search for String

3270	5250	VT
Yes	Yes	Yes

This function allows a client application to examine the presentation space for a specified string in a specified area.

Note: The client must set the start PS position, string to be searched for, and either the PS Length and Search Direction or End of Field (EOF) flag by using the **Set Presentation Space Service Condition** function before using this function. If the EOF flag is set to PCS_EFFECTEOF, the function will search the entire field specified by the Start PS Position parameter.

The client sends the following message to search for the string.

```
PostMessage( hServerWnd,  
            WM_DDE_REQUEST,  
            hClientWnd,  
            MAKELPARAM(cfFormat, aSTRING) );
```

where:

cfFormat

Identifies the format for the search information. This must be CF_DSPTEXT.

aSTRING

Identifies the search data item.

Personal Communications Response

Personal Communications returns the start position of the string in a DDE data message if the string was found in the specified area:

- WM_DDE_DATA(hData, aSTRING)
- WM_DDE_ACK(wStatus, aSTRING)

If Personal Communications cannot return the start position of the string, one of the following status codes is returned in the low-order byte of the wStatus word:

Return Code	Explanation
1	PS position is not valid or the string is too long.
2	The string cannot be found.
6	The specified format is not valid.
9	A system error occurred.

Structure of the Search Information

Personal Communications returns the search information in the following structure:

```
typedef struct tagSEARCH
{
    unsigned char data[(sizeof(DDEDATA)-1)];
    unsigned short uFieldStart; /* String start offset
} SEARCH;

typedef union tagSEARCH
{
    DDEDATA DDEdata;
    SEARCH DDEsearch;
} DDE_SEARCH, *lpDDE_SEARCH;
```

Send Keystrokes

3270	5250	VT
Yes	Yes	Yes

The **Send Keystrokes** function sends keystrokes to the connected session. The client sends the following message to the session to send keystrokes.

```
PostMessage( hServerWnd,
             WM_DDE_POKE,
             hClientWnd,
             PackDDE1Param(WM_DDE_POKE,
                           hData, aKEYS) );
```

where:

hData Identifies a handle to a Windows global memory object that contains the keystrokes to be sent to the session. The global memory object contains the following structure:

```
typedef struct tagKeystrokes
{
    unsigned char poke[(sizeof(DDEPOKE)-1)];
    unsigned short uTextType; /* Type of keystrokes
    unsigned short uRetryCount; /* Retry count 1 .. 16
    unsigned char szKeyData[1]; /* Keystrokes
```

```

} KEYSTROKES;

typedef union tagDDE_SENDKEYSTROKES
{
    DDEPOKE    DDEpoke;
    KEYSTROKES DDEkeys;
} DDE_SENDKEYSTROKES, *lpDDE_SENDKEYSTROKES;

```

The following key text types are supported:

```

PCS_PURETEXT  0          /* Pure text, no HLLAPI commands
PCS_HLLAPITEXT 1          /* Text, including HLLAPI tokens

```

Note: If the keystrokes are pure text, then specifying PCS_PURETEXT will transfer the keystrokes to the host in the fastest possible manner. If PCS_HLLAPITEXT is specified, then the keystroke data can contain HLLAPI commands interspersed with the text.

aKEYS

Identifies keystrokes as the item.

Personal Communications Response

Personal Communications receives the keystrokes and sends them to the presentation space. If the presentation space does not accept the keystrokes, a reset is sent to the presentation space and the keystrokes are sent again. This procedure continues until the presentation space accepts the keystrokes or the retry count is reached. If Personal Communications cannot send the keystrokes to the host, Personal Communications returns a negative ACK message containing one of the following status codes in the low-order byte of the wStatus word. Otherwise, Personal Communications returns a positive ACK message signalling the keystrokes have been sent.

WM_DDE_ACK(wStatus, aKEYS)

Return Code	Explanation
1	Retry count is not valid.
2	Type of key strokes is not valid.
6	The specified format is not valid.
9	A system error occurred.

Session Execute Macro

3270	5250	VT
Yes	Yes	Yes

You can issue commands and macros with the DDE_EXECUTE function. The DDE_EXECUTE function passes command strings to Personal Communications. The command strings must conform to DDE specifications. Refer to *Microsoft Windows Software Development Kit Guide to Programming* for more information about the DDE command syntax.

The client sends the following command to issue a DDE_EXECUTE function.

```

PostMessage ( hServerWnd,
              WM_DDE_EXECUTE,
              hClientWnd,
              (LPARAM)hCommands );

```

where:

hCommands

Identifies a handle to a Windows global memory object containing Personal Communications commands. For a list of commands you can issue, see “Issuing Commands with the Session Execute Macro Function.”

Personal Communications Response

If Personal Communications can process the command string, Personal Communications returns an ACK message containing positive status information to the client. If Personal Communications cannot perform the command string, Personal Communications returns an ACK message containing this error code in the low-order word of the wStatus word:

Return Code	Explanation
9	A system error occurred.

Issuing Commands with the Session Execute Macro Function

You can issue the following commands with the **Session Execute Macro** function:

- KEYBOARD
- RECEIVE
- SEND
- SENDKEY
- WAIT
- WINDOW

Use a separate DDE_EXECUTE message for each command.

Note:

- Enclose values that contain nonalphanumeric characters or blanks in double quotation marks (*"value value"*).
- To include a double quotation mark within a string, type it twice (for example, "This is a double quotation mark: """).
- The maximum length for any command is 255 characters.

WINDOW Command

[WINDOW(*action* [, *"name"*])]

Performs window actions, where:

action = HIDE | RESTORE | MAXIMIZE | MINIMIZE |
SHOW | CNGNAME
name = LT name or Switch List Entry name

Note: *name* should be specified when CNGNAME is specified at *action*. If *name* is a NULL string, the default caption will be displayed.

KEYBOARD Command

[KEYBOARD(*action*)]

Enables or disables the session keyboard, including the mouse, where:

action= LOCK|UNLOCK

SEND Command

[SEND(*pcfilename*,"*hostfilename*","*options*")]

Sends files to the host, where:

pcfilename = [*path*]*filename*[*.ext*]
hostfilename =
For VM system:
 filename filetype[filemode]
For MVS system:
 [']*filename*[(*membername*)][']
For CICS system:
For OS/400 system:
 library name filename member name

Any combination of the following file transfer options can be included in *options*: MVS, VM, CICS, QUIET, OS/400, and emulation-specific transfer options, separated by spaces.

Refer to *Administrator's Guide and Reference* for more information about the transfer options.

RECEIVE Command

[RECEIVE(*pcfilename*,"*hostfilename*","*options*")]

Receives files from the host, where:

pcfilename = [*path*]*filename*[*.ext*]
hostfilename =
For VM system:
 filename filetype[filemode]
For MVS system:
 [']*filename*[(*membername*)][']
For CICS system:
For OS/400 system:
 library name filename member name

Any combination of the following file transfer options can be included in *options*: MVS, VM, CICS, QUIET, OS/400, and emulation-specific transfer options, separated by spaces.

Refer to *Administrator's Guide and Reference* for more information about the transfer options.

SENDKEY Command

[SENDKEY(*token*,*token*)]

Sends keystrokes to Personal Communications, where:

token = *text string*|*command*|*macro macroname*

Notes:

1. Text strings are enclosed in double quotation marks.
2. Macros are prefixed with "macro".
3. The argument string for SENDKEY must be 255 characters or fewer.
4. The following commands are supported.

Table 19. SENDKEY Command List

Command Name	Token	PC/3270	PC400	VT
Alternate Cursor	alt cursor	Yes	Yes	No
Alternate Viewing Mode	alt view	Yes	Yes	No
Attention	sys attn	Yes	Yes	No
Backspace	backspace	Yes	Yes	Yes
Back Tab	backtab	Yes	Yes	No
Backtab Word	backtab word	Yes	Yes	No
Character Advance	character advance	No	Yes	No
Character Backspace	backspace valid	No	Yes	No
Clear Screen	clear	Yes	Yes	No
Clicker	click	Yes	Yes	No
Color Blue	blue	Yes	No	No
Color Field Inherit	field color	Yes	No	No
Color Green	green	Yes	No	No
Color Pink	pink	Yes	No	No
Color Red	red	Yes	No	No
Color Turquoise	turquoise	Yes	No	No
Color White	white	Yes	No	No
Color Yellow	yellow	Yes	No	No
Cursor Blink	cursor blink	Yes	Yes	No
Cursor Down	down	Yes	Yes	Yes
Cursor Left	left	Yes	Yes	Yes
Cursor Right	right	Yes	Yes	Yes
Cursor Select	cursor select	Yes	Yes	No
Cursor Up	up	Yes	Yes	Yes
Delete Character	delete char	Yes	Yes	No
Delete Word	delete word	Yes	Yes	No
Device Cancel	device cancel	Yes	Yes	No
Dup Field	dup	Yes	Yes	No
Edit Clear	edit-clear	Yes	Yes	Yes
Edit Copy	edit-copy	Yes	Yes	Yes
Edit Cut	edit-cut	Yes	Yes	Yes
Edit Paste	edit-paste	Yes	Yes	Yes
Edit Undo	edit-undo	Yes	Yes	Yes
End Field	end field	Yes	Yes	No
Enter	enter	Yes	Yes	No
Erase EOF	erase eof	Yes	Yes	No
Erase Field	erase field	Yes	No	No
Erase Input	erase input	Yes	Yes	No

Table 19. SENDKEY Command List (continued)

Command Name	Token	PC/3270	PC400	VT
Fast Cursor Down	fast down	Yes	Yes	No
Fast Cursor Left	fast left	Yes	Yes	No
Fast Cursor Right	fast right	Yes	Yes	No
Fast Cursor Up	fast up	Yes	Yes	No
Field Exit	field exit	No	Yes	No
Field Mark	field mark	Yes	Yes	No
Field +	field +	No	Yes	No
Field -	field -	No	Yes	No
Graphic Cursor	+cr	Yes	No	No
Help	help	Yes	Yes	No
Highlighting Field Inherit	field hilight	Yes	No	No
Highlighting Reverse	reverse	Yes	No	No
Highlighting Underscore	underscore	Yes	No	No
Home	home	Yes	Yes	No
Host Print	host print	Yes	No	No
Input	input	Yes	Yes	No
Input nondisplay	input nd	Yes	Yes	No
Insert Toggle	insert	Yes	Yes	No
Lower case	to lower	Yes	No	No
Mark Down	mark down	Yes	Yes	Yes
Mark Left	mark left	Yes	Yes	Yes
Mark Right	mark right	Yes	Yes	Yes
Mark Up	mark up	Yes	Yes	Yes
Move Mark Down	move down	Yes	Yes	Yes
Move Mark Left	move left	Yes	Yes	Yes
Move Mark Right	move right	Yes	Yes	Yes
Move Mark Up	move up	Yes	Yes	Yes
New Line	newline	Yes	Yes	Yes
Next Page	page down	No	Yes	No
Pause 1 second	pause	Yes	Yes	No
Previous Page	page up	No	Yes	No
Print Screen	local copy	Yes	Yes	Yes
Program Attention Key 1	pa1	Yes	No	No
Program Attention Key 2	pa2	Yes	No	No
Program Attention Key 3	pa3	Yes	No	No
Program Function Key 1	pf1	Yes	Yes	No
⋮	⋮	⋮	⋮	⋮
Program Function Key 5	pf5	Yes	Yes	No

Table 19. SENDKEY Command List (continued)

Command Name	Token	PC/3270	PC400	VT
Program Function Key 6	pf6	Yes	Yes	Yes
⋮	⋮	⋮	⋮	⋮
Program Function Key 20	pf20	Yes	Yes	Yes
Program Function Key 21	pf21	Yes	Yes	No
⋮	⋮	⋮	⋮	⋮
Program Function Key 24	pf24	Yes	Yes	No
Quit	quit	Yes	Yes	No
Reset	reset	Yes	Yes	No
Response Time Monitor	rtn	Yes	No	No
Roll Down	roll down	No	Yes	No
Roll Up	roll up	No	Yes	No
Rubout	rubout	Yes	Yes	Yes
Rule	rule	Yes	Yes	Yes
SO/SI Display	so si	Yes	Yes	No
SO/SI Generate	so si generate	No	Yes	No
System Request	sys req	Yes	Yes	No
Tab Field	tab field	Yes	Yes	Yes
Tab Word	tab word	Yes	Yes	No
Test	test request	No	Yes	No
Unmark	unmark	Yes	Yes	Yes
Upper case	to upper	Yes	No	No
Upper/Lower Change	to other	Yes	No	No
Wait for bind	wait app	Yes	Yes	No
Wait for System	wait sys	Yes	Yes	No
Wait transition	wait trn	Yes	Yes	No
Wait while input inh.	wait inp inh	Yes	Yes	No
Window Relocation 1	view 1	Yes	Yes	Yes
⋮	⋮	⋮	⋮	⋮
Window Relocation 8	view 8	X	X	X
VT compose	vt compose	No	No	Yes
VT find	vt find	No	No	Yes
VT hold screen	vt hold	No	No	Yes
VT insert here	vt insert	No	No	Yes
VT next screen	vt next	No	No	Yes
VT numeric keypad 0	vt numpad 0	No	No	Yes
VT numeric keypad 1	vt numpad 1	No	No	Yes
VT numeric keypad 2	vt numpad 2	No	No	Yes
VT numeric keypad 3	vt numpad 3	No	No	Yes
VT numeric keypad 4	vt numpad 4	No	No	Yes
VT numeric keypad 5	vt numpad 5	No	No	Yes
VT numeric keypad 6	vt numpad 6	No	No	Yes

Table 19. SENDKEY Command List (continued)

Command Name	Token	PC/3270	PC400	VT
VT numeric keypad 7	vt numpad 7	No	No	Yes
VT numeric keypad 8	vt numpad 8	No	No	Yes
VT numeric keypad 9	vt numpad 9	No	No	Yes
VT numeric keypad -	vt numpad minus	No	No	Yes
VT numeric keypad ,	vt numpad comma	No	No	Yes
VT numeric keypad .	vt numpad period	No	No	Yes
VT numeric keypad enter	vt numpad enter	No	No	Yes
VT PF1	vt pf1	No	No	Yes
VT PF2	vt pf2	No	No	Yes
VT PF3	vt pf3	No	No	Yes
VT PF4	vt pf4	No	No	Yes
VT prev. screen	vt prev	No	No	Yes
VT remove	vt remove	No	No	Yes
VT select	vt select	No	No	Yes
VT user defined function 6	vt user f6	No	No	Yes
VT user defined function 7	vt user f7	No	No	Yes
VT user defined function 8	vt user f8	No	No	Yes
VT user defined function 9	vt user f9	No	No	Yes
VT user defined function 10	vt user f10	No	No	Yes
VT user defined function 11	vt user f11	No	No	Yes
VT user defined function 12	vt 12	No	No	Yes
VT user defined function 13	vt user f13	No	No	Yes
VT user defined function 14	vt user f14	No	No	Yes
VT user defined function 15	vt user f15	No	No	Yes
VT user defined function 16	vt user f16	No	No	Yes
VT user defined function 17	vt user f17	No	No	Yes
VT user defined function 18	vt user f18	No	No	Yes
VT user defined function 19	vt user f19	No	No	Yes
VT user defined function 20	vt user f20	No	No	Yes

Examples:

1. To logon
[SENDKEY("Logon")]
2. To get reader list
[SENDKEY("RDRL", enter)]

WAIT Command

[WAIT("[time out][wait condition]")]

Waits until the timeout expires or the wait condition the client specified occurs. For this command, the client has to set at least one option, where:

time out (optional)

If the client sets a timeout value in the command statements, the following units are available in the wait statement.

- msec
- millisecond
- milliseconds
- sec
- second
- seconds
- minute
- minutes
- hour
- hours

wait condition (optional)

For the wait condition option, the client can select the following options:

while cursor at (cursor row, cursor column)

While the cursor is at (cursor row, cursor column), it keeps waiting.

while "string"

While the "string" is somewhere on the screen, it keeps waiting.

while "string" at (cursor row, cursor column)

While the "string" is at (cursor row, cursor column) on the screen, it keeps waiting.

until cursor at (cursor row, cursor column)

Until the cursor moves to (cursor row, cursor column), it keeps waiting.

until "string"

Until the "string" is displayed somewhere on the screen, it keeps waiting.

until "string" at (cursor row, cursor column)

Until the "string" is displayed at (cursor row, cursor column), it keeps waiting.

Examples:

1. To wait 10 seconds
[WAIT("10 seconds")]
2. To wait while "ABCDEF" is displayed at (2,9) on the screen
[WAIT("while ""ABCDEF"" at (2,9)")]
3. To wait until "ABCDEF" is displayed at (2,9) on the screen, or after 8 seconds
[WAIT("8 seconds until ""ABCDEF"" at (2,9)")]

Set Cursor Position

3270	5250	VT
Yes	Yes	Yes

The **Set Cursor Position** function allows the client application to set the cursor position in the session window.

```
PostMessage( hServerWnd,
            WM_DDE_POKE,
            hClientWnd,
            PackDDELPParam(WM_DDE_POKE,
                          hData, aSETCURSOR) );
```

where:

hData

Identifies a handle to a Windows global memory object that contains the cursor positioning information in the following structure:

```
typedef struct tagSETCURSOR
{
    unsigned char  poke[(sizeof(DDEPOKE)-1)];
    unsigned short uSetCursorType; /* Cursor Set Type
    unsigned short uSetCursor1;    /* Cursor Row or PS Offset
    unsigned short uSetCursor2;    /* Cursor Col
} SETCURSOR;

typedef union tagDDE_SETCURSOR
{
    DDEPOKE  DDEpoke;
    SETCURSOR DDEsetcursor;
} DDE_SETCURSOR, *lpDDE_SETCURSOR;
```

Personal Communications supports two ways to set the cursor position:

- PS Offset (uSetCursorType = 0)
- Row/Column number (uSetCursorType = 1)

The application specifies which method by setting the uSetCursorType field to the appropriate value, followed by setting the two other fields uSetCursor1 and uSetCursor2 to their appropriate values as follows:

- uSetCursorType = 0 offset
 - uSetCursor1: 0 ... (PSsize – 1)
- uSetCursorType = 1 row/col
 - uSetCursor1: 0 ... (PSrows – 1)
 - uSetCursor2: 0 ... (PScols – 1)

aSETCURSOR

Identifies cursor position as the item.

Personal Communications Response

Personal Communications receives the cursor information and moves the cursor to the specified position in the PS. If the cursor is positioned successfully, Personal Communications returns a positive ACK message to the client application. Otherwise, a negative ACK message is returned with one of the following error codes in the low-order byte of the wStatus word.

```
WM_DDE_ACK(wStatus, aSETCURSOR)
```

Return Code	Explanation
1	Cursor set type is not valid. Must be 0 or 1.
2	Cursor PS offset is not valid. Must be 0 ... (PSsize – 1).

Return Code	Explanation
3	Cursor row value is not valid. Must be 0 ... (PSrows - 1).
4	Cursor column value is not valid. Must be 0 ... (PScols - 1).
6	The specified format is not valid.
9	A system error occurred.

Set Mouse Intercept Condition

3270	5250	VT
Yes	Yes	Yes

This function specifies the mouse input to be intercepted. The client sends the following command to set the mouse event to be intercepted.

```
PostMessage( hServerWnd,
             WM_DDE_POKE,
             hClientWnd,
             PackDDElParam(WM_DDE_POKE,
                           hData, aMOUSE) );
```

where:

hData Identifies a handle to a Windows global memory object that specifies the condition of intercepting the mouse input.

If the format is CF_TEXT, the client program sends the condition in the following structure:

```
typedef struct tagSETMOUSE_CF_TEXT
{
    unsigned char poke[(sizeof(DDEPOKE)-1)];
    unsigned char zMouseCondition[1];
} SETMOUSE_CF_TEXT;

typedef union tagDDE_SETMOUSE_CF_TEXT
{
    DDEPOKE          DDEpoke;
    SETMOUSE_CF_TEXT DDEcond;
} DDE_SETMOUSE_CF_TEXT, *lpDDE_SETMOUSE_CF_TEXT;
```

The following table shows the parameters' values:

Parameter Name	Meaning	Value
Condition	Condition of intercepting the mouse input	<p>A string terminated with '\0', consists of the constants defined as follows in any order:</p> <p>L Enable intercepting the left button</p> <p>l Disable intercepting the left button</p> <p>R Enable intercepting the right button</p> <p>r Disable intercepting the right button</p> <p>M Enable intercepting the middle button</p> <p>m Disable intercepting the middle button</p> <p>S Enable intercepting a single click</p> <p>s Disable intercepting a single click</p> <p>D Enable intercepting a double click</p> <p>d Disable intercepting a double click</p> <p>T Retrieve the pointed string</p> <p>t Do not retrieve the pointed string</p>

If the format is CF_DSPTTEXT, the client program sends the condition in the following structure:

```
typedef struct tagSETMOUSE_CF_DSPTTEXT
{
    unsigned char poke[(sizeof(DDEPOKE)-1)];
    BOOL        bLeftButton;    /* Enable intercepting left button
    BOOL        bRightButton;   /* Enable intercepting right button
    BOOL        bMiddleButton;  /* Enable intercepting middle button
    BOOL        bSingleClick;   /* Enable intercepting single click
    BOOL        bDoubleClick;   /* Enable intercepting double click
    BOOL        bRetrieveString; /* Enable intercepting retrieve string
} SETMOUSE_CF_DSPTTEXT;

typedef union tagDDE_SETMOUSE_CF_DSPTTEXT
{
    DDEPOKE        DDEpoke;
    SETMOUSE_CF_DSPTTEXT DDEcond;
} DDE_SETMOUSE_CF_DSPTTEXT, *lpDDE_SETMOUSE_CF_DSPTTEXT;
```

The following table shows the values in the parameters:

Parameter Name	Meaning	Value
bLeftButton	Enable or disable interception of the left mouse button	True Enable intercepting the left button False Disable intercepting the left button
bRightButton	Enable or disable interception of the right mouse button	True Enable intercepting the right button False Disable intercepting the right button
bMiddleButton	Enable or disable interception of the middle mouse button	True Enable intercepting the middle button False Disable intercepting the middle button
bSingleClick	Enable or disable interception of the single click	True Enable intercepting the single click False Disable intercepting the single click
bDoubleClick	Enable or disable interception of the double click	True Enable intercepting the double click False Disable intercepting the double click
bRetrieveString	Retrieve or do not retrieve the pointed string	True Retrieve the pointed string False Do not retrieve the pointed string

aMOUSE

Identifies the mouse as the item.

Personal Communications Response

When receiving the **Set Mouse Intercept Condition** request, Personal Communications returns an ACK message if it can set the intercept condition to the specified status. Otherwise, a negative ACK message is returned to the client with one of the following return codes in the low-order byte of the wStatus field:

WM_DDE_ACK(wStatus, aMOUSE)

Return Code	Explanation
2	A character in the Condition parameter is not valid.
6	The specified format is not valid.
9	A system error occurred.

Set Presentation Space Service Condition

3270	5250	VT
Yes	Yes	Yes

The **Set Presentation Space Service Condition** function sets the condition for using the following functions:

- **Get Partial Presentation Space**
- **Find Field**
- **Search for String**

The client application sets the condition by calling a function such as:

- **Start PS position**
- **PS length**
- **EOF flag**
- **Search direction**
- **ASCIIZ string**

The client must specify the **Set Presentation Space Service Condition** function before invoking the functions listed above. The conditions set by this function remain in effect until the next **Set Presentation Space Service Condition** function is called. The client sends the following message to set the condition:

```
PostMessage( hServerWnd,
             WM_DDE_POKE,
             hClientWnd,
             PackDDELPParam(WM_DDE_POKE,
                             (hData, aEPSCOND) );
```

where:

hData

Identifies a handle to a Windows global memory object containing:

```
typedef struct tagPSSERVCOND
{
    unsigned char  poke[(sizeof(DDEPOKE)-1)];
    unsigned short uPSStart;                /* PS Position
    unsigned short uPSLength;              /* Length of String or PS
    unsigned short uSearchDir;            /* Direction for search
    unsigned short uEOFflag;              /* EOF effective switch
    unsigned char  szTargetString[1];     /* Target String
} PSSERVCOND;

typedef union tagDDE_PSSERVCOND
{
    DDEPOKE      DDEpoke;
    PSSERVCOND   DDEcond;
} DDE_PSSERVCOND, *lpDDE_PSSERVCOND;
```

The following values are valid at the uSearchDir field:

```
PCS_SRCHFRWD    0        /* Search forward.
PCS_SRCHBKWD    1        /* Search backward.
```

The following values are valid for the uEOFflag field:

```
PCS_UNEFFECTEOF 0 /* The PS Area is not truncated at End of Field (EOF).
PCS_EFFECTEOF   1 /* The PS Area is truncated at End of Field (EOF).
```

If the value of uEOFflag is PCS_EFFECTEOF then the PS length and Search Direction are not used.

aEPSCOND

Identifies the item for the **Set Presentation Space Service Condition** function.

Personal Communications Response

If Personal Communications can perform the **Set Presentation Space Service Condition** function, then Personal Communications returns an ACK message:

```
WM_DDE_ACK(wStatus, aEPSCOND)
```

If Personal Communications cannot perform the Set Presentation Space Service Condition function, then Personal Communications returns a negative ACK message containing the following return codes in the low-order byte of wStatus:

Return Code	Explanation
1	PS position is not valid.
2	Length is not valid.
3	The value of EOF flag is not valid.
4	The value of Search Direction is not valid.
6	The specified format is not valid.
9	A system error occurred.

Set Session Advise Condition

3270	5250	VT
Yes	Yes	Yes

This function sets the condition for the DDE_ADVISE of the **Start Session Advise** function. The client can specify a search string and a region of the screen. When the advise condition is met, the server notifies the client of the condition according to the options specified by the **Start Session Advise** function.

Note: The client must specify the **Set Session Advise Condition** function before invoking **Start Session Advise**. If the advise condition is set after the **Start Session Advise** function is started, the advise condition will be ignored and the client will receive a negative ACK message. See “Start Session Advise” on page 272 for more information about starting the advise.

The client sends the following message to set the advise condition.

```
PostMessage( hServerWnd,  
            WM_DDE_POKE,  
            hClientWnd,  
            PackDDElParam(WM_DDE_POKE,  
                          (hData, aPSCOND) ) );
```

where:

hData Identifies a handle to a Windows global memory object containing:

```
typedef struct tagSEARCHDATA  
{  
    unsigned char poke[(sizeof(DDEPOKE)-1)];  
    unsigned short uPSStart;           /* PS Position of string  
    unsigned short uPSLength;         /* Length of String  
    BOOL          bCaseSensitive;     /* Case Sensitive TRUE=YES  
    unsigned char SearchString[1]; /* Search String  
} SEARCHDATA;  
  
typedef union tagDDE_SEARCHDATA
```

```

{
    DDEPOKE    DDEpoke;
    SEARCHDATA DDEcond;
} DDE_SEARCHDATA, *lpDDE_SEARCHDATA;

```

aPSCOND

Identifies the item for the **Set Session Advise Condition** function.

Personal Communications Response

If Personal Communications can perform the **Set Session Advise Condition** function, Personal Communications returns this ACK message:

```
WM_DDE_ACK(wStatus, aPSCOND)
```

If Personal Communications cannot perform the **Set Session Advise Condition** function, then Personal Communications returns an negative ACK message containing one of the following return codes in the low-order byte of wStatus:

Return Code	Explanation
1	Advise is already active.
2	Advise condition is already active.
3	PS position is not valid.
4	String length is not valid.
6	The specified format is not valid.
9	A system error occurred.

Set Structured Field Service Condition

3270	5250	VT
Yes	No	No

The **Set Structured Field Service Condition** function passes the Query Reply data provided by the client application.

Note: The client must call the **Set Structured Field Service Condition** function before invoking the **Start Read SF** function or the **Write SF** function.

The client sends the following message to set the condition.

```

PostMessage( hServerWnd,
             WM_DDE_POKE,
             hClientWnd,
             PackDDElParam(WM_DDE_POKE,
                           (hData, aSFCOND));

```

where:

hData Identifies a handle to a Windows global memory object containing:

```

typedef struct tagSFSERVCOND
{
    unsigned char poke[(sizeof(DDEPOKE)-1)];
    unsigned short uBufferLength;           /* Buffer size of Read_SF
    unsigned short uQRLength;              /* Length of Query Reply dat
    unsigned char szQueryReply[1];        /* Query Reply data
} SFSERVCOND;

```



```

typedef union tagDDE_SFCOND
{
    DDEPOKE    DDEpoke;
    SFSERVCOND DDEcond;
} DDE_SFCOND, *lpDDE_SFCOND;

```

aSFCOND

Identifies the item for the **Set Structured Field Service Condition** function.

PC/3270 Response

PC/3270 checks the Query Reply ID and Type (not DOID) and the length. If they are valid, then PC/3270 returns an ACK message:

```
WM_DDE_ACK(wStatus, aSFCOND)
```

If PC/3270 cannot perform the **Set Structured Field Service Condition** function, then PC/3270 returns a negative ACK message containing one of the following return codes in the low-order byte of wStatus:

Return Code	Explanation
1	PS SF ID is not valid.
2	Length is not valid.
3	One DDM base type is already connected to this session.
4	Structured Field Service Condition is already set.
6	The specified format is not valid.
9	A system error occurred.

Start Close Intercept

3270	5250	VT
Yes	Yes	Yes

The **Start Close Intercept** function allows a client application to intercept close requests generated when a user selects the close option from the emulator session window. This function intercepts the close request and discards it until the **Stop Close Intercept** function is requested. After using this function, the client receives DATA messages notifying it that close requests occurred (CLOSE).

The client sends the following command to begin a session advise.

```

PostMessage( hServerWnd,
             WM_DDE_ADVISE,
             hClientWnd,
             Pack DDE1Param(WM_DDE_ADVISE,
                             (hOptions, aCLOSE) );

```

where:

hOptions

Is a handle to a Windows global memory object DDEADVISE structure.

If the value of fDeferUpd is 1, DDE Data messages will be sent to the client application with the hData set to NULL. The client must then issue a DDE REQUEST to request the data item.

If the value of `fAckReq` is 1, the server does not notify the client of further close requests until the server receives an ACK message from the client in response to any previous notification.

The `cfFormat` field specifies the format to send the close request. (Must be `CF_DSPTEXT`.)

aCLOSE

Identifies close intercept as the item.

Personal Communications Response

Personal Communications receives the **Start Close Intercept** and returns an ACK message if it can start the intercept. Otherwise a negative ACK message is returned to the client with one of the following return codes in the low-order byte of the `wStatus` field:

`WM_DDE_ACK(wStatus, aCLOSE)`

Return Code	Explanation
1	Close Intercept is already working.
6	The specified format is not valid.
9	A system error occurred.

Once the intercept starts, the client receives DATA messages notifying it that the close request is intercepted:

`WM_DDE_DATA(hData, aCLOSE)`

where:

hData Identifies a handle to a Windows global memory object containing:

```
typedef struct tagCLOSEREQ
{
    unsigned char data[(sizeof(DDEDATA)-1)];
    unsigned short uCloseReqCount; /* Number of the close requests.
} CLOSEREQ;

typedef union tagDDE_CLOSEREQ
{
    DDEDATA DDEdata;
    CLOSEREQ DDEclose;
} DDE_CLOSEREQ, *lpDDE_CLOSEREQ;
```

The DATA messages continue until a Stop Close Intercept message is sent to Personal Communications.

Start Keystroke Intercept

3270	5250	VT
Yes	Yes	Yes

The **Start Keystroke Intercept** function allows a client application to filter any keystrokes sent to a session by a terminal operator. After a call to this function, keystrokes are intercepted, and the client receives them (KEYS).

The client sends the following command to begin intercept.

```
PostMessage( hServerWnd,
            WM_DDE_ADVISE,
            hClientWnd,
            PackDDEIParam(WM_DDE_ADVISE,
                          (hOptions, aKEYS) );
```

where:

hOptions

Is a handle to a Windows global memory object DDEADVISE structure.

If the value of fDeferUpd is 1, DDE Data messages are sent to the client application with the hData set to NULL. The client then issues a DDE REQUEST to request the data item.

If the value of fAckReq is 1, the server does not notify the client of further keystrokes until the server receives an ACK message from the client in response to any previous keystrokes notification.

The cfFormat field specifies the format to send the keystrokes when the keystroke is sent by a terminal operator. (Must be CF_DSPTEXT.)

aKEYS

Identifies keystrokes as the item.

Personal Communications Response

Personal Communications receives the **Start Keystroke Intercept** and returns an ACK message if it can start the intercept. Otherwise a negative ACK message is returned to the client with one of the following return codes in the low-order byte of the wStatus field:

WM_DDE_ACK(wStatus, aKEYS)

Return Code	Explanation
1	Keystroke Intercept is already started.
6	The specified format is not valid.
9	A system error occurred.

Once the intercept has started, the client receives DATA messages notifying it that the keystroke is intercepted:

WM_DDE_DATA(hData, aKEYS)

The DATA messages continue until a **Stop Keystroke Intercept** message is sent to Personal Communications. The format of the data item is the same format as if the client requested the data item via a DDE_REQUEST.

Start Mouse Input Intercept

3270	5250	VT
Yes	Yes	Yes

The **Start Mouse Input Intercept** function allows a client application to intercept mouse input when a terminal operator presses the mouse button on an emulator session window. After calling this function, the client receives DATA messages that include the PS position where mouse input occurred.

The client sends the following command to begin to intercept the mouse input.

```
PostMessage( hServerWnd,  
            WM_DDE_ADVISE,  
            hClientWnd,  
            PackDDE1Param(WM_DDE_ADVISE,  
                          (hOptions, aMOUSE) );
```

where:

hOptions

Is a handle to a Windows global memory object DDEADVISE structure.

If the value of fDeferUpd is 1, DDE Data messages will be sent to the client application with the hData set to NULL. The client must then issue a DDE REQUEST to request the data item.

If the value of fAckReq is 1, the server does not notify the client of further structured field data until the server receives an ACK message from the client in response to any previous notification.

The cfFormat field specifies the format to send the data item has been updated.

aMOUSE

Identifies the mouse as the item.

Personal Communications Response

Personal Communications receives the **Start Mouse Input Intercept** and returns an ACK message if it can start this function. Otherwise a negative ACK message is returned to the client with one of the following return codes in the low-order byte of the wStatus field:

```
WM_DDE_ACK(wStatus, aMOUSE)
```

Return Code	Explanation
1	Mouse Input Intercept has been already started.
6	The specified format is not valid.
9	A system error occurred.

Once the **Mouse Input Intercept** starts, the client receives DATA messages of the structured field:

```
WM_DDE_DATA(hData, aMOUSE)
```

where:

hData

If the format is CF_TEXT, Personal Communications returns the mouse input information in the following format:

```
typedef struct tagMOUSE_CF_TEXT  
{  
    unsigned char data[(sizeof(DDEDATA)-1)];  
    unsigned char PSPos[4];        /* PS Offset - Mouse position  
    unsigned char Tab1[1];        /* Tab character  
    unsigned char PSRowPos[4];    /* ROW number of Mouse position  
    unsigned char Tab2[1];        /* Tab character  
    unsigned char PSColPos[4];    /* Col number of Mouse position  
    unsigned char Tab3[1];        /* Tab character  
    unsigned char PSSize[4];      /* Size of Presentation Space
```

```

    unsigned char Tab4[1];      /* Tab character
    unsigned char PSRows[4];   /* Row number of PS
    unsigned char Tab5[1];      /* Tab character
    unsigned char PSCols[4];   /* Column number of PS
    unsigned char Tab6[1];      /* Tab character
    unsigned char Button[1];   /* Type of clicked mouse butt n
    unsigned char Tab7[1];      /* Tab character
    unsigned char Click[1];    /* Type of clicking
    unsigned char Tab8[1];      /* Tab character
    unsigned char zClickString[1]; /* Retrieved string
} MOUSE_CF_TEXT;

typedef union tagDDE_MOUSE_CF_TEXT
{
    DDEDATA      DDEdata;
    MOUSE_CF_TEXT DDEmouse;
} DDE_MOUSE_CF_TEXT, *lpDDE_MOUSE_CF_TEXT;

```

The following table shows the values in the parameters:

Parameter Name	Meaning	Value
PSPos	PS offset of the position where mouse was clicked	0 ... (PSSize - 1)
PSRowPos	Row number of the position where mouse was clicked	0 ... (PSRows - 1)
PSColPos	Column number of the position where mouse was clicked	0 ... (PSCols - 1)
PSSize	Presentation space size	
PSRows	Number of presentation space rows	
PSCols	Number of presentation space columns	
ButtonType	Type of clicked mouse button	L Left button M Middle button R Right button
ClickType	Type of clicking	S Single click D Double click
ClickString	Retrieved string to which the mouse pointed	A character string terminated with a '\0'
Tab1-8	A tab character for delimiter	'\t'

If the format is CF_DSPTEXT, Personal Communications returns the mouse input information in the following format:

```

typedef struct tagMOUSE_CF_DSPTEXT
{
    unsigned char data[(sizeof(DDEDATA)-1)];
    unsigned short uPSPos;          /* PS Offset - Mouse position
    unsigned short uPSRowPos;      /* ROW number - Mouse position
    unsigned short uPSColPos;     /* Col number - Mouse position
    unsigned short uPSSize;       /* Size of Presentation Space
    unsigned short uPSRows;       /* Row number of PS
    unsigned short uPSCols;       /* Column number of PS
    unsigned short uButtonType;   /* Type of clicked mouse button
    unsigned short uClickType;    /* Type of clicking
    unsigned char zClickString[1]; /* Retrieved string
} MOUSE_CF_DSPTEXT;

```

```

typedef union tagDDE_MOUSE_CF_DSPTXT
{
    DDEDATA          DDEdata;
    MOUSE_CF_DSPTXT DDEmouse;
} DDE_MOUSE_CF_DSPTXT, *lpDDE_MOUSE_CF_DSPTXT;

```

The following table shows the values in the parameters:

Parameter Name	Meaning	Value
uPSPos	PS offset of the position where the mouse was clicked	0 ... (uPSSize - 1)
uPSRowPos	Row number of the position where the mouse was clicked	0 ... (uPSRows - 1)
uPSColPos	Column number of the position where the mouse was clicked	0 ... (uPSCols - 1)
uPSSize	Size of the presentation space	
uPSRows	Number of rows of the presentation space	
uPSCols	Number of columns of the presentation space	
uButtonType	Type of the clicked mouse button	0x0001 Left button 0x0002 Middle button 0x0003 Right button
uClickType	Type of clicking	0x0001 Single click 0x0002 Double click
szClickString	Retrieved string to which the mouse pointed	A character string terminated with a '\0'

The DATA messages continue until a **Stop Mouse Input Intercept** message is sent to Personal Communications.

Start Read SF

3270	5250	VT
Yes	No	No

The **Start Read SF** function allows a client application to read structured field data from the host application. After using this function, the client receives DATA messages notifying it that close requests occurred.

Note: Before using this function, the client must call the **Set Structured Field Service Condition** function to pass the Query Reply data to the server.

The client sends the following command to begin a Read SF.

```

PostMessage( hServerWnd,
             WM_DDE_ADVISE,
             hClientWnd,
             PackDDE1Param(WM_DDE_ADVISE,
                           (hOptions, aSF) ) );

```

where:

hOptions

Is a handle to a Windows global memory object DDEADVISE structure.

If the value of fDeferUpd is 1, DDE Data messages will be sent to the client application with the hData set to NULL. The client must then issue a DDE REQUEST to request the data item.

If the value of fAckReq is 1, the server does not notify the client of further structured field data until the server receives an ACK message from the client in response to any previous notification.

The cfFormat field specifies the format to send the structured field data. (It must be CF_DSPTEXT.)

aSF Identifies structured field as the item.

PC/3270 Response

PC/3270 receives the **Start Read SF** and returns an ACK message if it can start the Read SF. Otherwise a negative ACK message is returned to the client with one of the following return codes in the low-order byte of the wStatus field:

WM_DDE_ACK(wStatus, aSF)

Return Code	Explanation
1	Read SF is already started.
3	No prior Set Structured Field Service Condition function was called.
6	The specified format is not valid.
9	A system error occurred.

Once the Read SF has started, the client receives DATA messages of the structured field:

WM_DDE_DATA(hData, aSF)

where:

hData Identifies a handle to a Windows global memory object containing:

```
typedef struct tagMOUSE_CF_DSPTEXT
{
    unsigned char data[(sizeof(DDEDATA)-1)];
    unsigned short uPSPos; /* PS Offset - Mouse position
    unsigned short uPSRowPos; /* ROW number - Mouse position
    unsigned short uPSColPos; /* Col number - Mouse position
    unsigned short uPSSize; /* Size of Presentation Space
    unsigned short uPSRows; /* Row number of PS
    unsigned short uPSCols; /* Column number of PS
    unsigned short uButtonType; /* Type of clicked mouse button
    unsigned short uClickType; /* Type of clicking
    unsigned char zClickString[1]; /* Retrieved string
} MOUSE_CF_DSPTEXT;

typedef union tagDDE_MOUSE_CF_DSPTEXT
{
    DDEDATA DDEdata;
    MOUSE_CF_DSPTEXT DDEmouse;
} DDE_MOUSE_CF_DSPTEXT, *lpDDE_MOUSE_CF_DSPTEXT;
typedef struct tagSFDATA
{
    unsigned char data[(sizeof(DDEDATA)-1)];
```

```

        unsigned short uSFLength;           /* Length of SF data
        unsigned char  szSFData[1];       /* SF data
    } SFDATA;

    typedef union tagDDE_SFDATA
    {
        DDEDATA  DDEdata;
        SFDATA   DDEsfdata;
    } DDE_SFDATA, *lpDDE_SFDATA;

```

The DATA messages continue until a Stop Read SF message is sent to PC/3270.

Start Session Advise

3270	5250	VT
Yes	Yes	Yes

The **Start Session Advise** function establishes a link between the Personal Communications session and the client. This lets the client receive updates of the presentation space (PS), the operator information area (OIA), or the trim rectangle (TRIMRECT) when the data item is updated.

Note: If the client application needs conditional notification when the presentation space is updated, set an advise condition prior to invoking the advise function for the presentation space. See “Set Session Advise Condition” on page 263.

The client sends the following command to begin a session advise.

```

PostMessage( hServerWnd,
             WM_DDE_ADVISE,
             hClientWnd,
             PackDDE1Param(WM_DDE_ADVISE,
                           hOptions, aItem) );

```

where:

hOptions

Is a handle to a Windows global memory object DDEADVISE structure. This is the structure:

```

typedef struct tagDDEADVISE
{
    unsigned reserved:14;           // Reserved
    unsigned fDeferUpd:1;          // Send notification only
    unsigned fAckReq:1;            // Client will ACK all notices
    WORD      cfFormat;            // Clipboard format to use
} DDEADVISE, *lpDDEADVISE;

```

If the value of fDeferUpd is 1, DDE Data messages are sent to the client application with the hData set to NULL. The client must then issue a DDE REQUEST to request the data item.

If the value of fAckReq is 1, the server does not notify the client of further changes to the data item until the server receives an ACK message from the client in response to any previous update notification.

The cfFormat field specifies the format to send the data item when the item has been updated.

aItem Specifies the item of information being requested; in this case, the value can be PS, OIA, or TRIMRECT.

Personal Communications Response

Personal Communications receives the Start Session Advise and returns an ACK message if it can start the advise. Otherwise, a negative ACK message is returned to the client with one of the following return codes in the low-order byte of the wStatus field:

WM_DDE_ACK(wStatus, aItem)

Return Code	Explanation
1	Advise already active for data item.
6	Advise parameter not valid.
9	A system error occurred.

Once the advise has started, the client receives DATA messages notifying it that the data item (PS, OIA, or TRIMRECT) has changed:

WM_DDE_DATA(hData, aItem)

The DATA messages continue until a **Stop Session Advise** message is sent to Personal Communications. The format of the data item is the same as if the client requested the data item via a DDE_REQUEST.

Stop Close Intercept

3270	5250	VT
Yes	Yes	Yes

The **Stop Close Intercept** function ends a client application's ability to intercept close requests. The client sends the following command to perform the **Stop Close Intercept** function.

```
PostMessage( hServerWnd,  
            WM_DDE_UNADVISE,  
            hClientWnd,  
            MAKELPARAM(NULL, aCLOSE) );
```

where:

aCLOSE

Identifies close intercept as the item.

Personal Communications Response

If Personal Communications can perform the DDE_UNADVISE, Personal Communications returns an ACK message containing positive status information to the client:

WM_DDE_ACK(wStatus, aCLOSE)

If Personal Communications cannot perform the DDE_UNADVISE, Personal Communications returns an ACK message containing negative status information and one of the following return codes in the low-order byte of the wStatus word:

Return Code	Explanation
1	Advise has not started yet.
9	A system error occurred.

Stop Keystroke Intercept

3270	5250	VT
Yes	Yes	Yes

The **Stop Keystroke Intercept** function ends a client application's ability to intercept keystrokes. The client sends the following command to perform the **Stop Keystroke Intercept** function.

```
PostMessage( hServerWnd,
             WM_DDE_UNADVISE,
             hClientWnd,
             MAKELPARAM(NULL, aKEYS) );
```

where:

aKEYS

Identifies keystrokes as the item.

Personal Communications Response

If Personal Communications can perform the DDE_UNADVISE, Personal Communications returns an ACK message containing positive status information to the client:

```
WM_DDE_ACK(wStatus, aKEYS)
```

If Personal Communications cannot perform the DDE_UNADVISE, Personal Communications returns an ACK message containing negative status information and one of the following return codes in the low-order byte of the wStatus word.

Return Code	Explanation
1	Advise has not started yet.
9	A system error occurred.

Stop Mouse Input Intercept

3270	5250	VT
Yes	Yes	Yes

The **Stop Mouse Input Intercept** function ends a client application's ability to intercept mouse input.

The client sends the following command to perform the **Stop Mouse Input Intercept** function.

```
PostMessage( hServerWnd,
             WM_DDE_UNADVISE,
             hClientWnd,
             MAKELPARAM(NULL, aMOUSE) );
```

where:

aMOUSE

Identifies the mouse as the item.

Personal Communications Response

If Personal Communications can perform the DDE_UNADVISE, Personal Communications returns an ACK message containing positive status information to the client:

```
WM_DDE_ACK(wStatus, aMOUSE)
```

If Personal Communications cannot perform the DDE_UNADVISE, Personal Communications returns an ACK message containing negative status information and one of the following return codes in the low-order byte of the wStatus word.

Return Code	Explanation
1	Advise has not started yet.
9	A system error occurred.

Stop Read SF

3270	5250	VT
Yes	No	No

The **Stop Read SF** function ends a client application's ability to read structured field data.

The client sends the following command to perform the **Stop Read SF** function.

```
PostMessage( hServerWnd,  
            WM_DDE_UNADVISE,  
            hClientWnd,  
            MAKELPARAM(NULL, aSF) );
```

where:

aSF Identified structured field as the item.

PC/3270 response

If PC/3270 can perform the DDE_UNADVISE, PC/3270 returns an ACK message containing positive status information to the client:

```
WM_DDE_ACK(wStatus, aSF)
```

If PC/3270 cannot perform the DDE_UNADVISE, PC/3270 returns an ACK message containing negative status information and one of the following return codes in the low-order byte of the wStatus word.

Return Code	Explanation
1	Advise has not started yet.
9	A system error occurred.

Stop Session Advise

3270	5250	VT
Yes	Yes	Yes

The **Stop Session Advise** function disconnects a link between Personal Communications and the client. The client sends the following command to perform the **Stop Session Advise** function.

```
PostMessage( hServerWnd,  
            WM_DDE_UNADVISE,  
            hClientWnd,  
            MAKELPARAM(NULL, aItem) );
```

where:

aItem Specifies the item of information being requested; in this case, the value can be PS, OIA, TRIMRECT, or NULL.

If the value of *aItem* is NULL, then the client has requested termination of all active notifications for the conversation.

Personal Communications Response

If Personal Communications can perform the DDE_UNADVISE, Personal Communications returns an ACK message containing positive status information to the client:

```
WM_DDE_ACK(wStatus, aItem)
```

If Personal Communications cannot perform the DDE_UNADVISE, Personal Communications returns an ACK message containing negative status information and one of the following return codes in the low-order byte of the wStatus word.

Return Code	Explanation
1	Advise has not started yet.
9	A system error occurred.

Terminate Session Conversation

3270	5250	VT
Yes	Yes	Yes

The **Terminate Session Conversation** function disconnects the client from the Personal Communications session the client has previously started a conversation with.

The client sends the following command to terminate a session conversation.

```
SendMessage( hServerWnd,  
            WM_DDE_TERMINATE,  
            hClientWnd,  
            0 );
```

Personal Communications Response

Personal Communications acknowledges the terminate command with a terminate message:

WM_DDE_TERMINATE

Terminate Structured Field Conversation

3270	5250	VT
Yes	No	No

The **Terminate Structured Field Conversation** function disconnects the client from a structured field conversation.

The client sends the following command to terminate a structured field conversation.

```
SendMessage( hServerWnd,  
            WM_DDE_TERMINATE,  
            hClientWnd,  
            0 );
```

PC/3270 Response

PC/3270 acknowledges the terminate command with a terminate message:

WM_DDE_TERMINATE

Terminate System Conversation

3270	5250	VT
Yes	Yes	Yes

This disconnects the client from a system conversation.

The client sends the following command to terminate a system conversation.

```
SendMessage( hServerWnd,  
            WM_DDE_TERMINATE,  
            hClientWnd,  
            0 );
```

Personal Communications Response

Personal Communications acknowledges the terminate command with this message:

WM_DDE_TERMINATE

When the user closes a Personal Communications session, any global memory blocks that were allocated by Personal Communications will be freed by Windows. This can cause problems for the client if the client retains any of these global memory objects for long periods of time. If the client application needs to keep the information in a global memory item for a long time, it is suggested that the client make a copy of global memory item into a global memory item the client application owns.

Write SF

3270	5250	VT
Yes	No	No

The **Write SF** function allows a client application to write structured field data to the host application.

Note: The client must call the **Set Structured Field Service Condition** function before invoking the **Write SF** function.

The client sends the following message to write structured field data.

```
PostMessage( hServerWnd,
             WM_DDE_POKE,
             hClientWnd,
             PackDDELParm(WM_DDE_POKE,
                          hData, aSF) );
```

where:

hData Identifies a handle to a Windows global memory object containing:

```
typedef struct tagWRITESF
{
    unsigned char  poke[(sizeof(DDEPOKE)-1)];
    unsigned short uSFLength;    /* Length of SF data
    unsigned char  Work[8];      /* Work area
    unsigned char  szSFData[1]; /* SF data
} WRITESF;

typedef union tagDDE_WRITESF
{
    DDEPOKE  DDEpoke;
    WRITESF  DDEwritesf;
} DDE_WRITESF, *lpDDE_WRITESF;
```

aSF Identifies structured field as the item.

PC/3270 Response

PC/3270 receives structured field data and sends it to the host application. If the data transmission completes successfully, then PC/3270 returns an ACK message:

```
WM_DDE_ACK(wStatus, aSF)
```

Otherwise PC/3270 returns an negative ACK message containing one of the following return codes in the low-order byte of wStatus:

Return Code	Explanation
2	Length is not valid.
6	The specified format is not valid.
9	A system error occurred.

DDE Menu Item API in a Windows 32-Bit Environment

Personal Communications supports the addition, deletion, and changing of attributes of a dynamic menu item to the session menu bar. A menu will then be created for this menu item with space for up to 16 submenu items.

Personal Communications supports two kinds of DDE conversation. One is Personal Communications, which acts as a DDE menu client application, and the other is Personal Communications, which acts as a DDE menu server.

DDE Menu Client

To add, delete, and change menu items, the following DDE conversation must take place between the session and DDE menu server application.

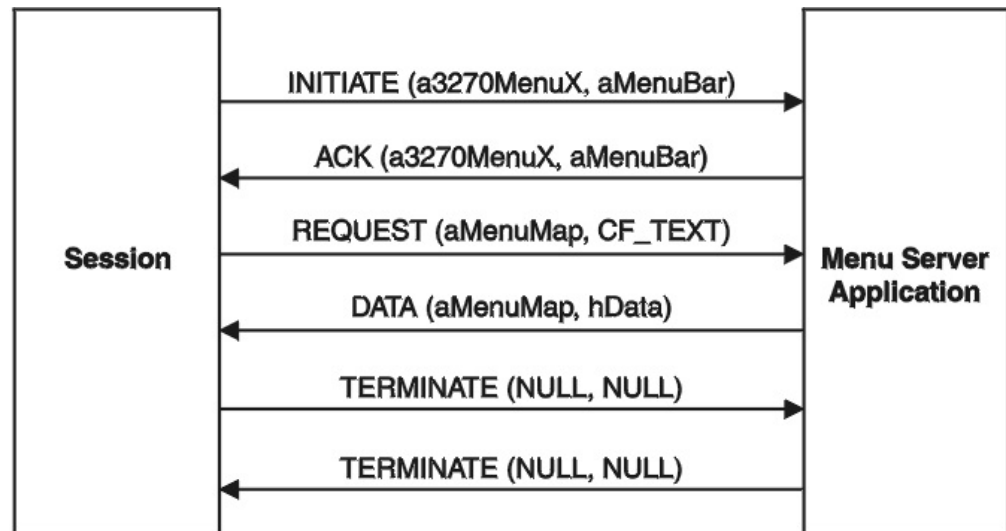


Figure 3. DDE Menu Server Conversation

The following data hierarchy details the menu map Personal Communications expects when adding a dynamic menu item and submenu to a session menu bar:

```

POPUP "MyMenu"
BEGIN
  MENUITEM "Send Files to Host", SEND
  MENUITEM "Receive Files from Host", RECEIVE
  MENUITEM SEPARATOR
  MENUITEM "Convert Files", CONVERT
END
  
```

When the user selects a menu item from the new menu, Personal Communications will send a DDE Initiate with 3270MenuN or 5250MenuN as the application and itemN token as the topic. If an ACK is received from the DDE application, Personal Communications will inhibit the session from accepting user input. The menu client application can then display a dialog, and so on. When the menu server application has completed processing of the menu item, it will send a DDE Terminate to signal Personal Communications the process is complete. Personal Communications will then reenble the window for the user.

DDE Menu Server

To add, delete, and change menu items, the following DDE conversation must take place between the session and a DDE menu client application.

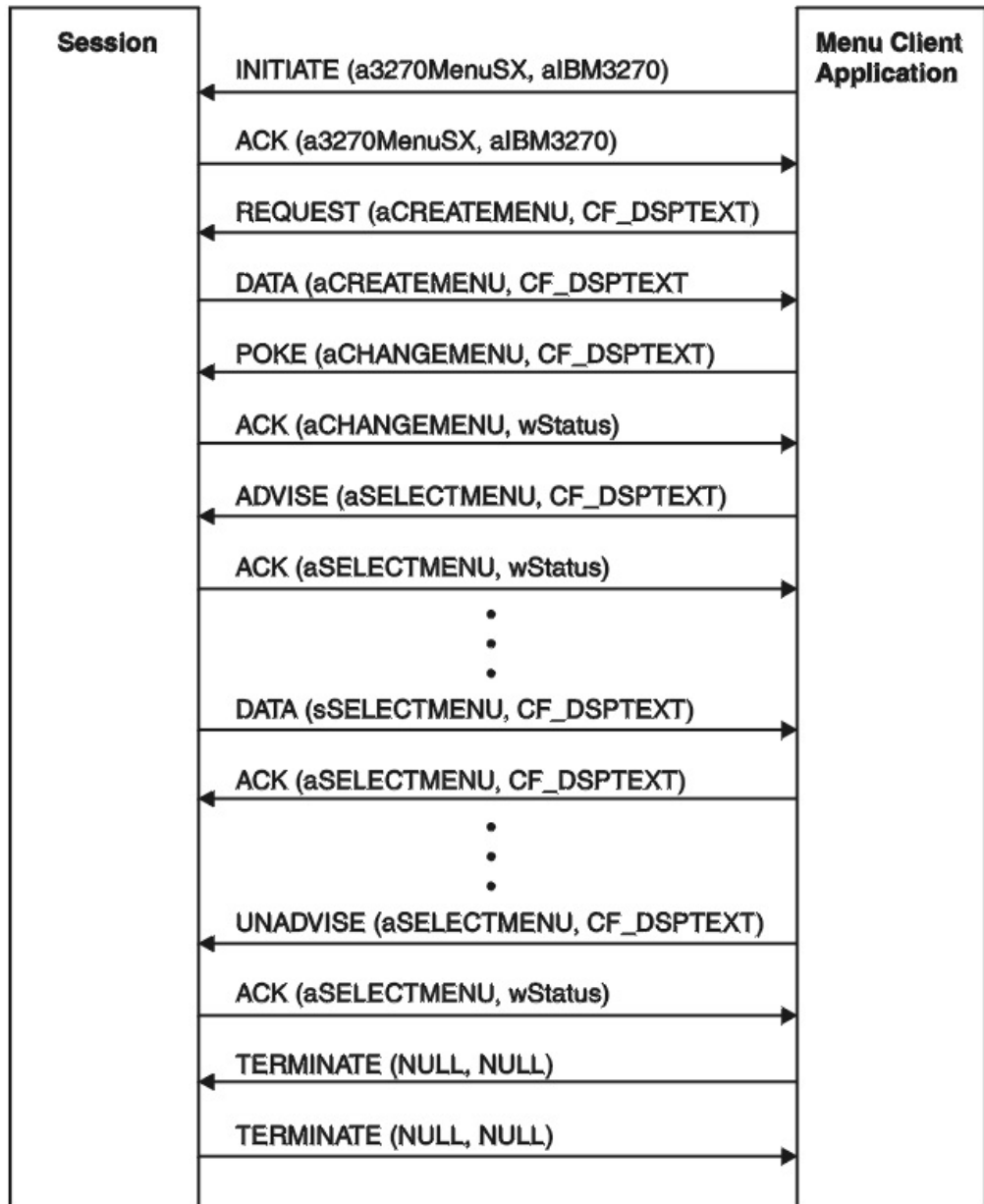


Figure 4. DDE Menu Client Conversation

When the user selects a menu item from the new menu, Personal Communications will send a DDE DATA with aSELECTMENU as the item. When Personal Communications sends DDE DATA to the client application, Personal Communications will inhibit the session from accepting user input. The menu client application can then display a dialog, and so on. When the menu client application has completed processing of the menu item, it will send a DDE ACK to signal Personal Communications the process is complete. Personal Communications will then reenable the window for the user.

DDE Menu Functions

The DDE Menu Item API functions listed below are available for use with Personal Communications. PC/3270 Windows mode and PC400 provide all of the following functions.

- “Change Menu Item”
- “Create Menu Item” on page 287
- “Initiate Menu Conversation” on page 288
- “Start Menu Advise” on page 289
- “Stop Menu Advise” on page 290
- “Terminate Menu Conversation” on page 290

Change Menu Item

3270	5250	VT
Yes	Yes	Yes

The **Change Menu Item** function appends, deletes, inserts, modifies, and removes menu items. The client sends the following message to the session to change a menu.

```
PostMessage( hServerWnd,  
            WM_DDE_POKE,  
            hClientWnd,  
            PackDDElParam(WM_DDE_POKE,  
                          hData,aCHANGEMENU));
```

where:

hData

Identifies a handle to a Windows global memory object that contains the requests for changing a menu. The global memory object contains the following structure:

```
typedef struct tagChangeMenu  
{  
    unsigned char poke[(sizeof(DDEPOKE)-1)];  
    HWND          hMenu; /* Window handle of menu item  
    unsigned long wIDNew; /* Menu ID of new menu item  
    unsigned short wPosition; /* The position of menu item  
    unsigned short wOperation; /* Specifies the operation  
    unsigned short wFlags; /* Specifies the options  
    unsigned char szItemName[1]; /* String of the item  
} CHANGEMENU;  
  
typedef union tagDDE_CHANGEMENU  
{  
    DDEPOKE DDEpoke;  
    CHANGEMENU DDEmenu;  
} DDE_CHANGEMENU,*lpDDE_CHANGEMENU;
```

The following operations are supported:

```
# MF_APPEND,MF_CHANGE ... MF_BYCOMMANDS are replaced with below commands.  
PCS_INSERT    0x0000 /* Inserts a menu item into a menu.  
PCS_CHANGE    0x0080 /* Modifies a menu item in a menu.  
PCS_APPEND    0x0100 /* Appends a menu item to the end of a menu  
PCS_DELETE    0x0200 /* Deletes a menu item from a menu,  
                /* destroying the menu item.  
PCS_REMOVE    0x1000 /* Removes a menu item from a menu but
```

```

/* does not destroy the menu item.

PCS_CHECKED      0x0008 /* Places a check mark next to the item.
PCS_DISABLED     0x0002 /* Disables the menu item so that it cannot
/* be selected, but does not gray it.
PCS_ENABLED      0x0000 /* Enables the menu item so that it can be
/* selected and restores from its grayed
/* state.
PCS_GRAYED       0x0001 /* Disables the menu item so that it cannot
/* be selected, and grays it.
PCS_MENUBARBREAK 0x0020 /* Same as PCS_MENUBREAK except that for
/* popup menus, separates the new column
/* from the old column with a vertical line
PCS_MENUBREAK    0x0040 /* Places the item on a new line for menu
/* bar items. For popup menus, places the
/* item in a new column, with no dividing
/* line between the columns.
PCS_SEPARATOR    0x0800 /* Draws a horizontal dividing line. Can
/* only be used in a popup menu. This line
/* cannot be grayed, disabled, or
/* highlighted. The wIDNew and szItemName
/* fields are ignored.
PCS_UNCHAKED     0x0000 /* Does not place a check mark next to the
/* item (default).

PCS_BYCOMMAND    0x0000 /* Specifies that the nPosition parameter
/* gives the menu item control ID number.
/* This is the default if neither item
/* control ID number. This is the default
/* if neither PCS_BYCOMMAND nor
/* PCS_POSITION is set.
PCS_BYPOSITION   0x0400 /* Specifies that the nPosition parameter
/* gives the position of the menu item
/* to be deleted rather than an ID number.

```

If the MF_APPEND is specified in the wOperation field, the following fields must be filled:

hMenu

Identifies the menu to be appended. To append a new item to a pop-up menu, specify the handle that is returned from Personal Communications when the **Create Menu Item** function is executed. To append a new item to a top-level menu bar, specify NULL.

wIDNew

Specifies the command ID of the new menu item. If a new item is added to the top-level menu bar, the handle of the menu item returned from Personal Communications when **Create Menu Item** function is executed.

wFlags

The following options can be set:

```

MF_CHECKED      // Places a check mark next to
                // the item.
MF_DISABLED     // Disables the menu item so
                // that it cannot be selected,
                // but does not gray it.
MF_ENABLED      // Enables the menu item so that
                // it can be selected and
                // restores from its grayed
                // state.
MF_GRAYED       // Disables the menu item so
                // that it cannot be selected,
                // and grays it.

```

```

MF_MENUBARBREAK // Same as MF_MENUBREAK except
                // that for pop-up menus,
                // separates the new column from
                // the old column with a
                // vertical line.
MF_MENUBREAK    // Places the item on a new line
                // for menu bar items.
                // For pop-up menus, places the
                // item in a new column, with
                // no dividing line between the
                // columns.
MF_SEPARATOR    // Draws a horizontal dividing
                // line. Can only be used in a
                // pop-up menu. This line cannot
                // be grayed, disabled, or
                // highlighted. The wIDNew and
                // szItemName fields are
                // ignored.
MF_UNCHECKED    // Does not place a check mark
                // next to the item (default).

```

szItemName

Specifies the contents of the new menu item. Contains a null-terminated character string.

If the MF_CHANGE is specified in the wOperation field, fill these fields:

hMenu

Identifies the menu to be changed. To change an item of a pop-up menu, specify the handle that is returned from Personal Communications when the **Create Menu Item** function is executed. To change an item to a top-level menu bar, specify NULL.

nPosition

Specifies the menu item to be changed. The interpretation of the wPosition parameter depends on the setting of the wFlags parameter.

MF_BYPOSITION

Specifies the position of the existing menu item. The first item in the menu is at position zero.

MF_BYCOMMAND

Specifies the command ID of the existing menu item.

wIDNew

Specifies the command ID of the menu item. If an item of the top-level menu bar is changed, the handle of the menu item returned from Personal Communications when the **Create Menu Item** function is executed.

wFlags

The following options can be set:

```

MF_BYCOMMAND    // Specifies that the nPosition
                // parameter gives the menu
                // item control ID number.
                // This is the default if
                // neither MF_BYCOMMAND nor
                // MF_BYPOSITION is set.
MF_BYPOSITION   // Specifies that the nPosition
                // parameter gives the position
                // of the menu item to be

```

```

// changed rather than an ID
// number.
MF_CHECKED // Places a check mark next to
// the item.
MF_DISABLED // Disables the menu item so
// that it cannot be selected,
// but does not gray it.
MF_ENABLED // Enables the menu item so
// that it can be selected and
// restores from its grayed
// state.
MF_GRAYED // Disables the menu item so
// that it cannot be selected,
// and grays it.
MF_MENUBARBREAK // Same as MF_MENUBREAK except
// that for pop-up menus,
// separates the new column
// from the old column with a
// vertical line.
MF_MENUBREAK // Places the item on a new
// line for menu bar items.
// For pop-up menus, places the
// item in a new column, with
// no dividing line between
// the columns.
MF_SEPARATOR // Draws a horizontal dividing
// line. Can only be used in
// a pop-up menu. This line
// cannot be grayed, disabled,
// or highlighted. The wIDNew
// and szItemName fields are
// ignored.
MF_UNCHECKED // Does not place a check mark
// next to the item (default).

```

szItemName

Specifies the contents of the menu item. Contains a null-terminated character string.

If the MF_DELETE is specified in the wOperation field, fill these fields:

hMenu

Identifies the menu to be deleted. To delete an item from a pop-up menu, specify the handle that is returned from Personal Communications when the **Create Menu Item**, function is executed. To delete an item from a top-level menu bar, specify NULL.

nPosition

Specifies the menu item to be deleted. The interpretation of the nPosition parameter depends on the setting of the wFlags parameter.

MF_BYPOSITION

Specifies the position of the existing menu item. The first item in the menu is at position zero.

MF_BYCOMMAND

Specifies the command ID of the existing menu item.

wFlags

The following options can be set:

```

MF_BYCOMMAND    // Specifies that the nPosition
                // parameter gives the menu
                // item control ID number.
                // This is the default if
                // neither MF_BYCOMMAND nor
                // MF_BYPOSITION is set.
MF_BYPOSITION   // Specifies that the nPosition
                // parameter gives the position
                // of the menu item to be
                // deleted rather than an ID
                // number.

```

If the MF_INSERT is specified in the wOperation field, the following fields must be filled:

hMenu

Identifies the menu to be inserted. To insert an item to a pop-up menu, specify the handle that is returned from Personal Communications when the **Create Menu Item** function is executed. To change an item to a top-level menu bar, specify NULL.

nPosition

Specifies the menu item before the new menu item is to be inserted. The interpretation of the nPosition parameter depends on the setting of the wFlags parameter.

MF_BYPOSITION

Specifies the position of the existing menu item. The first item in the menu is at position zero.

MF_BYCOMMAND

Specifies the command ID of the existing menu item.

wIDNew

Specifies the command ID of the menu item or, if an item of the top-level menu bar is changed, the handle of the menu item returned from Personal Communications when the **Create Menu Item** function is executed.

wFlags

The following options can be set:

```

MF_BYCOMMAND    // Specifies that the nPosition
                // parameter gives the menu
                // item control ID number. This
                // is the default if neither
                // MF_BYCOMMAND nor MF_BYPOSITION
                // is set.
MF_BYPOSITION   // Specifies that the nPosition
                // parameter gives the position
                // of the menu item to be
                // changed rather than an ID
                // number.
MF_CHECKED      // Places a check mark next to
                // the item.
MF_DISABLED     // Disables the menu item so
                // that it cannot be selected,
                // but does not gray it.
MF_ENABLED      // Enables the menu item so
                // that it can be selected and
                // restores from its grayed
                // state.
MF_GRAYED       // Disables the menu item so
                // that it cannot be selected,

```

```

MF_MENUBARBREAK // and grays it.
                // Same as MF_MENUBREAK except
                // that for pop-up menus,
                // separates the new column
                // from the old column with a
                // vertical line.
MF_MENUBREAK    // Places the item on a new
                // line for menu bar items.
                // For pop-up menus, places the
                // item in a new column, with
                // no dividing line between the
                // columns.
MF_SEPARATOR    // Draws a horizontal dividing
                // line. Can only be used in
                // a pop-up menu. This line
                // cannot be grayed, disabled,
                // or highlighted. The wIDNew
                // and szItemName fields are
                // ignored.
MF_UNCHECKED    // Does not place a check mark
                // next to the item (default).

```

szItemName

Specifies the contents of the menu item. Contains a null-terminated character string.

If the MF_REMOVE is specified in the wOperation field, the following fields must be filled:

hMenu

Identifies the menu to be removed. To remove an item from a pop-up menu, specify the handle that is returned from Personal Communications when the **Create Menu Item** function is executed. To remove an item from a top-level menu bar, specify NULL.

nPosition

Specifies the menu item to be removed. The interpretation of the nPosition parameter depends upon the setting of the wFlags parameter.

MF_BYPOSITION

Specifies the position of the existing menu item. The first item in the menu is at position zero.

MF_BYCOMMAND

Specifies the command ID of the existing menu item.

wFlags

The following options can be set:

```

MF_BYCOMMAND    // Specifies that the nPosition
                // parameter gives the menu
                // item control ID number.
                // This is the default if
                // neither MF_BYCOMMAND nor
                // MF_BYPOSITION is set.
MF_BYPOSITION    // Specifies that the nPosition
                // parameter gives the
                // position of the menu item to
                // be removed rather than an ID
                // number.

```

Personal Communications Response

Personal Communications receives the requests to change a menu and processes them. If the requests cannot be accepted, Personal Communications returns a negative ACK message containing one of the following status codes in the low-order byte of the `wStatus` word. Otherwise, Personal Communications returns a positive ACK message signalling that the keystrokes have been sent.

`WM_DDE_ACK(wStatus,aCHANGEMENU)`

Return code	Explanation
1	The specified parameters are not valid.
6	The specified format is not valid.
9	A system error occurred.

Create Menu Item

<i>3270</i>	<i>5250</i>	<i>VT</i>
<i>Yes</i>	<i>Yes</i>	<i>Yes</i>

The **Create Menu Item** function requests Personal Communications to add a menu item to the menu bar. A pop-up menu will be created at the same time, but it is initially empty and can be filled with menu items by using this function. The string of the new menu item that will be added to a top-level menu bar, is also specified by using the **Change Menu Item** function.

The client sends the following message to create a menu item.

```
PostMessage( hServerWnd,  
            WM_DDE_REQUEST,  
            hClientWnd,  
            MAKELPARAM(cfFormat,aCREATEMENU));
```

where:

cfFormat

Identifies the format for the ID of the new menu item. The valid value is `CF_DSPTEXT`.

aCREATEMENU

Identifies the create menu item.

Personal Communications Response

Personal Communications returns the handle of the newly created menu item in a DDE data message if the Personal Communications can create a menu item.

`WM_DDE_DATA(hData,aCREATEMENU)`

where:

hData

Identifies a handle to a windows global memory object that contains the handle of the menu item. The global memory object contains the following structure:

```
typedef struct tagCreateMenu  
{  
    unsigned char    data[(sizeof(DDEDATA)-1)];
```

```

        HWND          hMenuItem;    /* Handle of the menu item
    } CREATEMENU;

    typedef union tagDDE_CREATEMENU
    {
        DDEDATA      DDEdata;
        CREATEMENU   DDEmenu;
    } DDE_CREATEMENU,*lpDDE_CREATEMENU;

```

or

```
WM_DDE_ACK(wStatus,aCREATEMENU)
```

If Personal Communications cannot create a menu item, one of the following status codes is returned in the low-order byte of the wStatus word:

Return Code	Explanation
6	The specified format is not valid.
9	A system error occurred.

Initiate Menu Conversation

3270	5250	VT
Yes	Yes	Yes

The **Initiate Menu Conversation** function connects a client application to an available session of Personal Communications. Once a menu conversation is established, the session menu is reserved exclusively for the client until the conversation is terminated.

The client application sends the following message to initiate a DDE conversation with a menu:

```
SendMessage( -1,
             WM_DDE_INITIATE,
             hClientWnd,
             MAKELPARAM(aIBM327032,SN));
```

where:

aIBM327032

Identifies the application atom. The string used to create atom aIBM327032 is IBM327032. In the PC400, the application atom is aIBM525032 and the string IBM525032 is used to create it.

SN

Identifies the topic atom. The string used to create atom a3270MenuSN is 3270MenuS appended with the session ID A, B, ..., Z. In the PC400, the topic atom is a5250MenuSN and the string 5250MenuS appended with the session ID A, B, ..., Z. is used to create it.

Personal Communications Response

If Personal Communications can support a conversation with the client application, Personal Communications acknowledges the INITIATE transaction with:

```
WM_DDE_ACK(aIBM327032,SN)
```


Start Menu Advise

3270	5250	VT
Yes	Yes	Yes

The **Start Menu Advise** function allows a client application to process a user defined routine when the menu item that is added by the client application, is selected. After using this function, the client receives DATA messages indicating which menu item is selected.

The client sends the following command to begin a menu advise.

```
PostMessage( hServerWnd,
            WM_DDE_ADVISE,
            hClientWnd,
            PackDDEParam(WM_DDE_ADVISE,
            hOptions,aSELECTMENU));
```

where:

hOptions

Is a handle to a Windows global memory object with the following structure:

```
typedef struct tagOPTIONS
{
    unsigned reserved:14;        // Reserved
    unsigned fDeferUpd:1;        // Send notification only
                                // (Must be 0)
    unsigned fAckReq:1;          // Client will ACK all notices
                                // (Must be 1)
    WORD    cfFormat;            // Always CF_DSPTEXT
} OPTIONS,FAR *lpOPTIONS;
```

aSELECTMENU

Identifies a menu advise as the item.

Personal Communications Response

Personal Communications receives the **Start Menu Advise** and returns an ACK message if it can start the function. Otherwise, a negative ACK message is returned to the client with one of the following return codes in the low-order byte of the wStatus field.

Return Code	Explanation
1	Menu Advise has been already started.
6	The specified format is not valid.
9	A system error occurred.

```
WM_DDE_ACK(wStatus,aSELECTMENU)
```

Once the menu item (added to the client application) is selected, the client receives DATA messages notifying it which menu item is selected:

```
WM_DDE_DATA(hData,aSELECTMENU)
```

where:

hData

Identifies a handle to a Windows global memory object containing:

```
typedef struct tagSELECTMENU
{
    unsigned char data[(sizeof(DDEDATA)-1)];
    unsigned short uIDSelected; /* Command ID of the selected menu item
} SELECTMENU;

typedef union tagDDE_SELECTMENU
{
    DDEDATA DDEdata;
    SELECTMENU DDEmenu;
} DDE_SELECTMENU,*lpDDE_SELECTMENU;
```

The DATA messages continue until a Stop Menu Advise message is sent to Personal Communications.

Stop Menu Advise

3270	5250	VT
Yes	Yes	Yes

The **Stop Menu Advise** function ends a client application's ability to process a user-defined routine when the menu item added by the client application is selected. The client sends the following command to perform the **Stop Menu Advise** function.

```
PostMessage( hServerWnd,
             WM_DDE_UNADVISE,
             hClientWnd,
             MAKELPARAM(NULL,aSELECTMENU));
```

where:

aSELECTMENU

Identifies a menu advise as the item.

Personal Communications Response

If Personal Communications can perform the DDE_UNADVISE, Personal Communications returns an ACK message containing positive status information to the client:

```
WM_DDE_ACK(wStatus,aCLOSE)
```

If Personal Communications cannot perform the DDE_UNADVISE, Personal Communications returns an ACK message containing negative status information and one of the following return codes in the low-order byte of the wStatus word:

Return Code	Explanation
1	Advise has not started yet.
9	A system error occurred.

Terminate Menu Conversation

3270	5250	VT
Yes	Yes	Yes

The **Terminate Menu Conversation** function disconnects the client from the Personal Communications session with which a conversation had been previously started.

The client sends the following command to terminate a session conversation:

```
SendMessage( hServerWnd,
             WM_DDE_TERMINATE,
             hClientWnd,
             0 );
```

Personal Communications Response

Personal Communications acknowledges the terminate command with this message:

```
WM_DDE_TERMINATE
```

Summary of DDE Functions in a Windows 32-Bit Environment

The following table lists the DDE functions that can be used with PC/3270 or PC400. The table lists the name of the DDE function, the command the client sends to PC/3270 or PC400, the values that can be used for the variables in the client command, and the server response.

Table 20. DDE Function Summary

Function Name	Client Command	Server Response
Code Conversion (system)	PostMessage(hServerWnd, WM_DDE_POKE, hClientWnd, PackDDEIParam(WM_DDE_POKE, hData, aCONV));	UnPackDDEIParam(WM_DDE_ACK, wStatus, aCONV)
Initiate System Conversation (system)	SendMessage(-1, WM_DDE_INITIATE, hClientWnd, MAKELPARAM(aIBM327032, aSystem));	LOWORD/HIWORD to unpack WM_DDE_ACK(aIBM327032, aSystem)
Get System Configuration (system)	PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELPARAM(cfFormat, aSYSICON));	UnPackDDEIParam(WM_DDE_DATA, hData, aSYSICON) or UnPackDDEIParam(WM_DDE_ACK, wStatus, aSYSICON)
	cfFormat = CF_TEXT	
Get System Formats (system)	PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELPARAM(cfFormat, aFORMATS));	UnPackDDEIParam(WM_DDE_DATA, hData, aFORMATS) or UnPackDDEIParam(WM_DDE_ACK, wStatus, aFORMATS)
	cfFormat = CF_TEXT	
Get System Status (system)	PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELPARAM(cfFormat, aSTATUS));	UnPackDDEIParam(WM_DDE_DATA, hData, aSTATUS) or UnPackDDEIParam(WM_DDE_ACK, wStatus, aSTATUS)
	cfFormat = CF_TEXT	
Get System SysItems (system)	PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELPARAM(cfFormat, aSYSITEMS));	UnPackDDEIParam(WM_DDE_DATA, hData, aSYSITEMS) or UnPackDDEIParam(WM_DDE_ACK, wStatus, aSYSITEMS)
	cfFormat = CF_TEXT	

Table 20. DDE Function Summary (continued)

Function Name	Client Command	Server Response
Get System Topics (system)	PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELPARAM(cfFormat, aTOPICS));	UnPackDDElParam(WM_DDE_DATA, hData, aTOPICS) or UnPackDDElParam(WM_DDE_ACK, wStatus, aTOPICS)
	cfFormat = CF_TEXT	
Terminate System Conversation (system)	SendMessage(hServerWnd, WM_DDE_TERMINATE, hClientWnd, 0);	WM_DDE_TERMINATE
Initiate Session Conversation (session)	SendMessage(-1, WM_DDE_INITIATE, hClientWnd, MAKELPARAM(aIBM327032, aSessionN));	LOWORD/HIWORD to unpack WM_DDE_ACK(aIBM327032, aSessionN)
	N = a session letter A through Z.	
Find Field (session)	PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELPARAM(cfFormat, aFIELD));	UnPackDDElParam(WM_DDE_DATA, hData, aFIELD) or UnPackDDElParam(WM_DDE_ACK, wStatus, aFIELD)
	cfFormat = CF_DSPTEXT	
Get Keystrokes (session)	PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELPARAM(cfFormat, aKEYS));	UnPackDDElParam(WM_DDE_DATA, hData, aKEYS) or UnPackDDElParam(WM_DDE_ACK, wStatus, aKEYS)
	cfFormat = CF_DSPTEXT	
Get Mouse Input (session)	PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELPARAM(cfFormat, aMOUSE));	UnPackDDElParam(WM_DDE_DATA, hData, aMOUSE) or UnPackDDElParam(WM_DDE_ACK, wStatus, aMOUSE)
	cfFormat = CF_TEXT | CF_DSPTEXT	
Get Number of Close Requests (session)	PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELPARAM(cfFormat, aCLOSE));	UnPackDDElParam(WM_DDE_DATA, hData, aCLOSE) or UnPackDDElParam(WM_DDE_ACK, wStatus, aCLOSE)
	cfFormat = CF_DSPTEXT	
Get Operator Information Area (session)	PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELPARAM(cfFormat, aOIA));	UnPackDDElParam(WM_DDE_DATA, hData, aOIA) or UnPackDDElParam(WM_DDE_ACK, wStatus, aOIA)
	cfFormat = CF_DSPTEXT	
Get Partial Presentation Space (session)	PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELPARAM(cfFormat, aEPS));	UnPackDDElParam(WM_DDE_DATA, hData, aEPS) or UnPackDDElParam(WM_DDE_ACK, wStatus, aEPS)
	cfFormat = CF_TEXT | CF_DSPTEXT	
Get Presentation Space (session)	PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELPARAM(cfFormat, aPS));	UnPackDDElParam(WM_DDE_DATA, hData, aPS) or UnPackDDElParam(WM_DDE_ACK, wStatus, aPS)
	cfFormat = CF_TEXT | CF_DSPTEXT	

Table 20. DDE Function Summary (continued)

Function Name	Client Command	Server Response
Get Session Status (session)	PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELPARAM(cfFormat, aSSTAT));	UnPackDDE1Param(WM_DDE_DATA, hData, aSSTAT) or UnPackDDE1Param(WM_DDE_ACK, wStatus, aSSTAT)
	cfFormat = CF_TEXT	
Get Trim Rectangle (session)	PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELPARAM(cfFormat, aTRIMRECT));	UnPackDDE1Param(WM_DDE_DATA, hData, aTRIMRECT) or UnPackDDE1Param(WM_DDE_ACK, wStatus, aTRIMRECT)
	cfFormat = CF_TEXT	
Put Data to Presentation Space (session)	PostMessage(hServerWnd, WM_DDE_POKE, hClientWnd, PackDDE1Param(WM_DDE_POKE, hData, aEPS));	UnPackDDE1Param(WM_DDE_ACK, wStatus, aEPS)
	hData = Handle to a global memory object	
Search for String (session)	PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELPARAM(cfFormat, aSTRING));	UnPackDDE1Param(WM_DDE_DATA, hData, aSTRING) or UnPackDDE1Param(WM_DDE_ACK, wStatus, aSTRING)
	cfFormat = CF_DSPTEXT	
Send Keystrokes (session)	PostMessage(hServerWnd, WM_DDE_POKE, hClientWnd, PackDDE1Param(WM_DDE_POKE, hData, aKEYS));	UnPackDDE1Param(WM_DDE_ACK, wStatus, aKEYS)
	hData = Handle to a global memory object	
Session Execute Macro (session)	PostMessage(hServerWnd, WM_DDE_EXECUTE, hClientWnd, (LPARAM)hCommands);	UnPackDDE1Param(WM_DDE_ACK, wStatus, NULL)
	hCommands = Handle to a global memory object	
Set Cursor Position (session)	PostMessage(hServerWnd, WM_DDE_POKE, hClientWnd, PackDDE1Param(WM_DDE_POKE, hData, aSETCURSOR));	UnPackDDE1Param(WM_DDE_ACK, wStatus, aSETCURSOR)
	hData = Handle to a global memory object	
Set Mouse Intercept Condition (session)	PostMessage(hServerWnd, WM_DDE_POKE, hClientWnd, PackDDE1Param(WM_DDE_POKE, hData, aMOUSE));	UnPackDDE1Param(WM_DDE_ACK, wStatus, aMOUSE)
	cfFormat = CF_TEXT | CF_DSPTEXT hData = Handle to a global memory object	

Table 20. DDE Function Summary (continued)

Function Name	Client Command	Server Response
Set Presentation Space Service Condition (session)	PostMessage(hServerWnd, WM_DDE_POKE, hClientWnd, PackDDE1Param(WM_DDE_POKE, hData, aEPSCOND));	UnPackDDE1Param(WM_DDE_ACK, wStatus, aEPSCOND)
	hData = Handle to a global memory object	
Set Session Advise Condition (session)	PostMessage(hServerWnd, WM_DDE_POKE, hClientWnd, PackDDE1Param(WM_DDE_POKE, hData, aPSCOND));	UnPackDDE1Param(WM_DDE_ACK, wStatus, aPSCOND)
	hData = Handle to a global memory object	
Start Close Intercept (session)	SendMessage(hServerWnd, WM_DDE_ADVISE, hClientWnd, PackDDE1Param(WM_DDE_ADVISE, hOptions, aCLOSE));	UnPackDDE1Param(WM_DDE_ACK, wStatus, aCLOSE) or UnPackDDE1Param(WM_DDE_DATA, hData, aCLOSE)
	hOptions = Handle to a global memory object	
Start Keystroke Intercept (session)	SendMessage(hServerWnd, WM_DDE_ADVISE, hClientWnd, PackDDE1Param(WM_DDE_ADVISE, hOptions, aKEYS));	UnPackDDE1Param(WM_DDE_ACK, wStatus, aKEYS) or UnPackDDE1Param(WM_DDE_DATA, hData, aKEYS)
	hOptions = Handle to a global memory object	
Start Mouse Input Intercept (session)	SendMessage(hServerWnd, WM_DDE_ADVISE, hClientWnd, PackDDE1Param(WM_DDE_ADVISE, hOptions, aMOUSE));	UnPackDDE1Param(WM_DDE_ACK, wStatus, aMOUSE) or UnPackDDE1Param(WM_DDE_DATA, hData, aMOUSE)
	hOptions = Handle to a global memory object	
Start Session Advise (session)	PostMessage(hServerWnd, WM_DDE_ADVISE, hClientWnd, PackDDE1Param(WM_DDE_ADVISE, hOptions, aItem));	UnPackDDE1Param(WM_DDE_ACK, wStatus, aItem) or UnPackDDE1Param(WM_DDE_DATA, hData, aItem)
	hOptions = Handle to a global memory object aItem = OIA | PS | TRIMRECT	
Stop Close Intercept (session)	PostMessage(hServerWnd, WM_DDE_UNADVISE, hClientWnd, MAKELPARAM(NULL, aCLOSE));	UnPackDDE1Param(WM_DDE_ACK, wStatus, aCLOSE)
Stop Keystroke Intercept (session)	PostMessage(hServerWnd, WM_DDE_UNADVISE, hClientWnd, MAKELPARAM(NULL, aKEYS));	UnPackDDE1Param(WM_DDE_ACK, wStatus, aKEYS)
Stop Mouse Input Intercept (session)	PostMessage(hServerWnd, WM_DDE_UNADVISE, hClientWnd, MAKELPARAM(NULL, aMOUSE));	UnPackDDE1Param(WM_DDE_ACK, wStatus, aMOUSE)

Table 20. DDE Function Summary (continued)

Function Name	Client Command	Server Response
Stop Session Advise (session)	PostMessage(hServerWnd, WM_DDE_UNADVISE, hClientWnd, MAKELPARAM(NULL, aItem));	UnPackDDElParam(WM_DDE_ACK, wStatus, aItem)
	aItem = SysItems | Topics | NULL	
Terminate Session Conversation (session)	SendMessage(hServerWnd, WM_DDE_TERMINATE, hClientWnd, 0);	WM_DDE_TERMINATE
Initiate Structured Field Conversation (structured field)	SendMessage(-1, WM_DDE_INITIATE, hClientWnd, MAKELPARAM(aIBM327032, aLUN_xxxx));	LOWORD/HIWORD to unpack WM_DDE_ACK(aIBM327032, aLUN_xxxx)
	N = a session letter A through Z. xxxx = a user defined string.	
Terminate Structured Field Conversation (structured field)	SendMessage(hServerWnd, WM_DDE_TERMINATE, hClientWnd, 0);	WM_DDE_TERMINATE
Set Structured Field Service Condition (structured field)	PostMessage(hServerWnd, WM_DDE_POKE, hClientWnd, PackDDElParam(WM_DDE_POKE, hData, aSFCOND));	UnPackDDElParam(WM_DDE_ACK, wStatus, aSFCOND)
	hData = Handle to a global memory object	
Start Read SF (structured field)	PostMessage(hServerWnd, WM_DDE_ADVISE, hClientWnd, PackDDElParam(WM_DDE_ADVISE, hOptions, aSF));	UnPackDDElParam(WM_DDE_ACK, wStatus, aSF) or UnPackDDElParam(WM_DDE_DATA, hData, aSF)
	hOptions = Handle to a global memory object	
Stop Read SF (structured field)	PostMessage(hServerWnd, WM_DDE_UNADVISE, hClientWnd, MAKELPARAM(NULL, aSF));	UnPackDDElParam(WM_DDE_ACK, wStatus, aSF)
Write SF (structured field)	PostMessage(hServerWnd, WM_DDE_POKE, hClientWnd, PackDDElParam(WM_DDE_POKE, hData, aSF));	UnPackDDElParam(WM_DDE_ACK, wStatus, aSF)
	hData = Handle to a global memory object	
Initiate Menu Conversation (menu)	SendMessage(-1, WM_DDE_INITIATE, hClientWnd, MAKELPARAM(aIBM327032, a3270MenuSN));	LOWORD/HIWORD to unpack WM_DDE_ACK(aIBM327032, a3270MenuSN)
	N = a session letter A through Z	

Table 20. DDE Function Summary (continued)

Function Name	Client Command	Server Response
Change Menu Item (menu)	<pre>PostMessage(hServerWnd, WM_DDE_POKE, hClientWnd, PackDDElParam(WM_DDE_POKE, hData,aCHANGEMENU));</pre>	UnPackDDElParam(WM_DDE_ACK,wStatus,aCHANGEMENU)
	hData = Handle to a global memory object	
Create Menu Item (menu)	<pre>PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELPARAM(cfFormat,aCREATEMENU));</pre>	UnPackDDElParam(WM_DDE_DATA,hData,aCREATEMENU) or UnPackDDElParam(WM_DDE_ACK,wStatus,aCREATEMENU)
	cfFormat = CF_DSPTXT	
Start Menu Advise (menu)	<pre>PostMessage(hServerWnd, WM_DDE_ADVISE, hClientWnd, PackDDElParam(WM_DDE_ADVISE, hOption,aSELECTMENU));</pre>	UnPackDDElParam(WM_DDE_ACK,wStatus,aSELECTMENU) or UnPackDDElParam(WM_DDE_DATA,hData,aSELECTMENU)
	hData = Handle to a global memory object	
Stop Menu Advise (menu)	<pre>PostMessage(hServerWnd, WM_DDE_UNADVISE, hClientWnd, MAKELPARAM(NULL,aSELECTMENU));</pre>	UnPackDDElParam(WM_DDE_ACK,wStatus,aCLOSE)
Terminate Menu Conversation (menu)	<pre>SendMessage(hServerWnd, WM_DDE_TERMINATE, hClientWnd, 0);</pre>	WM_DDE_TERMINATE

Chapter 7. Using DDE Functions with a DDE Client Application

Windows allows users to run multiple application programs and to exchange data between Windows application programs. Dynamic data exchange (DDE) allows users this data exchange. Data exchange among Windows application programs can be considered as conversations between *server* and *client* application programs. The client application is an application program that starts DDE, and the server application is an application program that responds to the client application.

The client application needs three names (application program name, topic name, and item name) that are recognized by the server application to start the conversation to exchange data. The client application starts a DDE conversation with the server application by specifying the application program and topic names, and defines the exchange data by specifying the item name.

Personal Communications has a function as a DDE server, and can establish DDE conversations with other Windows application programs (Microsoft Visual Basic, Microsoft Excel, Microsoft Word) that have DDE client functions.

Using the Personal Communications DDE Interface

To start a DDE conversation and data exchange with Personal Communications, client application programs need to know the application program name, topic name, and item name that Personal Communications can recognize. The exchange data type between an application program and Personal Communications is defined with the combination of these names.

Table 21. Naming Scheme for Data Items

Level	Description	Example
Application	A Windows task or a specific task of the application. In this book, application programs are Personal Communications.	IBM327032
Topic	A specific part of application programs.	SessionA
Item	Type of data passed during DDE conversation.	PS (Presentation Space)

Application

As a Windows DDE server, Personal Communications supports application name *IBM327032* or *IBM525032* for 32-bit applications, *IBM3270* or *IBM5250* for 16-bit applications.

Topic Topic specifies the corresponding topic in the application. The following table shows the topics available to the users:

Table 22. Topics for Personal Communications

Topic	Conversation Name	Conversation Type
System	System conversation	Cold link
SessionA, SessionB, ..., SessionZ	Session conversation	Cold link and hot link

Table 22. Topics for Personal Communications (continued)

Topic	Conversation Name	Conversation Type
SessA_XXXX, SessB_XXXX, ..., SessZ_XXXX	Session conversation	Hot link

Item The client application programs can exchange data and information with Personal Communications. Types of data and information are specified by item name.

Explanations for topic conversation procedures and data items to be used follow.

System Conversation

To use the Personal Communications system DDE interface, do as follows:

1. Start the system conversation.
2. Request system information.
3. Terminate the system conversation.

Starting the DDE System Conversation with Personal Communications

To use the DDE interface with Personal Communications, the client application should first start a DDE conversation with Personal Communications. To start a DDE conversation, specify *IBM327032* or *IBM525032* as an application name for 32-bit applications; *IBM3270* or *IBM5250* for 16-bit applications and *System* as a topic name in the DDE function (Initiate) in the client application.

Requesting System Information

After starting the DDE conversation, the client application can request data or information using the DDE function. System information can be requested by specifying the following item names in the DDE function (Request) in the client application:

Item	Return Data	DDE Function
Formats	List of supported Windows clipboard format	Get System Formats
Status	Each session status information	Get System Status
SysCon	Information of emulator support-level and other system-related values	Get System Configuration
SysItems	List of available data items	Get System SysItems
Topics	List of available topics	Get System Topics

Terminating the DDE System Conversation with Personal Communications

To complete the conversation, the client application needs to terminate the DDE conversation with Personal Communications. To terminate the conversation, use the DDE function (Terminate) in the client application.

Session Conversation

To use the Personal Communications session DDE interface, do as follows:

1. Start the session conversation.
2. Use DDE functions (Request, Poke, Execute).

3. Terminate the session conversation.

Starting the DDE Session Conversation

To use the DDE interface with Personal Communications sessions, the client application should start the DDE conversation with Personal Communications. To start DDE conversation, specify *IBM327032* or *IBM525032* as an application name for 32-bit applications; *IBM3270* or *IBM5250* for 16-bit applications and *SessionA*, *SessionB*, ..., *SessionZ* as topic names in the DDE function (Initiate) in the client application.

Requesting Data

After starting the DDE conversation, the client application can request data using the DDE function. Session information can be requested by specifying the following item names in the DDE function (Request) in the client application:

Item	Return Data	DDE Function
EPS(pos,len,bEOF)	All or a part of session presentation space	Get Partial Presentation Space
FIELD(pos,"type")	Field information	Find Field
OIA	Operator Information Area (OIA) status line information	Get Operator Information Area
PS	Session presentation space	Get Presentation Space
SSTAT	Session status information	Get System Status
STRING(pos,bDir,"string")	String offset start	Search for string
TRIMRECT *	Session presentation space of trim rectangle	Get Trim Rectangle
*: Parameter should be added.		

Sending Data to the Emulator Window (Poke)

After starting the DDE conversation, the client application can send data to Personal Communications sessions using the DDE functions. The following table shows the valid items for the DDE functions:

Item	Explanation	DDE Function
EPS(pos,bEOF)	Sends an ASCII data string to the host presentation space	Put Data to Presentation Space
SETCURSOR	Sets the cursor position	Set Cursor Position

Executing Commands

After starting a DDE conversation, the client application can send commands to the Personal Communications session window using the DDE functions. Specify the command in the DDE function (Execute) of the client application. See "Session Execute Macro" on page 250 for details.

Terminating the DDE Session Conversation

The client application should terminate the DDE conversation with Personal Communications when completing the task. To terminate the conversation, use the DDE function (Terminate) in the client application.

Session Conversation (Hot Link)

To use the Personal Communications session DDE interface, do as follows:

1. Start the session conversation.
2. Start the **Advise** function.
3. Stop the **Advise** function.
4. Terminate the session conversation.

Starting the DDE Session Conversation (Hot Link)

To use the DDE interface with Personal Communications sessions, the client application should start the DDE conversation with Personal Communications. To start the DDE conversation, specify *IBM327032* or *IBM525032* as an application name for 32-bit applications; *IBM3270* or *IBM5250* for 16-bit applications, and *SessionA*, *SessionB*, ..., *SessionZ* as topic names in the DDE function (Initiate) in the client application.

Starting the Hot Link with the Session Window

After starting the DDE conversation, the client application can start the **Advise** function. Specify the following item names in the DDE function (Advise) in the client application to start the hot link, which enables the automatic data update:

Item	Explanation	DDE Function
CLOSE	Starts to intercept Window Close requests	Start Close Intercept
KEYS	Starts to intercept keystrokes	Start Keystroke Intercept
PS * OIA TRIMRECT *	Start to retrieve data of PS, OIA, or trim rectangle	Start Session Advise
*: Parameter should be added.		

Stopping the Hot Link with the Session Window

To terminate the **Advise** function, the client application needs to use the DDE function. Specify the following item names in the DDE function, **Unadvise**, in the client application to stop the hot link, which enables the automatic data update:

Item	Explanation	DDE function
CLOSE	Stops to intercept Close request	Stop Close Intercept
KEYS	Stops to intercept keystrokes	Stop Keystroke Intercept
PS * OIA TRIMRECT *	Stops to Advise function for the session	Stop Session Advise
*: Use the same parameter that is used when Start Session Advise was called.		

Terminating the DDE Session Conversation

The client application should terminate the DDE conversation with Personal Communications when completing the task. To terminate the conversation, use the DDE function (Terminate) in the client application.

Personal Communications DDE Interface

This section describes the DDE functions that can be used from the other applications, such as Microsoft Excel, Microsoft Word, and Microsoft Visual Basic.

DDE functions for system conversation

- "Initiate System Conversation" on page 303
- "Get System Configuration"
- "Get System Formats" on page 302
- "Get System Status" on page 302
- "Get System SysItems" on page 303
- "Get System Topics" on page 303
- "Terminate System Conversation" on page 304

DDE functions for session conversation

- "Initiate Session Conversation" on page 310 *1
- "Find Field" on page 304
- "Get Operator Information Area" on page 305
- "Get Partial Presentation Space" on page 306
- "Get Presentation Space" on page 307
- "Get Session Status" on page 308
- "Get Trim Rectangle" on page 308
- "Put Data to Presentation Space" on page 311
- "Search for String" on page 311
- "Session Execute Macro" on page 312
- "Set Cursor Position" on page 313
- "Terminate Session Conversation" on page 313 *2

DDE functions for session conversation (hot link)

- "Initiate Session Conversation" on page 313 (same as *1)
- "Start Close Intercept" on page 314
- "Start Keystroke Intercept" on page 314
- "Start Session Advise" on page 315
- "Stop Close Intercept" on page 316
- "Stop Keystroke Intercept" on page 317
- "Stop Session Advise" on page 317
- "Terminate Session Conversation" on page 317 (same as *2)

DDE Functions for System Conversation

The following DDE functions are provided for Personal Communications system conversation.

Get System Configuration

The **Get System Configuration** function returns the Personal Communications support level and other system-related values.

DDE Parameter	Value
Item	SysCon

The client application can use the Personal Communications DDE function by specifying the DDE function (Request) of the client application with the topic name (System).

Personal Communications Response

The Personal Communications system returns the Personal Communications system configuration data item.

Returned Information: See “Get System Configuration” on page 240 for details.

If Personal Communications do not return the system configuration data item, it may be because:

- An incorrect item name was specified.
- A system error has occurred.

Get System Formats

The **Get System Formats** function returns a list of Windows Clipboard formats that are supported by Personal Communications.

DDE Parameter	Value
Item	Formats

The client application can use the Personal Communications DDE function by specifying the DDE function (Request) of the client application with the item name (Formats).

Personal Communications Response

Personal Communications returns a list of supported Windows Clipboard formats.

If Personal Communications do not return the format data item, it may be because:

- An incorrect item name was specified.
- A system error has occurred.

Get System Status

The **Get System Status** function returns the status of each configured Personal Communicationssession.

DDE Parameter	Value
Item	SysCon

The client application can use the Personal Communications DDE function by specifying the DDE function (Request) of the client application with the item name (SysCon).

Personal Communications Response

Personal Communications returns a series of status information to each open session.

Returned Information: See “Get System Status” on page 242 for details.

If Personal Communications do not return the status data item, it may be because:

- An incorrect item name was specified.
- A system error has occurred.

Get System SysItems

The **Get System SysItems** function returns a list of data items that can be used with the Personal Communications system topic.

DDE Parameter	Value
Item	SysItems

The client application can use the Personal Communications DDE function by specifying the DDE function (Request) of the client application with the item name (SysItems).

Personal Communications Response

Personal Communications returns a list of Personal Communications system topic data items. The following data items are supported by Personal Communications:

- SysItems
- Topics
- Status
- Formats
- SysCon

If Personal Communications do not return the system data item, it may be because:

- An incorrect item name was specified.
- A system error has occurred.

Get System Topics

The **Get System Topics** function returns a list of active DDE topics that are supported by Personal Communications.

DDE Parameter	Value
Item	Topics

The client application can use the Personal Communications DDE function by specifying the DDE function (Request) of the client application with the item name (Topics).

Personal Communications Response

The following topics are supported by Personal Communications:

- System
- SessionA, SessionB, ..., SessionZ

If Personal Communications do not return the system data item, it may be because:

- An incorrect item name was specified.
- A system error has occurred.

Initiate System Conversation

The **Initiate System Conversation** function starts the system conversation. Only one client application can be connected to one system.

DDE Parameter	Value
Topic	System

The client application should start DDE conversation using the DDE function (Initiate) with the Personal Communications application name (IBM327032 or IBM525032 for 32-bit applications) or (IBM3270 or IBM5250 for 16-bit applications) and the topic name (System).

Terminate System Conversation

The **Terminate System Conversation** function terminates the system conversation. Use the DDE function (Terminate) to terminate the DDE conversation from the client application.

DDE Functions for Session Conversation

The following DDE functions are provided for Personal Communications session conversation.

Find Field

The **Find Field** function passes the field information to the client application.

DDE Parameter	Value
Item	FIELD (pos, "type")

Parameter	Value	Explanation
pos	NNNN	PS position.
"type"	"bb" or "Tb" "Pb" "Nb" "NP" "NU" "PP" "PU"	This field. The previous field, either protected or unprotected. The next field, either protected or unprotected. The next protected field. The next unprotected field. The previous protected field. The previous unprotected field.

Note: The **b** symbol represents a required blank.

An item in the IBM Personal Communications Version 3.1 format is also supported.

The client application can use the Personal Communications DDE function by specifying the DDE function (Request) of the client application with the foregoing item name.

Personal Communications Response

The following table shows the field information that PC/3270 returns:

Field	Returned Information	Explanation
Formatted/Unformatted	Formatted, Unformatted	Whether the presentation space is formatted or unformatted. If Unformatted is specified, no other field information will be returned.
Unprotected/Protected	N	0 = Unprotected data field. 1 = Protected data field.
A/N	N	0 = Alphanumeric. 1 = Numeric.

Field	Returned Information	Explanation
I/SPD	N	0 = Normal intensity, undetectable. 1 = Normal intensity, detectable. 2 = High intensity, detectable. 3 = Nondisplay, undetectable.
MDT	N	0 = Field is not changed. 1 = Field is changed.
Field start offset	NNNN	Field starts this field position.
Field length	NNNN	Field length.

The following table shows the field information that PC400 returns:

Field	Returned Information	Explanation
Formatted/Unformatted	Formatted, Unformatted	Whether the presentation space is formatted or unformatted. If Unformatted is specified, no other field information will be returned.
Field attribute	N	0 = Not field attribute byte. 1 = Field attribute byte.
Visibility	N	0 = Nondisplay. 1 = Display.
Unprotected/Protected	N	0 = Unprotected data field. 1 = Protected data field.
Intensity	N	0 = Normal. 1 = High.
Field Type	N	0 = Alphanumeric: all characters allowed. 1 = Alphabet only: uppercase and lowercase letters, comma, period, hyphen, blank, and Dup key allowed. 2 = Numeric shift: automatic shift for numerics. 3 = Numeric only: numbers 0–9, comma, period, plus, minus, blank, and Dup key allowed. 5 = Digits only: numbers 0–9 and Dup key allowed. 6 = Magnetic stripe reader data only. 7 = Signed numeric: numbers 0–9, plus, minus, and Dup key allowed.
MDT	N	0 = Field is not changed. 1 = Field is changed.
Field start offset	NNNN	Field starts this field position.
Field length	NNNN	Field length.

If Personal Communications do not return the field information, it may be because:

- An incorrect item name was specified.
- A system error has occurred.

Get Operator Information Area

The **Get Operator Information Area** function returns the OIA data information to the client application.

DDE Parameter	Value
Item	OIA

The client application can use the Personal Communications DDE function by specifying the DDE function (Request) of the client application with the item name (OIA).

Personal Communications Response

The following table shows the OIA information that Personal Communications returns:

Offset	Returned Information	Meaning
0	ONLINE LU-LU SSCP-LU	Online, the screen is unowned LU-LU session owns the screen SSCP-LU session owns the screen
9	X X MCHK X CCHK X PCHK X DNW X BUSY X TWAIT X -S X -f X MUCH X UA X -fUA X DEAD X WRONG X SYSTEM X II	Input inhibit Machine check Communication check Program check Device not working Printing Terminal waiting Minus symbol Minus function Input too much Unauthorized operator Unauthorized operator Minus function Incorrect dead key combination Wrong position System waiting Operator input error (PC400)
19	COMM	Communication error
25	MW	Message waiting (PC400)
36	APL	APL (PC/3270)
42	U NUM	Uppercase Numeric
43	A	Caps lock
47	S I	High intensity, operator selectable High intensity, field inherit
49	CS CI	Color, operator selectable Color, field inherit
52	^	Insert mode
61	P-MAL P-PRN P-ASS	Printer malfunction Printer printing Printer assignment

If Personal Communications do not return the OIA information, it may be because:

- An incorrect item name was specified.
- A system error has occurred.

Get Partial Presentation Space

The **Get Partial Presentation Space** function returns whole or partial presentation space data to the client application.

DDE Parameter **Value**
Item EPS (pos, len, bEOF)

Parameter	Value	Explanation
pos	NNNN	PS position
len	NNNN	PS length

Parameter	Value	Explanation
bEOF	1 or 0	EOF switch 1 Yes 0 No

Note: An item in the IBM Personal Communications Version 3.1 format is also supported.

The client application can use the Personal Communications DDE function by specifying the DDE function (Request) of the client application with the foregoing item names.

Personal Communications Response

The following table shows the information Personal Communications returns:

Field	Returned Information	Explanation
PS start position	NNNN	Specified by pos parameter
PS length	NNNN	Specified by len parameter
PS rows	NNNN	Specified by the number of rows
PS columns	NNNN	Specified by the number of columns
PS	NNNN	PS data starts from this position

If Personal Communications do not return the format data items, it may be because:

- An incorrect item name was specified.
- A system error has occurred.

Get Presentation Space

The **Get Presentation Space** function returns presentation space data to the client application.

DDE Parameter	Value
Item	PS

The client application can use the Personal Communications DDE function by specifying the DDE function (Request) of the client application with the item name (PS).

Personal Communications Response

The following table shows the information Personal Communications returns:

Field	Returned Information	Explanation
PS size	NNNN	Size of presentation space
PS rows	NNNN	Number of rows
PS columns	NNNN	Number of columns
PS	NNNN	PS data starts from this position

If Personal Communications do not return the format data items, it may be because:

- An incorrect item name was specified.
- A system error has occurred.

Get Session Status

The **Get Session Status** function returns the connected session status to the client application.

DDE Parameter	Value
Item	SSTAT

The client application can use the Personal Communications DDE function by specifying the DDE function (Request) of the client application with the item name (SSTAT).

Personal Communications Response

Refer to “Get Session Status” on page 381 for the returned information.

If Personal Communications do not return the format data items, it may be because:

- An incorrect item name was specified.
- A system error has occurred.

Get Trim Rectangle

The **Get Trim Rectangle** function returns the presentation space area of the current (or specified) trim rectangle to the client application.

DDE Parameter	Value
Item	TRIMRECT (row1, col1, row2, col2) TRIMRECT (pos1, pos2) TRIMRECT

Parameter	Value	Explanation
row1	NN	Top-left corner row of the trim rectangle
col1	NN	Top-left corner column of the trim rectangle
row2	NN	Bottom-right corner row of the trim rectangle
col2	NN	Bottom-right corner column of the trim rectangle
pos1	NNNN	PS position of the top-left corner of the trim rectangle
pos2	NNNN	PS position of the bottom-right corner of the trim rectangle

Note: An item in the IBM Personal Communications Version 3.1 format is also supported.

The current specified PS trim rectangle is used unless the client application specifies the PS trim rectangle in the parameter.

The client application can use the Personal Communications DDE function by specifying the DDE function (Request) of the client application with the item name (TRIMRECT).

Trim Rectangle Word by Word

This feature enables you to resize the trim rectangle along word boundaries. The Mark Word Left function moves the left side of the rectangle to the front of the previous word in the first line of the rectangle. The Mark Word Right function moves the right side of the rectangle to the front of the next word in the first line of the rectangle.

These functions are available only for single-byte languages. They are not available for Thai, Hindi, double-byte languages, or bidirectional sessions.

You can enable the Trim Rectangle Word by Word functions by adding the following keyword to the PCSWIN.INI file:

```
[Edit]
TrimRectJumpToWord=Y
```

When the feature is enabled, Mark Word Left can be invoked with the key combination Ctrl+Shift+LeftArrow. Mark Word Right can be invoked with the Ctrl+Shift+Right Arrow key combination.

The Mark Word Left and Mark Word Right functions can also be added to the popup keypad, a macro or script, or to a mouse button.

Table 23. Mark Word Left

Token name	mark word left
Face name	MrkWd<
Context	Available
Keyboard	Yes
Popup keypad	Yes
Mouse	Yes
Macro	Yes
Keyboard/macro function	Yes
3270 SBCS	Yes
3270 DBCS	No
3270 AEA (SBCS)	Yes
5250 SBCS	Yes
5250 DBCS	No
VT SBCS	Yes

Table 24. Mark Word Right

Token name	mark word right
Face name	MrkWd>
Context	Available
Keyboard	Yes

Table 24. Mark Word Right (continued)

Popup keypad	Yes
Mouse	Yes
Macro	Yes
Keyboard/macro function	Yes
3270 SBCS	Yes
3270 DBCS	No
3270 AEA (SBCS)	Yes
5250 SBCS	Yes
5250 DBCS	No
VT SBCS	Yes

Autocopy

This feature enables you to automatically copy the trim rectangle text to the clipboard.

After you mark an area on the screen with a trim rectangle, the text inside the Trim Rectangle is automatically copied to the clipboard. When an existing trim rectangle is moved to another screen area, the text inside the new trim rectangle is automatically copied to the clipboard.

Enable the feature by adding the following keywords to the .WS profile. Both keywords must be enabled in order for Autocopy to work correctly.

```
[Edit]
AutoCopy=Y
TrimRectRemainAfterEdit=Y
```

Personal Communications Response

The information returned from Personal Communications is as follows:

Field	Returned Information	Explanation
PS		PS data starts from this position.

If Personal Communications do not return the trim rectangle items, it may be because:

- An incorrect item name was specified.
- A system error has occurred.

Initiate Session Conversation

The **Initiate Session Conversation** function starts a DDE conversation in the available session window. Only one client application can be connected to one session conversation:

```
DDE Parameter  Value
Topic          SessionA, SessionB, ..., SessionZ
```

Parameter Value	Explanation
SessionA, SessionB, ..., SessionZ	"SessionA" implies a string combined "Session" and a session ID "A", "B", ..., "Z".

The client application should start the DDE conversation by specifying the DDE function (Initiate) of the client application with the topic name (SessionA, SessionB, ..., SessionZ).

Personal Communications Response

If a topic is not specified, Personal Communications responds after confirming the following available topics:

- System
- SessionA, SessionB, ..., SessionZ

Put Data to Presentation Space

The **Put Data to Presentation Space** function sends an ASCII data string to write on the specified host presentation space.

DDE Parameter	Value
Item	EPS (pos, bEOF)

Parameter	Value	Explanation				
pos	NNNN	PS position to start writing the data				
bEOF	1 or 0	EOF switch <table> <tr> <td>1</td> <td>Yes</td> </tr> <tr> <td>0</td> <td>No</td> </tr> </table>	1	Yes	0	No
1	Yes					
0	No					

Note: An item in the IBM Personal Communications Version 3.1 format is also supported.

The client application can use the Personal Communications DDE function by specifying the DDE function (Poke) of the client application with the foregoing item name.

Personal Communications Response

If Personal Communications do not accept the string data, it may be because:

- An incorrect item name was specified.
- The PS position is not valid.
- The length is not valid.
- The PS input was inhibited.
- A system error has occurred.

Search for String

Using the **Search for String** function, the client application can check whether the specified strings exist within the specified presentation space area.

DDE Parameter	Value
Item	STRING (pos, bDir, "string")

Parameter	Value	Explanation
pos	NNNN	PS start position of the string search
bDir	1 or 0	Search Direction 1 Forward 0 Backward
"string"		Search string <ul style="list-style-type: none"> • Enclose a string including blanks with double quotation marks. • To specify a double quotation mark within the string, enclose the double quotation mark with another set of double quotation marks. Example: <i>This is a double quotation" mark.</i> is specified as <i>"This is a double quotation"" mark."</i>

Note: An item in the IBM Personal Communications Version 3.1 format is also supported.

The maximum length of the search string is 255.

The client application can use the Personal Communications DDE function by specifying the DDE function (Request) of the client application with the foregoing item names.

Personal Communications Response

Personal Communications returns the following information:

Field	Returned Information	Explanation
String start offset	NNNN, None	"None" is returned if the string is not found.

If Personal Communications do not return the string start position, it may be because:

- An incorrect item name was specified.
- The PS position is not valid, or the string is too long.
- A system error has occurred.

Session Execute Macro

The **Session Execute Macro** function enables users to send commands and macro strings to Personal Communications.

Refer to "Session Execute Macro" on page 392 for details of commands and macro strings.

The client application can use the Personal Communications DDE function by specifying the DDE function (Execute) of the client application.

Personal Communications Response

A system error can cause Personal Communications not to return the string start position.

Set Cursor Position

Using the **Set Cursor Position** function, the client application can set the cursor position in the session window.

DDE Parameter	Value
Item	SETCURSOR
Data (Cursor position)	NNNN or Rn1Rn2

Parameter Value	Explanation
NNNN	PS offset
Rn1Rn2	Row/column n1 PS position row n2 PS position column

The client application can use the Personal Communications DDE function by specifying the DDE function (Poke) of the client application with the foregoing item names.

Personal Communications Response

If Personal Communications do not move the cursor to the specified PS position, it may be because:

- An incorrect item name was specified.
- The Cursor PS offset is not valid (it must be from 0 to PS size-1).
- The Cursor row value is not valid (it must be from 0 to PS row-1).
- The Cursor column value is not valid (it must be from 0 to PS column-1).
- A system error has occurred.

Terminate Session Conversation

The **Terminate Session Conversation** function terminates the DDE conversation between the client application and Personal Communications.

Use the DDE function (Terminate) of the client application to terminate the DDE conversation.

DDE Functions for Session Conversation (Hot Link)

The following DDE functions are provided for Personal Communications session conversation with hot link connection.

Initiate Session Conversation

The **Initiate Session Conversation** function starts a DDE conversation with the available session window.

DDE Parameter	Value
Topic	SessionA, SessionB, ..., SessionZ or SessA_xxxx, SessB_xxxx, ..., SessZ_xxxx

Note: If SessA_xxxx, SessB_xxxx, ..., SessZ_xxxx is used, the client application allows only hot link session conversation.

Parameter Value	Explanation
SessA_xxxx, SessB_xxxx, ..., SessZ_xxxx	String 'SessA_xxxx' indicates session A (SessA_) with any user-defined strings (xxxx). The length of the user-defined strings is not limited.

Specify the Personal Communications application name and the foregoing topic name in the DDE function (Initiate) of the client application to start a DDE conversation.

Start Close Intercept

Using the **Start Close Intercept** function, the client application can intercept the Close request generated by selecting the Close option from the emulator session window. When this service is started, the client application receives the Close request event data.

DDE Parameter	Value
Item	CLOSE

The client application can use the Personal Communications DDE function by specifying the DDE function (Advise) of the client application with the foregoing item name.

Personal Communications Response

Personal Communications returns the following information:

Field	Returned Information	Explanation
Number of PS close request	NNNN	When a Close request is generated, the client application receives "0001".

If Personal Communications do not start to Close intercept, it may be because:

- An incorrect item name was specified.
- The Close intercept for the session has already started with the same topic name.
- A system error has occurred.

Start Keystroke Intercept

Using the **Start Keystroke Intercept** function, the client application can filter keystrokes that are entered by the terminal operator. When started, the keystrokes are intercepted and received by the client application.

DDE Parameter	Value
Item	KEYS

The client application can use the Personal Communications DDE function by specifying the DDE function (Advise) of the client application with the foregoing item name.

Personal Communications Response

Personal Communications returns the following information:

Field	Returned Information	Explanation
Keys		Refer to Table 19 on page 253.

If Personal Communications do not start KeyStroke Intercept, it may be because:

- An incorrect item name was specified.
- The Keystroke Intercept for the session has already started with the same topic name.
- A system error has occurred.

Start Session Advise

The **Start Session Advise** function establishes the link between the client application and Personal Communications. As the data item is changed, the client application receives the changed data of the presentation space (PS), operator information area (OIA), or trim rectangle (TRIMRECT).

DDE Parameter	Value
Item	PS (pos, len, bCaseSen, "string") PS TRIMRECT (row1, col1, row2, col2) TRIMRECT (pos1, pos2) TRIMRECT OIA

The maximum length of the search string is 255.

Parameter	Value	Explanation
pos	NNNN	PS start position of the string search (PS offset)
len	NNNN	Length of the search string
bCaseSen	1 or 0	Case sensitivity 1 Yes 0 No
"string"		Search string <ul style="list-style-type: none"> • Enclose a string including blanks with double quotation marks. • To specify a double quotation mark within the string, enclose the double quotation mark with another set of double quotation marks. Example: <i>This is a double quotation" mark.</i> is specified as <i>"This is a double quotation"" mark."</i>

Note: An item in the IBM Personal Communications Version 3.1 format is also supported.

To receive a conditional advice when the presentation space is updated, the client application needs to set the advise conditions as well as the foregoing parameter values. The foregoing parameter values can be used when the presentation space is specified as the item name.

Parameter	Value	Explanation
row1	NN	Top-left corner row of the trim rectangle
col1	NN	Top-left corner column of the trim rectangle
row2	NN	Bottom-right corner row of the trim rectangle
col2	NN	Bottom-right corner column of the trim rectangle
pos1	NNNN	PS position of the top-left corner of the trim rectangle
pos2	NNNN	PS position of the bottom-right corner of the trim rectangle

Note: An item in the IBM Personal Communications Version 3.1 format is also supported.

The current specified presentation space trim rectangle is used unless the client application specifies the presentation space trim rectangle in the item name parameter. This parameter value can be used when TRIMRECT is specified as the item name.

The client application can use the Personal Communications DDE function by specifying the DDE function (Advise) of the client application with the foregoing item name.

Personal Communications Response

Refer to “Get Partial Presentation Space” on page 306, “Get Operator Information Area” on page 305, and “Get Trim Rectangle” on page 308.

If Personal Communications do not start Advise, it may be because:

- An incorrect item name was specified.
- The Advise for the session has already started with the same topic name
- A system error has occurred.

Stop Close Intercept

Using the **Stop Close Intercept** function, the client application stops intercepting the close requests.

DDE Parameter	Value
Item	CLOSE

The client application can use the Personal Communications DDE function by specifying the DDE function, **Unadvise**, of the client application with the foregoing item name.

Personal Communications Response

If Personal Communications do not stop Close Intercept, it may be because:

- The Advise has not been started.
- A system error has occurred.

Stop Keystroke Intercept

Using the **Stop Keystroke Intercept** function, the client application stops intercepting the keystrokes.

DDE Parameter	Value
Item	KEYS

The client application can use the Personal Communications DDE function by specifying the DDE function, **Unadvise**, of the client application with the foregoing item name.

Personal Communications Response

If Personal Communications do not stop Keystroke Intercept, it may be because:

- An incorrect item name was specified.
- The Advise has not been started.
- A system error has occurred.

Stop Session Advise

The **Stop Session Advise** function closes the link between the client application and Personal Communications.

DDE Parameter	Value
Item	PS (pos, len, bCaseSen, "string") PS TRIMRECT (row1, col1, row2, col2) TRIMRECT (pos1, pos2) TRIMRECT OIA

The maximum length of the search string is 255.

The item name must be the same item name that was used when **Start Session Advise** was called.

The client application can use the Personal Communications DDE function by specifying the DDE function, **Unadvise**, of the client application with the foregoing item name.

Personal Communications Response

If Personal Communications do not stop Advise, it may be because:

- An incorrect item name was specified.
- The Advise has not been started
- A system error has occurred.

Terminate Session Conversation

The **Terminate Session Conversation** function terminates the DDE conversation between the client application and the Personal Communications session.

Use the DDE function (Terminate) of the client application to terminate the DDE conversation.

Visual Basic Sample Program

Following is a sample program with Visual Basic:

Note: This sample program is simplified and differs from the actual sample file provided.

```

' /*****
' /*
' /*      System conversation
' /*
' /*****

' ****
' ****      Initiate System Conversation
' ****
' ****
' ****

'
'   Start DDE Conversation with system
'
Sub Command1_Click ()
On Error GoTo ErrHandlerInit
Dim COLD As Integer
COLD = 2
FunctionComp& = True

DoEvents
Text1.LinkTopic = "|System"
Text1.LinkMode = COLD

If FunctionComp&= False Then
MsgBox "Error has occurred", 48, "DDE sample"
End If
Exit Sub

ErrHandlerInit:
FunctionComp& = False
Resume Next
End Sub

'-- note -----
'
' If you use VisualBasic Version2.0, use "DoEvents"
' function before starting DDE conversation by
' calling "LinkMode" function.
'
'-----
' ****
' ****      Get System Format
' ****
' ****
' ****

'   Request a list of Personal Communications'   Clipboard Format
'
Sub Command2_Click ()
On Error GoTo ErrHandler
FunctionComp& = True

Text1.LinkItem = "Formats"
Text1.LinkRequest

If FunctionComp&= False Then
MsgBox "Error has occurred", 48, "DDE sample"
End If
Exit Sub

ErrHandler:
FunctionComp& = False
Resume Next

```

```

End Sub

'*****
'***                                     ***
'***   Get System Status                 ***
'***                                     ***
'*****
'
'   Requests each Personal Communications'   Session Status
'
Sub Command2_Click ()
On Error GoTo ErrHandler
FunctionComp& = True

Text1.LinkItem = "Status"
Text1.LinkRequest

If FunctionComp&= False Then
MsgBox "Error has occurred", 48, "DDE sample"
End If
Exit Sub

ErrorHandler:
FunctionComp& = False
Resume Next
End Sub

'*****
'***                                     ***
'***   Get System Configuration         ***
'***                                     ***
'*****
'
'   Requests Personal Communications'   System Configuration Values
'
Sub Command2_Click ()
On Error GoTo ErrHandler
FunctionComp& = True

Text1.LinkItem = "SysCon"
Text1.LinkRequest

If FunctionComp&= False Then
MsgBox "Error has occurred", 48, "DDE sample"
End If
Exit Sub

ErrorHandler:
FunctionComp& = False
Resume Next
End Sub

'*****
'***                                     ***
'***   Get System SysItems             ***
'***                                     ***
'*****
'
'   Requests a list of Data Items for
'   Personal Communications System Conversation
'
Sub Command2_Click ()
On Error GoTo ErrHandler
FunctionComp& = True

Text1.LinkItem = "SysItems"
Text1.LinkRequest

```

```

        If FunctionComp&= False Then
            MsgBox "Error has occurred", 48, "DDE sample"
        End If
    Exit Sub

ErrorHandler:
    FunctionComp& = False
    Resume Next
End Sub

'*****
'***                                     ***
'***   Get System Topics                                     ***
'***                                     ***
'*****
'
'   Requests a list of Personal Communications'   Topics
'
Sub Command2_Click ()
On Error GoTo ErrorHandler
    FunctionComp& = True

    Text1.LinkItem = "Topics"
    Text1.LinkRequest

    If FunctionComp&= False Then
        MsgBox "Error has occurred", 48, "DDE sample"
    End If
    Exit Sub

ErrorHandler:
    FunctionComp& = False
    Resume Next
End Sub

'*****
'***                                     ***
'***   Terminate System Conversation                       ***
'***                                     ***
'*****
'
'   Terminates DDE Conversation with system
'
Sub Command3_Click ()
On Error GoTo ErrorHandler
    Dim NONE As IntegerTerm
    NONE = 0
    FunctionComp& = True

    Text1.LinkMode = NONE

    If FunctionComp&= False Then
        MsgBox "Error has occurred", 48, "DDE sample"
    End If
    Exit Sub

ErrorHandlerTerm:
    FunctionComp& = False
    Resume Next
End Sub

'/*
'/*                                     */
'/*   Session conversation                                     */
'/*                                     */
'/*
'/*

```



```

'*****
'***                                     ***
'***   Initiate Session Conversation     ***
'***                                     ***
'*****
'
'   Initiate DDE Conversation with system
'
Sub Command1_Click ()
On Error GoTo ErrHandlerInit
Dim COLD As Integer
COLD = 2
FunctionComp& = True

DoEvents
Text1.LinkTopic = "|SessionA"
Text1.LinkMode = COLD

If FunctionComp&= False Then
MsgBox "Error has occurred", 48, "DDE sample"
End If
Exit Sub

ErrHandlerInit:
FunctionComp& = False
Resume Next
End Sub

'-- note -----
'
' If you use VisualBasic Version2.0, use "DoEvents"
' function before starting DDE conversation by
' calling "LinkMode" function.
'
'-----
'*****
'***                                     ***
'***   Find Field                       ***
'***                                     ***
'*****
'
'   Requests 100 Field Information of PS Position
'
Sub Command2_Click ()
On Error GoTo ErrHandler
FunctionComp& = True

Text1.LinkItem = "FILED(100," " ")
Text1.LinkRequest

If FunctionComp&= False Then
MsgBox "Error has occurred", 48, "DDE sample"
End If
Exit Sub

ErrHandler:
FunctionComp& = False
Resume Next
End Sub

'*****
'***                                     ***
'***   Get Operator Information Area     ***
'***                                     ***
'*****
'

```

```

' Requests OIA Data
'
Sub Command2_Click ()
On Error GoTo ErrHandler
FunctionComp& = True

Text1.LinkItem = "OIA"
Text1.LinkRequest

If FunctionComp&= False Then
MsgBox "Error has occurred", 48, "DDE sample"
End If
Exit Sub

ErrHandler:
FunctionComp& = False
Resume Next
End Sub
'*****
'***                               ***
'*** Get Partial Presentation Space ***
'***                               ***
'*****
'
' Requests PS Data Bytes from PS Position from 100 to 1000
'
Sub Command2_Click ()
On Error GoTo ErrHandler
FunctionComp& = True

Text1.LinkItem = "EPS(100,1000,1)"
Text1.LinkRequest

If FunctionComp&= False Then
MsgBox "Error has occurred", 48, "DDE sample"
End If
Exit Sub

ErrHandler:
FunctionComp& = False
Resume Next
End Sub

'*****
'***                               ***
'*** Get Presentation Space         ***
'***                               ***
'*****
'
' Requests PS Data
'
Sub Command2_Click ()
On Error GoTo ErrHandler
FunctionComp& = True

Text1.LinkItem = "PS"
Text1.LinkRequest

If FunctionComp&= False Then
MsgBox "Error has occurred", 48, "DDE sample"
End If
Exit Sub

ErrHandler:
FunctionComp& = False
Resume Next
End Sub

```

```

'*****
'***                                     ***
'***   Get Session Status               ***
'***                                     ***
'*****
'
'   Requests Session Connection Status
'
Sub Command2_Click ()
On Error GoTo ErrHandler
FunctionComp& = True

Text1.LinkItem = "SSTAT"
Text1.LinkRequest

If FunctionComp&= False Then
MsgBox "Error has occurred", 48, "DDE sample"
End If
Exit Sub

ErrHandler:
FunctionComp& = False
Resume Next
End Sub
'*****
'***                                     ***
'***   Get Trim Rectangle               ***
'***                                     ***
'*****
'
'   Requests PS Data in Current Specified Trim Rectangle
'
Sub Command2_Click ()
On Error GoTo ErrHandler
FunctionComp& = True

Text1.LinkItem = "TRIMRECT"
Text1.LinkRequest

If FunctionComp&= False Then
MsgBox "Error has occurred", 48, "DDE sample"
End If
Exit Sub

ErrHandler:
FunctionComp& = False
Resume Next
End Sub

'*****
'***                                     ***
'***   Put Data to Presentation Space   ***
'***                                     ***
'*****
'
'   Writes string "Hello, World!" from PS Position 200
'
Sub Command2_Click ()
On Error GoTo ErrHandler
FunctionComp& = True

Text1.Text      = "Hello, World!"
Text1.LinkItem = "EPS(200,1)"
Text1.LinkPoke

If FunctionComp&= False Then

```

```

        MsgBox "Error has occurred", 48, "DDE sample"
    End If
    Exit Sub

ErrorHandler:
    FunctionComp& = False
    Resume Next
End Sub

'*****
'***                                     ***
'***   Search for String                 ***
'***                                     ***
'*****

'
'   Search forward for string "Hello!" from PS Position 1
'
Sub Command2_Click ()
On Error GoTo ErrorHandler
    FunctionComp& = True

    Text1.LinkItem = "STRING(1,1,""Hello!"")"
    Text1.LinkRequest

    If FunctionComp&= False Then
        MsgBox "Error has occurred", 48, "DDE sample"
    End If
    Exit Sub

ErrorHandler:
    FunctionComp& = False
    Resume Next
End Sub

'*****
'***                                     ***
'***   Session Execute Macro           ***
'***                                     ***
'*****

'
'   Maximize the Session
'
Sub Command2_Click ()
On Error GoTo ErrorHandler
    FunctionComp& = True

    Text1.LinkExecute "[WINDOW(MAXIMIZE)]"

    If FunctionComp&= False Then
        MsgBox "Error has occurred", 48, "DDE sample"
    End If
    Exit Sub

ErrorHandler:
    FunctionComp& = False
    Resume Next
End Sub

'*****
'***                                     ***
'***   Set Cursor Position              ***
'***                                     ***
'*****

'
'   Set Cursor Position (Row,Column) = (1,1)
'

```

```

Sub Command2_Click ()
On Error GoTo ErrHandler
    FunctionComp& = True

    Text1.Text      = "RIC1"
    Text1.LinkItem = "SETCURSOR"
    Text1.LinkPoke

    If FunctionComp&= False Then
        MsgBox "Error has occurred", 48, "DDE sample"
    End If
    Exit Sub

ErrHandler:
    FunctionComp& = False
    Resume Next
End Sub

'*****
'***                                     ***
'***   Terminate Session Conversation   ***
'***                                     ***
'*****
'
'   Terminate DDE Conversation with session
'
Sub Command3_Click ()
On Error GoTo ErrHandlerTerm
    Dim NONE As Integer
    NONE = 0
    FunctionComp& = True

    Text1.LinkMode = NONE

    If FunctionComp&= False Then
        MsgBox "Error has occurred", 48, "DDE sample"
    End If
    Exit Sub

ErrHandlerTerm:
    FunctionComp& = False
    Resume Next
End Sub

'*****/
'/*                                     */
'/*   Session conversation(Hot Link)   */
'/*                                     */
'*****/

'*****
'***                                     ***
'***   Start Close Intercept           ***
'***                                     ***
'*****
'
'   Start Intercepting Close request
'
Sub Command1_Click ()
On Error GoTo ErrHandlerInit
    Dim HOT As Integer
    HOT = 1
    FunctionComp& = True

    DoEvents
    Text1.LinkTopic = "|SessionA"
    Text1.LinkItem = "CLOSE"

```

```

    Text1.LinkMode = HOT

    If FunctionComp&= False Then
        MsgBox "Error has occurred", 48, "DDE sample"
    End If
    Exit Sub

ErrHandlerInit:
    FunctionComp& = False
    Resume Next
End Sub

'-- note -----
'
' If you use VisualBasic Version2.0, use "DoEvents"
' function before starting DDE conversation by
' calling "LinkMode" function.
'
'-----
'*****
'***                                     ***
'***   Start Keystroke Intercept         ***
'***                                     ***
'*****
'
' Start Intercepting Keystrokes
'
Sub Command1_Click ()
On Error GoTo ErrHandlerInit
Dim HOT As Integer
HOT = 1
FunctionComp& = True

DoEvents
Text1.LinkTopic = "|SessionA"
Text1.LinkItem = "KEYS"
Text1.LinkMode = HOT

    If FunctionComp&= False Then
        MsgBox "Error has occurred", 48, "DDE sample"
    End If
    Exit Sub

ErrHandlerInit:
    FunctionComp& = False
    Resume Next
End Sub

'-- note -----
'
' If you use VisualBasic Version2.0, use "DoEvents"
' function before starting DDE conversation by
' calling "LinkMode" function.
'
'-----
'*****
'***                                     ***
'***   Start Session Advise(PS)         ***
'***                                     ***
'*****
'
' Receives PS Data when updated
' (only when "Hello!" is displayed from PS Position 1)
'
Sub Command1_Click ()
On Error GoTo ErrHandlerInit
Dim HOT As Integer

```

```

HOT = 1
FunctionComp& = True

DoEvents
Text1.LinkTopic = "|SessA_PS"
Text1.LinkItem = "PS(1,6,1,""Hello!"")"
Text1.LinkMode = HOT

If FunctionComp&= False Then
    MsgBox "Error has occurred", 48, "DDE sample"
End If

Exit Sub

ErrHandlerInit:
    FunctionComp& = False
    Resume Next
End Sub

'-- note -----
'|
'| If you use VisualBasic Version2.0, use "DoEvents"
'| function before starting DDE conversation by
'| calling "LinkMode" function.
'|
'-----
'| *****
'| ***                                     ***
'| ***   Start Session Advise(TRIMRECT)   ***
'| ***                                     ***
'| *****
'|
'|   Receives PS Data in Trim Rectangle when PS Data in Trim Rectangle
'|   specified by R1C1:R20C40 is changed
'|
Sub Command1_Click ()
On Error GoTo ErrHandlerInit
Dim HOT As Integer
HOT = 1
FunctionComp& = True

DoEvents
Text1.LinkTopic = "|SessA_TRIMRECT"
Text1.LinkItem = "TRIMRECT(1,1,20,40)"
Text1.LinkMode = HOT

If FunctionComp&= False Then
    MsgBox "Error has occurred", 48, "DDE sample"
End If
Exit Sub

ErrHandlerInit:
    FunctionComp& = False
    Resume Next
End Sub

'-- note -----
'|
'| If you use VisualBasic Version2.0, use "DoEvents"
'| function before starting DDE conversation by
'| calling "LinkMode" function.
'|
'-----
'| *****
'| ***                                     ***
'| ***   Start Session Advise(OIA)       ***
'| ***                                     ***
'| *****

```

```

'*****
'
'   Receives OIA Data when changed
'
Sub Command1_Click ()
On Error GoTo ErrHandlerInit
  Dim HOT As Integer
  HOT = 1
  FunctionComp& = True

  DoEvents
  Text1.LinkTopic = "|SessA_OIA"
  Text1.LinkItem = "OIA"
  Text1.LinkMode = HOT

  If FunctionComp&= False Then
    MsgBox "Error has occurred", 48, "DDE sample"
  End If
  Exit Sub

ErrHandlerInit:
  FunctionComp& = False
  Resume Next
End Sub

'-- note -----
'
' If you use VisualBasic Version2.0, use "DoEvents"
' function before starting DDE conversation by
' calling "LinkMode" function.
'
'-----
'*****
'***                                     ***
'***   Terminate Session Conversation(Hot Link) ***
'***                                     ***
'*****
'
'   Terminate DDE Conversation with session (Hot Link)
'
Sub Command3_Click ()
On Error GoTo ErrHandlerTerm
  Dim NONE As Integer
  NONE = 0
  FunctionComp& = True

  Text1.LinkMode = NONE

  If FunctionComp&= False Then
    MsgBox "Error has occurred", 48, "DDE sample"
  End If
  Exit Sub

ErrHandlerTerm:
  FunctionComp& = False
  Resume Next
End Sub

```

Chapter 8. Server-Requester Programming Interface (SRPI) Support

The Server-Requester Programming Interface (SRPI) is an API that provides access to IBM Enhanced Connectivity Facility (ECF) providing the tools to write SRPI requester programs. SRPI uses a single verb, `SEND_REQUEST`, to provide a synchronous call-return interface to remote server programs.

Note: SRPI is not available on Personal Communications for iSeries and will not work when connected to an iSeries, eServer i5, or System i5 host.

PC/3270 SRPI supports 32-bit SRPI Requester Program written in C or C++.

How to Use SRPI

You can write the application program using the SRPI in C or C++. To develop a SRPI application, do as follows:

1. Prepare the source code and add the appropriate SRPI calls.
2. Include the header file `UCCPRB.H` in the application program.
3. Compile the source code.
4. Link the resultant `.OBJ` files with the appropriate object file or libraries.

You must also link it with the SRPI import library, `PCSCAL32.LIB` for 32-bit and `PCSCALLS.LIB` for 16-bit.

SRPI Compatibility

PC/3270 supports the SRPI function with:

- SRPI interface is the same as Personal Communications Version 3.1.
- The SRPI interface is usable via a host connect of the emulator in all modes (except asynchronous and Control Unit Terminal connection) when the physical connection to the host is through a token ring or a coaxial cable, or through SNA or non-SNA protocols.
- If a call is made to the SRPI interface but there is no response from the host due to a communication failure, an associated error is returned to the caller.
- SRPI and EHLLAPI are capable of concurrent operations.
- SRPI is supported only for C requester.
- Server Alias is not supported.
- The 3270 screen update notify is not supported.

`PCSSRPI.DLL` is provided to support the existing 16-bit SRPI applications for Personal Communications `PCSSRPI.DLL` converts 16-bit addressing to 32-bit addressing and passes it to PC/3270 SRPI DLL.

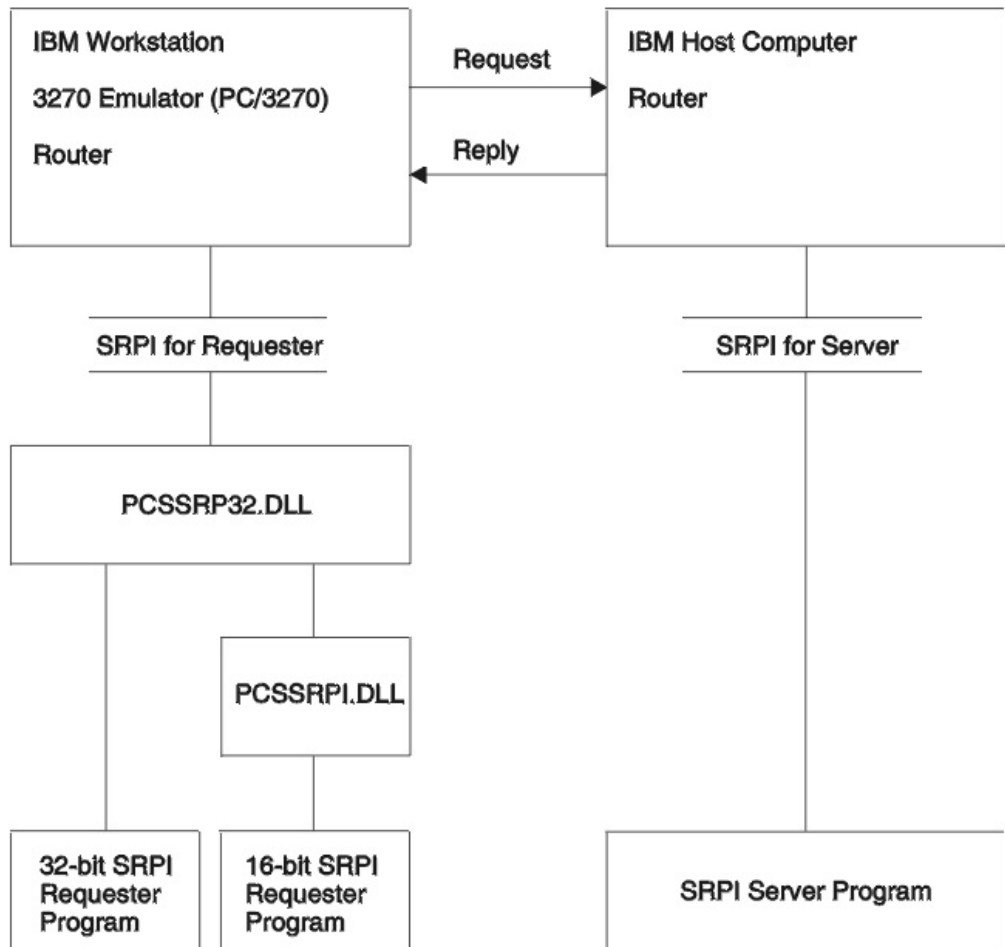


Figure 5. Example of PC/3270 SRPI Requester and Server

Using the Server-Requester Programming Interface

The API between SRPI requesters from the workstation and servers on the host computer is the Server-Requester Programming Interface (SRPI).

Note: For information about a corresponding interface for servers on the IBM host computer, see one of the following publications:

- *TSO/E Version 2 Guide to the Server-Requester Programming Interface*
- *IBM Programmer's Guide to the Server-Requester Programming Interface for VM/System Product*

When used on a workstation, SRPI supports only SRPI requesters. It provides a call-return function for application-to-application communication. Using the **SEND_REQUEST** function, a program on a workstation calls (requests) for service from a partner program on a host computer, which returns (services) the results.

See Figure 6 for an illustration of the workstation and host computer relationship.

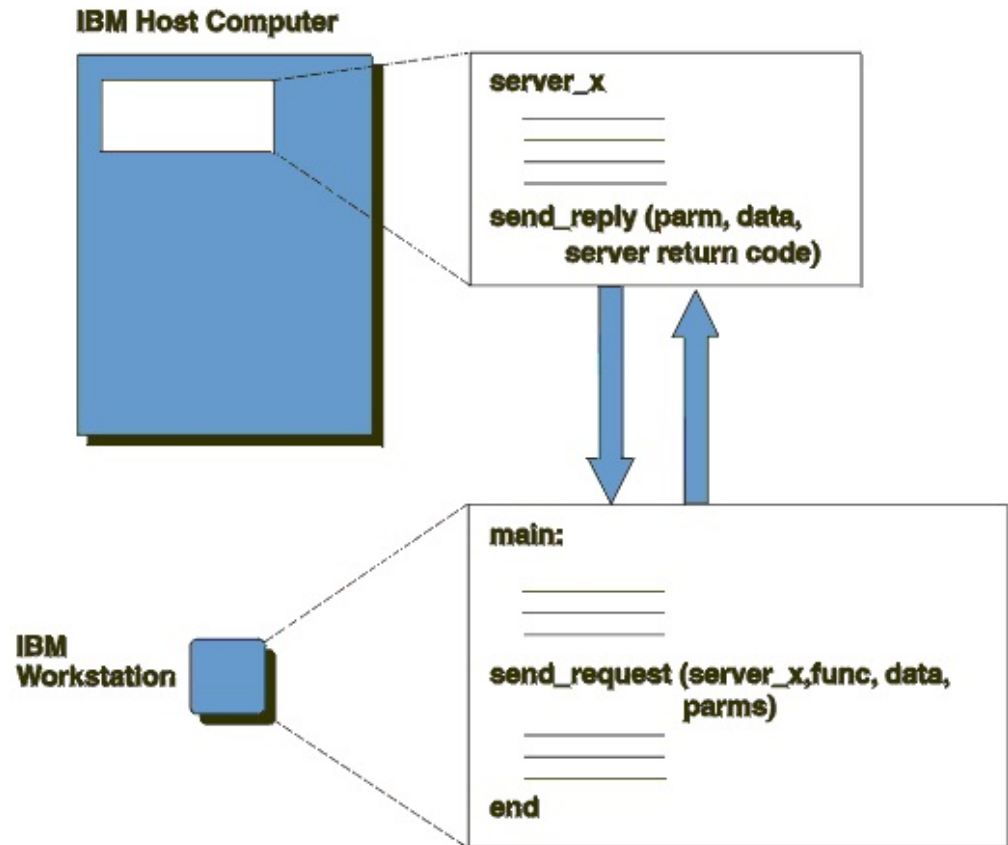


Figure 6. IBM Workstation Requester and IBM Host Computer Server Relationship

Applications use SRPI by issuing the **SEND_REQUEST** verb.

When a workstation SRPI requester issues the **SEND_REQUEST** verb using SRPI:

1. The SRPI router converts the request into a structure that the host computer router recognizes.
2. The SRPI router passes the request to the host computer router, using the appropriate 3270 terminal emulation session.
3. The host computer router passes the request to the appropriate host computer server.
4. The host computer server processes the request and passes a reply back to the host computer router.
5. The host computer router passes the reply back to the SRPI router.
6. The SRPI router converts and returns the reply to the originating SRPI requester application. for See Figure 7 for an illustration of the requester and server flow.

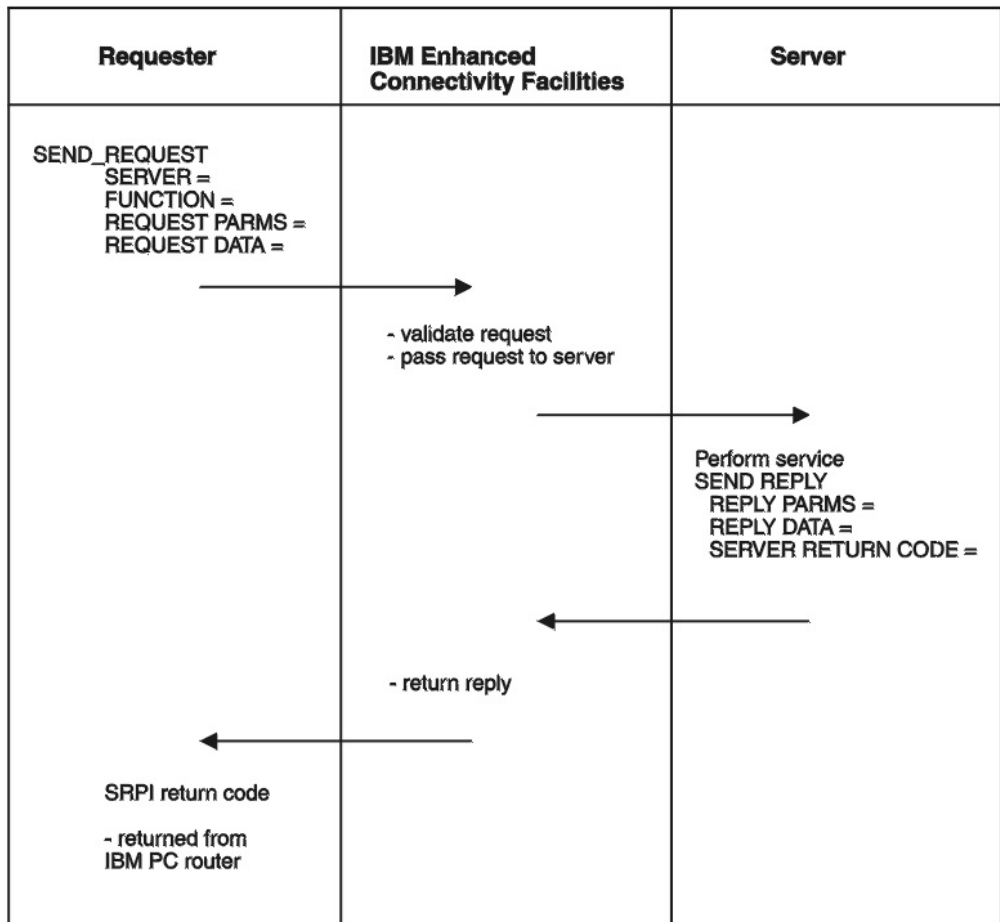


Figure 7. Example of an SRPI Requester and Server Flow

SEND_REQUEST Parameters

The SRPI router sends the request to the host computer using the communication facilities provided by 3270 terminal emulation. SRPI returns control to the SRPI requester with an appropriate return code, optional parameters, and optional data.

The parameters and data associated with the **SEND_REQUEST** function are described in Table 25 on page 332 and in Table 26 on page 334.

Supplied Parameters

Table 25. Parameters Supplied by the SRPI Requester

Name of Parameter	Required/Optional	Default Value	Description
Function ID	Optional	0	A 2-byte unsigned binary number that specifies the server function being requested. Values of 0 through 65535 are valid for specification by an SRPI requester.

Table 25. Parameters Supplied by the SRPI Requester (continued)

Name of Parameter	Required/ Optional	Default Value	Description
Reply data buffer length	Optional	0	A 2-byte unsigned binary number that specifies the length in bytes of the reply data buffer supplied by the SRPI requester. Values of 0 through 65535 are valid. A value of 0 indicates that no reply data is expected from the server.
Reply data buffer pointer	Optional	0	The 4-byte address of the reply data buffer. A nonzero value in the reply data buffer length indicates that there is reply data to be received.
Reply parameters buffer length	Optional	0	A 2-byte unsigned binary number that specifies the length in bytes of the reply parameter buffer supplied by the SRPI requester. Values of 0 through 32763 are valid. A value of 0 indicates that no reply parameters are expected from the server.
Reply parameters buffer pointer	Optional	0	The 4-byte address of the reply parameter buffer. Its presence is indicated by a nonzero value in the reply parameters buffer length.
Request data length	Optional	0	A 2-byte unsigned binary number that specifies the byte length of the request data to be passed to the server. Values of 0 through 65535 are valid. A value of 0 indicates that there is no request data to be passed.
Request data pointer	Optional	0	The 4-byte address of the data, if any, to be passed to the server. A nonzero value in the request data length indicates that there is data to be passed.
Request parameters length	Optional	0	A 2-byte unsigned binary number that specifies the byte length of the request parameters to be passed to the server. Values of 0 through 32763 are valid. A value of 0 indicates that there are no request parameters to be passed.
Request parameters pointer	Optional	0	The 4-byte address of the parameters, if any, to be passed to the server. A nonzero value in the request parameters length indicates that there are parameters to be passed.

Table 25. Parameters Supplied by the SRPI Requester (continued)

Name of Parameter	Required/Optional	Default Value	Description
Server name	Required	Blanks	The name of the host computer server must be 8 bytes long (PC/ASCII), left-justified, and padded with blanks (X'20'); leading blanks, embedded blanks, and names consisting of all blanks are not valid. The valid PC/ASCII characters are A through Z (uppercase and lowercase), 0 through 9, \$, #, and @. The name is converted to EBCDIC before the request is sent to the host computer.

Returned Parameters

Table 26. Parameters Returned to the SRPI Requester

Name of Parameter	Description
SRPI return code	A 4-byte value that specifies the results of the SEND_REQUEST execution. See Appendix D, for a complete description of SRPI return codes.
Server return code	A 4-byte value returned by the server. The contents and meaning of the return status are defined by the requester or the server, but the length of the field is always 32 bits.
Replied parameter length	A 2-byte unsigned binary storage location that specifies the number, in bytes, of parameters returned by the server. Values of 0 through 32763 are valid. A value of 0 indicates that no reply parameters were received from the server.
Replied data length	A 2-byte unsigned binary storage location that specifies the length in bytes of the data returned by the server. Values of 0 through 65535 are valid. A value of 0 indicates that no reply data was received from the server.

Notes:

1. You can set the default values by using the appropriate request record initialization function.
2. The server name is used to route the **SEND_REQUEST** to a 3270 session and to invoke the host server.
3. SRPI requesters and servers determine the contents and meaning of the application data and parameters pointed to by the addresses in the connectivity programming request block (CPRB).

How PC/3270 Applications Use SRPI

A local application running on PC/3270 can issue the **SEND_REQUEST** verb to an application on a connected remote computer. The local application is the SRPI requester and the remote application is the intended server. The SRPI requester can identify a specific function of the server by specifying a function ID.

If the contact is successful, the remote application can provide its services to the SRPI requester. Information on invoking and implementing the `SEND_REQUEST` function follows.

Invoking `SEND_REQUEST`

When an application invokes `SEND_REQUEST`, it appears to the program that the main routine (the local application) calls a subroutine (the remote application). The programmer who writes the requester application must perform the following tasks:

1. Obtain storage for the connectivity programming request block (CPRB).
2. Initialize the CPRB. This involves setting the default values and completing the application parameters.
PC/3270 provides initialization routines and macros for each supported language. These initialization facilities insulate the application from the CPRB mapping and call mechanisms.
3. Call the SRPI dynamic link library (DLL) by issuing `SEND_REQUEST`.
4. Validate the SRPI return code received in the CPRB.

The `SEND_REQUEST` function is implemented as a DLL.

Performance Considerations

The size of the data transfer buffers used by the SRPI router to exchange data with the host computer is calculated automatically by PC/3270. If your SRPI requester produces requests that transfer large blocks of data to and from the server, performance might be improved by overriding the data transfer buffer size calculated by PC/3270. This is accomplished by changing the definition of the logical 3270 display terminals used for SRPI.

The data transfer buffer-size override parameter supplied on the Create/Change Logical 3270 Display Terminal window is used to change the buffer size used by SRPI. A value of 0 indicates that PC/3270 calculates the buffer size. Other values (from 1 through 32) specify the buffer size in multiples of 1024 bytes. Be aware that large values (such as 30) might improve SRPI performance at the expense of overall system performance. Note that the data transfer buffer-size override parameter also sets the size of the data transfer buffers used by the File Transfer feature.

Handling the Interrupt (Ctrl+Break) Key

During processing of a `SEND_REQUEST` verb, all signals (except numeric coprocessor signals) are delayed until verb completion. In particular, pressing the Interrupt (Ctrl+Break) key does not cancel a program during execution of a `SEND_REQUEST` verb.

C Requesters

This section is for programmers who want to write a requester in the C language. It describes:

- C `send_request` function
- SRPI record definition
- `Send_request` function definition

- SRPI return codes

Sample programs are supplied on the Personal Communications installation.

Note: To follow C conventions, the function called **SEND_REQUEST** in other sections is spelled **send_request** in this section.

C send_request Function

The **send_request** parameters are grouped into a single C structure of type **UERCPRB**. The **init_send_req_parms** function is provided to initialize all **send_request** parameters in the **UERCPRB** structure to their defaults. This allows the default values to be set once for parameters not used by a requester. The **send_request** function is provided to make synchronous calls to the server program.

The **init_send_req_parms** and **send_request** functions must be linked with your C application. **PCSSRP32.DLL** for 32-bit interface and **PCSSRPI.DLL** for 16-bit interface; both of these object files are provided with **PC/3270**.

The **send_request** function copies the contents of the **UERCPRB** structure into a connectivity programming request block (**CPRB**) and calls the **PCSSRP32.DLL**. After the server has completed its processing, the **send_request** procedure copies the returned parameters from the **CPRB** into the **UERCPRB** structure and returns control to the C application.

If the request parameters or data consist of several structures, the application must convert the data or parameters into a single flat structure that consists of a contiguous sequence of bytes that are stored in a buffer. The requesting program must package the request parameters and data in a format recognizable by the server.

UERCPRB is a packed structure. That is, each structure member after the first member is stored at the first available byte.

The memory used for the request parameters can also be used for the reply parameters; the memory used for the request data can also be used for the reply data. The application program must ensure that the reply data and parameters are written into the request data and parameters buffer only when the request data and parameters are no longer needed.

SRPI Record Definition

The **UERCPRB** record type defines a record passed to the SRPI router using the **send_request** function. The record is defined in an application program by using the **#include** preprocessor directive to include the **UCCPRB.H** file. For the definitions and value ranges of the supplied and returned parameters, see "Supplied Parameters" on page 332 and "Returned Parameters" on page 334.

SRPI Return Codes

See Appendix D, "SRPI Return Codes," on page 359 for the SRPI return codes.

Chapter 9. Troubleshooting for Emulator programming

You can use the following self-help information resources and tools to help you troubleshoot problems:

- Refer to the release information for your product for known issues, workaround, and troubleshooting information.
- Check if a download or fix is available to resolve your problem.
- Search the available knowledge bases to see if the resolution to your problem is already documented.
- If you still need help, contact IBM Software Support and report your problem.

Partial EHLLAPI input on Personal Communications host screen

Problem

Truncated command text was sent to a host when using IBM Personal Communications.

Cause

If an EHLLAPI application sends a SYSREQ key to the host and then tries to input a command onto the host screen, sometimes only a truncated part of the command is sent to the host. This problem occurs due to lack of synchronization between the SYSREQ processing at the Personal Communications host side and the input of commands from the EHLLAPI application.

When the application sends a SYSREQ command to the host, the following situations occur:

- The OIA is updated to indicate that you are in a SSCP-LU session.
- The Personal Communications session sends the AO command (the SYSREQ) to the 3270 host.

As soon as the host receives the SYSREQ, it responds to Personal Communications with the 0x15 or NL (NewLine) code. When Personal Communications processes this NL command by filling the rest of the line with NULLs, and moving the cursor to the beginning of the next line.

A problem occurs when the EHLLAPI application continues to input various commands in the host screen (through the SendKeys function), even before the Personal Communications session has received the NL command from the host and processed it. As a result, a part of the input command is first entered onto the screen, while the NL command is processed and the cursor is moved over to the next line. Then the remaining part of the command is input on the next line. Thus, only the truncated second part of the command is sent to the host, causing erroneous results.

Resolution

The solution for this problem is to force the EHLLAPI application to wait until the NL command is received and processed, before continuing to input the commands to the host screen. Once the session has notified the EHLLAPI application that the host response for SYSREQ has been processed, the EHLLAPI application can then continue with its input

(because the session is now in the right state to accept new input). To accomplish this, use the following EHLLAPI function calls:

```
Start_Host_Notification (23)
Pause (18)
Set_Session_Parameters (9)
Query_Host_Update (24).
```

Possible code in the EHLLAPI application is as follows:

- Call Sendkeys(@A@H). This sends the SYSREQ command to the session.
- Call StartHostNotify with input B, where B indicates notification of both OIA and PS. This tells the session to notify the EHLLAPI application when the session's OIA and/or PS is updated by the host.
- Call Pause, specifying a sufficient timeout period. This causes the EHLLAPI application to wait until the session notifies it of a host update to the session's OIA and/or PS. This occurs when the session receives the most-awaited host response for the SYSREQ command. Note that if the timeout value has been exceeded, and no host notification has been received, the Pause function call still returns.

Also, for this Pause call to work, you must use the Set_Session_Parameters (9) function call to enable the IPAUSE option. This is required because it tells the Pause API call to return when the host notifies the session of an OIA and/or PS update.

If Pause has returned due to an OIA/PS update (host notification), it has a return value of 26. If this is the case, you are ready to send the host command. Otherwise, you must wait again for the host response.

The EHLLAPI application can continue with the command once it knows that either the OIA or the Presentation Space (or both) has been updated by the host. The QueryHostUpdate is used to check what was updated: that is, whether the OIA alone was updated (return code 21), or the PS alone was updated (return code 22) or whether both the OIA and the PS were updated (return code 23).

For example, the EHLLAPI code might resemble the following part:

```
Send Keys(@A@H) /* Send SYSREQ command to the host */

Start Host Notification with 'B' in byte 2 /* Enable notification to EHLLAPI application
                                           when session's OIA and/or PS are updated */

Set Session Parms with IPAUSE option /* Allow Pause to be interrupted */

Label WW:

Pause for 15 seconds /* 15 secs is a sample time-out value */

retVal = Query Host Update /* Store return value of QueryHostUpdate() into retVal */

If (retVal = 21 or 22 or 23) /* OIA and/or PS was updated */

Send Keys("Your Input Command to host") /* Send input command to host */

else

goto (Label WW)

Stop Host Notification /* Disable host notification */
```

This is the most appropriate solution for this problem, because the EHLLAPI application waits for the exact minimum time required to allow the session to receive and process the SYSREQ host response, before sending its command input.

Another solution is to add a delay [for example, Sleep(1000)] in the EHLLAPI application between the SYSREQ command and the subsequent command, so that the session has enough time to receive and process the host response. However, this solution is not the best, because the delay might be too little or might be excessive.

Refer to RFC 2355 (TN3270 Enhancements) for more information about the 3270 SYSREQ functionality.

IBM Personal Communications VBHLLAPI sample does not run in FDCC Windows Vista

Problem

The IBM Personal Communications VBHLLAPI sample uses controls provided by comdlg32.ocx, which is not installed in the Federal Desktop Core Configuration (FDCC) of Microsoft Windows Vista.

Cause VBHLLAPI uses ActiveX and Common Dialog controls that are provided by the Microsoft comdlg32.ocx module. For security purposes, the FDCC of Windows Vista does not contain this particular module.

Resolution

The FDCC version of Windows Vista is customized, and changes are not recommended.

If HLLAPI samples containing VBHLLAPI need to be run, then the comdlg32.ocx module must be copied from a standard Windows Vista machine into the \Windows\System32\ directory of the FDCC Windows Vista installation.

Then reboot the system for the change to take effect.

Appendix A. Query Reply Data Structures Supported by EHLLAPI

This appendix lists and defines the query reply structures supported by the EHLLAPI structured field interface for PC/3270. Refer to *IBM 3270 Information Display System Data Stream Programmer's Reference* or, in the case of an IBM licensed program, the documentation for the specific licensed program.

Notes:

1. EHLLAPI must scan the query reply buffers to locate the destination/origin ID (DOID) self-defining parameter (SDP) for the structured field support to work and be reliable. The DOID field is then filled in with the assigned ID.
2. The application should build the query reply data structures in the application's private memory.
3. Only cursory checking is performed on the query reply data. Only the ID and the length of the structure are checked for validity.
4. The 2-byte length field at the beginning of each query reply **is not byte reversed**.
5. Only one distributed data management (DDM) base-type connection is allowed per host session. If the DDM connection supports the SDP for the DOID, multiple connections are allowed.
6. If a nonzero return code is received indicating that an application is already connected to the selected session (RC 32 or 39), use that presentation space with caution. Conflicts with SRPI, File Transfer, and other EHLLAPI applications might result.

The DDM Query Reply

Several DDM query reply formats are supported. Here are some of them:

Table 27. DDM Query Reply Base Format

Offset	Length	Content	Meaning
0	1 word	Length	Length of structure
2	1 byte	X'81'	Query reply ID
3	1 byte	X'95'	Query reply type
4-5	2 bytes	FLAGS	Reserved
6-7	2 bytes	LIMIN	Maximum DDM bytes allowed in inbound transmission
8-9	2 bytes	LIMOUT	Maximum DDM bytes allowed in outbound transmission
10	1 byte	NSS	Number of subsets identifier
11	1 byte	DDMSS	DDM subset identifier

DDM Application Name Self-Defining Parameter

The DDM application name self-defining parameter provides the host application with the name of the application containing control of the DDM auxiliary device. The controlling application is identified by the DOID in the Direct Access self-defining parameter.

This self-defining parameter is optional, but it is necessary if a host application is to identify a distinct DDM auxiliary device when more than one application is in existence at a remote workstation.

Table 28. DDM Application Name Self-Defining Parameter

Offset	Length	Content	Meaning
0	1 byte	Length	Parameter length
1	1 byte	X'02'	DDM application name
2-n	n-2 bytes	NAME	Name of the remote application program

NAME The name consists of 8 characters or less and is the means by which a host application can relate to an application in a remote workstation. It is the responsibility of the host and remote application users to ensure that the name is understood by the application at each end.

PCLK Protocol Controls Self-Defining Parameter

The PCLK Protocol Controls self-defining parameter indicates that the PCLK Protocol Controls structured field, ID = X'1013', can be used for both inbound and outbound in data streams destined to or from the DDM auxiliary device processor.

Table 29. DDM PCLK Auxiliary Device Self-Defining Parameter

Offset	Length	Content	Meaning
0	1 byte	X'04'	Parameter length
1	1 byte	X'03'	PCLK protocol controls
2-3	2 bytes	VERS	Protocol version

VERS The value given in VERS is used to indicate the versions of PCLK installed in the terminal at the time the query reply is returned. For example, X'0001' indicates PCLK Version 1.1.

Refer to *IBM 3270 Information Display System Data Stream Programmer's Reference* for the field definitions for this query reply.

Base DDM Query Reply Formats

The following query reply formats are *examples* of some of the Base + SDP (self-defining parameter) combinations possible. Not all of the combinations are shown.

Table 30. Base DDM Query Reply Format with Name and Direct Access Self-Defining Parameters

Offset	Length	Content	Meaning
0	1 word	Length	Length of structure (includes self-defining parameters)
2	1 byte	X'81'	Query reply ID
3	1 byte	X'95'	Query Reply type
4-5	2 bytes	FLAGS	Reserved
6-7	2 bytes	LIMIN	Maximum DDM bytes allowed in inbound transmission
8-9	2 bytes	LIMOUT	Maximum DDM bytes allowed in outbound transmission
10	1 byte	NSS	Number of subsets supported
11	1 byte	DDMSS	DDM subset identifier
12	1 byte	Length (n+2)	Parameter length
13	1 byte	X'02'	DDM application name
14- (13+n)	n bytes	Name	Name of the remote application program
14+n	1 byte	X'04'	Parameter length
15+n	1 byte	X'01'	Direct access ID
16+n - 17+n	2 bytes	DOID	Destination/origin ID assigned by the subsystem

The self-defining parameters begin at offsets 12 and (14 + *n*) where *n* is the length of the application name supplied at offset 14.

Refer to *IBM 3270 Information Display System Data Stream Programmer's Reference* for the field definitions for this query reply.

Table 31. Base DDM Query Reply Format with Direct Access and Name Self-Defining Parameters

Offset	Length	Content	Meaning
0	1 word	Length	Length of structure (includes self-defining parameters)
2	1 byte	X'81'	Query reply ID
3	1 byte	X'95'	Query reply type
4-5	2 bytes	FLAGS	Reserved

Table 31. Base DDM Query Reply Format with Direct Access and Name Self-Defining Parameters (continued)

Offset	Length	Content	Meaning
6-7	2 bytes	LIMIN	Maximum DDM bytes allowed in inbound transmission
8-9	2 bytes	LIMOUT	Maximum DDM bytes allowed in outbound transmission
10	1 byte	NSS	Number of subsets supported
11	1 byte	DDMSS	DDM subset identifier
12	1 byte	X'04'	Parameter length
13	1 byte	X'01'	Direct access ID
14-15	2 bytes	DOID	Destination/origin ID assigned by the subsystem
16	1 byte	Length (n+2)	Parameter length
17	1 byte	X'02'	DDM application name
16+n - 17+n	n bytes	Name	Name of the remote application program

The self-defining parameters begin at offsets 12 and 16.

Refer to *IBM 3270 Information Display System Data Stream Programmer's Reference* for the field definitions for this query reply.

The IBM Auxiliary Device Query Reply

The Auxiliary Device Query Reply is used to indicate to the host application the support of an IBM auxiliary device that uses a data stream defined by IBM, refer to *IBM 3270 Information Display System Data Stream Programmer's Reference* for more details.

When the function is supported, the query reply is transmitted inbound in reply to a Read Partition structured field specifying Query or Query List (QCODE List = X'9E', Equivalent, or All).

When a workstation supports multiple auxiliary devices, the IBM auxiliary devices query reply must be sent for each device.

Optional Parameters

All parameters shown in the base part of the query reply must be present. Parameters not used are set to X'00'.

At least one self-defining parameter must be present.

Table 32. IBM Auxiliary Device Base Format with Direct Access Self-Defining Parameter

Offset	Length	Content	Meaning
0-1	1 word	Length	Length of structure (includes self-defining parameters)
2	1 byte	X'81'	Query reply ID
3	1 byte	X'9E'	IBM auxiliary device reply
4	1 byte	FLAGS	Reserved
	BIT 0	QUERY B'1'	Read Part (Query, Query List) Auxiliary device supports Query
	1-7	RES	Reserved, must be B'0's
5	1 byte	FLAGS	Reserved
6-7	2 bytes	LIMIN	Maximum DDM bytes allowed in inbound transmission
8-9	2 bytes	LIMOUT	Maximum DDM bytes allowed in outbound transmission
10	1 byte	TYPE X'01' X'02' Others	Type of auxiliary device supported IBM auxiliary device display IBM auxiliary device printer Reserved
11	1 byte	X'04'	Parameter length
12	1 byte	X'01'	Direct access
13-14	1 word	DOID	Destination/origin ID assigned by the subsystem

QUERY This bit must be set to B'1' for all IBM auxiliary devices to indicate that it supports receiving a Read Partition (Query, Query List). The host applications can then use a Read Partition directed to the auxiliary device to determine its characteristics. The destination/origin structured field is used to direct the Read Partition structured field to the auxiliary device.

The minimum support level for the IBM auxiliary device is to return the Null query reply in response to the Read Partition.

LIMIN States the maximum number of bytes that can be sent in an inbound transmission. A LIMIN value of X'0000' indicates no implementation limit on the number of bytes transmitted inbound.

LIMOUT States the maximum number of bytes that can be sent to an IBM auxiliary device in an outbound transmission. A LIMOUT value of X'0000' indicates no implementation limit on the number of bytes transmitted outbound.

TYPE Identifies the auxiliary device being supported. Two values are valid. One identifies an auxiliary display and the other identifies an auxiliary printer. All other values are reserved.

The IBM auxiliary device processor supports two self-defining parameters, 01 and 03. These are defined in Table 33 on page 346.

Direct Access Self-Defining Parameter

The direct access self-defining parameter provides the ID for use in the destination/origin structured field in the direct access of the IBM auxiliary device.

This SDP is always required to accompany the base query reply.

Table 33. IBM Auxiliary Device Direct Access Self-Defining Parameter

Offset	Length	Content	Meaning
0	1 byte	X'04'	Parameter length
1	1 byte	X'01'	Direct access ID
2-3	2 bytes	DOID	Destination/origin ID

DOID The value in these bytes is used in the ID field of the destination/origin structured field to identify the auxiliary device as the destination or origin of the data that follows.

PCLK Protocol Controls Self-Defining Parameter

The presence of the PCLK protocol controls self-defining parameter indicates that the PCLK protocol controls structured field, ID = X'1013', can be used for both inbound and outbound in data streams destined to or from the IBM auxiliary device processor.

Table 34. IBM Auxiliary Device PCLK Self-Defining Parameter

Offset	Length	Content	Meaning
0	1 byte	X'04'	Parameter length
1	1 byte	X'03'	PCLK protocol controls
2-3	2 bytes	VERS	Protocol version

VERS The value given in VERS is used to indicate the versions of PCLK installed in the terminal at the time the query reply is returned. For example, X'0001' indicates PCLK version 1.1.

Refer to *IBM 3270 Information Display System Data Stream Programmer's Reference* for the field definitions for this query reply.

The OEM Auxiliary Device Query Reply

The OEM Auxiliary Device query reply format is as follows:

Table 35. OEM Auxiliary Device Base Format with Direct Access Self-Defining Parameter

Offset	Length	Content	Meaning
0-1	1 word	Length	Length of structure (includes self-defining parameters)
2	1 byte	X'81'	Query reply ID
3	1 byte	X'8F'	OEM query reply
4-5	2 bytes	FLAGS	Reserved
6-13	4 words	DTYPE	Device type
14-21	4 words	UNAME	User assigned name
22	1 byte	X'04'	Parameter length
23	1 byte	X'01'	Direct access

Table 35. OEM Auxiliary Device Base Format with Direct Access Self-Defining Parameter (continued)

Offset	Length	Content	Meaning
24–25	1 word	DOID	Destination/origin ID assigned by the subsystem

Refer to *IBM 3270 Information Display System Data Stream Programmer's Reference* for the field definitions for this query reply.

The OEM auxiliary device processor supports two self-defining parameters, 01 and 03. These are defined in Table 36.

Direct Access Self-Defining Parameter

The direct access self-defining parameter provides the ID for use in the destination/origin structured field in the direct access of the OEM auxiliary device.

Table 36. OEM Auxiliary Device Direct Access Self-Defining Parameter

Offset	Length	Content	Meaning
0	1 byte	X'04'	Parameter length
1	1 byte	X'01'	Direct access ID
2–3	2 bytes	DOID	Destination/origin ID

DOID The value in these bytes is used in the ID field of the destination/origin structured field to identify the auxiliary device as the destination or origin of the data that follows.

PCLK Protocol Controls Self-Defining Parameter

The presence of the PCLK protocol controls self-defining parameter indicates that the PCLK Protocol Controls structured field, ID = X'1013', can be used for both inbound and outbound in data streams destined to or from the OEM auxiliary device processor.

Table 37. IBM Auxiliary Device PCLK Self-Defining Parameter

Offset	Length	Content	Meaning
0	1 byte	X'04'	Parameter length
1	1 byte	X'03'	PCLK protocol controls
2–3	2 bytes	VERS	Protocol version

VERS The value given in VERS is used to indicate the versions of PCLK installed in the terminal at the time the query reply is returned. For example, X'0001' indicates PCLK version 1.1.

The Cooperative Processing Requester Query Reply

The Cooperative Processing Requester query reply is also called the SRPI query reply or CPSI query reply. The format is as follows:

Table 38. CPR Query Reply Buffer Format

Offset	Length	Content	Meaning
0	1 word	Length	Length of structure (includes self-defining parameters)
2	1 byte	X'81'	Query reply ID
3	1 byte	X'AB'	Query reply type
4-5	2 bytes	FLAGS	Reserved
6-7	2 bytes	LIMIN	Maximum DDM bytes allowed in inbound transmission
8-9	2 bytes	LIMOUT	Maximum DDM bytes allowed in outbound transmission
10	1 byte	FETAL	Length (in bytes) of the following feature information
11-12	1 word	FEATS	CPR length and feature flags
13- (N*2)+12	0-2 bytes	FEATSs	Additional flags
(N*2)+12	1 byte	X'04'	Length of DOID SDP
(N*2)+13	1 byte	X'01'	Type of D/O ID
(N*2)+14	1 word	DOID	Destination/origin ID assigned by the subsystem

Refer to *IBM 3270 Information Display System Data Stream Programmer's Reference* for the field definitions for this query reply.

The Product-Defined Query Reply

This query reply is used by IBM products using registered subidentifiers within the X'9C' data structure. The Product-Defined Data Stream query reply indicates support of a 3270DS workstation auxiliary device that uses an IBM product-defined data stream. The data stream is *not* defined by a format architecture document having an identifiable control point such as an architecture review board.

When an auxiliary device supports an IBM product-defined data stream, this query reply is transmitted inbound in reply to a Query List (QCODE List = X'9C' or All).

Optional Parameters

All parameters shown in the base part of the query reply and the direct access self-defining parameter must be present.

The format of the Product-Defined query reply is as follows:

Table 39. IBM Product-Defined Query Reply Base Format

Offset	Length	Content	Meaning
0-1	1 word	Length	Length of structure (includes self-defining parameters)
2	1 byte	X'81'	Query reply ID
3	1 byte	X'9C'	IBM product-defined data stream
4-5	2 bytes	FLAGS	Reserved
6	1 byte	REFID	Reference identifier
7	1 byte	SSID	Subset identifier
8	1 byte	X'04'	Parameter length
9	1 byte	X'01'	Direct access
10-11	1 word	DOID	Destination/origin ID assigned by the subsystem

Valid values for REFID (offset 6) and SSID (offset 7) of the Product-Defined query reply are as follows:

Table 40. Valid REFID and SSID Values for the IBM Product-Defined Query Reply

REFID	SSID	Product and Data Stream Documentation
X'01'		5080 Graphics System: This reference ID indicates the 5080 Graphics System data stream is supported by the auxiliary device. Descriptions of the 5080 Graphics Architecture, structured field, subset ID, DOID, and associated function sets are defined in <i>IBM 5080 Graphics System Principles of Operation</i>
	X'01' X'02'	5080 HGFD Graphics Subset 5080 RS232 Ports Subset
X'02'		WHIP API (replaced by SRL name when written) This reference ID indicates that the WHIP API data stream is supported by the auxiliary device. A description of the WHIP API architecture is defined in <i>IBM RT PC Workstation Host Interface Program Version 1.1 User's Guide and Reference Manual</i>
	X'01'	WHIP Subset 1
X'03' to X'FF'		All other values are reserved.

The IBM product-defined processor supports only the direct access self-defining parameter. It is defined in Table 41 on page 350.

Direct Access Self-Defining Parameter

The presence of the Direct Access ID self-defining parameter indicates that the auxiliary device can be accessed directly by using the destination/origin structured

field. When multiple auxiliary devices are supported that use a product-defined data stream, separate Product-Defined Data Stream query replies must be provided, each of which has a unique DOID.

Table 41. IBM Product-Defined Direct Access Self-Defining Parameter

Offset	Length	Content	Meaning
0	1 byte	X'04'	Parameter length
1	1 byte	X'01'	Direct access ID
2-3	2 bytes	DOID	Destination/origin ID

DOID The value in these bytes is used in the ID field of the destination/origin structured field to identify the auxiliary device as the destination or origin of the data that follows.

The Document Interchange Architecture Query Reply

This query reply indicates the Document Interchange Architecture (DIA) function set supported. The format of the DIA Query Reply is as follows:

Table 42. IBM DIA Base Format

Offset	Length	Content	Meaning
0	1 word	Length	Length of structure (includes self-defining parameters)
2	1 byte	X'81'	Query reply ID
3	1 byte	X'97'	IBM DIA
4-5	2 bytes	FLAGS	Reserved
6-7	2 bytes	LIMIN	Maximum DDM bytes allowed in inbound transmission
8-9	2 bytes	LIMOUT	Maximum DDM bytes allowed in outbound transmission
10	1 byte	NFS	Number of 3-byte function set IDs that follow
11-13	3 bytes	DIAFS	DIA function set identifier
14- (13+(N*3))	N*3 bytes	DIAFSs	Additional DIA function set IDs
14+(N*3)	1 byte	X'04'	Parameter length
15+(N*3)	1 byte	X'01'	Direct access
16+(N*3)	1 word	DOID	Destination/origin ID assigned by the subsystem

The DIA auxiliary device processor supports only the direct access self-defining parameter. It is defined in Table 43 on page 351.

The presence of the direct access ID self-defining parameter indicates that the auxiliary device can be accessed directly by using the destination/origin structured field.

Table 43. IBM Product-Defined Direct Access Self-Defining Parameter

Offset	Length	Content	Meaning
0	1 byte	X'04'	Parameter length
1	1 byte	X'01'	Direct access ID
2-3	2 bytes	DOID	Destination/origin ID

DOID The value in these bytes is used in the ID field of the destination/origin structured field to identify the auxiliary device as the destination or origin of the data that follows.

Refer to *IBM 3270 Information Display System Data Stream Programmer's Reference* for the field definitions for this query reply.

Appendix B. Differences from Communication Manager/2 EHELLAPI

This appendix describes the differences between EHELLAPI of Personal Communications and EHELLAPI for Communication Manager/2.

The following EHELLAPI functions are different from those with the same names in Communication Manager/2. You need to understand the differences when you use these functions:

- **Set Session Parameter** (9)
- **Copy OIA** (13)
- **Copy String to PS** (15)
- **Storage Manager** (17)
- **Copy String to Field** (33)
- **Get Key** (51)
- **Window Status** (104)
- **Query Sessions** (10)
- **Connect for Structured Field** (120)
- **Allocate Communications Buffer** (123)
- ASCII mnemonics

Set Session Parameter (9)

Set Options

Personal Communications does not provide the following set options provided by Communication Manager:

OLDOIA, NEWOIA
COMPCASE, COMPICASE
OLD5250OIA, NEW5250OIA

Return Parameters

When the **Set Session Parameter** (9) function is terminated, Communication Manager returns a length of the valid data string as the third parameter, the data string length. However, Personal Communications returns a number of the valid set options as the data string length.

EAB Option

In Communication Manager/2, a color remap affects the value of the character color in the EAB attribute copied by **Copy PS** (5) or **Copy PS to String** (8) function when the EAB option is specified in the **Set Session Parameter** (9) function.

In Personal Communications, however, the value of the character color in the EAB attribute depends on the contents of the presentation space regardless of a color remap, and it is not affected by a color remap.

Copy OIA (13)

The **Copy OIA (13)** function has the following differences between Communication Manager/2 and Personal Communications. For more information of the group and the column positions, refer to “Copy OIA (13)” on page 48.

- Byte Position 21
 - Personal Communications returns X'F6'.
 - Communication Manager/2 returns X'20'.
- Byte Positions 61–63
 - Personal Communications does not return the printer information.
 - Communication Manager/2 returns the printer information.
- Group 3: Shift State

Communication Manager/2 does not return the value of bit 2. Bit 2 is reserved, and bit 0 contains both the Upper Shift and the Caps Lock.
- Group 8 Byte 1: Input Inhibited
 - Personal Communications does not return bit 6 (Device not working).
 - Communication Manager/2 can return bit 6.
- Group 8 Byte 3: Input Inhibited
 - Personal Communications does not return bit 1 (Operator unauthorized) and bit 2 (Operator unauthorized -f).
 - Communication Manager/2 can return bits 1 and 2.
- Group 8 Byte 4: Input Inhibited
 - Personal Communications does not return bit 2 (System wait).
 - Communication Manager/2 can return bit 2.
- Group 10: Highlight Group 2
 - Personal Communications does not return bit 0 (Selected).
 - Communication Manager/2 can return bit 0.
- Group 11: Color Group 2
 - Personal Communications does not return bit 0 (Selected).
 - Communication Manager/2 can return bit 0.
- Group 13: Printer Status
 - In Personal Communications, this group is reserved.
 - Communication Manager/2 can return this group.
- Group 14: Graphics

Communication Manager/2 does not return bit 0 (Graphic cursor).

Copy String to PS (15)

In Communication Manager/2, the EAB option of the **Set Session Parameter (9)** function affects the **Copy String to PS** function. When you specify the EAB option, pass the attribute data that has the same size as the text data to the function with the text data.

In Personal Communications, however, the data to be passed is only text data regardless of EAB option. If you want to use the same interface with Communication Manager/2, use the PUTEAB option of **Set Session Parameter (9)**.

Storage Manager (17)

Storage Manager (17) function provided by Communication Manager/2 is not supported by Personal Communications. Use the APIs provided by Windows to allocate the memory for the applications.

Copy String to Field (33)

In Communication Manager/2, when the EAB option of the **Set Session Parameter (9)** function is specified, the attribute data is passed to the function as a part of the data. Therefore, when you specify the EAB option, pass the attribute data that has the same size as the text data to the function with the text data.

In Personal Communications, however, the EAB option does not affect the data contents of the **Copy String to Field (33)** function. The data to be passed is not the attribute data, but only the text data. If you want to use the same interface with Communication Manager/2, use the PUTEAB option of **Set Session Parameter (9)**.

Get Key (51)

Communication Manager/2 returns shift state using @A, @S, or @r, if the shift state of a passed key is not a key or function recognized by the emulator session. Personal Communications does not support these ASCII mnemonics.

Window Status (104)

EHLAPI function 104 (PM_WINDOW_STATUS) 'query extended status' command (0x03) will return the handle of the emulator presentation space window. This is consistent with the definition of the function and the Communication Manager/2 implementation. However, Personal Communications for Windows EHLAPI returns the handle of the frame window. EHLAPI applications written for Personal Communications for Windows using this function need to use the parent of the window handle returned.

Query Sessions (10)

In Communication Manager/2, the descriptor for personal computer is returned. However, the descriptor is not returned in Personal Communications.

Connect for Structured Fields (120)

The event object for communication connection status provided by Communication Manager/2 is not in Personal Communications.

Allocate Communications Buffer (123)

In Communication Manager/2, the maximum value of the requested buffer size is 64 KB minus 8 bytes (X'FFF8').

In Personal Communications, however, it is 64 KB minus 256 bytes (X'FF00').

ASCII Mnemonics

The following ASCII mnemonics are not supported in Personal Communications:

Mnemonics	Meaning
@A@N	Get Cursor
@A@O	Locate Cursor
@A@X	Hexadecimal
@A@Y	Cmd (Function) Key
@A@a	Destructive Backspace
@S@A	Erase EOL
@S@B	Field Advance
@S@C	Field Backspace
@S@D	Valid Character Backspace
@S@P	POR (For sending only)
@S@T	Jump to Task Manager
@/	Overrun of queue (Only in the Get Key function)

Get Request Completion (125)

Personal Communications does not support a blank or null session ID.

Appendix C. DOS-Mode EHLLAPI for Windows

Personal Communications supports EHLLAPI applications for DOS. This appendix provides information about this support.

Installation

To install DOS EHLLAPI support for Personal Communications do the following:

1. Select the Emulator Utilities folder from the Utilities folder in the IBM Personal Communications folder.
2. Select DOS EHLLAPI application from the Emulator Utilities folder.
3. Select the check box of the DOS MODE EHLLAPI to enable DOS EHLLAPI support.
4. Enter the major DOS version for which your DOS EHLLAPI applications are written. (For example, 2 for DOS Emulator Version 2.x).
5. Select OK to enable changes.
6. Shut down the workstation and restart it again.

This procedure adds the following statement in config.nt.

```
device=%SystemRoot%\system32\drivers\hlldrv.com
```

Note: DOS EHLLAPI applications assert interrupt X'7F' to request EHLLAPI services. Any other proprietary DOS application using interrupt X'7F' will not work with DOS EHLLAPI enabled and vice-versa.

Appendix D. SRPI Return Codes

This appendix describes error handling in the SRPI environment. Types 0, 1, 2, and 3 return codes and their definitions are listed. Exception class definitions, code values, and object values are listed. Server return codes are also discussed.

Error Handling

An unsuccessful service request in the SRPI environment can result from problems at any of the different layers. SRPI shields applications from transport layer errors as much as possible. Errors within server processing are handled by the applications. The other errors are caused by SRPI and are treated accordingly.

Transport Layer Errors

SRPI tries to recover from transport layer errors. When recovery is not possible, SRPI returns to the requester with a return code indicating transport layer failure. The programmer should handle such failures using the problem determination procedures of the transport mechanism.

Application Errors

SRPI is responsible for routing requests to servers and returning replies to requesters. Requesters and servers are responsible for handling errors (except for abend) that servers encounter. When a server ends abnormally, SRPI returns to the requester with an abend notice in the SRPI return code.

The server return code is set by the server on the IBM host computer running under VM or MVS. The value and meaning of the server return code is dependent on the requester or the server.

SEND_REQUEST Processing Errors

SRPI return codes can encounter a number of errors in processing the `SEND_REQUEST` function. Such errors include:

- Incorrect function parameters
- Unidentified server
- Inability to contact the server

There are also system error codes for internal SRPI errors.

Types of SRPI Return Codes

SRPI return codes include types 0, 1, 2, and 3:

Type 0

Indicates successful completion of the `SEND_REQUEST` function.

Type 1

Indicates errors detected by the SRPI router that prevent a request from being processed.

Type 2

Indicates errors detected by the SRPI router and reported to the remote computer by an acknowledge interchange unit.

Type 3

Indicates errors detected by the remote computer and reported to the SRPI router by an acknowledge interchange unit.

The return code values are word-reversed and byte-reversed within each word. For example, the SRPI return code X'0100 0402' is stored in the CPRB memory as X'0204 0001'.

Type 0 Return Code Definitions

The type 0 return code (constant return code UERERROK) has the following format: X'0000 0000'. This return code value indicates that the SRPI function completed successfully.

Type 1 Return Code Definitions

Type 1 return codes have the following format: X'0100 nnnn'.

The *nnnn* bytes are the hexadecimal value that indicates the specific error detected.

The return code definitions and descriptions are listed in Table 44.

Table 44. Type 1 Return Code Definitions and Descriptions

Hexadecimal Return Code	Constant Return Code	Description
X'0100 0402'	UERERRT1START	SRPI is not started because the host ECF program is not started.
X'0100 0404'	UERERRT1LOAD	The SRPI router is not loaded.
X'0100 0408'	UERERRT1BUSY	The SRPI router is busy. This return code is not used by the Personal Communications program.
X'0100 040A'	UERERRT1VER	The version ID in the CPRB passed to the SRPI router is not supported by the resident portion of the SRPI router. The version ID is automatically put into the CPRB by the C interface facility.
X'0100 040C'	UERERRT1EMU	Personal Communications is not loaded.
X'0100 040E'	UERERRT1ROUT	The server name supplied in the CPRB is not defined in the server routing table. Default routing is not configured so SRPI is unable to route the request. Use a valid server name or update the configuration to include the server name.
X'0100 0410'	UERERRT1COMMR	Communications resource not available.
X'0100 0412'	UERERRT1REST	3270 emulation has been restarted since the application last used SRPI. End the application and restart it before using SRPI.
X'0100 0414'	UERERRT1INUSE	The request has been routed to a communication session that is in use by File Transfer.
X'0100 0602'	UERERRT1QPLEN	Request parameters length exceeds the maximum value. The maximum value allowed is 32763.

Table 44. Type 1 Return Code Definitions and Descriptions (continued)

Hexadecimal Return Code	Constant Return Code	Description
X'0100 0604'	UERERRT1RPLEN	Reply parameters buffer length exceeds the maximum value. The maximum value allowed is 32763.
X'0100 0606'	UERERRT1VERB	Incorrect or unsupported verb type. The verb type in the CPRB passed to the SRPI router is not recognized. The verb type is put into the CPRB automatically by the C interface facility.
X'0100 0608'	UERERRT1SERV	Incorrect server name. One or more characters in the server name could not be converted to EBCDIC for sending to the host.
X'0100 060C'	UERERRT1QPAD	One of the following conditions exists: <ul style="list-style-type: none"> • The request parameter address is not valid. • The request parameter length extends beyond the end of the request parameter buffer. • The request parameter address is 0 with a nonzero request parameter length.
X'0100 060E'	UERERRT1QDAD	One of the following conditions exists: <ul style="list-style-type: none"> • The request data address is not valid. • The request data length extends beyond the end of the request data buffer. • The request data address is 0 with a nonzero request data length.
X'0100 0610'	UERERRT1RPAD	One of the following conditions exists: <ul style="list-style-type: none"> • The reply parameter buffer address is not valid. • The reply parameter buffer length extends beyond the end of the reply parameter buffer. • The reply parameter buffer address is 0 with a nonzero reply parameter length.
X'0100 0612'	UERERRT1RDAD	One of the following conditions exists: <ul style="list-style-type: none"> • The reply data buffer address is not valid. • The reply data buffer length extends beyond the end of the reply data buffer. • The reply data buffer address is 0 with a nonzero reply data length.
X'0100 0616'	UERERRT1TOPV	The TopView environment is not supported. This return code is not used by the Personal Communications program.

Table 44. Type 1 Return Code Definitions and Descriptions (continued)

Hexadecimal Return Code	Constant Return Code	Description
X'0100 0622'	UERERRT1INV3270 d	Notification of 3270 screen update indicator is not valid. The Notification of 3270 screen update indicator must be set to X'00' (notify user of 3270 screen update) or X'FF' (suppress user notification of 3270 screen update) in the CPRB.
X'0100 0624'	UERERRT1INVCPRB	Incorrect CPRB segment. The CPRB address points to a truncated CPRB structure. Use a read/write data segment large enough to contain the entire CPRB structure.
X'0100 0802'	UERERRT1CNCL	The remote computer canceled the communication session while the request was being processed. You can cause this to happen by stopping the remote program with the F3 key in the emulator session. However, use of this value is not limited to user-initiated cancellation of the session. It is used any time SRPI receives notification from the host that the session is canceled while processing a request.
X'0100 0C00'	UERERRT1CONV	A system error occurred. Conversation with the host ended for one of the following reasons: <ul style="list-style-type: none"> • The host communication session is not active. • A link-level communication error occurred. • The system was unable to transmit data reliably to or from the host. For example, a sequence error occurred.
X'0100 0C02'	UERERRT1ISE	A system error occurred because of an internal software error in the SRPI router.
X'0100 0C04'	UERERRT1PROT	A system error occurred. This is a protocol violation error or a system software error in the SRPI router or the host.
X'0100 0C06'	UERERRT1SYIN	A system error occurred. The error is caused by system inconsistency. This is a system software error in the SRPI router.

Type 2 Return Code Definitions

Type 2 return codes have the following format: X'02xx yyzz'.

The 3 error-specific bytes consist of the following exception conditions from the acknowledge interchange unit:

- xx exception class

- *yy* exception code
- *zz* exception object

Note: No constants are supplied.

Type 3 Return Code Definitions

Type 3 return codes have the following format: X'03xx yyzz'.

The 3 error-specific bytes consist of the following exception conditions from the acknowledge interchange unit:

- *xx* exception class
- *yy* exception code
- *zz* exception object

The return code definitions and descriptions are listed in Table 45.

Table 45. Type 3 Return Code Definitions and Descriptions

Hexadecimal Return Code	Constant Return Code	Description
X'0304 1D00'	UERERRT3NORES	A resource required by the host SRPI router to process the request is not available. This might be a temporary condition.
X'0304 1E00'	UERERRT3NOSER	The server is unknown at the host.
X'0304 1F00'	UERERRT3UNSER	The server is not available at the host.
X'0304 2200'	UERERRT3TERMS	The server terminated in a normal fashion but did not send a reply.
X'0304 2300'	UERERRT3ABNDS	The server terminated abnormally and did not send a reply.

Class Definitions for Type 2 and Type 3

The exception classes are syntax, semantic, and process.

- **Syntax exception class.** This class reports violations of the transmission unit syntax rules (for example, omitting the server return code parameter: X'0202 1A08'). In general, a return code reporting a syntax exception indicates a system software error in the SRPI router or in the host.
- **Semantic exception class.** This class reports conflicting parameters (for example, an incorrect correlation value: X'0203 1B00'). In general, a return code reporting a semantic exception indicates a system software error in the SRPI router or in the host.
- **Process exception class.** This class reports exception conditions during request processing (for example, server unknown: X'0304 1E00').

The exception class definitions are listed in Table 46.

Table 46. Class Definitions for Type 2 and Type 3

Value	Definition
X'00' to X'01'	Reserved
X'02'	Syntax

Table 46. Class Definitions for Type 2 and Type 3 (continued)

Value	Definition
X'03'	Semantic
X'04'	Process
X'05' to X'FF'	Reserved

Exception Code Values for Type 2 and Type 3

The exception code defines a specific error condition and is required with every error. The exception code values are listed in Table 47.

Table 47. Exception Code Values for Type 2 and Type 3

Value	Definition
X'00'	Reserved
X'08'	Segmentation
X'0C'	Incorrect operand ID
X'0F'	Incorrect length
X'16'	Incorrect subfield type
X'18'	Incorrect subfield value
X'19'	Required operand missing
X'1A'	Required subfield missing
X'1B'	Correlation error
X'1C'	Data exceeds allowable maximum length
X'1D'	Resource not available
X'1E'	Server unknown
X'1F'	Server not available
X'20'	Parameter length
X'21'	Data length
X'22'	Normal termination
X'23'	Abnormal termination (server abend)
X'24'	Multiple occurrences of a subfield
X'25'	Multiple occurrences of operand

Note: All exception code values not specified in this table are reserved.

Exception Object Values for Type 2 and Type 3

The exception object defines the incorrect transmission unit object. An exception object is required with syntax errors. The exception object values are listed in Table 48.

Table 48. Exception Object Values for Type 2 and Type 3

Value	Definition
X'00'	Not specified
X'01'	Prefix

Table 48. Exception Object Values for Type 2 and Type 3 (continued)

Value	Definition
X'07'	Command operand
X'08'	Command subfields
X'1C'	Parameters operand
X'1D'	Data operand
X'13'	Suffix

Note: All exception object values not specified in this table are reserved.

Server Return Codes

A server return code is a doubleword (4-byte) return code supplied by the server program and is returned to the requester program. The contents and meaning of the return status are defined by the requester or the server. For information about server return codes, contact your host personnel or see one of the following manuals:

- *TSO/E Version 2 Guide to the Server-Requester Programming Interface*
- *IBM Programmer's Guide to the Server-Requester Programming Interface for VM/System Product*

Appendix E. DDE Functions in a 16-Bit Environment

This appendix describes DDE functions in 16-bit mode. This is useful information when you are migrating from 16-bit to 32-bit mode.

PC/3270 Windows mode and PC400 provide a dynamic data exchange (DDE) interface that allows applications to exchange data. The exchange of data between two Windows applications can be thought of as a conversation between a client and a server. The *client* initiates DDE conversations. The *server* in turn responds to the client. Personal Communications is a DDE server for the open sessions that Personal Communications is managing. For more information about DDE, refer to *Microsoft Windows Software Development Kit Guide to Programming*.

Note: If you use DDE functions with Visual Basic, see Chapter 7, "Using DDE Functions with a DDE Client Application," on page 297.

Personal Communications DDE Data Items in a 16-Bit Environment

Microsoft Windows DDE uses a three-level naming scheme to identify data items: application, topic, and item. Table 49 describes these levels.

Table 49. Naming Scheme for Data Items

Level	Description	Example
Application	A Windows task or a particular task of an application. In this book, the application is Personal Communications.	IBM3270
Topic	A specific part of an application.	SessionA
Item	A data object that can be passed in a data exchange. An item is an application-defined data item that conforms to one of the Windows clipboard formats or to a private, application-defined, clipboard format. For more information regarding Windows clipboard formats, refer to <i>Microsoft Windows Software Development Kit Guide to Programming</i> .	PS (presentation space)

Personal Communications supports IBM3270 IBM5250 as Windows DDE server.

You can use the following topics:

- System
- SessionA, SessionB, ..., SessionZ
- LUA_xxxx, LUB_xxxx, ..., LUZ_xxxx

In DDE, *atoms* identify application names, topic names, and data items. Atoms represent a character string that is reduced to a unique integer value. The character string is added to an atom table, which can be referred to for the value of the string associated with an atom. Atoms are created with the GlobalAddAtom function call. Refer to *Microsoft Windows Software Development Kit Guide to Programming* for more information about how to create and use atoms.

Using System Topic Data Items

Applications that provide a DDE interface should also provide a special topic SYSTEM. This topic provides a context for items of information that might be of general interest to an application. The SYSTEM topic for Personal Communications contains these associated data items:

Item	Function
Formats	Returns the list of clipboard formats (numbers) that Personal Communications is capable of rendering.
Status	Returns information about the status of each Personal Communications session.
SysCon	Returns the level of Personal Communications support and other system related values.
SysItems	Returns the list of data items that are available when connected to the Personal Communications system topic.
Topics	Returns the list of Personal Communications topics that are available.

Using Session Topic Data Items

For each Session topic, the following data items are supported:

Item	Function
CLOSE	Retrieves the window close requests.
EPS	Retrieves the session presentation space with additional data.
EPSCOND	Retrieves the presentation space service condition.
FIELD	Retrieves the field in the presentation space of the session.
KEYS	Retrieves the keystrokes.
MOUSE	Retrieves the mouse input.
OIA	Retrieves the operator information area status line.
PS	Retrieves the session presentation space.
PSCOND	Retrieves the session advise condition.
SSTAT	Retrieves the session status.
STRING	Retrieves the ASCII string data.
TRIMRECT	Retrieves the session presentation space within the current trim rectangle.

Using LU Topic Data Items (PC/3270 Only)

For each LU topic, the following data items are supported:

Item	Function
SF	Retrieves the destination/origin structured field data.
SFCOND	Retrieves the query reply data.

DDE Functions in a 16-Bit Environment

Table 50 lists the DDE functions that are available for use with Personal Communications.

Table 50. DDE Functions in a 16-Bit Environment

Function	PC/3270 Windows	PC400
"Find Field" on page 370	Yes	Yes
"Get Keystrokes" on page 371	Yes	Yes
"Get Mouse Input" on page 372	Yes	Yes

Table 50. DDE Functions in a 16-Bit Environment (continued)

Function	PC/3270 Windows	PC400
"Get Number of Close Requests" on page 375	Yes	Yes
"Get Operator Information Area" on page 376	Yes	Yes
"Get Partial Presentation Space" on page 377	Yes	Yes
"Get Presentation Space" on page 379	Yes	Yes
"Get Session Status" on page 381	Yes	Yes
"Get System Configuration" on page 382	Yes	Yes
"Get System Formats" on page 383	Yes	Yes
"Get System Status" on page 384	Yes	Yes
"Get System SysItems" on page 385	Yes	Yes
"Get System Topics" on page 386	Yes	Yes
"Get Trim Rectangle" on page 387	Yes	Yes
"Initiate Session Conversation" on page 387	Yes	Yes
"Initiate Structured Field Conversation" on page 388	Yes	No.
"Initiate System Conversation" on page 389	Yes	Yes
"Put Data to Presentation Space" on page 389	Yes	Yes
"Search for String" on page 390	Yes	Yes
"Send Keystrokes" on page 391	Yes	Yes
"Session Execute Macro" on page 392	Yes	Yes
"Set Cursor Position" on page 398	Yes	Yes
"Set Mouse Intercept Condition" on page 400	Yes	Yes
"Set Presentation Space Service Condition" on page 402	Yes	Yes
"Set Session Advise Condition" on page 403	Yes	Yes
"Set Structured Field Service Condition" on page 404	Yes	No
"Start Close Intercept" on page 405	Yes	Yes
"Start Keystroke Intercept" on page 407	Yes	Yes
"Start Mouse Input Intercept" on page 408	Yes	Yes
"Start Read SF" on page 411	Yes	No
"Start Session Advise" on page 412	Yes	Yes
"Stop Close Intercept" on page 413	Yes	Yes
"Stop Keystroke Intercept" on page 414	Yes	Yes
"Stop Mouse Input Intercept" on page 415	Yes	Yes
"Stop Read SF" on page 415	Yes	No
"Stop Session Advise" on page 416	Yes	Yes
"Terminate Session Conversation" on page 417	Yes	Yes
"Terminate Structured Field Conversation" on page 417	Yes	No
"Terminate System Conversation" on page 417	Yes	Yes
"Write SF" on page 418	Yes	No

Refer to "Summary of DDE Functions in a 16-Bit Environment" on page 430 for a summary of the 16-bit DDE functions.

Naming Conventions for Parameters

Most DDE parameter names and local variables. These variables have a prefix that indicates the general type of the parameter, followed by one or more words that describe the content of the parameter. Prefixes presented in this book are:

- a Atom
- c Character (a 1-byte value)

- f** Bit flags packed into a 16-bit integer
- h** 16-bit handle
- p** Short (16-bit) pointer
- lp** Long (32-bit) pointer
- w** Short (16-bit) unsigned integer
- u** Unsigned integer
- sz** Null-terminated character string

Find Field

<i>3270</i>	<i>5250</i>	<i>VT</i>
Yes	Yes	Yes

The **Find Field** function returns to the client the information of the field specified by the **Set Presentation Space Service Condition** function.

Note: The client must set the PS position by using the **Set Presentation Service Condition** function before using this function.

The client sends this following message to receive the field information.

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELONG(cfFormat, aFIELD) );
```

where:

- cfFormat** Identifies the format for the field information. This must be CF_DSPTEXT.
- aFIELD** Identifies field data item.

The **Find Field** function supports a new format like Visual Basic. Using the new format, the **Find Field** function can find a field with specifying its type. The new format is:

FIELD (pos, type)

- pos** Position where Personal Communications starts to search a target field.
- type** Target field type. The field type are:

Type	Meaning
bb or Tb	This field.
Pb	The previous field, either protected or unprotected.
Nb	The next field, either protected or unprotected.
NP	The next protected field.
NU	The next unprotected field.
PP	The previous protected field.
PU	The previous unprotected field.

Note: The **b** symbol represents a required blank.

Personal Communications Response

Personal Communications returns the following information of the field in a DDE data message,

- Start PS position
- Length
- Attribute value

WM_DDE_DATA(hData, aFIELD)

or responds with an ACK message containing status information.

WM_DDE_ACK(wStatus, aFIELD)

If Personal Communications cannot return the field information, one of the following status codes is returned in the low-order byte of the wStatus word:

Return Code	Explanation
1	PS position is not valid.
2	PS is unformatted.
6	The specified format is not valid.
9	A system error occurred.

Structure of the Field Information

Personal Communications returns the field information in the following structure:

```
typedef struct tagFINDFIELD
{
    unsigned unused:12;           // *** unused ***
    unsigned fResponse:1;        // TRUE = DDE_REQUEST response
    unsigned fRelease:1;         // TRUE = Client frees this data
    unsigned reserved:1;         // *** reserved ***
    unsigned fAckReq:1;          // TRUE = Client returns DDE_ACK
    int    cfFormat;              // Format of Field data CF_DSPTEXT
    unsigned char cAttribute;     // Attribute character
    unsigned uFieldStart;        // Field start offset
    unsigned uFieldLength;       // Field Length;
} FINDFIELD, far *lpFINDFIELD;
```

Get Keystrokes

3270	5250	VT
Yes	Yes	Yes

The **Get Keystrokes** function returns to the client the keystrokes that are intercepted by the **Start Keystroke Intercept** function. The client sends the following message to receive the keystroke information.

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELONG(cfFormat, aKEYS) );
```

where:

- cfFormat** Identifies the format for the keystroke information. This must be CF_DSPTEXT.
- aKEYS** Identifies keystroke data item.

Personal Communications Response

Personal Communications either returns the keystrokes in a DDE data message, or responds with one of these ACK messages containing status information:

- WM_DDE_DATA(hData, aKEYS)
- WM_DDE_ACK(wStatus, aKEYS)

If Personal Communications cannot return the keystroke information, one of the following status codes is returned in the low-order byte of the wStatus word:

Return Code	Explanation
2	No keystroke was intercepted.
6	The specified format is not valid.
9	A system error occurred.

Structure of the Keystroke Information

Personal Communications returns the keystroke information in the following structure:

```
typedef struct tagKEYSTROKE
{
    unsigned unused:12;          // *** unused ***
    unsigned fResponse:1;       // TRUE = DDE_REQUEST response
    unsigned fRelease:1;        // TRUE = Client frees this data
    unsigned reserved:1;        // *** reserved ***
    unsigned fAckReq:1;         // TRUE = Client returns DDE_ACK
    int      cfFormat;           // Format of keystroke data CF_DSPTXT
    unsigned uTextType;         // Type of keystrokes
    unsigned char szKeyData[1]; // Keystrokes
} KEYSTROKE, far *lpKEYSTROKE;
```

The format for the keystrokes parameters is the same as for the **Session Execute Macro** function SENDKEY command.

The following key text types are supported:

```
WC_CHARACTER 0 // Pure text, no command
WC_TOKEN     1 // including commands
```

Get Mouse Input

3270	5250	VT
Yes	Yes	Yes

The **Get Mouse Input** function returns the latest mouse input intercepted by **Start Mouse Input Intercept** function to the client.

Note: The client must call the **Start Mouse Input Intercept** function before using this function.

The client sends the following command to receive the mouse input information.

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELONG(cfFormat, aMOUSE) );
```

where:

- cfFormat** Identifies the format for the presentation space. Valid values are CF_TEXT or CF_DSPTEXT. The structure of the mouse input data, in these two formats, is shown below.
- aMOUSE** Identifies the mouse input as the item.

Personal Communications Response

Personal Communications either returns the mouse input data in a DDE data message, or responds with one of these ACK messages:

- WM_DDE_DATA(hData, aMOUSE)
- WM_DDE_ACK(wStatus, aMOUSE)

If Personal Communications cannot return the mouse input information, one of the following status codes is returned in the low-order byte of the wStatus word:

Return Code	Explanation
2	No mouse input information was intercepted.
6	The specified format is not valid.
9	A system error occurred.

Structure of the Mouse Input Information

If the format is CF_TEXT, Personal Communications returns the mouse input information in the following format:

```
typedef struct tagMOUSE_CF_TEXT
{
    unsigned    unused:12,        // **** Unused ****
    unsigned    fRespons:1,      // TRUE = DDE_REQUEST response
    unsigned    fRelease:1,     // TRUE = Client frees this data
    unsigned    reserved:1,     // **** Reserved ****
    unsigned    fAckReq:1;      // TRUE = Client returns DDE_ACK
    int         cfFormat;       // CF_TEXT
    unsigned char PPos[4];      // PS position
    unsigned char Tab1[1];     // TAB character
    unsigned char PRowPos[4];  // PS row position
    unsigned char Tab2[1];     // TAB character
    unsigned char PColPos[4];  // PS columns position
    unsigned char Tab3[1];     // TAB character
    unsigned char PSSize[4];   // Size of the PS
    unsigned char Tab4[1];     // TAB character
    unsigned char PSRows[4];   // PS number of rows
    unsigned char Tab5[1];     // TAB character
    unsigned char PSCols[4];   // PS number of columns
    unsigned char Tab6[1];     // TAB character
    unsigned char ButtonType[1]; // Pressed button type
    unsigned char Tab7[1];     // TAB character
    unsigned char ClickType[1]; // Click type
    unsigned char Tab8[1];     // TAB character
    unsigned char ClickString[1]; // Retrieved string
} MOUSE_CF_TEXT, FAR *lpMOUSE_CF_TEXT;
```

The following table shows the values in the parameters:

Parameter Name	Meaning	Value
PSPos	PS offset of the position where mouse was clicked	0 ... (PSSize - 1)
PSRowPos	Row number of the position where mouse was clicked	0 ... (PSRows - 1)

Parameter Name	Meaning	Value
PSColPos	Column number of the position where mouse was clicked	0 ... (PSCols - 1)
PSSize	Size of the presentation space	
PSRows	Number of rows of presentation space	
PSCols	Number of columns of presentation space	
ButtonType	Type of the clicked mouse button	L Left button M Middle button R Right button
ClickType	Type of clicking	S Single click D Double click
ClickString	Retrieved string to which the mouse pointed	A character string terminated with a '\0'
Tab1-8	A tab character for delimiter	'\t'

If the format is CF_DSPTEXT, Personal Communications returns the mouse input information in the following format:

```
typedef struct tagMOUSE_CF_DSPTEXT
{
    unsigned    unused:12,        // **** Unused ****
    unsigned    fRespons:1,      // TRUE = DDE_REQUEST response
    unsigned    fRelease:1,     // TRUE = client frees the storage
    unsigned    reserved:1,     // **** Reserved ****
    unsigned    fAckReq:1;      // TRUE = client returns DDE_ACK
    int         cfFormat;       // CF_DSPTEXT
    unsigned    uPSPos;         // PS position
    unsigned    uPSRowPos;     // PS row position
    unsigned    uPSColPos;     // PS column position
    unsigned    uPSSize;       // Size of the presentation space
    unsigned    uPSRows;       // PS number of rows
    unsigned    uPSCols;       // PS number of columns
    unsigned    uButtonType;    // Pressed button type
    unsigned    uClickType;     // Click type
    unsigned char szClickString[1]; // Retrieved string
} MOUSE_CF_DSPTEXT, FAR *lpMOUSE_CF_DSPTEXT;
```

The following table shows the values in the parameters:

Parameter Name	Meaning	Value
uPSPos	PS offset of the position where mouse was clicked	0 ... (uPSSize - 1)
uPSRowPos	Row number of the position where mouse was clicked	0 ... (uPSRows - 1)
uPSColPos	Column number of the position where mouse was clicked	0 ... (uPSCols - 1)
uPSSize	Size of the presentation space	
uPSRows	Number of rows of the presentation space	

Parameter Name	Meaning	Value
uPSCols	Number of columns of the presentation space	
uButtonType	Type of the clicked mouse button	0x0001 Left button 0x0002 Middle button 0x0003 Right button
uClickType	Type of clicking	0x0001 Single click 0x0002 Double click
szClickString	Retrieved string that the mouse pointed to	A character string terminated with a '\0'

Get Number of Close Requests

3270	5250	VT
Yes	Yes	Yes

The **Get Number of Close Requests** function returns to the client the number of the close requests that are intercepted by the **Start Close Intercept** function. The client sends the following message to receive the number of the close requests.

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELONG(cfFormat, aCLOSE) );
```

where:

cfFormat Identifies the format for the close intercept information. This must be CF_DSPTEXT.
aCLOSE Identifies close intercept data item.

Personal Communications Response

Personal Communications either returns the number of the close requests in a DDE data message, or responds with one of these ACK messages:

- WM_DDE_DATA(hData, aCLOSE)
- WM_DDE_ACK(wStatus, aCLOSE)

If Personal Communications cannot return the close intercept information, one of the following status codes is returned in the low-order byte of the wStatus word:

Return Code	Explanation
6	The specified format is not valid.
9	A system error occurred.

Structure of the Number of the Close Requests Information

Personal Communications returns the close intercept information in the following structure:

```

typedef struct tagCLOSEREQ
{
    unsigned unused:12;        // *** unused ***
    unsigned fResponse:1;     // TRUE = DDE_REQUEST response
    unsigned fRelease:1;      // TRUE = Client frees this data
    unsigned reserved:1;      // *** reserved ***
    unsigned fAckReq:1;       // TRUE = Client returns DDE_ACK
    int     cfFormat;         // Format of close intercept data CF_DSPTEXT
    unsigned uCloseReqCount;  // Number of the close requests.
} CLOSEREQ, far *lpCLOSEREQ;

```

Get Operator Information Area

3270	5250	VT
Yes	Yes	Yes

The Get Operator Information Area (OIA) function returns a copy of the OIA to the client. The client sends the following message to request the OIA.

```

PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELONG(cfFormat, aOIA) );

```

where:

cfFormat Identifies the format for the OIA. For the OIA this format must be CF_DSPTEXT.

aOIA Identifies the operator information area as the item.

Personal Communications Response

Personal Communications either returns the OIA in a DDE data message, or responds with one of these ACK messages:

- WM_DDE_DATA(hData, aOIA)
- WM_DDE_ACK(wStatus, aOIA)

If Personal Communications cannot return the OIA, one of the following status codes is returned in the low-order byte of the wStatus word:

Return Code	Explanation
6	The specified format is not valid.
9	A system error occurred.

Structure of the Operator Information Area

Personal Communications returns the operator information area in the following structure:

```

typedef struct tagOIADATA
{
    unsigned unused:12;        // *** unused ***
    unsigned fResponse:1;     // TRUE = DDE_REQUEST response
    unsigned fRelease:1;      // TRUE = Client frees this data
    unsigned reserved:1;      // *** reserved ***
    unsigned fAckReq:1;       // TRUE = Client returns DDE_ACK
    int     cfFormat;         // Format of OIA data CF_DSPTEXT
} OIADATA, far *lpOIADATA;

```


Get Partial Presentation Space

3270	5250	VT
Yes	Yes	Yes

The **Get Partial Presentation Space** function returns all or part of the session presentation space to the client.

Note: The client must set the start PS position and the length (or set the EOF flag) by using the **Set Presentation Space Service Condition** function before using this function.

The client sends the following command to get the presentation space.

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELONG(cfFormat, aEPS) );
```

where:

cfFormat Identifies the format for the presentation space. Valid values are CF_TEXT or CF_DSPTEXT. The structure of the presentation space, in these two formats, is shown below.

aEPS Identifies presentation space atom as the item.

Personal Communications Response

Personal Communications either returns the presentation space data, or responds with one of these ACK messages containing an error code in the low-order byte of the wStatus word:

- WM_DDE_DATA(hData, aEPS)
- WM_DDE_ACK(wStatus, aEPS)

If Personal Communications cannot return the presentation space, one of the following status codes is returned in the low-order byte of the wStatus word:

Return Code	Explanation
1	No prior Set Presentation Space Service Condition function was called, or an incorrect parameter was set.
6	The specified format is not valid.
9	A system error occurred.

Structure of the Presentation Space

Personal Communications returns the part of the presentation space in the format specified in the **Get Partial Presentation Space** request.

If the format is CF_DSPTEXT, Personal Communications returns the presentation space in the following format:

```
typedef struct tagEPS_CF_DSPTEXT
{
    unsigned Unused:12,           // Unused
    unsigned fResponse:1,        // TRUE = DDE_REQUEST response
    unsigned fRelease:1,         // TRUE = client frees the storage
    unsigned reserved:1,         // **** Reserved ****
};
```

```

unsigned fAckReq:1,          // TRUE = DDE_ACK requested
int      cfFormat;          // Format data is rendered in
unsigned uPSPosition;      // Start PS position
unsigned uPSLength;        // Length of the part of the PS
unsigned uPSRows;          // PS number of rows
unsigned uPSCols;          // PS number of columns
unsigned uPSOffset;        // Offset to the presentation space
unsigned uFieldCount;      // Number of fields
unsigned uFieldOffset;     // Offset to the field array
unsigned char PSData[1];   // PS and Field list Array
} EPS_CF_DSPTTEXT, FAR *lpEPS_CF_DSPTTEXT;

```

```

typedef struct tagPSFIELDS
{
    unsigned char cAttribute; // Attribute Character
    unsigned uFieldStart;     // Field start offset
    unsigned uFieldLength;    // Field Length
} PSFIELDS, FAR *lpPSFIELDS;

```

Note: The following examples show how to obtain long pointers to the PS and the PSFIELDS array.

```

lppls = (lp_EPS_CF_DSPTTEXT) lpEPS_CF_DSPTTEXT->PSData
        + lpEPS_CF_DSPTTEXT->uPSOffset;
lpplsfields = (lpPSFIELDS) lpEPS_CF_DSPTTEXT->PSData
              + lpEPS_CF_DSPTTEXT->uFieldOffset;

```

If the format is CF_TEXT, Personal Communications returns the part of the presentation space in the following format:

```

typedef struct tagEPS_CF_TEXT
{
    unsigned Unused:12;      // **** Unused ****
    unsigned fResponse:1;    // TRUE = DDE_REQUEST response
    unsigned fRelease:1;     // TRUE = Client frees this data
    unsigned reserved:1;     // **** Reserved ****
    unsigned fAckReq:1;      // TRUE = Client returns DDE_ACK
    int      cfFormat;       // Format of the data
    unsigned char PSPOSITION[4]; // Start PS position
    unsigned char Tab1[1];    // Tab character
    unsigned char PSENGTH[4]; // Length of the part of the PS
    unsigned char Tab2[1];    // Tab character
    unsigned char PSROWS[4];  // Number of rows in the Partial PS
    unsigned char Tab3[1];    // Tab character
    unsigned char PSCOLS[4];  // Number of columns in the PS
    unsigned char Tab4[1];    // Tab character
    unsigned char PS[1];      // PS
} EPS_CF_TEXT, FAR *lpEPS_CF_TEXT;

```

Following the PS in the buffer is the following additional structure of fields that compose the field list.

```

typedef struct tagFL_CF_TEXT
{
    unsigned char Tab5[1];    // Tab character
    unsigned char PSFldCount[4]; // Number of fields in the PS
    unsigned char Tab6[1];    // Tab character
    PS_FIELD      Field[1];    // Field List Array
} FL_CF_TEXT, FAR *lpFL_CF_TEXT;

```

```

typedef struct tagPS_FIELD
{
    unsigned char FieldStart[4];
    unsigned char TabF1[1];
    unsigned char FieldLength[4];
}

```

```

unsigned char TabF2[1];
unsigned char Attribute;
unsigned char TabF3[1];
} PS_FIELD, FAR *lpPS_FIELD;

```

Note: The following examples show how to obtain long pointers to the PS and the PS_FIELD array.

```

lpps = lpEPS_CF_TEXT->PS;
lpps_field = (lpPS_FIELD) lpEPS_CF_TEXT->PS
             + atoi(lpEPS_CF_TEXT->PSLENGTH)
             + ((atoi(lpEPS_CF_TEXT->PSROWS) - 1) * 2) // CR/LF
             + 1 + 1 + 4 + 1; // Tabs + size of field count

```

Get Presentation Space

3270	5250	VT
Yes	Yes	Yes

The **Get Presentation Space** function returns the session presentation space to the client. The client sends the following command to get the presentation space.

```

PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELONG(cfFormat, aPS) );

```

where:

cfFormat Identifies the format for the presentation space. Valid values are CF_TEXT or CF_DSPTEXT. The structure of the presentation space, in these two formats, is shown below.

aPS Identifies presentation space atom as the item.

Personal Communications Response

Personal Communications either returns the presentation space and a list of the fields that comprise the presentation space, or responds with one of these ACK messages containing an error code in the low-order byte of the wStatus word:

- WM_DDE_DATA(hData, aPS)
- WM_DDE_ACK(wStatus, aPS)

If Personal Communications cannot return the presentation space, one of the following status codes is returned in the low-order byte of the wStatus word:

Return Code	Explanation
6	The specified format is not valid.
9	A system error occurred.

Structure of the Presentation Space

Personal Communications returns the presentation space in the format specified in the **Get Presentation Space** request.

If the format is CF_DSPTEXT, Personal Communications returns the presentation space in the following format:

```

typedef struct tagPS_CF_DSPTTEXT
{
    unsigned Unused:12,           // Unused
    unsigned fResponse:1,        // TRUE = DDE_REQUEST response
    unsigned fRelease:1,         // TRUE = client frees the storage
    unsigned reserved:1,         // **** Reserved ****
    unsigned fAckReq:1,          // TRUE = DDE_ACK requested
    int     cfFormat;             // Format data is rendered in
    unsigned uPSSize;             // Size of the presentation space
    unsigned uPSRows;            // PS number of rows
    unsigned uPSCols;            // PS number of columns
    unsigned uPSOffset;          // Offset to the presentation space
    unsigned uFieldCount;        // Number of fields
    unsigned uFieldOffset;       // Offset to the field array
    unsigned char PSData[1];     // PS and Field list Array
} PS_CF_DSPTTEXT, FAR *lpPS_CF_DSPTTEXT;

```

```

typedef struct tagPSFIELDS
{
    unsigned char cAttribute;     // Attribute Character
    unsigned uFieldStart;        // Field start offset
    unsigned uFieldLength;       // Field Length
} PSFIELDS, FAR *lpPSFIELDS;

```

Note: The following examples show how to obtain long pointers to the PS and the PSFIELDS array.

```

lppls = (lp_PS_CF_DSPTTEXT) lpPS_CF_DSPTTEXT->PSData
        + lpPS_CF_DSPTTEXT->uPSOffset;
lpplsfields = (lpPSFIELDS) lpPS_CF_DSPTTEXT->PSData
              + lpPS_CF_DSPTTEXT->uFieldOffset;

```

If the format is CF_TEXT, Personal Communications returns the presentation space in the following format:

```

typedef struct tagPS_CF_TEXT
{
    unsigned Unused:12;          // **** Unused ****
    unsigned fResponse:1;       // TRUE = DDE_REQUEST response
    unsigned fRelease:1;       // TRUE = Client frees this data
    unsigned reserved:1;       // **** Reserved ****
    unsigned fAckReq:1;        // TRUE = Client returns DDE_ACK
    int     cfFormat;           // Format of the data
    unsigned char PSSIZE[4];     // Size of the PS
    unsigned char Tab1[1];      // Tab character
    unsigned char PSROWS[4];    // Number of rows in the PS
    unsigned char Tab2[1];      // Tab character
    unsigned char PSCOLS[4];    // Number of Cols in the PS
    unsigned char Tab3[1];      // Tab character
    unsigned char PS[1];        // PS
} PS_CF_TEXT, FAR *lpPS_CF_TEXT;

```

Following the PS in the buffer is the following additional structure of fields that compose the field list.

```

typedef struct tagFL_CF_TEXT
{
    unsigned char Tab4[1];      // Tab character
    unsigned char PSFldCount[4]; // Number of fields in the PS
    unsigned char Tab5[1];      // Tab character
    PS_FIELD     Field[1];      // Field List Array
} FL_CF_TEXT, FAR *lpFL_CF_TEXT;

```

```

typedef struct tagPS_FIELD
{
    unsigned char FieldStart[4];
    unsigned char TabF1[1];

```

```

unsigned char FieldLength[4];
unsigned char TabF2[1];
unsigned char Attribute;
unsigned char TabF3[1];
} PS_FIELD, FAR *lpPS_FIELD;

```

Note: The following example shows how to obtain long pointers to the PS and the PS_FIELD array.

```

lpps = lpPS_CF_TEXT->PS;
lpss_field = (lpPS_FIELD) lpPS_CF_TEXT->PS
             + atoi(lpPS_CF_TEXT->PSSIZE)
             + ((atoi(lpPS_CF_TEXT->PSROWS) - 1) * 2) // CR/LF
             + 1 + 1 + 4 + 1; // Tabs + size of field count

```

Get Session Status

3270	5250	VT
Yes	Yes	Yes

The **Get Session Status** function returns the status of the connected session. The client sends the following message to request session status:

```

PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELONG(cfFormat, aSSTAT) );

```

where:

cfFormat Identifies the DDE format for the status information. The value used is CF_TEXT.

aSSTAT Identifies session status as the data item requested.

Personal Communications Response

Personal Communications either returns the session status in a DDE data message, or responds with one of these ACK messages containing status information:

- WM_DDE_DATA(hData, aSSTAT)
- WM_DDE_ACK(wStatus, aSSTAT)

If Personal Communications cannot return the session status, one of the following status codes is returned in the low-order byte of the wStatus word:

Return Code	Explanation
6	The specified format is not valid.
9	A system error occurred.

Format of Status Information

Personal Communications returns the session status as text in CF_TEXT format. The following fields are returned with the following possible values:

Fields	Returned values	Description
Status	Closed, Invisible, Maximized, Minimized, Normal	The window is in one of these states.

Fields	Returned values	Description
Usage	DDE, User	The session is connected in either a DDE session or a user session.
ScreenX	NN	Defines the horizontal size of the screen.
ScreenY	NN	Defines the vertical size of the screen.
CursorX	NN	Defines the horizontal position of the cursor. (0 ... ScreenX - 1)
CursorY	NN	Defines the vertical position of the cursor. (0 ... ScreenY - 1)
TrimRect Status	Closed, Moved, Sized	The current status of the trim rectangle.
Trim Rectangle X1	N	The top-left corner X position of the trim rectangle in character coordinates.
Trim Rectangle Y1	N	The top-left corner Y position of the trim rectangle in character coordinates.
Trim Rectangle X2	N	The lower-right corner X position of the trim rectangle in character coordinates.
Trim Rectangle Y2	N	The lower-right corner Y position of the trim rectangle in character coordinates.
Session Presentation Space Status	N	The current status of the presentation space. The following values are possible: 0: The presentation space is unlocked. 4: The presentation space is busy. 5: The presentation space is locked.
Session Window Handle	XXXX	Window handle of the session.

Notes:

1. The status of each field is updated each time the status is requested.
2. A new field might be added in a future version of Personal Communications.

Get System Configuration

3270	5250	VT
Yes	Yes	Yes

The **Get System Configuration** function returns the level of Personal Communications support and other system-related values. Most of this information is for use by a service coordinator when a customer calls the IBM Support Center after receiving a system error.

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELONG(cfFormat, aSYSCON) );
```

where:

- cfFormat** Identifies the DDE format for the data item requested. The value used is CF_TEXT.
- aSYSCON** Identifies system configuration as the data item requested.

Personal Communications Response

Personal Communications either returns the system configuration data item in a DDE DATA message, or responds with one of these ACK messages containing status information:

- WM_DDE_DATA(hData, aSYSCON)
- WM_DDE_ACK(wStatus, aSYSCON)

If Personal Communications cannot return the system configuration, a DDE ACK message will be returned with an error code in the low-order byte of the wStatus word:

WM_DDE_ACK(wStatus, aSYSCON)

Return Code	Explanation
9	A system error occurred.

Format of System Configuration information

Personal Communications returns the system configuration as text in CF_TEXT format. The following fields are returned with the following possible values:

Fields	Returned values	Description
Version	N	The version of Personal Communications
Level	NN	The level of Personal Communications
Reserved	XXXXXX	Reserved
Reserved	XXXX	Reserved
Monitor Type	MONO, CGA, EGA, VGA, XGA	Type of the monitor
Country Code	NNNN	Country code used with 3270 or 5250

Get System Formats

3270	5250	VT
Yes	Yes	Yes

The Get System Formats function returns the list of Windows clipboard formats supported by Personal Communications. The client application sends the following message to retrieve the format list supported by Personal Communications:

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELONG(cfFormat, aFORMATS) );
```

where:

cfFormat Identifies the DDE format for the data item requested. The value used is CF_TEXT.
aFORMATS Identifies formats as the data item requested.

Personal Communications Response

Personal Communications returns the list of supported Windows clipboard formats in CF_TEXT format in a DDE DATA message.

```
WM_DDE_DATA(hData, aFORMATS)
```

The following Windows Clipboard formats are supported by Personal Communications:

- CF_TEXT
- CF_DSPTEXT

If Personal Communications cannot return the formats data item, a DDE ACK message is returned with an error code in the low-order byte of the wStatus word:

```
WM_DDE_ACK(wStatus, aFORMATS)
```

Return Code	Explanation
9	A system error occurred.

Get System Status

3270	5250	VT
Yes	Yes	Yes

The **Get System Status** function returns the status of each 3270 or 5250

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELONG(cfFormat, aSTATUS) );
```

where:

cfFormat Identifies the DDE format for the data item requested. The value used is CF_TEXT.
aSTATUS Identifies status as the data item requested.

Personal Communications Response

Personal Communications returns the status data item in CF_TEXT format in a DDE DATA message:

```
WM_DDE_DATA(hData, aSTATUS)
```


For each opened session, Personal Communications returns a line of status information. Each line contains a series of fields with the following range of values:

Fields	Range of values	Description
Session ID	A, B, ..., Z	The short ID of the session.
Host Type	370, 400	The host system currently supported by Personal Communications.
Emulation Type	3270, 5250	The emulation type supported by Personal Communications.
Session Status	Closed, Invisible, Normal, Minimized, Maximized	The current status of the session's window.

If Personal Communications cannot return the status data item, a DDE ACK message is returned with an error code in the low-order byte of the wStatus word:
WM_DDE_ACK(wStatus, aSTATUS)

Return Code	Explanation
9	A system error occurred.

Get System Systems

3270	5250	VT
Yes	Yes	Yes

Personal Communications supports the DDE system topic so that a client application can connect to the system topic and retrieve information about Personal Communications and the status of the sessions that Personal Communications is managing.

The **Get System SysItems** function returns the list of data items available in the Personal Communications system topic. The client application sends the following message to get the system topic data items:

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELONG(cfFormat, aSYSITEMS) );
```

where:

cfFormat Identifies the DDE format for the data item requested. The value used is CF_TEXT.
aSYSITEMS Identifies SysItems as the data item requested.

Personal Communications Response

Personal Communications returns the list of system topic data items in CF_TEXT format in a DDE DATA message.

```
WM_DDE_DATA(hData, aSYSITEMS)
```

The following data items are supported by Personal Communications:

- SysItems
- Topics
- Status
- Formats
- SysCon

If Personal Communications cannot return the system data items, a DDE ACK message is returned with an error code in the low-order byte of the wStatus word:
WM_DDE_ACK(wStatus, aSYSITEMS)

Return Code	Explanation
9	A system error occurred.

Get System Topics

3270	5250	VT
Yes	Yes	Yes

The **Get System Topics** function returns the list of active DDE topics currently supported by Personal Communications. The client application sends the following message to the system topic to retrieve the list of topics that are currently active:

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELONG(cfFormat, aTOPICS) );
```

where:

- cfFormat** Identifies the DDE format for the data item requested. The value used is CF_TEXT.
- aTOPICS** Identifies topics as the data item requested.

Personal Communications Response

Personal Communications returns the list of DDE topics in CF_TEXT format in a DDE DATA message.

```
WM_DDE_DATA(hData, aTOPICS)
```

The following topics are supported by Personal Communications:

- System – System Topic
- SessionA – Session A Topic
- ⋮
- SessionZ – Session Z Topic

Note: The actual number of session topics supported depends on the number of sessions currently opened. The client program should always query the topics data item of the system topic to obtain the list of sessions currently opened.

If Personal Communications cannot return the list of topics, a DDE ACK message is returned with an error code in the low-order byte of the wStatus word:

```
WM_DDE_ACK(wStatus, aTOPICS)
```

Return Code	Explanation
9	A system error occurred.

Get Trim Rectangle

3270	5250	VT
Yes	Yes	Yes

The **Get Trim Rectangle** function returns to the client the area of the presentation space that is within the current trim rectangle. The client sends the following message to receive the trim rectangle.

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELONG(cfFormat, aTRIMRECT) );
```

where:

cfFormat Identifies the format for the trim rectangle. This is CF_TEXT.
aTRIMRECT Identifies trim rectangle as the data item requested.

Personal Communications Response

Personal Communications either returns trim rectangle in a DDE data message, or responds with one of these ACK messages:

- WM_DDE_DATA(hData, aTRIMRECT)
- WM_DDE_ACK(wStatus, aTRIMRECT)

If Personal Communications cannot return the trim rectangle, one of the following status codes is returned in the low-order byte of the wStatus word:

Return Code	Explanation
6	The specified format is not valid.
9	A system error occurred.

Initiate Session Conversation

3270	5250	VT
Yes	Yes	Yes

The **Initiate Session Conversation** function connects a client application to an available session of Personal Communications. Once a session conversation has been established, the session is reserved for exclusive use by the client until the conversation is terminated.

The client application sends the following message to initiate a DDE conversation with a session:

```
SendMessage( -1,
             WM_DDE_INITIATE,
             hClientWnd,
             MAKELONG(aIBM327032, aSessionN) );
```

where:

- aIBM327032** Identifies the application atom. The string used to create atom aIBM3270 is IBM3270. In the PC400, the application atom is aIBM5250 and the string IBM5250 is used to create it.
- aSessionN** Identifies the topic atom. The string used to create atom aSessionN is either NULL or Session appended with the session ID A, B, ..., Z.

Personal Communications Response

If a specific topic is selected and Personal Communications can support a conversation with the client application, Personal Communications acknowledges the INITIATE transaction with:

```
WM_DDE_ACK(aIBM327032, aSessionN)
```

If a topic is not selected (aSessionN = NULL), Personal Communications responds by acknowledging all topics that are currently available:

```
WM_DDE_ACK(aIBM327032, aSystem)
WM_DDE_ACK(aIBM327032, aSessionA)
:
WM_DDE_ACK(aIBM327032, aSessionZ)
```

The client application selects the conversation it wishes to communicate with from the returned list of topics and terminates all other unwanted conversations.

Initiate Structured Field Conversation

3270	5250	VT
Yes	Yes	Yes

The **Initiate Structured Field** Conversation function connects a client application and a host application. This allows the applications to send data to each other and to receive data from each other.

The client sends the following command to initiate a structured field conversation:

```
SendMessage( -1,
             WM_DDE_INITIATE,
             hClientWnd,
             MAKELONG(aIBM3270, aLUN_xxxx) );
```

where:

- aIBM3270** Identifies the application atom.
- aLUN_xxxx** Identifies the topic atom. The string used to create atom aLUN_xxxx is LU appended with the session ID A, B, ..., Z, appended with an underscore (_), and appended with the user-defined string of any length.

PC/3270 Response

If PC/3270 can support a structured field conversation with the client application, it returns an acknowledgment message with the following parameter:

```
WM_DDE_ACK(aIBM3270, aLUN_xxxx)
```

Initiate System Conversation

3270	5250	VT
Yes	Yes	Yes

The **Initiate System Conversation** function connects a client application to the system conversation. Only one client can be connected to the system conversation at a given time. The client sends the following command to initiate a system conversation:

```
SendMessage( -1,  
             WM_DDE_INITIATE,  
             hClientWnd,  
             MAKELONG(aIBM327032, aSystem) );
```

where:

aIBM327032 Identifies the application atom.
aSystem Identifies the topic atom.

Personal Communications Response

If Personal Communications can support a system topic conversation with the client application, it returns an acknowledgment message with the following parameters:

```
WM_DDE_ACK(aIBM327032, aSystem)
```

Put Data to Presentation Space

3270	5250	VT
Yes	Yes	Yes

The **Put Data to Presentation Space** function sends an ASCIIZ data string to be written into the host presentation space at the location specified by the calling parameter. The client sends the following message to the session to send the string.

```
PostMessage( hServerWnd,  
             WM_DDE_POKE,  
             hClientWnd,  
             MAKELONG(hData, aEPS) );
```

where:

hData Identifies a handle to a Windows global memory object that contains the string to be sent to the session. The global memory object contains the following structure:

```
typedef struct tagPutString
{
    unsigned unused:13;           // ** unused **
    unsigned fRelease:1;         // Session frees memory
    unsigned fReserved:2;        // ** reserved **
    int cfFormat;                 // Always CF_DSPTXT
    unsigned uPSStart;           // PS Position
    unsigned uEOFflag;           // EOF effective switch
    char szStringData[1];        // String Data
} PUTSTRING, FAR *lpPUTSTRING;
```

These values are valid at the uEOFflag field:

```
WC_EFFECTEOF 0 // The string is truncated at EOF.
WC_UNEFFECTEOF 1 // The string is not truncated at EOF.
```

aEPS Identifies the presentation space atom as the item.

Personal Communications Response

Personal Communications receives the string data and sends them to the presentation space, and returns a positive ACK message.

If the presentation space does not accept the string data, Personal Communications returns a negative ACK message containing one of the following status codes in the low-order byte of the wStatus word:

```
WM_DDE_ACK(wStatus, aEPS)
```

Return Code	Explanation
1	PS position is not valid.
2	Length is not valid.
3	The value of EOF flag is not valid.
5	Input to the target PS was inhibited.
6	The specified format is not valid.
7	The string was truncated (successful putting).
9	A system error occurred.

Search for String

3270	5250	VT
Yes	Yes	Yes

This function allows a client application to examine the presentation space for a specified string in a specified area.

Note: The client must set the start PS position, search direction, a string to be searched, and EOF flag by using the **Set Presentation Space Service Condition** function before using this function.

The client sends the following message to search for the string.

```
PostMessage( hServerWnd,
            WM_DDE_REQUEST,
            hClientWnd,
            MAKELONG(cfFormat, aSTRING) );
```

where:

cfFormat Identifies the format for the search information. This is CF_DSPTXT.
aSTRING Identifies the search data item.

Personal Communications Response

Personal Communications returns the start position of the string in a DDE data message if the string was found in the specified area:

- WM_DDE_DATA(hData, aSTRING)
- WM_DDE_ACK(wStatus, aSTRING)

If Personal Communications cannot return the start position of the string, one of the following status codes is returned in the low-order byte of the wStatus word:

Return Code	Explanation
1	PS position is not valid or the string is too long.
2	The string cannot be found.
6	The specified format is not valid.
9	A system error occurred.

Structure of the Search Information

Personal Communications returns the Search information in the following structure:

```
typedef struct tagSEARCH
{
    unsigned unused:12;            // *** unused ***
    unsigned fResponse:1;        // TRUE = DDE_REQUEST response
    unsigned fRelease:1;         // TRUE = Client frees this data
    unsigned reserved:1;         // *** reserved ***
    unsigned fAckReq:1;          // TRUE = Client returns DDE_ACK
    int        cfFormat;          // Format of Search data CF_DSPTXT
    unsigned uFieldStart;        // String start offset
} SEARCH, far *lpSEARCH;
```

Send Keystrokes

3270	5250	VT
Yes	Yes	Yes

The **Send Keystrokes** function sends keystrokes to the connected session. The client sends the following message to the session to send keystrokes.

```
PostMessage( hServerWnd,
            WM_DDE_POKE,
            hClientWnd,
            MAKELONG(hData, aKEYS) );
```

where:

hData Identifies a handle to a Windows global memory object that contains the keystrokes to be sent to the session. The global memory object contains the following structure:

```
typedef struct tagKeystrokes
{
    unsigned unused:13;           // ** unused **
    unsigned fRelease:1;         // Session frees memory
    unsigned fReserved:2;        // ** reserved **
    int      cfFormat;           // Always CF_DSPTXT
    unsigned uTextType;          // Type of keystrokes
    unsigned uRetryCount;        // Retry count 1 .. 16
    unsigned char szKeyData[1];  // Keystrokes
} KEYSTROKES, FAR *lpKEYSTROKES;
```

The following key text types are supported:

```
WC_PURETEXT  0 // Pure text, no AID, or included HLLAPI
              // commands
WC_HLLAPITEXT 1 // Text, including HLLAPI tokens
```

Note: If the keystrokes are pure text then specifying WC_PURETEXT will transfer the keystrokes to the host in the fastest possible manner. If WC_HLLAPITEXT is specified then the keystroke data can contain HLLAPI commands interspersed with the text.

aKEYS Identifies keystrokes as the item.

Personal Communications Response

Personal Communications receives the keystrokes and sends them to the presentation space. If the presentation space does not accept the keystrokes, a reset is sent to the presentation space and the keystrokes are sent again. This procedure continues until the presentation space accepts the keystrokes or the retry count is reached. If Personal Communications cannot send the keystrokes to the host, Personal Communications returns a negative ACK message containing one of the following status codes in the low-order byte of the wStatus word. Otherwise, Personal Communications returns a positive ACK message signalling the keystrokes have been sent.

```
WM_DDE_ACK(wStatus, aKEYS)
```

Return Code	Explanation
1	Retry count is not valid.
2	Type of key strokes is not valid.
6	The specified format is not valid.
9	A system error occurred.

Session Execute Macro

3270	5250	VT
Yes	Yes	Yes

You can issue commands and macros with the **DDE_EXECUTE** function. The **DDE_EXECUTE** function passes command strings to Personal Communications. The command strings must conform to DDE specifications. Refer to *Microsoft Windows Software Development Kit Guide to Programming* for more information about the DDE command syntax.

The client sends the following command to issue a DDE_EXECUTE function.

```
PostMessage ( hServerWnd,  
             WM_DDE_EXECUTE,  
             hClientWnd,  
             MAKELONG(NULL, hCommands) );
```

where:

hCommands

Identifies a handle to a Windows global memory object containing Personal Communications commands. For a list of commands you can issue, see "Issuing Commands with the Session Execute Macro Function."

Personal Communications Response

If Personal Communications can process the command string, Personal Communications returns an ACK message containing positive status information to the client. If Personal Communications cannot perform the command string, Personal Communications returns an ACK message containing this error code in the low-order word of the wStatus word:

Return Code	Explanation
9	A system error occurred.

Issuing Commands with the Session Execute Macro Function

You can issue the following commands with the **Session Execute Macro** function:

- WINDOW
- KEYBOARD
- SEND
- RECEIVE
- SENDKEY
- WAIT

Use a separate DDE_EXECUTE message for each command.

Note:

- Enclose values that contain nonalphanumeric characters or blanks in double quotation marks ("*value value*").
- To include a double quotation mark within a string, type it twice (for example, this is a double quotation mark:"").
- The maximum length for any command is 255 characters.

WINDOW Command

```
[WINDOW(action[, "name"])]
```

Performs window actions, where:

```
action = HIDE|RESTORE|MAXIMIZE|MINIMIZE|  
          SHOW|CNGNAME  
name = LT name or Switch List Entry name
```

Note: *name* should be specified when CNGNAME is specified at *action*. If *name* is a NULL string, the default caption will be displayed.

KEYBOARD Command

[KEYBOARD(*action*)]

Enables or disables the session keyboard, including the mouse, where:

action= LOCK|UNLOCK

SEND Command

[SEND("*pcfilename*", "*hostfilename*", "*options*")]

Sends files to the host, where:

pcfilename = [*path*]*filename*[*.ext*]
hostfilename =
For VM system:
 filename filetype[filemode]
For MVS system:
 [']*filename*[(*membername*)][']
For CICS system:
For OS/400 system:
 library name filename member name

options includes any combination of the following file transfer options: MVS, VM, CICS, QUIET, OS/400, and emulation-specific transfer options, separated by spaces.

Refer to *Administrator's Reference* for more information about the transfer options.

RECEIVE Command

[RECEIVE("*pcfilename*", "*hostfilename*", "*options*")]

Receives files from the host, where:

pcfilename = [*path*]*filename*[*.ext*]
hostfilename =
For VM system:
 filename filetype[filemode]
For MVS system:
 [']*filename*[(*membername*)][']
For CICS system:
For OS/400 system:
 library name filename member name

options includes any combination of the following file transfer options: MVS, VM, CICS, QUIET, OS/400, and emulation-specific transfer options, separated by spaces.

Refer to *Administrator's Reference* for more information about the transfer options.

SENDKEY Command

[SENDKEY(*token*, *token*)]

Sends keystrokes to Personal Communications, where:

token = *text string*|*command*|*macro macroname*

Note:

- Text strings are enclosed in double quotation marks.

- Macros are prefixed with “macro”.
- The argument string for SENDKEY must be 255 characters or less.
- The following commands are supported.

Table 51. SENDKEY Command List

Command Name	Token	PC/3270	PC400
Alternate Cursor	alt cursor	Yes	Yes
Alternate Viewing Mode	alt view	Yes	Yes
Attention	sys attn	Yes	Yes
Backspace	backspace	Yes	Yes
Back Tab	backtab	Yes	Yes
Backtab Word	backtab word	Yes	Yes
Character Advance	character advance	No	Yes
Character Backspace	backspace valid	No	Yes
Clear Screen	clear	Yes	Yes
Clicker	click	Yes	Yes
Color Blue	blue	Yes	No
Color Field Inherit	field color	Yes	No
Color Green	green	Yes	No
Color Pink	pink	Yes	No
Color Red	red	Yes	No
Color Turquoise	turquoise	Yes	No
Color White	white	Yes	No
Color Yellow	yellow	Yes	No
Cursor Blink	cursor blink	Yes	Yes
Cursor Down	down	Yes	Yes
Cursor Left	left	Yes	Yes
Cursor Right	right	Yes	Yes
Cursor Select	cursor select	Yes	Yes
Cursor Up	up	Yes	Yes
Delete Character	delete char	Yes	Yes
Delete Word	delete word	Yes	Yes
Device Cancel	device cancel	Yes	Yes
Dup Field	dup	Yes	Yes
Edit Clear	edit-clear	Yes	Yes
Edit Copy	edit-copy	Yes	Yes
Edit Cut	edit-cut	Yes	Yes
Edit Paste	edit-paste	Yes	Yes
Edit Undo	edit-undo	Yes	Yes
End Field	end field	Yes	Yes
Enter	enter	Yes	Yes

Table 51. SENDKEY Command List (continued)

Command Name	Token	PC/3270	PC400
Erase EOF	erase eof	Yes	Yes
Erase Field	erase field	Yes	No
Erase Input	erase input	Yes	Yes
Fast Cursor Down	fast down	Yes	Yes
Fast Cursor Left	fast left	Yes	Yes
Fast Cursor Right	fast right	Yes	Yes
Fast Cursor Up	fast up	Yes	Yes
Field Exit	field exit	No	Yes
Field Mark	field mark	Yes	Yes
Field +	field +	No	Yes
Field -	field -	No	Yes
Graphic Cursor	+cr	Yes	No
Help	help	Yes	Yes
Highlighting Field Inherit	field hilight	Yes	No
Highlighting Reverse	reverse	Yes	No
Highlighting Underscore	underscore	Yes	No
Home	home	Yes	Yes
Host Print	host print	Yes	No
Input	input	Yes	Yes
Input nondisplay	input nd	Yes	Yes
Insert Toggle	insert	Yes	Yes
Lower case	to lower	Yes	No
Mark Down	mark down	Yes	Yes
Mark Left	mark left	Yes	Yes
Mark Right	mark right	Yes	Yes
Mark Up	mark up	Yes	Yes
Move Mark Down	move down	Yes	Yes
Move Mark Left	move left	Yes	Yes
Move Mark Right	move right	Yes	Yes
Move Mark Up	move up	Yes	Yes
New Line	newline	Yes	Yes
Next Page	page down	No	Yes
Pause 1 second	pause	Yes	Yes
Previous Page	page up	No	Yes
Print Screen	local copy	Yes	Yes
Program Attention Key 1	pa1	Yes	No
Program Attention Key 2	pa2	Yes	No

Table 51. SENDKEY Command List (continued)

Command Name	Token	PC/3270	PC400
Program Attention Key 3	pa3	Yes	No
Program Function Key 1 ⋮ Program Function Key 24	pf1 ⋮ pf24	Yes ⋮ X	Yes ⋮ X
Quit	quit	Yes	Yes
Reset	reset	Yes	Yes
Response Time Monitor	rtn	Yes	No
Roll Down	roll down	No	Yes
Roll Up	roll up	No	Yes
Rubout	rubout	Yes	Yes
Rule	rule	Yes	Yes
SO/SI Display	so si	Yes	Yes
SO/SI Generate	so si generate	No	Yes
System Request	sys req	Yes	Yes
Tab Field	tab field	Yes	Yes
Tab Word	tab word	Yes	Yes
Test	test request	No	Yes
Unmark	unmark	Yes	Yes
Upper case	to upper	Yes	No
Upper/Lower Change	to other	Yes	No
Wait for bind	wait app	Yes	Yes
Wait for System	wait sys	Yes	Yes
Wait transition	wait trn	Yes	Yes
Wait while input inh.	wait inp inh	Yes	Yes
Window Relocation 1 ⋮ Window Relocation 8	view 1 ⋮ view 8	Yes ⋮ X	Yes ⋮ X

Examples:

- To logon
[SENDKEY("Logon")]
- To get reader list
[SENDKEY("RDRL", enter)]

WAIT Command

[WAIT("[time out][wait condition]")]

Waits until the timeout expires or the wait condition the client specified occurs. For this command, the client has to set at least one option, where:

time out (optional)

If the client sets a time out value in the command statements, the following units are available in the wait statement.

- msec
- millisecond
- milliseconds
- sec
- second
- seconds
- minute
- minutes
- hour
- hours

wait condition (optional)

For the wait condition option, the client can select the following options:

while cursor at (cursor row, cursor column)

While the cursor is at (cursor row, cursor column), it keeps waiting.

while "string"

While the "string" is somewhere on the screen, it keeps waiting.

while "string" at (cursor row, cursor column)

While the "string" is at (cursor row, cursor column) on the screen, it keeps waiting.

until cursor at (cursor row, cursor column)

Until the cursor moves to (cursor row, cursor column), it keeps waiting.

until "string"

Until the "string" is displayed somewhere on the screen, it keeps waiting.

until "string" at (cursor row, cursor column)

Until the "string" is displayed at (cursor row, cursor column), it keeps waiting.

Examples:

1. To wait 10 seconds
[WAIT("10 seconds")]
2. To wait while "ABCDEF" is displayed at (2,9) on the screen
[WAIT("while "ABCDEF" at (2,9)")]
3. To wait until "ABCDEF" is displayed at (2,9) on the screen, or after 8 seconds
[WAIT("8 seconds until "ABCDEF" at (2,9)")]

Set Cursor Position

3270	5250	VT
Yes	Yes	Yes

The **Set Cursor Position** function allows the client application to set the cursor position in the session window.

```
PostMessage( hServerWnd,
            WM_DDE_POKE,
            hClientWnd,
            MAKELONG(hData, aSETCURSOR) );
```

where:

hData Identifies a handle to a Windows global memory object that contains the cursor positioning information in the following structure:

```
typedef struct tagSETCURSOR
{
    unsigned unused:13;           // ** unused **
    unsigned fRelease:1;         // TRUE = Session frees memory
    unsigned fReserved:2;       // ** reserved **
    int      cfFormat;           // Always CF_DSPTEXT
    unsigned uSetCursorType;     // Cursor Set Type
    unsigned uSetCursor1;       // Cursor Row or PS Offset
    unsigned uSetCursor2;       // Cursor Col
} SETCURSOR, FAR *lpSETCURSOR;
```

Personal Communications supports two ways to set the cursor position:

- PS Offset (uSetCursorType = 0)
- Row/Column number (uSetCursorType = 1)

The application specifies which method by setting the uSetCursorType field to the appropriate value, followed by setting the two other fields uSetCursor1 and uSetCursor2 to their appropriate values as follows:

- uSetCursorType = 0 offset
 - uSetCursor1: 0 ... (PSsize – 1)
- uSetCursorType = 1 row/col
 - uSetCursor1: 0 ... (PSrows – 1)
 - uSetCursor2: 0 ... (PScols – 1)

aSETCURSOR Identifies cursor position as the item.

Personal Communications Response

Personal Communications receives the cursor information and moves the cursor to the specified position in the PS. If the cursor is positioned successfully, Personal Communications returns a positive ACK message to the client application. Otherwise, a negative ACK message is returned with one of the following error codes in the low-order byte of the wStatus word.

WM_DDE_ACK(wStatus, aSETCURSOR)

Return Code	Explanation
1	Cursor set type is not valid. Must be 0 or 1.
2	Cursor PS offset is not valid. Must be 0 ... (PSsize – 1).
3	Cursor row value is not valid. Must be 0 ... (PSrows – 1).
4	Cursor column value is not valid. Must be 0 ... (PScols – 1).
6	The specified format is not valid.
9	A system error occurred.

Set Mouse Intercept Condition

3270	5250	VT
Yes	Yes	Yes

This function specifies the mouse input to be intercepted. The client sends the following command to set the mouse event to be intercepted.

```
PostMessage( hServerWnd,
             WM_DDE_POKE,
             hClientWnd,
             MAKELONG(hData, aMOUSE) );
```

where:

hData Identifies a handle to a Windows global memory object that specifies the condition of intercepting the mouse input, CF_TEXT or CF_DSPTEXT.
aMOUSE Identifies Mouse atom as the item.

If the format is CF_TEXT, the client program sends the condition in the following structure:

```
typedef struct tagSETMOUSE_CF_TEXT
{
    unsigned    unused:12,          //
    unsigned    fRelease:1,        //
    unsigned    fReserved:3;       //
    int         cfFormat;           // Always CF_TEXT
    unsigned char Condition[1]     //
} SETMOUSE_CF_TEXT, FAR *lpSETMOUSE_CF_TEXT;
```

The following table shows the parameters' values:

Parameter Name	Meaning	Value
Condition	Condition of intercepting the mouse input	A string terminated with \0, consists of the constants defined as follows in any order: L Enable intercepting the left button l Disable intercepting the left button R Enable intercepting the right button r Disable intercepting the right button M Enable intercepting the middle button m Disable intercepting the middle button S Enable intercepting a single click s Disable intercepting a single click D Enable intercepting a double click d Disable intercepting a double click T Retrieve the pointed string t Do not retrieve the pointed string

If the format is CF_DSPTEXT, the client program sends the condition in the following structure:


```

typedef struct tagSETMOUSE_CF_DSPTXT
{
    unsigned    unused:12,        //
    unsigned    fRelease:1,      //
    unsigned    fReserved:3;     //
    int         cfFormat;        // Always CF_DSPTXT
    BOOL        bLeftButton;     //
    BOOL        bRightButton;    //
    BOOL        bMiddleButton;   //
    BOOL        bSingleClick;    //
    BOOL        bDoubleClick;    //
    BOOL        bRetrieveString;  //
} SETMOUSE_CF_DSPTXT, FAR *lpSETMOUSE_CF_DSPTXT;

```

The following table shows the values in the parameters:

Parameter Name	Meaning	Value
bLeftButton	Enable or disable interception of the left mouse button	True Enable intercepting the left button False Disable intercepting the left button
bRightButton	Enable or disable interception of the right mouse button	True Enable intercepting the right button False Disable intercepting the right button
bMiddleButton	Enable or disable interception of the middle mouse button	True Enable intercepting the middle button False Disable intercepting the middle button
bSingleClick	Enable or disable interception of the single click	True Enable intercepting the single click False Disable intercepting the single click
bDoubleClick	Enable or disable interception of the double click	True Enable intercepting the double click False Disable intercepting the double click
bRetrieveString	Retrieve or do not retrieve the pointed string	True Retrieve the pointed string False Do not retrieve the pointed string

Personal Communications Response

When receiving the **Set Mouse Intercept Condition** request, Personal Communications returns an ACK message if it can set the intercept condition to the specified status. Otherwise, a negative ACK message is returned to the client with one of the following return codes in the low-order byte of the wStatus field:

WM_DDE_ACK(wStatus, aMOUSE)

Return Code	Explanation
2	A character in Condition parameter is not valid.

Return Code	Explanation
6	The specified format is not valid.
9	A system error occurred.

Set Presentation Space Service Condition

3270	5250	VT
Yes	Yes	Yes

The **Set Presentation Space Service Condition** function sets the condition for using the following functions:

- **Get Partial Presentation Space**
- **Find Field**
- **Search for String**

The client application sets the condition by calling this function such as:

- Start PS position
- PS length
- EOF flag
- Search direction
- ASCIIZ string

The client must specify the **Set Presentation Space Service Condition** function before invoking the functions listed above. The conditions set by this function remain in effect until the next **Set Presentation Space Service Condition** function is called. The client sends the following message to set the condition:

```
PostMessage( hServerWnd,
             WM_DDE_POKE,
             hClientWnd,
             MAKELONG(hData, aEPSCOND) );
```

where:

hData Identifies a handle to a Windows global memory object containing:

```
typedef struct tagPSSERVCOND
{
    unsigned    unused:13,           //
    unsigned    fRelease:1,         //
    unsigned    fReserved:2;        //
    int         cfFormat;           // Always CF_DSPTXT
    unsigned    uPSSStart;          // PS Position
    unsigned    uPSLength;          // Length of PS
    unsigned    uSearchDir;         // Direction for search
    unsigned    uEOFFlag;           // EOF effective switch
    char        szTargetString[1];  // Target String
} PSSERVCOND, FAR *lpPSSERVCOND;
```

The following values are valid at the uSearchDir field:

```
WC_SRCHFRWD  0 // Search forward.
WC_SRCHBKWD  1 // Search backward.
```

The following values are valid at the uEOFFlag field:

```
WC_UNEFFECTEOF 0 // The string is not truncated at EOF.
WC_EFFECTEOF   1 // The string is truncated at EOF.
```

aEPSCOND Identifies the item for the **Set Presentation Space Service Condition** function.

Personal Communications Response

If Personal Communications can perform the **Set Presentation Space Service Condition** function, then Personal Communications returns an ACK message:

```
WM_DDE_ACK(wStatus, aEPSCOND)
```

If Personal Communications cannot perform the **Set Presentation Space Service Condition** function, then Personal Communications returns a negative ACK message containing one of the following return codes in the low-order byte of wStatus:

Return Code	Explanation
1	PS position is not valid.
2	Length is not valid.
3	The value of EOF flag is not valid.
4	The value of Search Direction is not valid.
6	The specified format is not valid.
9	A system error occurred.

Set Session Advise Condition

3270	5250	VT
Yes	Yes	Yes

This function sets the condition for the DDE_ADVISE of the **Start Session Advise** function. The client can specify a search string and a region of the screen. When the advise condition is met, the server notifies the client of the condition according to the options specified by the **Start Session Advise** function.

Note: The client must specify the **Set Session Advise Condition** function before invoking **Start Session Advise**. If the advise condition is set after the **Start Session Advise** function is started, the advise condition will be ignored and the client will receive a negative ACK message. See "Start Session Advise" on page 412 for more information about starting the advise.

The client sends the following message to set the advise condition.

```
PostMessage( hServerWnd,  
            WM_DDE_POKE,  
            hClientWnd,  
            MAKELONG(hData, aPSCOND) );
```

where:

hData Identifies a handle to a Windows global memory object containing:

```
typedef struct tagSEARCHDATA
{
    unsigned    unused:13,           //
    unsigned    fRelease:1,         //
    unsigned    fReserved:2;        //
    int         cfFormat;           // Always CF_DSPTXT
    WORD        uPSStart;           // PS Position of string
    WORD        uPSLength           // Length of String
    BOOL        bCaseSensitive;     // Case Sensitive TRUE=YES
    char        SearchString[1];    // Search String
} SEARCHDATA, FAR *lpSEARCHDATA;
```

aPSCOND Identifies the item for the **Set Session Advise Condition** function.

Personal Communications Response

If Personal Communications can perform the **Set Session Advise Condition** function, Personal Communications returns this ACK message:

```
WM_DDE_ACK(wStatus, aPSCOND)
```

If Personal Communications cannot perform the **Set Session Advise Condition** function, then Personal Communications returns an negative ACK message containing one of the following return codes in the low-order byte of wStatus:

Return Code	Explanation
1	Advise is already active.
2	Advise condition is already active.
3	PS position is not valid.
4	String length is not valid.
6	The specified format is not valid.
9	A system error occurred.

Set Structured Field Service Condition

3270	5250	VT
Yes	Yes	Yes

The **Set Structured Field Service Condition** function passes the Query Reply data provided by the client application.

Note: The client must call the **Set Structured Field Service Condition** function before invoking the **Start Read SF** function or the **Write SF** function.

The client sends the following message to set the condition.

```
PostMessage( hServerWnd,
             WM_DDE_POKE,
             hClientWnd,
             MAKELONG(hData, aSFCOND) );
```

where:

hData Identifies a handle to a Windows global memory object containing:

```
typedef struct tagSFCOND
{
    unsigned    unused:12,        //
    unsigned    fRelease:1,      //
    unsigned    fReserved:3;     //
    int         cfFormat;        // Always CF_DSPTXT
    WORD        uBufferSize;     // Buffer size of Read SF
    WORD        uQRLength;       // Length of Query Reply data
    char        szQueryReply[1]; // Query Reply data
} SFCOND, FAR *lpSFCOND;
```

aSFCOND Identifies the item for the **Set Structured Field Service Condition** function.

PC/3270 Response

PC/3270 checks the Query Reply ID and Type (not DOID) and the length. If they are valid, then PC/3270 returns an ACK message:

```
WM_DDE_ACK(wStatus, aSFCOND)
```

If PC/3270 cannot perform the **Set Structured Field Service Condition** function, then PC/3270 returns a negative ACK message containing one of the following return codes in the low-order byte of wStatus:

Return Code	Explanation
1	PS SF ID is not valid.
2	Length is not valid.
3	One DDM base type is already connected to this session.
4	Structured Field Service Condition is already set.
6	The specified format is not valid.
9	A system error occurred.

Start Close Intercept

3270	5250	VT
Yes	Yes	Yes

The **Start Close Intercept** function allows a client application to intercept close requests generated when a user selects the close option from the emulator session window. This function intercepts the close request and discards it until the Stop Close Intercept function is requested. After using this function, the client receives DATA messages notifying it that close requests occurred (CLOSE).

The client sends the following command to begin a session advise.

```
PostMessage( hServerWnd,
             WM_DDE_ADVISE,
             hClientWnd,
             MAKELONG(hOptions, aCLOSE) );
```

where:

hOptions Is a handle to a Windows global memory object, with the following structure:

```
typedef struct tagOPTIONS
{
    unsigned reserved:14;           // *** reserved ***
    unsigned fDeferUpd:1;           // Send notification only
    unsigned fAckReq:1;             // Client will ACK all notices
    WORD      cfFormat;             // Clipboard format to use
} OPTIONS, FAR *lpOPTIONS;
```

If the value of fDeferUpd is 1, DDE Data messages will be sent to the client application with the hData set to NULL. The client must then issue a DDE REQUEST to request the data item.

If the value of fAckReq is 1, the server does not notify the client of further close requests until the server receives an ACK message from the client in response to any previous notification.

The cfFormat field specifies the format to send the close request. (Must be CF_DSPTEXT.)

aCLOSE Identified close intercept as the item.

Personal Communications Response

Personal Communications receives the Start Close Intercept and returns an ACK message if it can start the intercept. Otherwise a negative ACK message is returned to the client with one of the following return codes in the low-order byte of the wStatus field:

WM_DDE_ACK(wStatus, aCLOSE)

Return Code	Explanation
1	Close Intercept is already working.
6	The specified format is not valid.
9	A system error occurred.

Once the intercept starts, the client receives DATA messages notifying it that the close request is intercepted:

WM_DDE_DATA(hData, aCLOSE)

where:

hData Identifies a handle to a Windows global memory object containing:

```
typedef struct tagCLOSEREQ
{
    unsigned unused:12,           // *** unused ***
    unsigned fResponse:1,         // TRUE = DD_REQUEST response
    unsigned fRelease:1,         // TRUE = Client releases memory
    unsigned reserved:1,         // *** reserved ***
    unsigned fAckReq:1,          // TRUE = DDE_ACK is required
    int      cfFormat;           // Always CF_DSPTEXT
    WORD     uCloseReqCount;     // Counter of the Close Requests
} CLOSEREQ, FAR *lpCLOSEREQ;
```

The DATA messages continue until a Stop Close Intercept message is sent to Personal Communications.

Start Keystroke Intercept

3270	5250	VT
Yes	Yes	Yes

The **Start Keystroke Intercept** function allows a client application to filter any keystrokes sent to a session by a terminal operator. After a call to this function, keystrokes are intercepted, and the client receives them (KEYS).

The client sends the following command to begin intercept.

```
PostMessage( hServerWnd,
            WM_DDE_ADVISE,
            hClientWnd,
            MAKELONG(hOptions, aKEYS) );
```

where:

hOptions Is a handle to a Windows global memory object, with the following structure:

```
typedef struct tagOPTIONS
{
    unsigned reserved:14;        // Reserved
    unsigned fDeferUpd:1;        // Send notification only
    unsigned fAckReq:1;          // Client will ACK all notices
    WORD      cfFormat;          // Clipboard format to use
} OPTIONS, FAR *lpOPTIONS;
```

If the value of `fDeferUpd` is 1, DDE Data messages are sent to the client application with the `hData` set to NULL. The client then issues a DDE REQUEST to request the data item.

If the value of `fAckReq` is 1, the server does not notify the client of further keystrokes until the server receives an ACK message from the client in response to any previous keystrokes notification.

The `cfFormat` field specifies the format to send the keystrokes when the keystroke is sent by a terminal operator. (Must be `CF_DSPTEXT`.)

aKEYS Identified keystrokes as the item.

Personal Communications Response

Personal Communications receives the **Start Keystroke Intercept** and returns an ACK message if it can start the intercept. Otherwise a negative ACK message is returned to the client with one of the following return codes in the low-order byte of the `wStatus` field:

```
WM_DDE_ACK(wStatus, aKEYS)
```

Return Code	Explanation
1	Keystroke Intercept is already started.
6	The specified format is not valid.
9	A system error occurred.

Once the intercept has started, the client receives DATA messages notifying it that the keystroke is intercepted:

```
WM_DDE_DATA(hData, aKEYS)
```

The DATA messages continue until a Stop Keystroke Intercept message is sent to Personal Communications. The format of the data item will be the same format as if the client requested the data item via a DDE_REQUEST.

Start Mouse Input Intercept

3270	5250	VT
Yes	Yes	Yes

The **Start Mouse Input Intercept** function allows a client application to intercept mouse input when a terminal operator press the mouse button on emulator session window. After calling this function, the client receives DATA messages that include the PS position where mouse input occurred.

The client sends the following command to begin to intercept the mouse input.

```
PostMessage( hServerWnd,
             WM_DDE_ADVISE,
             hClientWnd,
             MAKELONG(hOptions, aMOUSE) );
```

where:

hOptions Is a handle to a Windows global memory object, with the following structure:

```
typedef struct tagOPTIONS
{
    unsigned reserved:14;           // Reserved
    unsigned fDeferUpd:1;          // Send notification only
    unsigned fAckReq:1;            // Client will ACK all notices
    WORD     cfFormat;             // Clipboard format to use
} OPTIONS, FAR *lpOPTIONS;
```

If the value of fDeferUpd is 1, DDE Data messages will be sent to the client application with the hData set to NULL. The client must then issue a DDE REQUEST to request the data item.

If the value of fAckReq is 1, the server does not notify the client of further structured field data until the server receives an ACK message from the client in response to any previous notification.

The cfFormat field specifies the format to send the data item has been updated.

aMOUSE Identified MOUSE as the item.

Personal Communications Response

Personal Communications receives the **Start Mouse Input Intercept** and returns an ACK message if it can start this function. Otherwise a negative ACK message is returned to the client with one of the following return codes in the low-order byte of the wStatus field:

```
WM_DDE_ACK(wStatus, aMOUSE)
```

Return Code	Explanation
1	Mouse Input Intercept has been already started.
6	The specified format is not valid.
9	A system error occurred.

Once the **Mouse Input Intercept** starts, the client receives DATA messages of the structured field:

WM_DDE_DATA(hData, aMOUSE)

where:

hData If the format is CF_TEXT, Personal Communications returns the mouse input information in the following format:

```
typedef struct tagMOUSE_CF_TEXT
{
    unsigned    unused:12,        // **** Unused ****
    unsigned    fRespons:1,      // TRUE = DDE_REQUEST response
    unsigned    fRelease:1,      // TRUE = Client frees this data
    unsigned    reserved:1,      // **** Reserved ****
    unsigned    fAckReq:1;       // TRUE = Client returns DDE_ACK
    int         cfFormat;        // CF_TEXT
    unsigned char PSPos[4];      // PS position
    unsigned char Tab1[1];       // TAB character
    unsigned char PSRowPos[4];   // PS row position
    unsigned char Tab2[1];       // TAB character
    unsigned char PSColPos[4];   // PS columns position
    unsigned char Tab3[1];       // TAB character
    unsigned char PSSize[4];     // Size of the PS
    unsigned char Tab4[1];       // TAB character
    unsigned char PSRows[4];     // PS number of rows
    unsigned char Tab5[1];       // TAB character
    unsigned char PSCols[4];     // PS number of columns
    unsigned char Tab6[1];       // TAB character
    unsigned char ButtonType[1]; // Pressed button type
    unsigned char Tab7[1];       // TAB character
    unsigned char ClickType[1];  // Click type
    unsigned char Tab8[1];       // TAB character
    unsigned char ClickString[1]; // Retrieved string
} MOUSE_CF_TEXT, FAR *lpMOUSE_CF_TEXT;
```

The following table shows the values in the parameters:

Parameter Name	Meaning	Value
PSPos	PS offset of the position where mouse was clicked	0 ... (PSSize - 1)
PSRowPos	Row number of the position where mouse was clicked	0 ... (PSRows - 1)
PSColPos	Column number of the position where mouse was clicked	0 ... (PSCols - 1)
PSSize	Presentation space size	
PSRows	Number of presentation space rows	
PSCols	Number of presentation space columns	
ButtonType	Type of clicked mouse button	L Left button M Middle button R Right button
ClickType	Type of clicking	S Single click D Double click

Parameter Name	Meaning	Value
ClickString	Retrieved string to which the mouse pointed	A character string terminated with a '\0'
Tab1-8	A tab character for delimiter	'\t'

hData If the format is CF_DSPTTEXT, Personal Communications returns the mouse input information in the following format:

```
typedef struct tagMOUSE_CF_DSPTTEXT
{
    unsigned    unused:12,           // **** Unused ****
    unsigned    fRespons:1,         // TRUE = DDE_REQUEST response
    unsigned    fRelease:1,        // TRUE = client frees the storage
    unsigned    reserved:1,        // **** Reserved ****
    unsigned    fAckReq:1;         // TRUE = client returns DDE_ACK
    int         cfFormat;          // CF_DSPTTEXT
    unsigned    uPSPos;            // PS position
    unsigned    uPSRowPos;        // PS row position
    unsigned    uPSColPos;        // PS column position
    unsigned    uPSSize;          // Size of the presentation space
    unsigned    uPSRows;          // PS number of rows
    unsigned    uPSCols;          // PS number of columns
    unsigned    uButtonType;      // Pressed button type
    unsigned    uClickType;       // Click type
    unsigned char szClickString[1]; // Retrieved string
} MOUSE_CF_DSPTTEXT, FAR *lpMOUSE_CF_DSPTTEXT;
```

The following table shows the values in the parameters:

Parameter Name	Meaning	Value
uPSPos	PS offset of the position where mouse was clicked	0 ... (uPSSize - 1)
uPSRowPos	Row number of the position where mouse was clicked	0 ... (uPSRows - 1)
uPSColPos	Column number of the position where mouse was clicked	0 ... (uPSCols - 1)
uPSSize	Size of the presentation space	
uPSRows	Number of rows of the presentation space	
uPSCols	Number of columns of the presentation space	
uButtonType	Type of the clicked mouse button	0x0001 Left button 0x0002 Middle button 0x0003 Right button
uClickType	Type of clicking	0x0001 Single click 0x0002 Double click
szClickString	Retrieved string to which the mouse pointed	A character string terminated with a \0

The DATA messages continue until a Stop Mouse Input Intercept message is sent to Personal Communications.

Start Read SF

3270	5250	VT
Yes	Yes	Yes

The **Start Read SF** function allows a client application to read structured field data from the host application. After using this function, the client receives DATA messages notifying it that close requests occurred.

Note: Before using this function, the client must call the **Set Structured Field Service Condition** function to pass the Query Reply data to the server.

The client sends the following command to begin a Read SF.

```
PostMessage( hServerWnd,
             WM_DDE_ADVISE,
             hClientWnd,
             MAKELONG(hOptions, aSF) );
```

where:

hOptions Is a handle to a Windows global memory object, with the following structure:

```
typedef struct tagOPTIONS
{
    unsigned reserved:14;           // Reserved
    unsigned fDeferUpd:1;          // Send notification only
    unsigned fAckReq:1;            // Client will ACK all notices
    WORD      cfFormat;            // Clipboard format to use
} OPTIONS, FAR *lpOPTIONS;
```

If the value of fDeferUpd is 1, DDE Data messages will be sent to the client application with the hData set to NULL. The client must then issue a DDE REQUEST to request the data item.

If the value of fAckReq is 1, the server does not notify the client of further structured field data until the server receives an ACK message from the client in response to any previous notification.

The cfFormat field specifies the format to send the structured field data. (It must be CF_DSPTEXT.)

aSF Identified structured field as the item.

PC/3270 Response

PC/3270 receives the **Start Read SF** and returns an ACK message if it can start the Read SF. Otherwise a negative ACK message is returned to the client with one of the following return codes in the low-order byte of the wStatus field:

```
WM_DDE_ACK(wStatus, aSF)
```

Return Code	Explanation
1	Read SF is already started.
3	No prior Set Structured Field Service Condition function was called.
6	The specified format is not valid.
9	A system error occurred.

Once the Read SF has started, the client receives DATA messages of the structured field:

```
WM_DDE_DATA(hData, aSF)
```

where:

hData Identifies a handle to a Windows global memory object containing:

```
typedef struct tagSFDATA
{
    unsigned    unused:12,           //
    unsigned    fRelease:1,        //
    unsigned    fReserved:3;       //
    int         cfFormat;           // Always CF_DSPTXT
    WORD        uSFLength;         // Length of SF data
    char        szSFData[1];       // SF data
} SFDATA, FAR *lpSFDATA;
```

The DATA messages continue until a Stop Read SF message is sent to PC/3270.

Start Session Advise

3270	5250	VT
Yes	Yes	Yes

The **Start Session Advise** function establishes a link between the Personal Communications session and the client. This lets the client receive updates of the presentation space (PS), the operator information area (OIA), or the trim rectangle (TRIMRECT) when the data item is updated.

Note: If the client application needs conditional notification when the presentation space is updated, set an advise condition prior to invoking the advise function for the presentation space. See “Set Session Advise Condition” on page 403.

The client sends the following command to begin a session advise.

```
PostMessage( hServerWnd,
             WM_DDE_ADVISE,
             hClientWnd,
             MAKELONG(hOptions, aItem) );
```

where:

hOptions

Is a handle to a Windows global memory object. This is the structure:

```
typedef struct tagOPTIONS
{
    unsigned reserved:14;           // Reserved
    unsigned fDeferUpd:1;          // Send notification only
    unsigned fAckReq:1;            // Client will ACK all notices
    WORD    cfFormat;              // Clipboard format to use
} OPTIONS, FAR *lpOPTIONS;
```

If the value of fDeferUpd is 1, DDE Data messages are sent to the client application with the hData set to NULL. The client must then issue a DDE REQUEST to request the data item.

If the value of fAckReq is 1, the server does not notify the client of further changes to the data item until the server receives an ACK message from the client in response to any previous update notification.

The cfFormat field specifies the format to send the data item when the item has been updated.

aItem

Specifies the item of information being requested; in this case, the value can be PS, OIA, or TRIMRECT.

Personal Communications Response

Personal Communications receives the **Start Session Advise** and returns an ACK message if it can start the advise. Otherwise, a negative ACK message is returned to the client with one of the following return codes in the low-order byte of the wStatus field:

WM_DDE_ACK(wStatus, aItem)

Return Code	Explanation
1	Advise already active for data item.
6	Advise parameter not valid.
9	A system error occurred.

Once the advise has started, the client receives DATA messages notifying it that the data item (PS, OIA, or TRIMRECT) has changed:

WM_DDE_DATA(hData, aItem)

The DATA messages continue until a Stop Session Advise message is sent to Personal Communications. The format of the data item will be the same format as if the client requested the data item via a DDE_REQUEST.

Stop Close Intercept

3270	5250	VT
Yes	Yes	Yes

The **Stop Close Intercept** function ends a client application's ability to intercept close request. The client sends the following command to perform the **Stop Close Intercept** function.

```
PostMessage( hServerWnd,
             WM_DDE_UNADVISE,
             hClientWnd,
             MAKELONG(NULL, aCLOSE) );
```

where:

aCLOSE Identified close intercept as the item.

Personal Communications Response

If Personal Communications can perform the DDE_UNADVISE, Personal Communications returns an ACK message containing positive status information to the client:

```
WM_DDE_ACK(wStatus, aCLOSE)
```

If Personal Communications cannot perform the DDE_UNADVISE, Personal Communications returns an ACK message containing negative status information and one of the following return codes in the low-order byte of the wStatus word:

Return Code	Explanation
1	Advise has not started yet.
9	A system error occurred.

Stop Keystroke Intercept

3270	5250	VT
Yes	Yes	Yes

The **Stop Keystroke Intercept** function ends a client application's ability to intercept keystrokes. The client sends the following command to perform the **Stop Keystroke Intercept** function.

```
PostMessage( hServerWnd,  
             WM_DDE_UNADVISE,  
             hClientWnd,  
             MAKELONG(NULL, aKEYS) );
```

where:

aKEYS Identified keystrokes as the item.

Personal Communications Response

If Personal Communications can perform the DDE_UNADVISE, Personal Communications returns an ACK message containing positive status information to the client:

```
WM_DDE_ACK(wStatus, aKEYS)
```

If Personal Communications cannot perform the DDE_UNADVISE, Personal Communications returns an ACK message containing negative status information and one of the following return codes in the low-order byte of the wStatus word.

Return Code	Explanation
1	Advise has not started yet.
9	A system error occurred.

Stop Mouse Input Intercept

3270	5250	VT
Yes	Yes	Yes

The **Stop Mouse Input Intercept** function ends a client application's ability to intercept mouse input.

The client sends the following command to perform the **Stop Mouse Input Intercept** function.

```
PostMessage( hServerWnd,  
            WM_DDE_UNADVISE,  
            hClientWnd,  
            MAKELONG(NULL, aMOUSE) );
```

where:

aMOUSE Identified mouse as the item.

Personal Communications Response

If Personal Communications can perform the DDE_UNADVISE, Personal Communications returns an ACK message containing positive status information to the client:

```
WM_DDE_ACK(wStatus, aMOUSE)
```

If Personal Communications cannot perform the DDE_UNADVISE, Personal Communications returns an ACK message containing negative status information and one of the following return codes in the low-order byte of the wStatus word.

Return Code	Explanation
1	Advise has not started yet.
9	A system error occurred.

Stop Read SF

3270	5250	VT
Yes	Yes	Yes

The **Stop Read SF** function ends a client application's ability to read structured field data.

The client sends the following command to perform the **Stop Read SF** function.

```
PostMessage( hServerWnd,  
            WM_DDE_UNADVISE,  
            hClientWnd,  
            MAKELONG(NULL, aSF) );
```

where:

aSF Identified structured field as the item.

PC/3270 Response

If PC/3270 can perform the DDE_UNADVISE, PC/3270 returns an ACK message containing positive status information to the client:

```
WM_DDE_ACK(wStatus, aSF)
```

If PC/3270 cannot perform the DDE_UNADVISE, PC/3270 returns an ACK message containing negative status information and one of the following return codes in the low-order byte of the wStatus word.

Return Code	Explanation
1	Advise has not started yet.
9	A system error occurred.

Stop Session Advise

3270	5250	VT
Yes	Yes	Yes

The **Stop Session Advise** function disconnects a link between Personal Communications and the client. The client sends the following command to perform the **Stop Session Advise** function.

```
PostMessage( hServerWnd,  
            WM_DDE_UNADVISE,  
            hClientWnd,  
            MAKELONG(NULL, aItem) );
```

where:

aItem Specifies the item of information being requested; in this case, the value can be PS, OIA, TRIMRECT, or NULL.

If the value of *aItem* is NULL, then the client has requested termination of all active notifications for the conversation.

Personal Communications Response

If Personal Communications can perform the DDE_UNADVISE, Personal Communications returns an ACK message containing positive status information to the client:

```
WM_DDE_ACK(wStatus, aItem)
```

If Personal Communications cannot perform the DDE_UNADVISE, Personal Communications returns an ACK message containing negative status information and one of the following return codes in the low-order byte of the wStatus word.

Return Code	Explanation
1	Advise has not started yet.
9	A system error occurred.

Terminate Session Conversation

3270	5250	VT
Yes	Yes	Yes

The **Terminate Session Conversation** function disconnects the client from the Personal Communications session the client has previously started a conversation with.

The client sends the following command to terminate a session conversation.

```
SendMessage( hServerWnd,  
             WM_DDE_TERMINATE,  
             hClientWnd,  
             MAKELONG(NULL, NULL) );
```

Personal Communications Response

Personal Communications acknowledges the terminate command with a terminate message:

```
WM_DDE_TERMINATE
```

Terminate Structured Field Conversation

3270	5250	VT
Yes	Yes	Yes

The **Terminate Structured Field Conversation** function disconnects the client from a structured field conversation.

The client sends the following command to terminate a structured field conversation.

```
SendMessage( hServerWnd,  
             WM_DDE_TERMINATE,  
             hClientWnd,  
             MAKELONG(NULL, NULL) );
```

PC/3270 Response

PC/3270 acknowledges the terminate command with a terminate message:

```
WM_DDE_TERMINATE
```

Terminate System Conversation

3270	5250	VT
Yes	Yes	Yes

This disconnects the client from a system conversation.

The client sends the following command to terminate a system conversation.

```
SendMessage( hServerWnd,  
             WM_DDE_TERMINATE,  
             hClientWnd,  
             MAKELONG(NULL, NULL) );
```

Personal Communications Response

Personal Communications acknowledges the terminate command with this message:

```
WM_DDE_TERMINATE
```

When the user closes a Personal Communications session, any global memory blocks that were allocated by Personal Communications will be freed by Windows. This can cause problems for the client if the client retains any of these global memory objects for long periods of time. If the client application needs to keep the information in a global memory item for a long period of time, it is suggested that the client make a copy of global memory item into a global memory item the client application owns.

Write SF

3270	5250	VT
Yes	Yes	Yes

The **Write SF** function allows a client application to write structured field data to the host application.

Note: The client must call the **Set Structured Field Service Condition** function before invoking the **Write SF** function.

The client sends the following message to write structured field data.

```
PostMessage( hServerWnd,  
            WM_DDE_POKE,  
            hClientWnd,  
            MAKELONG(hData, aSF) );
```

where:

hData Identifies a handle to a Windows global memory object containing:

```
typedef struct tagWRITESF  
{  
    unsigned    unused:12,           //  
    unsigned    fRelease:1,         //  
    unsigned    fReserved:3;        //  
    int         cfFormat;            // Always CF_DSPTEXT  
    WORD        uSFLength;           // Length of SF data  
    char        Work[8];             // Work area  
    char        szSFData[1];        // SF data  
} WRITESF, FAR *lpWRITESF;
```

aSF Identified structured field as the item.

PC/3270 Response

PC/3270 receives structured field data and sends them to the host application. If the data transmission completes successfully, then PC/3270 returns an ACK message:

```
WM_DDE_ACK(wStatus, aSF)
```

Otherwise PC/3270 returns an negative ACK message containing one of the following return codes in the low-order byte of wStatus:

Return Code	Explanation
2	Length is not valid.
6	The specified format is not valid.
9	A system error occurred.

DDE Menu Item API in a 16-Bit Environment

Personal Communications supports the addition, deletion, and changing of attributes of a dynamic menu item to the session menu bar. A menu will then be created for this menu item with space for up to 16 submenu items.

Personal Communications supports two kinds of DDE conversation. One is Personal Communications, which acts as a DDE menu client application, and the other is Personal Communications, which acts as a DDE menu server.

DDE Menu Client in a 16-Bit Environment

To add, delete, and change menu items, the following DDE conversation must take place between the session and DDE menu server application.

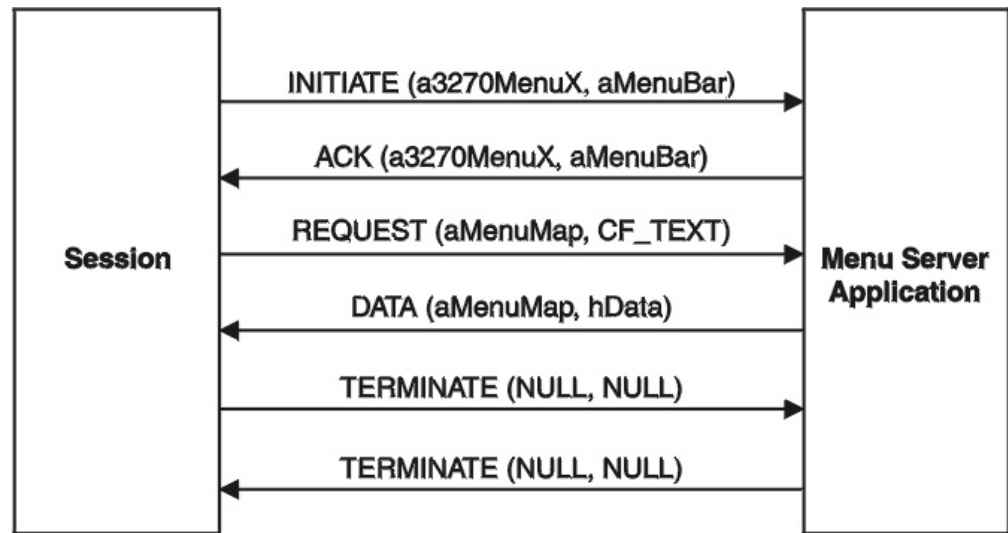


Figure 8. DDE Menu Server Conversation

The following data hierarchy details the menu map Personal Communications expects when adding a dynamic menu item and submenu to a session menu bar:

```

POPOP "MyMenu"
BEGIN
  MENUITEM "Send Files to Host", SEND
  MENUITEM "Receive Files from Host", RECEIVE
  MENUITEM SEPARATOR
  MENUITEM "Convert Files", CONVERT
END
  
```

When the user selects a menu item from the new menu, Personal Communications will send a DDE Initiate with 3270MenuN or 5250MenuN as the application and itemN token as the topic. If an ACK is received from the DDE application, Personal Communications will inhibit the session from accepting user input. The

menu client application can then display a dialog, and so on. When the menu server application has completed processing of the menu item, it will send a DDE Terminate to signal Personal Communications the process is complete. Personal Communications will then reenable the window for the user.

DDE Menu Server, 32-Bit

To add, delete, and change menu items, the Figure 9 on page 420 must take place between the session and a DDE menu client application.

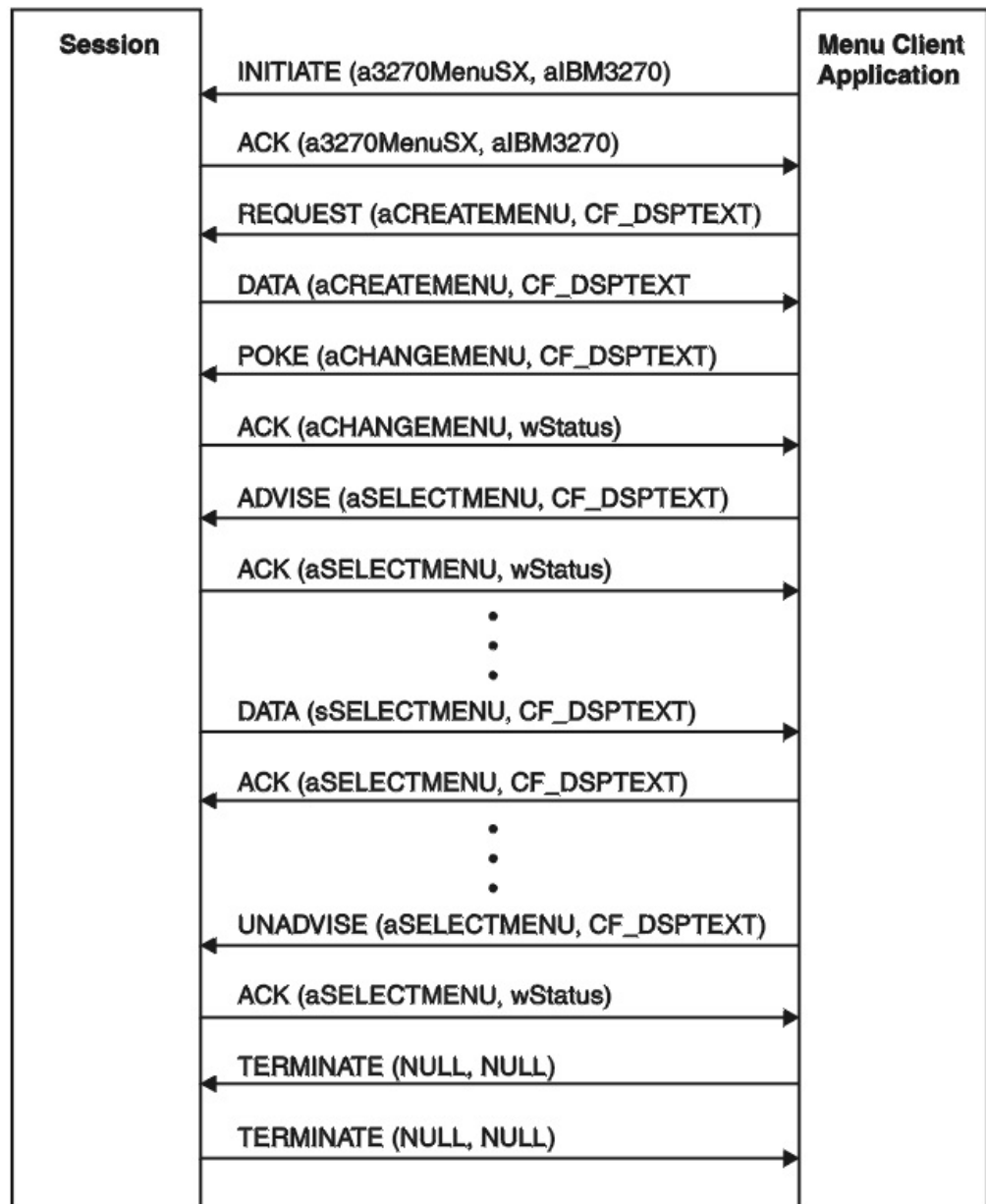


Figure 9. DDE Menu Client Conversation

When the user selects a menu item from the new menu, Personal Communications will send a DDE DATA with aSELECTMENU as the item. When Personal Communications sends DDE DATA to the client application, Personal Communications will inhibit the session from accepting user input. The menu

client application can then display a dialog, and so on. When the menu client application has completed processing of the menu item, it will send a DDE ACK to signal Personal Communications the process is complete. Personal Communications will then reenable the window for the user.

DDE Menu Functions in a 16-Bit Environment

This section describes the DDE Menu Item API functions that are available for use with Personal Communications. PC/3270 Windows mode and PC400 provide all of the listed functions.

Change Menu Item

3270	5250	VT
Yes	Yes	Yes

The **Change Menu Item** function appends, deletes, inserts, modifies, and removes menu items. The client sends the following message to the session to change a menu.

```
PostMessage( hServerWnd,
             WM_DDE_POKE,
             hClientWnd,
             MAKELONG(hData, aCHANGEMENU) );
```

where:

hData Identifies a handle to a Windows global memory object that contains the requests for changing a menu. The global memory object contains the following structure:

```
typedef struct tagChangeMenu
{
    unsigned unused:13;    // ** unused **
    unsigned fRelease:1;  // Session frees memory
    unsigned fReserved:2; // ** reserved **
    int cfFormat;         // Always CF_DSPTXT
    HANDLE hMenu;         // Handle of the menu item
    WORD wPosition;       // The position of the menu
                          // item
    WORD wIDNew;          // The menu ID of the new
                          // menu item
    WORD wOperation;      // Specifies the operation
    WORD wFlags;          // Specifies the options
    unsigned char szItemName[1]; // String of the item
} CHANGEMENU, FAR *lpCHANGEMENU;
```

The following operations are supported:

```
MF_APPEND // Appends a menu item to the end of a menu.
MF_CHANGE // Modifies a menu item in a menu.
MF_DELETE // Deletes a menu item from a menu, destroying
           // the menu item.
MF_INSERT // Inserts a menu item into a menu.
MF_REMOVE // Removes a menu item from a menu but does not
           // destroy the menu item.
```

If the MF_APPEND is specified in the wOperation field, the following fields must be filled:

hMenu	Identifies the menu to be appended. To append a new item to a pop-up menu, specify the handle that is returned from Personal Communications when Create Menu Item function is executed. To append a new item to a top-level menu bar, specify NULL.
wIDNew	Specifies the command ID of the new menu item. If a new item is added to the top-level menu bar, the handle of the menu item returned from Personal Communications when Create Menu Item function is executed.
wFlags	The following options can be set: <pre> MF_CHECKED // Places a check mark next to // the item. MF_DISABLED // Disables the menu item so // that it cannot be selected, // but does not gray it. MF_ENABLED // Enables the menu item so that // it can be selected and // restores from its grayed // state. MF_GRAYED // Disables the menu item so // that it cannot be selected, // and grays it. MF_MENUBARBREAK // Same as MF_MENUBREAK except // that for pop-up menus, // separates the new column from // the old column with a // vertical line. MF_MENUBREAK // Places the item on a new line // for menu bar items. // For pop-up menus, places the // item in a new column, with // no dividing line between the // columns. MF_SEPARATOR // Draws a horizontal dividing // line. Can only be used in a // pop-up menu. This line cannot // be grayed, disabled, or // highlighted. The wIDNew and // szItemName fields are // ignored. MF_UNCHECKED // Does not place a check mark // next to the item (default). </pre>
szItemName	Specifies the content of the new menu item. Contains a null-terminated character string.

If the MF_CHANGE is specified in the wOperation field, fill these fields:

hMenu	Identifies the menu to be changed. To change an item of a pop-up menu, specify the handle that is returned from Personal Communications when Create Menu Item function is executed. To change an item to a top-level menu bar, specify NULL.
nPosition	Specifies the menu item to be changed. The interpretation of the wPosition parameter depends on the setting of the wFlags parameter. MF_BYPOSITION Specifies the position of the existing menu item. The first item in the menu is at position zero. MF_BYCOMMAND Specifies the command ID of the existing menu item.
wIDNew	Specifies the command ID of the menu item. If an item of the top-level menu bar is changed, the handle of the menu item returned from Personal Communications when Create Menu Item function is executed.

wFlags

The following options can be set:

```
MF_BYCOMMAND    // Specifies that the nPosition
                 // parameter gives the menu
                 // item control ID number.
                 // This is the default if
                 // neither MF_BYCOMMAND nor
                 // MF_BYPOSITION is set.
MF_BYPOSITION   // Specifies that the nPosition
                 // parameter gives the position
                 // of the menu item to be
                 // changed rather than an ID
                 // number.
MF_CHECKED      // Places a check mark next to
                 // the item.
MF_DISABLED     // Disables the menu item so
                 // that it cannot be selected,
                 // but does not gray it.
MF_ENABLED      // Enables the menu item so
                 // that it can be selected and
                 // restores from its grayed
                 // state.
MF_GRAYED       // Disables the menu item so
                 // that it cannot be selected,
                 // and grays it.
MF_MENUBARBREAK // Same as MF_MENUBREAK except
                 // that for pop-up menus,
                 // separates the new column
                 // from the old column with a
                 // vertical line.
MF_MENUBREAK    // Places the item on a new
                 // line for menu bar items.
                 // For pop-up menus, places the
                 // item in a new column, with
                 // no dividing line between
                 // the columns.
MF_SEPARATOR    // Draws a horizontal dividing
                 // line. Can only be used in
                 // a pop-up menu. This line
                 // cannot be grayed, disabled,
                 // or highlighted. The wIDNew
                 // and szItemName fields are
                 // ignored.
MF_UNCHECKED    // Does not place a check mark
                 // next to the item (default).
```

szItemName

Specifies the content of the menu item. Contains a null-terminated character string.

If the MF_DELETE is specified in the wOperation field, fill these fields:

hMenu

Identifies the menu to be deleted. To delete an item from a pop-up menu, specify the handle that is returned from Personal Communications when **Create Menu Item** function is executed. To delete an item from a top-level menu bar, specify NULL.

nPosition

Specifies the menu item to be deleted. The interpretation of the nPosition parameter depends on the setting of the wFlags parameter.

MF_BYPOSITION

Specifies the position of the existing menu item. The first item in the menu is at position zero.

MF_BYCOMMAND

Specifies the command ID of the existing menu item.

wFlags The following options can be set:

```

MF_BYCOMMAND       // Specifies that the nPosition
                      // parameter gives the menu
                      // item control ID number.
                      // This is the default if
                      // neither MF_BYCOMMAND nor
                      // MF_BYPOSITION is set.
MF_BYPOSITION       // Specifies that the nPosition
                      // parameter gives the position
                      // of the menu item to be
                      // deleted rather than an ID
                      // number.

```

If the MF_INSERT is specified in the wOperation field, the following fields must be filled:

hMenu Identifies the menu to be inserted. To insert an item to a pop-up menu, specify the handle that is returned from Personal Communications when **Create Menu Item** function is executed. To change an item to a top-level menu bar, specify NULL.

nPosition Specifies the menu item before the new menu item is to be inserted. The interpretation of the nPosition parameter depends on the setting of the wFlags parameter.

MF_BYPOSITION
 Specifies the position of the existing menu item. The first item in the menu is at position zero.

MF_BYCOMMAND
 Specifies the command ID of the existing menu item.

wIDNew Specifies the command ID of the menu item or, if an item of the top-level menu bar is changed, the handle of the menu item returned from Personal Communications when **Create Menu Item** function is executed.

wFlags

The following options can be set:

```

MF_BYCOMMAND    // Specifies that the nPosition
                 // parameter gives the menu
                 // item control ID number. This
                 // is the default if neither
                 // MF_BYCOMMAND nor MF_BYPOSITION
                 // is set.
MF_BYPOSITION   // Specifies that the nPosition
                 // parameter gives the position
                 // of the menu item to be
                 // changed rather than an ID
                 // number.
MF_CHECKED      // Places a check mark next to
                 // the item.
MF_DISABLED     // Disables the menu item so
                 // that it cannot be selected,
                 // but does not gray it.
MF_ENABLED      // Enables the menu item so
                 // that it can be selected and
                 // restores from its grayed
                 // state.
MF_GRAYED       // Disables the menu item so
                 // that it cannot be selected,
                 // and grays it.
MF_MENUBARBREAK // Same as MF_MENUBREAK except
                 // that for pop-up menus,
                 // separates the new column
                 // from the old column with a
                 // vertical line.
MF_MENUBREAK    // Places the item on a new
                 // line for menu bar items.
                 // For pop-up menus, places the
                 // item in a new column, with
                 // no dividing line between the
                 // columns.
MF_SEPARATOR    // Draws a horizontal dividing
                 // line. Can only be used in
                 // a pop-up menu. This line
                 // cannot be grayed, disabled,
                 // or highlighted. The wIDNew
                 // and szItemName fields are
                 // ignored.
MF_UNCHECKED    // Does not place a check mark
                 // next to the item (default).

```

szItemName

Specifies the content of the menu item. Contains a null-terminated character string.

If the MF_REMOVE is specified in the wOperation field, the following fields must be filled:

hMenu

Identifies the menu to be removed. To remove an item from a pop-up menu, specify the handle that is returned from Personal Communications when **Create Menu Item** function is executed. To remove an item from a top-level menu bar, specify NULL.

nPosition

Specifies the menu item to be removed. The interpretation of the nPosition parameter depends upon the setting of the wFlags parameter.

MF_BYPOSITION

Specifies the position of the existing menu item. The first item in the menu is at position zero.

MF_BYCOMMAND

Specifies the command ID of the existing menu item.

wFlags The following options can be set:

```

MF_BYCOMMAND // Specifies that the nPosition
               // parameter gives the menu
               // item control ID number.
               // This is the default if
               // neither MF_BYCOMMAND nor
               // MF_BYPOSITION is set.
MF_BYPOSITION // Specifies that the nPosition
               // parameter gives the
               // position of the menu item to
               // be removed rather than an ID
               // number.

```

Personal Communications Response

Personal Communications receives the requests to change a menu and processes them. If the requests cannot be accepted, Personal Communications returns a negative ACK message containing one of the following status codes in the low-order byte of the wStatus word. Otherwise, Personal Communications returns a positive ack message signalling that the keystrokes have been sent.

WM_DDE_ACK(wStatus, aCHANGEMENU)

Return code	Explanation
1	The specified parameters are not valid.
6	The specified format is not valid.
9	A system error occurred.

Create Menu Item

3270	5250	VT
Yes	Yes	Yes

The **Create Menu Item** function requests Personal Communications to add a menu item to the menu bar. A pop-up menu will be created at the same time, but it is initially empty and can be filled with menu items by using this function. The string of the new menu item that will be added to a top-level menu bar, is also specified by using the change menu item function.

The client sends the following message to create a menu item.

```

PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELONG(cfFormat, aCREATEMENU) );

```

where:

cfFormat Identifies the format for the ID of the new menu item. The valid value is CF_DSPTEXT.
aCREATEMENU Identifies the create menu item.

Personal Communications Response

Personal Communications returns the handle of the newly created menu item in a dde data message if the Personal Communications can create a menu item.

WM_DDE_DATA(hData, aCREATEMENU)

or
 WM_DDE_ACK(wStatus, aCREATEMENU)

where:

hData Identifies a handle to a windows global memory object that contains the handle of the menu item. The global memory object contains the following structure:

```
typedef struct tagcreatemenue
{
  unsigned   unused:12,      // *** unused ***
  unsigned   fresponse:1,    // true = dd_request response
  unsigned   frelease:1,     // true = client releases memory
  unsigned   reserved:1,    // *** reserved ***
  unsigned   fackreq:1,      // true = dde_ack is required
  int        cfformat;       // always cf_dsptext
  handle     hmemuitem;      // handle of the menu item
} CREATEMENU, FAR *lpCREATEMENU;
```

If Personal Communications cannot create a menu item, one of the following status codes are returned in the low-order byte of the wStatus word:

Return Code	Explanation
6	The specified format is not valid.
9	A system error occurred.

Initiate Menu Conversation

3270	5250	VT
Yes	Yes	Yes

The **Initiate Menu Conversation** function connects a client application to an available session of Personal Communications. Once a menu conversation is established, the session menu is reserved exclusively for the client until the conversation is terminated.

The client application sends the following message to initiate a DDE conversation with a menu:

```
SendMessage( -1,
             WM_DDE_INITIATE,
             hClientWnd,
             MAKELONG(aIBM327032, SN) );
```

where:

aIBM327032 Identifies the application atom. The string used to create atom aIBM3270 is IBM3270 In the PC400, the application atom is aIBM5250 and the string IBM5250 is used to create it.

SN Identifies the topic atom. The string used to create atom a3270MenuSN is 3270MenuS appended with the session ID A, B, ..., Z. In the PC400, the topic atom is a5250MenuSN and the string 5250MenuS appended with the session ID A, B, ..., Z. is used to create it.

Personal Communications Response

If Personal Communications can support a conversation with the client application, Personal Communications acknowledges the INITIATE transaction with:

```
WM_DDE_ACK(aIBM327032, SN)
```

Start Menu Advise

3270	5250	VT
Yes	Yes	Yes

The **Start Menu Advise** function allows a client application to process a user defined routine when the menu item that is added by the client application, is selected. After using this function, the client receives DATA messages indicating which menu item is selected.

The client sends the following command to begin a menu advise.

```
PostMessage( hServerWnd,  
            WM_DDE_ADVISE,  
            hClientWnd,  
            MAKELONG(hOptions, aSELECTMENU) );
```

where:

hOptions Is a handle to a Windows global memory object, with the following structure:

```
typedef struct tagOPTIONS  
{  
    unsigned reserved:14;    // Reserved  
    unsigned fDeferUpd:1;    // Send notification only  
                            // (Must be 0)  
    unsigned fAckReq:1;     // Client will ACK all notices  
                            // (Must be 1)  
    WORD    cfFormat;       // Always CF_DSPTXT  
} OPTIONS, FAR *lpOPTIONS;
```

aSELECTMENU Identified a menu advise as the item.

Personal Communications Response

Personal Communications receives the **Start Menu Advise** and returns an ACK message if it can start the function.

```
WM_DDE_ACK(wStatus, aSELECTMENU)
```

Otherwise, a negative ACK message will be returned to the client with one of the following return codes in the low-order byte of the wStatus field.

Return Code	Explanation
1	Menu Advise has been already started.
6	The specified format is not valid.
9	A system error occurred.

Once the menu item (added to the client application) is selected, the client receives DATA messages notifying it which menu item is selected:

```
WM_DDE_DATA(hData, aSELECTMENU)
```

where:

hData Identifies a handle to a Windows global memory object containing:

```
typedef struct tagSELECTMENU
{
    unsigned    Unused:12,        // *** unused ***
    unsigned    fResponse:1,     // TRUE = DD_REQUEST response
    unsigned    fRelease:1,      // TRUE = Client releases memory
    unsigned    reserved:1,      // *** reserved ***
    unsigned    fAckReq:1,       // TRUE = DDE_ACK is required
    int         cfFormat;        // Always CF_DSPTXT
    WORD        uIDSelected;     // Command ID of the
                                // selected menu item
} SELECTMENU, FAR *lpSELECTMENU;
```

The DATA messages continue until a Stop Menu Advise message is sent to Personal Communications.

Stop Menu Advise

3270	5250	VT
Yes	Yes	Yes

The **Stop Menu Advise** function ends a client application's ability to process a user-defined routine when the menu item added by the client application is selected. The client sends the following command to perform the Stop Menu Advise function.

```
PostMessage( hServerWnd,
             WM_DDE_UNADVISE,
             hClientWnd,
             MAKELONG(NULL, aSELECTMENU) );
```

where:

aSELECTMENU Identifies a menu advise as the item.

Personal Communications Response

If Personal Communications can perform the DDE_UNADVISE, Personal Communications returns an ACK message containing positive status information to the client:

```
WM_DDE_ACK(wStatus, aCLOSE)
```

If Personal Communications cannot perform the DDE_UNADVISE, Personal Communications returns an ACK message containing negative status information and one of the following return codes in the low-order byte of the wStatus word:

Return Code	Explanation
1	Advise has not started yet.
9	A system error occurred.

Terminate Menu Conversation

3270	5250	VT
Yes	Yes	Yes

The **Terminate Menu Conversation** function disconnects the client from the Personal Communications session with which a conversation had been previously started.

The client sends the following command to terminate a session conversation:

```
SendMessage( hServerWnd,
             WM_DDE_TERMINATE,
             hClientWnd,
             MAKELONG(NULL, NULL) );
```

Personal Communications Response

Personal Communications acknowledges the terminate command with this message:

```
WM_DDE_TERMINATE
```

Summary of DDE Functions in a 16-Bit Environment

Table 52 lists the DDE functions that can be used with Personal Communications. The table lists the name of the DDE function, the command the client sends to Personal Communications, and the values that can be used for the variables in the client command.

Table 52. Summary of DDE Functions in a 16-Bit Environment

Function name	Client command
Change Menu Item	PostMessage(hServerWnd, WM_DDE_POKE, hClientWnd, MAKELONG(hData, aCHANGEMENU));
	hData = Handle to a global memory object
Create Menu Item	PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELONG(cfFormat, aCREATEMENU));
	cfFormat = CF_DSPTEXT
Find Field	PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELONG(cfFormat, aFIELD));
	cfFormat = CF_DSPTEXT
Get Keystrokes	PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELONG(cfFormat, aKEYS));
	cfFormat = CF_DSPTEXT

Table 52. Summary of DDE Functions in a 16-Bit Environment (continued)

Function name	Client command
Get Mouse Input	PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELONG(cfFormat, aMOUSE));
	cfFormat = CF_TEXT | CF_DSPTEXT
Get Number of Close Requests	PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELONG(cfFormat, aCLOSE));
	cfFormat = CF_DSPTEXT
Get Operator Information Area	PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELONG(cfFormat, aOIA));
	cfFormat = CF_DSPTEXT
Get Partial Presentation Space	PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELONG(cfFormat, aEPS));
	cfFormat = CF_TEXT | CF_DSPTEXT
Get Presentation Space	PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELONG(cfFormat, aPS));
	cfFormat = CF_TEXT | CF_DSPTEXT
Get Session Status	PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELONG(cfFormat, aSSTAT));
	cfFormat = CF_TEXT
Get System Configuration	PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELONG(cfFormat, aSYSCON));
	cfFormat = CF_TEXT
Get System Formats	PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELONG(cfFormat, aFORMATS));
	cfFormat = CF_TEXT
Get System Status	PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELONG(cfFormat, aSTATUS));
	cfFormat = CF_TEXT
Get System Systems	PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELONG(cfFormat, aSYSTEMS));
	cfFormat = CF_TEXT

Table 52. Summary of DDE Functions in a 16-Bit Environment (continued)

Function name	Client command
Get System Topics	PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELONG(cfFormat, aTOPICS));
	cfFormat = CF_TEXT
Get Trim Rectangle	PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELONG(cfFormat, aTRIMRECT));
	cfFormat = CF_TEXT
Initiate Menu Conversation	PostMessage(hServerWnd, WM_DDE_INITIATE, hClientWnd, MAKELONG(aIBM327032, SN));
	N = a session letter A through Z
Initiate Session Conversation	SendMessage(-1, WM_DDE_INITIATE, hClientWnd, MAKELONG(aIBM327032, aSessionN));
	N = a session letter A through Z.
Initiate Structured Field Conversation	SendMessage(-1, WM_DDE_INITIATE, hClientWnd, MAKELONG(aIBM327032, aLUN_xxxx)
	N = a session letter A through Z. xxxx = a user defined string.
Initiate System Conversation	SendMessage(-1, WM_DDE_INITIATE, hClientWnd, MAKELONG(aIBM327032, aSystem));
Put Data to Presentation Space	PostMessage(hServerWnd, WM_DDE_POKE, hClientWnd, MAKELONG(hData, aEPS));
	hData = Handle to a global memory object
Search for String	PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELONG(cfFormat, aSTRING));
	cfFormat = CF_DSPTEXT
Send Keystrokes	PostMessage(hServerWnd, WM_DDE_POKE, hClientWnd, MAKELONG(hData, aKEYS));
	hData = Handle to a global memory object
Session Execute Macro	PostMessage(hServerWnd, WM_DDE_EXECUTE, hClientWnd, MAKELONG(NULL, hCommands));
	hCommands = Handle to a global memory object

Table 52. Summary of DDE Functions in a 16-Bit Environment (continued)

Function name	Client command
Set Cursor Position	PostMessage(hServerWnd, WM_DDE_POKE, hClientWnd, MAKELONG(hData, aSETCURSOR));
	hData = Handle to a global memory object
Set Mouse Intercept Condition	PostMessage(hServerWnd, WM_DDE_POKE, hClientWnd, MAKELONG(hData, aMOUSE));
	hData = Handle to a global memory object
Set Presentation Space Service Condition	PostMessage(hServerWnd, WM_DDE_POKE, hClientWnd, MAKELONG(hData, aEPSCOND));
	hData = Handle to a global memory object
Set Session Advise Condition	PostMessage(hServerWnd, WM_DDE_POKE, hClientWnd, MAKELONG(hData, aPSCOND));
	hData = Handle to a global memory object
Set Structured Field Service Condition	PostMessage(hServerWnd, WM_DDE_POKE, hClientWnd, MAKELONG(hData, aSFCOND));
	hData = Handle to a global memory object
Start Close Intercept	SendMessage(hServerWnd, WM_DDE_ADVISE, hClientWnd, MAKELONG(hOptions, aCLOSE));
	hOptions = Handle to a global memory object
Start Keystroke Intercept	SendMessage(hServerWnd, WM_DDE_ADVISE, hClientWnd, MAKELONG(hOptions, aKEYS));
	hOptions = Handle to a global memory object
Start Menu Advise	PostMessage(hServerWnd, WM_DDE_ADVISE, hClientWnd, MAKELONG(hOptions, aSELECTMENU));
	hOptions = Handle to a global memory object
Start Mouse Input Intercept	PostMessage(hServerWnd, WM_DDE_ADVISE, hClientWnd, MAKELONG(hOptions, aMOUSE));
	hOptions = Handle to a global memory object
Start Read SF	PostMessage(hServerWnd, WM_DDE_ADVISE, hClientWnd, MAKELONG(hOptions, aSF));
	hOptions = Handle to a global memory object

Table 52. Summary of DDE Functions in a 16-Bit Environment (continued)

Function name	Client command
Start Session Advise	PostMessage(hServerWnd, WM_DDE_ADVISE, hClientWnd, MAKELONG(hOptions, aItem));
	hOptions = Handle to a global memory object aItem = OIA | PS | TRIMRECT
Stop Close Intercept	PostMessage(hServerWnd, WM_DDE_UNADVISE, hClientWnd, MAKELONG(NULL, aCLOSE));
Stop Keystroke Intercept	PostMessage(hServerWnd, WM_DDE_UNADVISE, hClientWnd, MAKELONG(NULL, aKEYS));
Start Mouse Input Intercept	PostMessage(hServerWnd, WM_DDE_ADVISE, hClientWnd, MAKELONG(hOptions, aMOUSE));
	hOptions = Handle to a global memory object
Stop Menu Advise	PostMessage(hServerWnd, WM_DDE_UNADVISE, hClientWnd, MAKELONG(NULL, aSELECTMENU));
Stop Read SF	PostMessage(hServerWnd, WM_DDE_UNADVISE, hClientWnd, MAKELONG(NULL, aSF));
Stop Session Advise	PostMessage(hServerWnd, WM_DDE_UNADVISE, hClientWnd, MAKELONG(NULL, aItem));
	aItem = OIA | PS | TRIMRECT | NULL
Terminate Session Conversation	SendMessage(hServerWnd, WM_DDE_TERMINATE, hClientWnd, MAKELONG(NULL, NULL));
Terminate Menu Conversation	SendMessage(hServerWnd, WM_DDE_TERMINATE, hClientWnd, MAKELONG(NULL, NULL));
Terminate Structured Field Conversation	SendMessage(hServerWnd, WM_DDE_TERMINATE, hClientWnd, MAKELONG(NULL, NULL));
Terminate System Conversation	SendMessage(hServerWnd, WM_DDE_TERMINATE, hClientWnd, MAKELONG(NULL, NULL));
Write SF	PostMessage(hServerWnd, WM_DDE_POKE, hClientWnd, MAKELONG(hData, aSF));
	hData = Handle to a global memory object

Appendix F. Notices

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