z/OS Communications Server

Communications Server support for RoCE Express2 features

Version 2 Release 1

Note:
Links to related publications are from original documents and might not work. The links to publications are included for reference purposes only.

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Conventions and terminology that are used in this information

Commands in this information that can be used in both TSO and z/OS® UNIX environments use the following conventions:

- When describing how to use the command in a TSO environment, the command is presented in uppercase (for example, NETSTAT).
- When describing how to use the command in a z/OS UNIX environment, the command is presented in bold lowercase (for example, **netstat**).
- When referring to the command in a general way in text, the command is presented with an initial capital letter (for example, Netstat).

All the exit routines described in this information are *installation-wide exit routines*. The installation-wide exit routines also called installation-wide exits, exit routines, and exits throughout this information.

The TPF logon manager, although included with VTAM®, is an application program; therefore, the logon manager is documented separately from VTAM.

Samples used in this information might not be updated for each release. Evaluate a sample carefully before applying it to your system.

Note: In this information, you might see the following Shared Memory Communications over Remote Direct Memory Access (SMC-R) terminology:

- "RoCE Express®", which is a generic term representing both IBM® 10 GbE RoCE Express and IBM 10 GbE RoCE Express2 capability. When this term is used in this information, the processing being described applies to both features. If processing is applicable to only one feature, the full terminology, for instance, IBM 10 GbE RoCE Express will be used.
- RDMA network interface card (RNIC), which is used to refer to the IBM 10 GbE RoCE Express or 10 GbE RoCE Express2Express feature.
- Shared RoCE environment, which means that the "RoCE Express" feature can be used concurrently, or shared, by multiple operating system instances. The feature is considered to operate in a shared RoCE environment even if you use it with a single operating system instance.

For definitions of the terms and abbreviations that are used in this information, you can view the latest IBM terminology at the IBM Terminology website.

Clarification of notes

Information traditionally qualified as Notes is further qualified as follows:

Note Supplemental detail

Tip Offers shortcuts or alternative ways of performing an action; a hint

Guideline
Customary way to perform a procedure

Rule Something you must do; limitations on your actions

Restriction
Indicates certain conditions are not supported; limitations on a product or facility

Requirement
Dependencies, prerequisites

Result Indicates the outcome

Chapter 1. New Function Summary

Communications Server support for RoCE Express2 features

z/OS Communications Server V2R1 with APARs OA51949 and PI75199 extends the Shared Memory Communications over Remote Direct Memory Access (SMC-R) function to support the next generation IBM® 10 GbE RoCE Express2® feature. The IBM® 10 GbE RoCE Express2® feature allows TCP/IP stacks on different LPARs within the same central processor complex (CPC) to leverage the power of these state-of-the-art adapters to optimize network connectivity for mission critical workloads by using Shared Memory Communications technology.

Incompatibilities: This function does not support IPAQENET interfaces that are defined by using the DEVICE, LINK, and HOME statements. Convert your IPAQENET definitions to use the INTERFACE statement to enable this support.

Dependencies: This function requires the IBM z14 or later systems.

To enable the z/OS Communications Server support for RoCE Express2 features, complete the appropriate tasks in Table 1.

Table 1. Task topics to enable z/OS Communications Server support for RoCE Express2 features

Task	Reference
Configure at least one IBM 10 GbE RoCE Express2 feature in HCD. For each 10 GbE RoCE Express2 port, configure the physical network ID (PNetID), the physical channel ID (PCHID), the Function ID (FID), the virtual function ID (VF), and the port number (PORTNUM).	z/OS Hardware Configuration Definition (HCD) Reference Summary
Configure or update the GLOBALCONFIG SMCR statement in the TCP/IP profile. • Use the FID values configured in HCD to define the PFID values that represent physically different 10 GbE RoCE Express2 features to provide full redundancy support. • Do not specify PortNum for 10 GbE RoCE Express2 PFIDs, or specify the PORTNUM value configured in HCD for the PFID.	• GLOBALCONFIG statement in z/OS Communications Server: IP Configuration Reference • Shared Memory Communications over Remote Direct Memory Access in z/OS Communications Server: IP Configuration Guide
Display information about a 10 GbE RoCE Express2 interface by issuing the Netstat DEvlinks/-d command and specifying the RoCE Express2 interface.	Netstat DEvlinks/-d report in z/OS Communications Server: IP System Administrator's Commands

Chapter 2. IP Configuration Guide

Base TCP/IP System

Shared Memory Communications

Shared Memory Communications over Remote Direct Memory Access

Comparing 10 GbE RoCE Express feature environments:

An IBM 10 GbE RoCE Express feature operates in either a dedicated or a shared RoCE environment.

z/OS Communications Server dynamically determines the operating environment supported by this generation of System z® when the first 10 GbE RoCE Express feature is activated. Any additional 10 GbE RoCE Express features that are activated operate in the same environment that is determined when the first feature is activated.

Dedicated RoCE environment:

In a dedicated RoCE environment, z/OS Communications Server uses PCIe Physical Function services to manage the 10 GbE RoCE Express feature.

A 10 GbE RoCE Express feature operating in a dedicated RoCE environment can only be used by a single LPAR. z/OS allows the feature to be shared by up to eight TCP/IP stacks within a single LPAR. Each TCP/IP stack uses the same PCIe function ID (PFID) value to define its representation of the 10 GbE RoCE Express feature. The PFID value is defined by using traditional hardware configuration definition (HCD) tools. In a dedicated RoCE environment, only one of the two available ports can be used at a time.

Figure 1 on page 4 is an example of a 10 GbE RoCE Express feature that is defined in a dedicated RoCE environment. A single z/OS image (z/OS 2) is using the 10 GbE RoCE Express features identified by PCHID values 100 and 200. Two PFID values (0001 and 0016) are defined to represent the features, and the PFID values correspond to the FID values defined in the HCD for the features. No other z/OS images can use these two features, although up to eight stacks on z/OS 2 can use the features. In this example, port 1 is used on both features, and port 2 cannot be used when port 1 is in use.

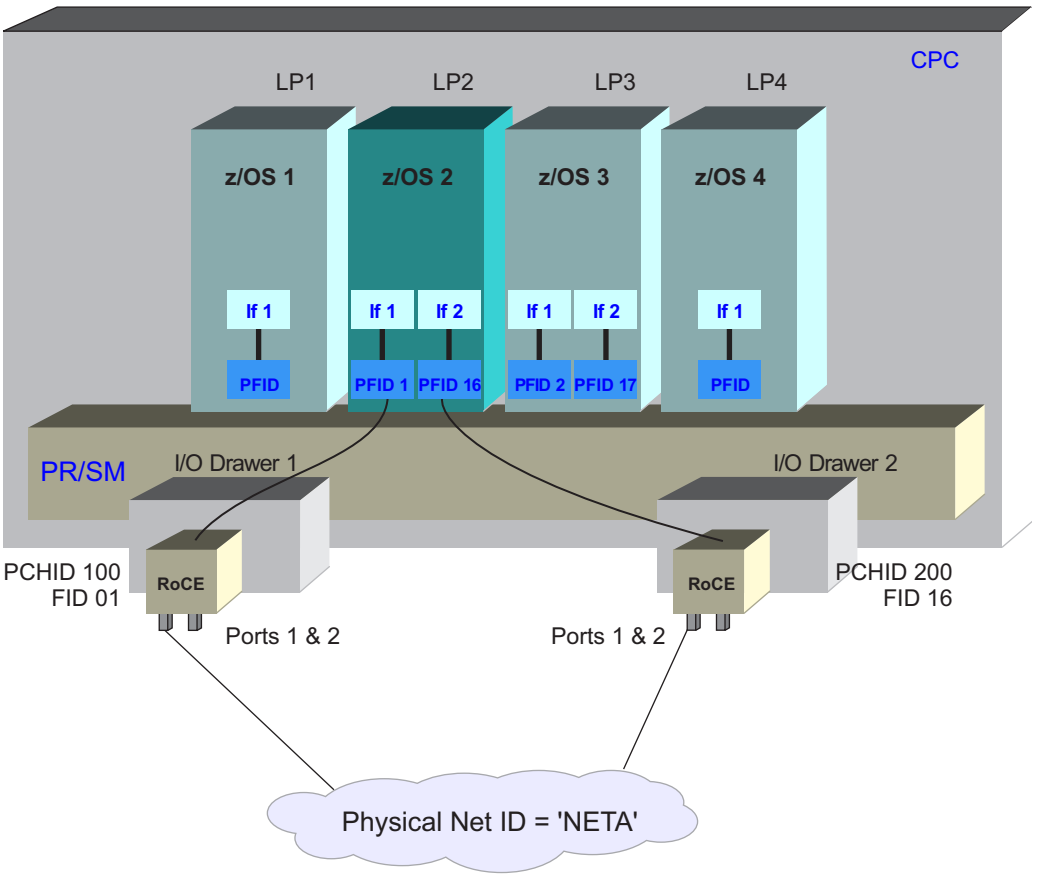


Figure 1. 10 GbE RoCE Express feature in a dedicated RoCE environment

A dedicated RoCE environment mode is supported on an IBM zEnterprise® EC12 (zEC12) with driver 15, or an IBM zEnterprise BC12 (zBC12).

Shared RoCE environment:

In a shared RoCE environment, z/OS Communications Server uses PCIe Virtual Function (VF) services to manage the 10 GbE RoCE Express feature, and System z provides the Physical Function management.

A 10 GbE RoCE Express feature operating in a shared RoCE environment can be shared by up to 31 operating system instances or TCP/IP stacks across the same central processor complex (CPC). Each TCP/IP stack within an LPAR, or each operating system instance, uses a unique FID value to define its representation of the 10 GbE RoCE Express feature. These FID values are defined by using HCD tools. In the shared environment, both 10 GbE RoCE ports can be used at the same time.

Guideline: For a TCP/IP stack, the FID value is represented by a PFID value on the GLOBALCONFIG statement in the TCP/IP profile. In addition, the same or different TCP/IP stacks can share the two 10 GbE RoCE Express ports of an individual 10 GbE RoCE Express feature if different PFID values are configured for the individual ports.

Figure 2 on page 5 is an example of a 10 GbE RoCE Express feature operating in a shared RoCE environment. Two z/OS images are using the 10 GbE RoCE Express features identified by PCHID values 100 and 200. Four unique PFID values are

defined, two per z/OS image, to represent the usage of the features. The PFID values correspond to the FID values defined for the features in the HCD. In this example, the combination of PFID and port is unique for all four interfaces, but TCP/IP stacks are sharing the same feature and port.

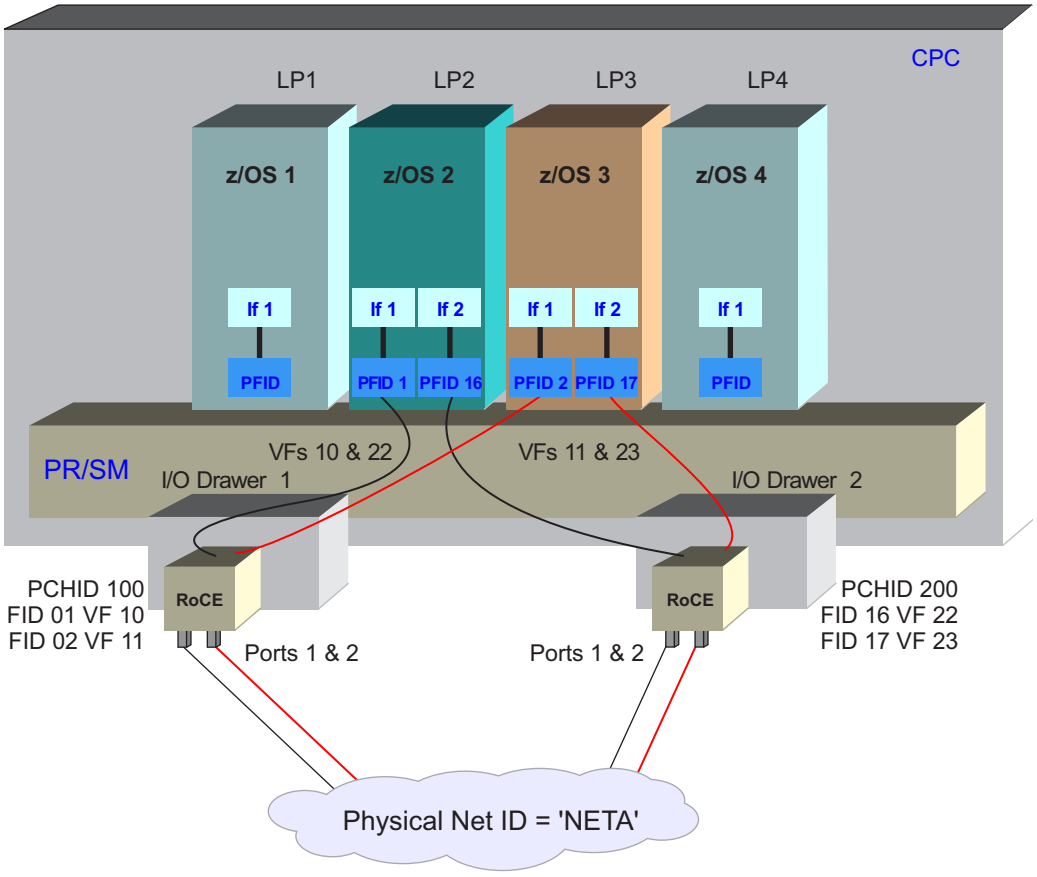


Figure 2. 10 GbE RoCE Express feature in a shared RoCE environment

Guideline: For full redundancy at a TCP/IP stack, configure PFID values that are associated with physically separate 10 GbE RoCE Express features. For example, in Figure 2, for z/OS 2, the two features are in different System z I/O drawers. Therefore, the failure of one I/O drawer or one feature does not affect the other I/O drawer or feature.

A shared RoCE environment must be used on the IBM z13™ (z13) or later systems.

10 GbE RoCE Express2 feature environment:

An IBM 10 GbE RoCE Express2 feature operates in a shared RoCE environment. In general, the same rules and guidelines for defining and using a 10 GbE RoCE Express feature apply to a 10 GbE RoCE Express2 feature. Each 10 GbE RoCE Express2 port can be shared by 31 or 63 operating system instances or TCP/IP stacks across the same CPC, depending on the z14 model's capability. See Shared RoCE environment for a description of operating in a shared RoCE environment.

Shared Memory Communications over RDMA terms and concepts

The following terms and concepts apply to Shared Memory Communications over Remote Direct Memory Access (SMC-R). You can use this list as needed for brief descriptions when you are using other SMC-R information.

Associated RNIC interface
An IBM 10 GbE RoCE Express interface that is associated with an SMC-R capable interface that has the same physical network ID.

IBM 10 GbE RoCE Express feature or IBM 10 GbE RoCE Express2 feature
A feature that enables Remote Direct Memory Access by managing low-level functions that the TCP/IP stack typically handles.

IBM 10 GbE RoCE Express interface
An interface that is dynamically created by TCP/IP that uses a particular port of an IBM 10 GbE RoCE Express feature.

Internal path
The System z internal PCIe infrastructure for "RoCE Express" features. The internal path of a "RoCE Express" feature is determined based on how the feature is plugged into the System z I/O drawers.

Operating system images
Logical partitions (LPARs) or guest virtual machines that operate in the same central processor complex (CPC).

Physical channel ID (PCHID)
A 2-byte hexadecimal value that is used to uniquely define a RoCE Express feature.

PCIe function ID (PFID)
A value that is configured on the SMCR parameter of the GLOBALCONFIG statement in the TCP/IP profile to identify a "RoCE Express" feature. The PFID represents a physical "RoCE Express" feature and must match a FID value configured in the hardware configuration definition (HCD) for the PCHID value that identifies the feature. When the "RoCE Express" feature is installed on a System z that supports a shared RoCE environment, the same physical feature can be shared with other operating system images, and multiple PFID values specified on the same GLOBALCONFIG statement can represent different ports on the same physical "RoCE Express" feature.

Peripheral Component Interconnect Express (PCI Express, or PCIe)
A local bus that provides the high-speed data path between the processor and an attached "RoCE Express" feature.

Physical network ID (PNet ID)
A value that is defined to uniquely identify your physical layer 2 LAN fabric or physical broadcast domain. You can use this value to logically associate the System z features, adapters, and ports to be physically connected to your network. You specify the PNet ID in a single step within the hardware configuration definition (HCD), and all operating systems of all associated central processor complexes (CPCs) can dynamically learn and use this definition.

RDMA network interface card (RNIC)
An IBM 10 GbE RoCE Express feature that enables Remote Direct Memory Access by managing low-level functions that are typically handled by the TCP/IP stack.

RDMA over Converged Ethernet (RoCE)
An InfiniBand Trade Association (IBTA) standard that enables Remote Direct Memory Access over Converged Ethernet.

Redundancy level
For an SMC-R link group, this value indicates the level to which z/OS Communications Server can provide dynamic failover processing if there is a failure of an underlying "RoCE Express" interface or the associated network hardware.

Reliable connected queue pair (RC QP)
A logical connection between two virtual servers that enables that specific pair of servers to use RDMA communications between themselves.

Remote Direct Memory Access (RDMA)
A high-speed, low-latency network communications protocol in which data is transferred directly to the memory of a remote host with no involvement from the remote host processors or operating system.

Remote memory buffer (RMB)
Local memory that is used to receive inbound data over an SMC-R link. The remote peer places TCP socket application data directly into the RMB that the local peer assigns to receive data for the TCP connection. The local peer then copies the data from the RMB into the receive buffer of the receiving socket application.

Rendezvous processing
The sequence of TCP connection management flows that are required to establish SMC-R communications between two peers.

RMB element (RMBE)
The specific portion of an RMB that is associated with a specific TCP connection. Each RMB is partitioned into RMBEs.

RoCE environments
Depending on the level of hardware that is used, the 10 GbE RoCE Express feature operates in either a shared or a dedicated RoCE environment.A 10 GbE RoCE Express2 feature always operates in a shared RoCE environment.

Dedicated RoCE environment
A dedicated RoCE environment applies to an IBM zEnterprise EC12 (zEC12) with driver 15, or an IBM zEnterprise BC12 (zBC12). In this environment, only a single operating system instance can use a physical 10 GbE RoCE Express feature. Multiple operating system instances cannot concurrently share the feature.

Shared RoCE environment
A shared RoCE environment applies to an IBM z13 (z13) or later system. In this environment, multiple operating system instances can concurrently use or share the same physical 10 GbE RoCE Express feature. With IBM z13 (z13) or later systems, the 10 GbE RoCE Express feature operates in a shared environment even if only one operating system instance is configured to use the feature.

"RoCE Express"
Generic term for either 10 GbE RoCE Express or 10 GbE RoCE Express2 feature.

SMC-R link
A logical point-to-point link between two virtual servers that is used for SMC-R communications.

SMC-R link group
A logical grouping of equal SMC-R links between two communicating peers.

Staging buffer
Memory that the TCP/IP stack allocates for outbound SMC-R data. Staging buffers are not associated with specific SMC-R links or link groups, and are used by all TCP connections that traverse SMC-R links on this stack. Only local applications access the staging buffer storage.

Using Shared Memory Communications

Configuration considerations for Shared Memory Communications:

VLANID considerations: The VLANID operand is optional on IPAQENET and IPAQENET6 INTERFACE statements with the OSD channel path ID type (CHPIDTYPE OSD). On a specific OSA transport resource list element (TRLE) basis, Communications Server enforces consistent VLAN definitions for INTERFACE statements that are associated with the same OSA TRLE.

For example, when VLANs are not used, the stack configuration allows only a single INTERFACE statement, and the VLANID operand is omitted on that INTERFACE statement. When VLANs are used, multiple INTERFACE statements are allowed and each INTERFACE statement must specify a unique VLANID value.

The OSD VLAN attributes of the IPAQENET or IPAQENET6 interface are propagated to the "RoCE Express" interfaces (associated RNIC) that have the same physical network identifier (PnetID) value. See Physical network considerations for more details on PnetID.

SMC-R VLANID usage for the 10 GbE RoCE Express feature

Whether SMC-R communications use virtual LANs depends on the definition of the SMC-R capable OSD interfaces that are extended to the associated 10 GbE RoCE Express interfaces. The 10 GbE RoCE Express feature can be shared by TCP/IP stacks that are configured to use different VLAN capabilities for the 10 GbE RoCE Express feature.

Depending on the operating mode, the number of VLANID values that can be used per 10 GbE RoCE Express feature has the following limits:

- When the 10 GbE RoCE Express feature operates in a dedicated RoCE environment, up to 126 unique VLANID values can be used per port.
- When the 10 GbE RoCE Express feature operates in a shared RoCE environment, up to 126 unique VLANID values can be used per port. In addition, each virtual function (VF) PFID representation of the feature can use up to 16 VLANID values, although internal 10 GbE RoCE Express feature limitations might further reduce that maximum value for individual PFID representations.

  Result: Multiple VF representations of the same 10 GbE RoCE Express feature can use the same VLANID value, and only one of the available 126 VLANID values is used.

Results: If you define more unique VLANID values for one PnetID on the SMC-R capable INTERFACE statements than the 10 GbE RoCE Express feature can support, the VLANID values of the last INTERFACE statements to be activated are not registered with the 10 GbE RoCE Express feature. The IPAQENET or IPAQENET6 interfaces can start, but TCP connections that are established over these interfaces cannot use SMC-R communications. Netstat ALL/-A reports that display the TCP connections include the following diagnostic information for the connection:

```
SMCSTATUS:        INACTIVE
SMCREASON:        00005206 - VLAN ID NOT FOUND
```

SMC-R VLANID usage for the 10 GbE RoCE Express2 feature

Whether SMC-R communications use virtual LANs depends on the definition of the SMC-R capable OSD interfaces that are extended to the associated 10 GbE RoCE Express2 interfaces. The 10 GbE RoCE Express2 feature can be shared by TCP/IP stacks that are configured to use different VLAN capabilities for the 10 GbE RoCE Express2 feature. There is no limit on the number of unique VLANIDs that you can use per 10 GbE RoCE Express2 port.

Physical network considerations: A physically separate "RoCE Express" feature is provided to use RDMA over Converged Ethernet (RoCE) on System z. This feature is used with the existing Ethernet connectivity that OSA provides. The "RoCE Express" feature provides access to the same physical Ethernet fabric that is used for traditional IP connectivity. For more information about the Ethernet switch requirements for RoCE, see Setting up the environment for Shared Memory Communications over RDMA and *IBM z Systems™ Planning for Fiber Optic Links*.

The operating systems must logically group the associated physical ports of both the "RoCE Express" and OSA adapters based on their required physical connectivity. Each central processor complex (CPC) connects to a physical network by using both OSA and "RoCE Express" ports. You can use two "RoCE Express" ports at most to connect to a physical network at a given time, but you can use as many OSA adapters as necessary for your network bandwidth or usage requirements. An example of this logical grouping, using two OSA adapters and two "RoCE Express" features, is shown in Figure 3 on page 10.

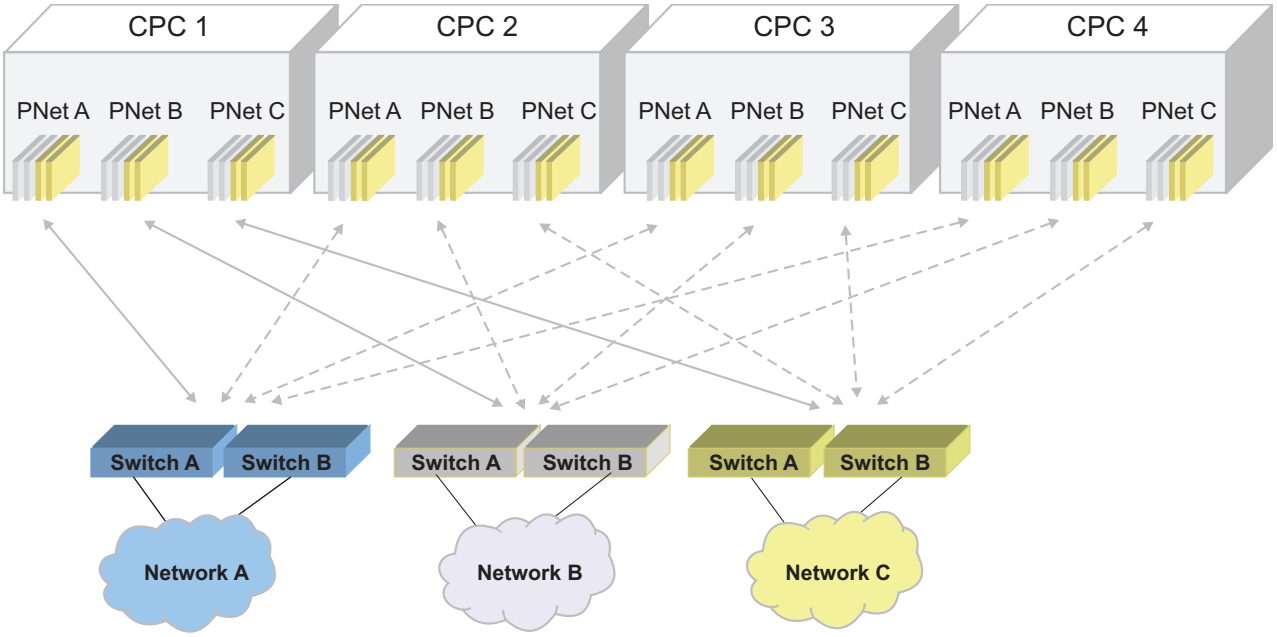


Figure 3. Physical networks

One TCP/IP stack can define up to 16 Peripheral Component Interconnect Express (PCIe) function ID (PFID) values. Each PFID value must match a FID value configured in the hardware configuration definition (HCD).

- In a dedicated RoCE environment, each PFID represents a unique PCHID definition of a 10 GbE RoCE Express feature, and only one of the two 10 GbE RoCE Express ports for the feature can be used at a time.
- In a shared RoCE environment, each PFID represents a virtual function (VF) usage of a 10 GbE RoCE Express feature or a 10 GbE RoCE Express2 feature, and multiple PFID values can be associated with the same physical feature and port.

The TCP/IP stack must be able to determine which physical network is connected to a particular 10 GbE RoCE Express interface, so that the 10 GbE RoCE Express interface can be associated with the SMC-R capable IPAQENET or IPAQENET6 interfaces that connect to that same physical network. For instance, in Figure 3, three distinct and physically separated networks can be accessed by using SMC-R communications.

The concept of a physical network identifier (PNet ID) was created to simplify this physical network configuration task. With the convention of a PNet ID, you can define a value to represent the ID or name of your physical layer 2 LAN fabric or physical broadcast domain. The System z physical ports that are to be connected to the associated physical networks are then logically associated with their respective PNet IDs. The PNet ID then becomes an attribute of the physical port of the feature or adapter, describing how this feature or adapter is physically connected to your data center network. You can specify the PNet ID in a single step within the hardware configuration definition (HCD), enabling all operating systems of all associated CPCs to dynamically learn and use this definition.

To match the "RoCE Express" features with the correct OSA SMC-R capable adapters, you must define a PNet ID value for both the "RoCE Express" interface (physical port) and the corresponding OSA adapters (physical port) within the HCD. The OSA ports correspond to the stack IPAQENET and IPAQENET6

interfaces. VTAM and the TCP/IP stack then dynamically learn the PNet IDs for the "RoCE Express" interface and the OSA interfaces when the "RoCE Express" interface or the OSD interface is started. The "RoCE Express" interface is associated with only SMC-R capable OSA interfaces that have the same PNet ID value defined.

Guideline: The TCP/IP stack does not validate the layer 2 physical network topology or broadcast domain. PNet IDs are values that you assign, and the operating systems learn and use these assigned values but cannot validate them within the Ethernet switched fabric. Therefore, the operating system does not assure or enforce any physical network separation or isolation across different physical networks. To physically isolate unique physical networks, you must ensure that traffic on PNet A cannot reach hosts on PNet B.

You can use virtual LANs (VLANs) to logically separate a physical network. If you configure multiple PNet IDs for SMC-R, then you must ensure that each VLAN or subnet in your configuration does not span more than one PNet ID.

Rules:

- The physical network that a PNet ID represents can include multiple subnets, but each subnet must be completely contained within a specific PNet ID.
- The physical network that a PNet ID represents can include multiple VLANs, but VLANs do not span PNet IDs even if they have the same VLAN number. For example VLAN 400 on PNet A is not the same VLAN as VLAN 400 on PNet B.

SMC-R processing requires the use of subnet masks. For more information, see "Configuring Shared Memory Communications over RDMA" on page 19.

For more information about the HCD, see z/OS HCD Planning and z/OS HCD User's Guide.

High availability considerations: Shared Memory Communications over RDMA (SMC-R) enables high-speed peer-to-peer connections over the RDMA over Converged Ethernet (RoCE) fabric between reliable connected queue pairs (RC QPs). SMC-R defines the RC QPs as an SMC-R link, and SMC-R links are logically grouped into SMC-R link groups. For more information, see SMC-R links and SMC-R link groups.

"RoCE Express" features at each host are required for SMC-R communications. After a TCP connection dynamically and successfully switches to SMC-R, it cannot revert to standard TCP/IP communications. Therefore, to achieve network high availability for SMC-R, it is critical to provide redundant physical network connectivity.

If the underlying "RoCE Express" interface or the associated network hardware fails, the z/OS host provides dynamic failover processing that transparently moves the TCP connections from the SMC-R links that are using the failed "RoCE Express" interface to another SMC-R link in the link group. If no other SMC-R link in the link group is available at the time of failure, the TCP connections are lost. To have a second redundant SMC-R link within a link group, two "RoCE Express" interfaces must be defined and active.

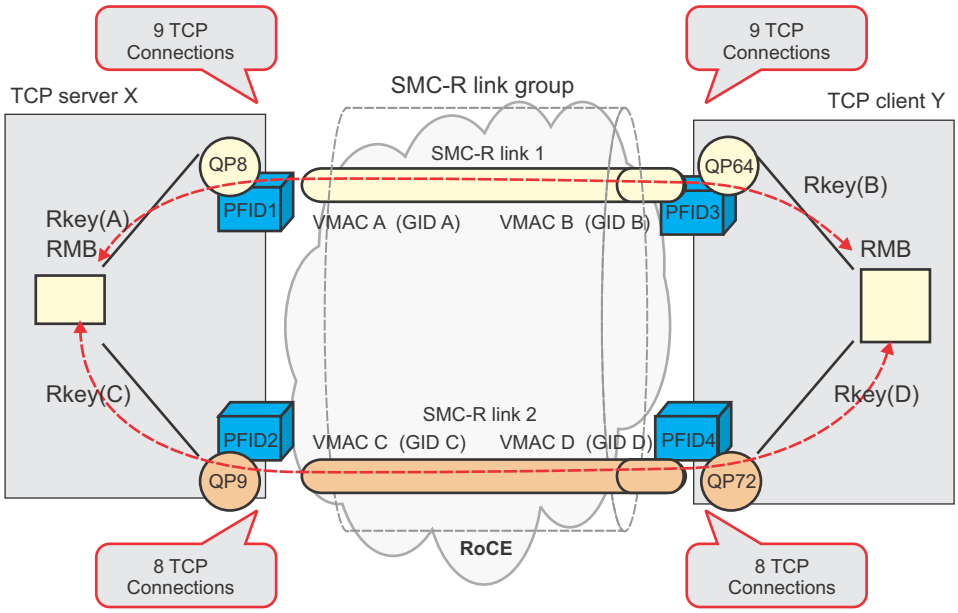


Figure 4. Redundant SMC-R links in an SMC-R link group

If the "RoCE Express" interfaces operate in a shared RoCE environment , an SMC-R link group might be considered redundant, even though the "RoCE Express" interfaces associated with SMC-R links use the same physical "RoCE Express" feature.

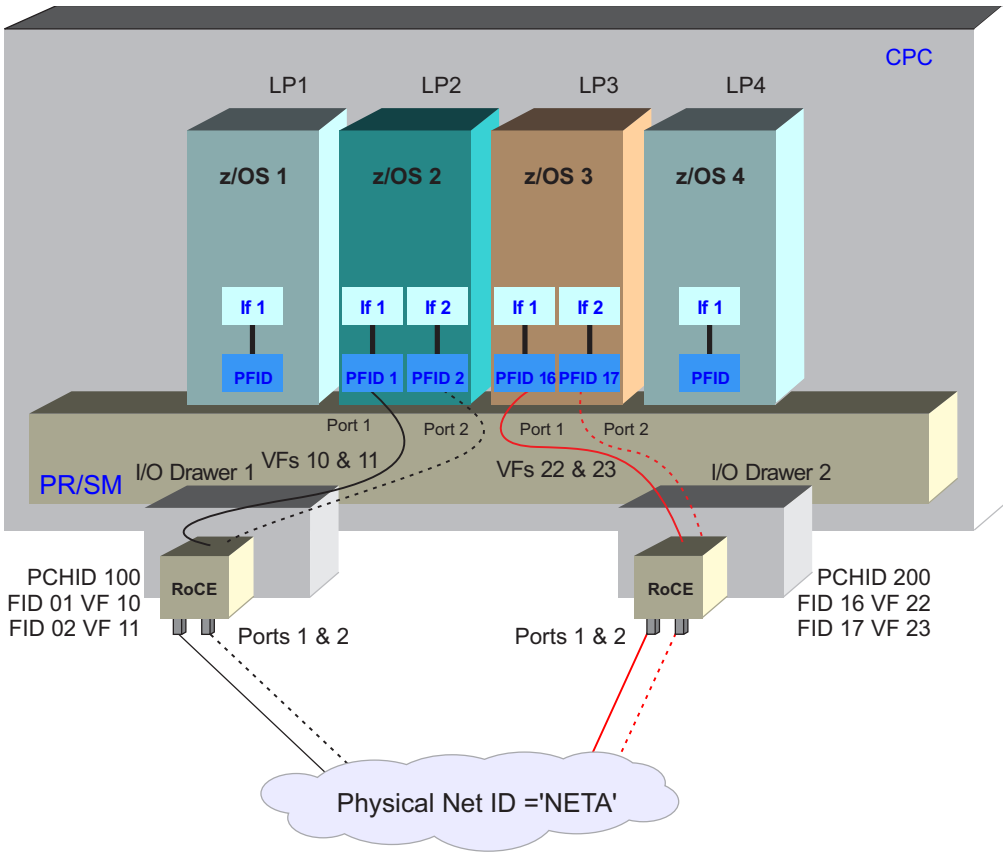


Figure 5. Misleading full redundancy configuration in a shared RoCE environment

For instance, in Figure 5, z/OS 2 has multiple PFID values defined, but the PFID values represent different ports on the same "RoCE Express" feature. When TCP connections that use SMC-R are established in this configuration, an SMC-R link group, with two SMC-R links, is created. The two SMC-R links make this SMC-R link group appear to have full redundancy, but an failure involving the "RoCE Express" feature will result in failures of both PFIDs and all the associated interfaces. This in turn will cause failures for both SMC-R links within the SMC-R link group. As a result, dynamic failover processing will not occur, and TCP connections that use those SMC-R links will fail. A configuration of this type is identified by a value of "Partial (single local PCHID, unique ports)" in Netstat Devlinks/-d reports involving the SMC-R link group. For more information, see Redundancy levels.

To ensure that a redundant path exists in a shared RoCE environment, you must design your connectivity to ensure that the PFID values used by a given TCP/IP stack represent physically different "RoCE Express" features. Two "RoCE Express" features are physically different if they are configured with different PCHID values. See Figure 2 on page 5 for an example of using physically different "RoCE Express" features in a shared RoCE environment.

As shown in Figure 4 on page 12, when both SMC-R peers have two active "RoCE Express" interfaces, TCP connections are distributed across the links. TCP connection data can use either SMC-R link, even if the TCP connection is considered to be assigned to a specific SMC-R link.

If a failure is experienced involving one SMC-R link, all the TCP connections are moved automatically to the other SMC-R link. For example, as shown in Figure 6, when SMC-R link 2 fails, all connections are moved to SMC-R link 1. After recovery, when a new SMC-R link is established, new TCP/IP connections are moved to the new link to balance utilization of the RoCE physical resources. Existing connection might also be moved to the new link.

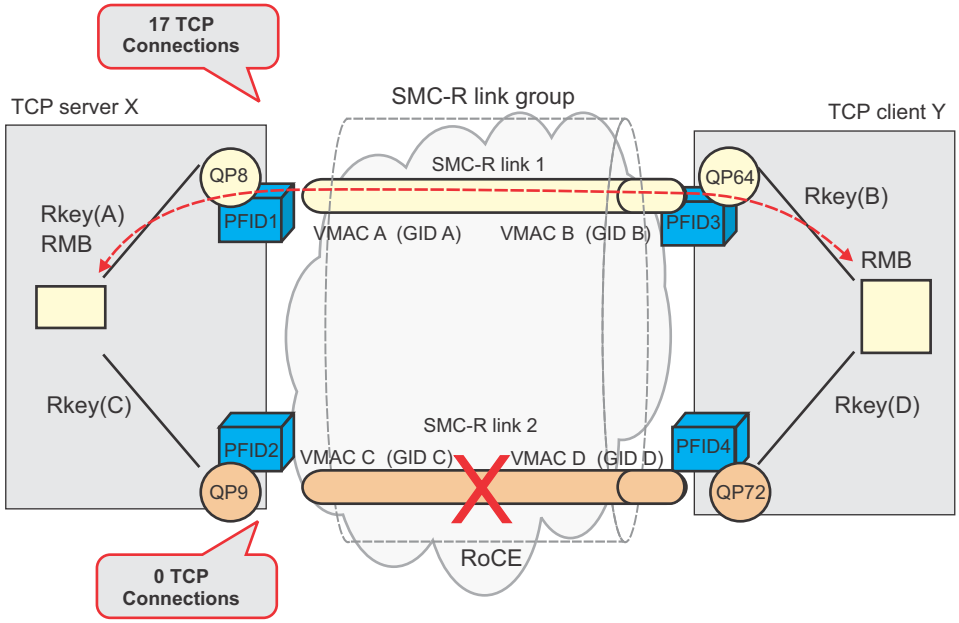


Figure 6. Failover processing within an SMC-R link group

Figure 4 on page 12 and Figure 6 do not show the RoCE switches, but ideally, redundant physical switches are also present.

If both SMC-R peers do not have multiple active "RoCE Express" interfaces, then the SMC-R link group does not provide an ideal level of TCP connection resiliency. Figure 7 on page 15 is an example of a configuration where one peer (the server host) has two active "RoCE Express" interfaces, but the other peer (the client host) has just one. In this situation, the server still creates two SMC-R links, one per active interface, so the server can still move the TCP connections between SMC-R links if a "RoCE Express" interface fails. The client, however, cannot move the TCP connections if its "RoCE Express" interface fails because no alternative path exists. Because only one peer can provide recovery capability, this configuration has partial redundancy.

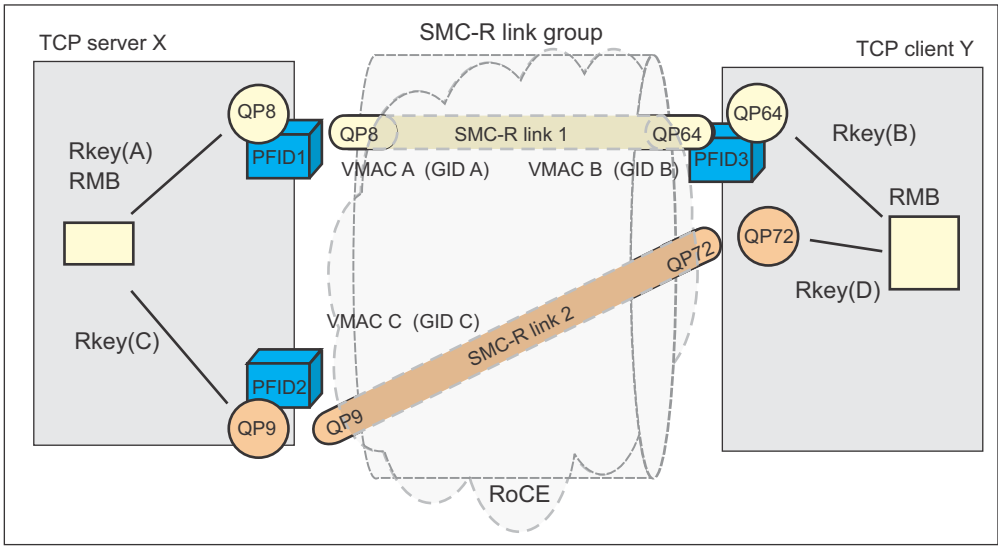


Figure 7. Partially redundant SMC-R links

If neither the server or the client has multiple active "RoCE Express" interfaces, as shown in Figure 8, then the SMC-R link group is composed of a single SMC-R link. If a "RoCE Express" interface fails in this configuration, the TCP connections cannot be recovered or moved, so they are all lost. This type of SMC-R link is called a single link, and the configuration has no redundancy capability.

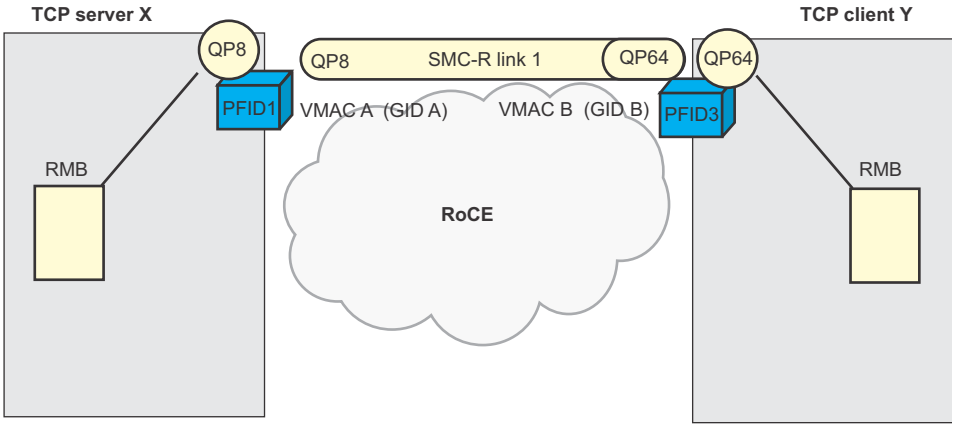


Figure 8. SMC-R link group with no redundant link

Redundancy levels

System z also provides redundant internal Peripheral Component Interconnect Express (PCIe) hardware support infrastructures for the PCIe-based "RoCE Express" features. For simplicity, the System z internal PCIe infrastructure is referred to as the *internal path*. The internal path of the "RoCE Express" feature is determined based on how the feature is plugged into the System z I/O drawers. To have full "RoCE Express" hardware redundancy on System z, each feature must have unique internal paths. For more information about the System z I/O drawer configurations, see your IBM Service representative.

A complete high availability solution, therefore, requires the following setup between two SMC-R peers:

- Two unique physical "RoCE Express" features that use unique PCHIDs (see “High availability considerations” on page 11)
- Unique system PCIe support infrastructures, or internal paths, for the two features
- Unique physical RoCE switches

From the perspective of the local stack, the physical network topology and the internal path configuration at the remote system to the remote adapters are not visible. z/OS Communications Server can evaluate and report a redundancy level that is based only on the known local factors. If the local stack has two unique "RoCE Express" features that have unique internal paths, then an SMC-R link group with two redundant SMC-R links is considered to have full redundancy.

Table 2 shows the reported redundancy levels with a description of each level. The values that are listed here represent the values that are displayed for an SMC-R link group in a Netstat DEVlinks/-d report. For an example of the Netstat DEvlinks/-d report, see z/OS Communications Server: IP System Administrator's Commands.

Table 2. Redundancy levels

Redundancy level	SMC-R link group with redundant links	Unique "RoCE Express" features have unique physical internal paths	Description
Full	Yes	Yes	Full local hardware redundancy **Rule:** Hardware redundancy must be verified at each host. The internal path at the remote host is not visible to the local host and therefore is not considered.
Partial (single local internal path)	Yes	No	The local "RoCE Express" features share an internal System z PCIe adapter support infrastructure (hardware internal path). This hardware configuration provides a single point of failure, so full redundancy cannot be guaranteed.
Partial (single local PCHID, unique ports)	Yes	No	The local "RoCE Express" features use the same PCHID but unique ports. Using the same PCHID creates a single point of failure, so full redundancy cannot be guaranteed.
Partial (single local PCHID and port)	Yes	No	The local "RoCE Express" features use the same PCHID and port. Using the same PCHID and port creates a single point of failure, so full redundancy cannot be guaranteed.
Partial (single local RNIC)	No	N/A	The link group has only a single active feature on the local host, but multiple active features are available to the remote host.
Partial (single remote RNIC)	No	N/A	The link group has only a single active feature on the remote host, but multiple active features on the local host.
None (single local and remote RNIC)	No	N/A	The link group has only a single active feature on both the local and the remote host.

A "RoCE Express" interface that is associated with an SMC-R capable interface because it has the same physical network ID is referred to as an *associated RNIC interface*. More than two "RoCE Express" interfaces can be defined with the same physical network ID, but the TCP/IP stack creates SMC-R link groups that use no more than two associated RNIC interfaces at any particular time. The "RoCE Express" interfaces are considered to be associated RNIC interfaces for IPAQENET and IPAQENET6 interfaces that match all of the following characteristics:

- The interfaces are active.
- The interfaces are defined by the INTERFACE statement with the OSD channel path ID type (CHPIDTYPE OSD).
- The interfaces are enabled for SMC-R communications.
- The interfaces have matching PNet ID values.

Associated RNIC interfaces are displayed in the Netstat DEvlinks/-d OSD report. For an example of the Netstat DEvlinks/-d report, see z/OS Communications Server: IP System Administrator's Commands.

Any additional "RoCE Express" interfaces that have the matching PNet ID are started, but they are not used to provide for added link level load-balancing purposes. Instead, the extra "RoCE Express" interfaces are held in reserve for use if one of the associated RNIC interfaces fails.

For instance, in Figure 6 on page 14, if "RoCE Express" interface 2 (shown as PFID2) on the server host fails, the TCP connections that were using SMC-R link 2 across interface 2 are switched to SMC-R link 1. The SMC-R link group loses its level of full link redundancy because only SMC-R link 1 is active. However, if another "RoCE Express" interface, call it PFID 5, were active on the server host, and PFID 5 had the same PNet ID value as PFID 1 and PFID 2, the server can immediately activate new SMC-R links across PFID 5 to the client host to reestablish full link redundancy. If PFID 5 and PFID 1 have unique physical paths, then full redundancy is also restored. This new SMC-R link is used for TCP connections within the link group. If PFID 2 recovers, it now serves as a standby PFID and can be used if either PFID 1 or PFID 5 fails.

You can also use extra PFIDs for planned outages, such as to schedule an upgrade to the "RoCE Express" features.

System and network requirements for Shared Memory:

Communications

System requirements for SMC-R in a dedicated RoCE environment:

You need to ensure that your system meets the requirements to use SMC-R with 10 GbE RoCE Express features operating in a dedicated RoCE environment.

A z/OS image must be z/OS Version 2 Release 1 or later to use Shared Memory Communications over RDMA (SMC-R) with 10 GbE RoCE Express features operating in a dedicated RoCE environment.

SMC-R requires RDMA over Converged Ethernet (RoCE) hardware and firmware support. The following minimum hardware requirements must be met to use SMC-R:

- You must have an IBM zEnterprise EC12 (zEC12) with driver 15, or an IBM zEnterprise BC12 (zBC12).
- You must have one or more IBM 10 GbE RoCE Express features.

  10 GbE RoCE Express features are dual ports with short range (SR) optics and dedicated to a single LPAR image.

  Guideline: Provide two 10 GbE RoCE Express features per z/OS image per unique physical network. For more information, see “RoCE network high availability” on page 19.

- You must have System z OSA-Express for traditional Ethernet LAN connectivity using CHPID type OSD.

  SMC-R does not impose any specific OSA requirements.
- You must have standard 10 GbE switches.

System requirements for SMC-R in a shared RoCE environment:

You need to ensure that your system meets the requirements to use Shared Memory Communications over RDMA (SMC-R) with "RoCE Express" features operating in a shared RoCE environment.

To use SMC-R with 10 GbE RoCE Express features operating in a shared RoCE environment, the minimum software requirement must be z/OS Version 2 Release 1 with APARs OA44576 and PI12223 applied.

To use SMC-R with 10 GbE RoCE Express2 features, the minimum software requirement is:

- z/OS Version 2 Release 1 with APARs OA51949 and PI75199 applied

SMC-R requires RDMA over Converged Ethernet (RoCE) hardware and firmware support. The following minimum hardware requirements must be met to use SMC-R:

- If you use 10 GbE RoCE Express features, you must have IBM z13 (z13) or later systems.
- If you use 10 GbE RoCE Express 2 features, you must have IBM z14 or later systems
- You must have one or more IBM 10 GbE RoCE Express or IBM 10 GbE RoCE Express2 features.

  "RoCE Express" features are dual ports with short range (SR) optics and can be shared across multiple operating systems images or TCP/IP stacks in a central processor complex (CPC).

  Guideline: Provide two "RoCE Express" features per unique physical network. For more information, see “RoCE network high availability” on page 19.
- You must have System z OSA-Express for traditional Ethernet LAN connectivity.

  SMC-R does not impose any specific OSA requirements.
- You must have standard 10 GbE switches.

RoCE network configuration requirements

z/OS Communications Server supports connectivity to multiple, distinct layer 2 networks through unique physical LANs. Each unique physical network is identified by existing Ethernet standards that are based on the physical layer 2 broadcast domain. You can define a physical network ID (PNet ID) for each physical network. For more information, see “Physical network considerations” on page 9.

For hosts to communicate by using SMC-R, they must connect directly to the same Ethernet layer 2 LAN network. If VLANs are in use, each host must also have access to the same VLAN. For more information, see “VLANID considerations” on page 8.

There are restrictions on the physical distances that can be used to route RDMA frames. To understand these distance specifications and limitations, see *IBM z Systems Planning for Fiber Optic Links*.

RoCE network high availability

Because RoCE connections do not use IP routing and the RDMA connections to remote hosts are direct point-to-point connections that use reliable connected queue pairs (RC QPs), there is no concept of an alternative IP route to the peer. SMC-R connectivity is possible with a single 10 GbE RoCE Express feature, but a loss in that single feature means that the associated TCP connections and workloads are disrupted. Therefore, redundant 10 GbE RoCE Express features on both the local and remote hosts are required to achieve network high availability with SMC-R. If your TCP workloads require high availability, redundant 10 GbE RoCE Express features and redundant Ethernet switches are required. The SMC-R protocol actively uses both features, rather than using one feature with the other in standby mode. For more information, see "High availability considerations" on page 11.

IBM 10 GbE RoCE Express features also have redundant internal PCIe support structures, or PCIe internal paths, as described in "Redundancy levels" on page 15. To avoid another single point of failure, install each 10 GbE RoCE Express feature that is managed by the same operating system with a unique internal path. For more information about how to install a 10 GbE RoCE Express feature to achieve full redundancy, see your IBM service representative.

RoCE bandwidth

The 10 GbE RoCE Express features provide 10 GbE ports. When redundant features are defined, SMC-R link groups can be formed by using both features, resulting in a 20 GbE logical pipe to each physical network. z/OS Communications Server uses only two features within a link group at any particular time.

Configuring Shared Memory Communications over RDMA:

Use these steps to configure and begin to use Shared Memory Communications over RDMA (SMC-R).

Before you begin

See Setting up the environment for Shared Memory Communications over RDMA.

Procedure

Perform the following steps to configure SMC-R:

1. If necessary, convert IPv4 IPAQENET DEVICE, LINK, and HOME definitions to INTERFACE definitions. SMC-R processing is provided only for OSD interfaces configured with INTERFACE definitions. For more information about converting IPv4 IPAQENET DEVICE, LINK, and HOME definitions to INTERFACE definitions, see Steps for converting from IPv4 IPAQENET DEVICE, LINK, and HOME definitions to the IPv4 IPAQENET INTERFACE statement.
2. Configure the SMCR parameter on the GLOBALCONFIG statement in the TCP/IP profile. The SMCR parameter includes the following subparameters:
   - PFID specifies the PCI Express (PCIe) function ID (PFID) value for a "RoCE Express" feature that this stack uses.

You must code at least one PFID subparameter for this stack to use SMC-R, and two PFIDs per PNet ID per stack for redundancy.

- When the 10 GbE RoCE Express features operate in a dedicated RoCE environment, each RoCE Express feature must have a unique PFID value, but each TCP/IP stack that uses the RoCE Express feature specifies the same PFID value.
- When the 10 GbE RoCE Express features or 10 GbE RoCE Express2 operate in a shared RoCE environment, each TCP/IP stack that uses the same "RoCE Express" feature must have a unique PFID value, even if the TCP/IP stacks are defined on different LPARs.

- PORTNUM specifies the 10 GbE RoCE Express port number to use for each PFID.

  Guideline: You do not have to code PORTNUM for a PFID representing a 10 GbE RoCE Express2 feature. The port number is defined for the PFID in the HCD, and VTAM and the TCP/IP stack learns the port number during PFID activation.

  Configure each PFID to use only a single port. The port number can be 1 or 2; 1 is the default port number.

  - When the 10 GbE RoCE Express features operate in a dedicated RoCE environment, either port 1 or port 2 can be used for a particular 10 GbE RoCE Express feature, but z/OS Communications Server cannot be configured to use both ports of a feature. For example, specifying `PFID 0018 PORTNUM 1` and `PFID 0018 PORTNUM 2`, even if specified on different TCP/IP stacks in the same LPAR, results in an error during 10 GbE RoCE Express activation processing for the second port that is activated.
  - When the 10 GbE RoCE Express features operate in a shared RoCE environment, both port 1 and port 2 can be used simultaneously if the ports are associated with different PFID values. For example, assuming that PFID 0018 and PFID 0019 represent the same physical 10 GbE RoCE Express feature, you can specify `PFID 0019 PORTNUM 1` and `PFID 0018 PORTNUM 2` to use both ports.

- MTU specifies the maximum transmission unit (MTU) to be used for this PFID. The default value is 1024. For more information, see RoCE maximum transmission unit.
- FIXEDMEMORY specifies the total amount of memory, in megabytes, that can be used for the staging and remote memory buffers.

  The default value is 256 MB. To choose a value that is appropriate for your environment, see Storage considerations.
- TCPKEEPMININTERVAL specifies the minimum time interval, in seconds, for sending keepalive probes for TCP connections that use SMC-R protocols to exchange data.

  The default value is 300 seconds. For more information, see TCP keepalive.

The following GLOBALCONFIG statement defines two 10 GbE RoCE Express features, PFID 0018 and PFID 0019. Port 2 is used on each feature, and the maximum amount of 64-bit private storage that can be used for SMC-R communications is 200 megabytes. The default values for both TCPKEEPMININTERVAL and MTU are used.

```
GLOBALCONFIG SMCR
    PFID 0018 PORTNUM 2
    PFID 0019 PORTNUM 2
    FIXEDMEMORY 200
```

If PFID 0018 and PFID 0019 represent 10 GbE RoCE Express2 features, you do not need to specify PORTNUM on the GLOBALCONFIG definition.

```
GLOBALCONFIG SMCR
PFID 0018
PFID 0019
FIXEDMEMORY 200
```

For more information about these and other SMCR subparameters on the GLOBALCONFIG statement, see z/OS Communications Server: IP Configuration Reference.

3. (Optional) Configure the SMCR parameter on the IPAQENET and IPAQENET6 INTERFACE statements with the OSD channel path ID type (CHPIDTYPE OSD).

   Tip: SMCR is the default setting on the IPAQENET and IPAQENET6 INTERFACE statements for the OSD CHPID type.

4. Associate the interfaces with the appropriate subnet or prefix.
   - For an IPv4 interface to be eligible for SMC-R, you must configure a nonzero subnet mask on the INTERFACE statement in the TCP/IP profile.

     Result: SMC-R is used only between peers whose interfaces have the same subnet value.
   - For an IPv6 interface to be eligible for SMC-R, the interface must have at least one prefix that is associated with it.

     Rule: A prefix can be associated to an IPv6 interface in any of these ways:
     - A prefix received on a router advertisement message from an attached router
     - A prefix that is configured in OMPROUTE by using the PREFIX parameter on the IPV6_OSPF_INTERFACE, IPV6_RIP_INTERFACE, or IPV6_INTERFACE statement
     - A direct static prefix route that is configured over the interface on a ROUTE statement in a BEGINROUTES block in the TCP/IP profile

     Result: SMC-R is used only between peers whose IPv6 interfaces have at least one prefix in common.
5. (Optional) If you are using VLANs for your SMC-R communications, configure the VLANID parameter on the IPAQENET and IPAQENET6 INTERFACE statements for the OSD CHPID type. For more information, see "VLANID considerations" on page 8.
6. (Optional) If you have a server application that primarily uses short-lived TCP connections, you might want to avoid SMC-R rendezvous processing for TCP connections that are using that server port. Configure NOSMCR on the PORT or PORTRANGE statement for the server port or ports that this server application uses. For more information, see z/OS Communications Server: IP Configuration Reference.
7. Start the IPAQENET and IPAQENET6 interfaces. When the first SMC-R capable OSD interface becomes active, z/OS Communications Server automatically starts all PFIDs that are defined in the GLOBALCONFIG statement, and associates the 10 GbE RoCE Express interfaces with the OSD interfaces that have matching physical network IDs (PNet IDs). For more information about PNet IDs, see "Physical network considerations" on page 9.

What to do next

For information about how SMC-R interacts with other functions, see SMC-R interactions with other z/OS Communications Server functions.

For information about managing SMC-R communications, see Managing SMC-R communications.

Managing SMC communications

VTAM displays and tuning statistics: When a "RoCE Express" interface is first started, VTAM dynamically creates a transport resource list element (TRLE) to represent it.

- For a "RoCE Express" interface, the TRLE name is in the form of IUT*pfffff*, where *p* is the port number and *ffff* is the PCI-Express function ID (PFID).
  - For a 10 GbE RoCE Express feature, if you specify `GLOBALCONFIG SMCR PFID 0018 PORTNUM 1`, the TRLE name is IUT10018.
  - For a 10 GbE RoCE Express2 feature, if you specify `GLOBALCONFIG SMCR PFID 0055`, the TRLE name will be IUT10055 or IUT20055. It depends on the port number defined for PFID 55 in the Hardware Configuration Definition (HCD). VTAM learns the port number when the PFID is activated.

You can use the VTAM DISPLAY TRL and DISPLAY ID commands to display information about the TRLE representation of the "RoCE Express" interface, including information about the physical network ID (PNet ID), and which TCP stacks use the interface.

Tip: Use the presence of a virtual function number (VFN) in the DISPLAY TRL or DISPLAY ID command output to determine whether the "RoCE Express" feature operates in a shared RoCE environment. A VFN is present in a shared environment and absent in a dedicated environment. A 10 GbE RoCE Express2 TRLE always has a VFN and always operates in a shared environment.

VTAM collects tuning statistics for "RoCE Express" interfaces when requested by using the TNSTAT start option or the MODIFY TNSTAT command. Tuning statistics that represent processing at a "RoCE Express" interface level and statistics at a user or TCP/IP stack level are both maintained. The TCP/IP stack level statistics are also provided on the GetRnics request. For more information, see Network Management Interface.

For more information about the VTAM commands, see z/OS Communications Server: SNA Operation. For more information about gathering tuning statistics, see z/OS Communications Server: SNA Network Implementation Guide.

Chapter 3. IP Configuration Reference

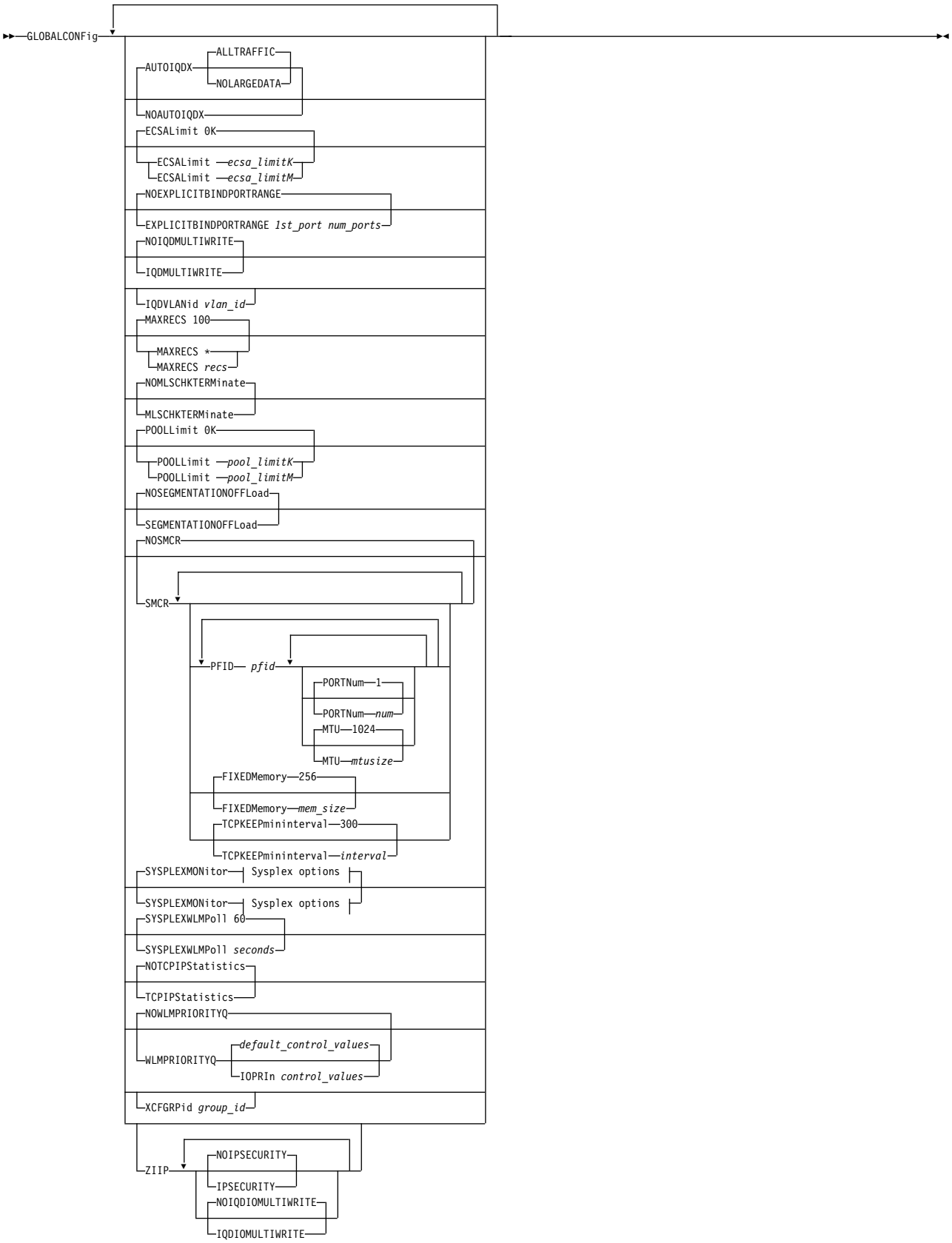
TCP/IP profile (PROFILE.TCPIP) and configuration statements

GLOBALCONFIG statement

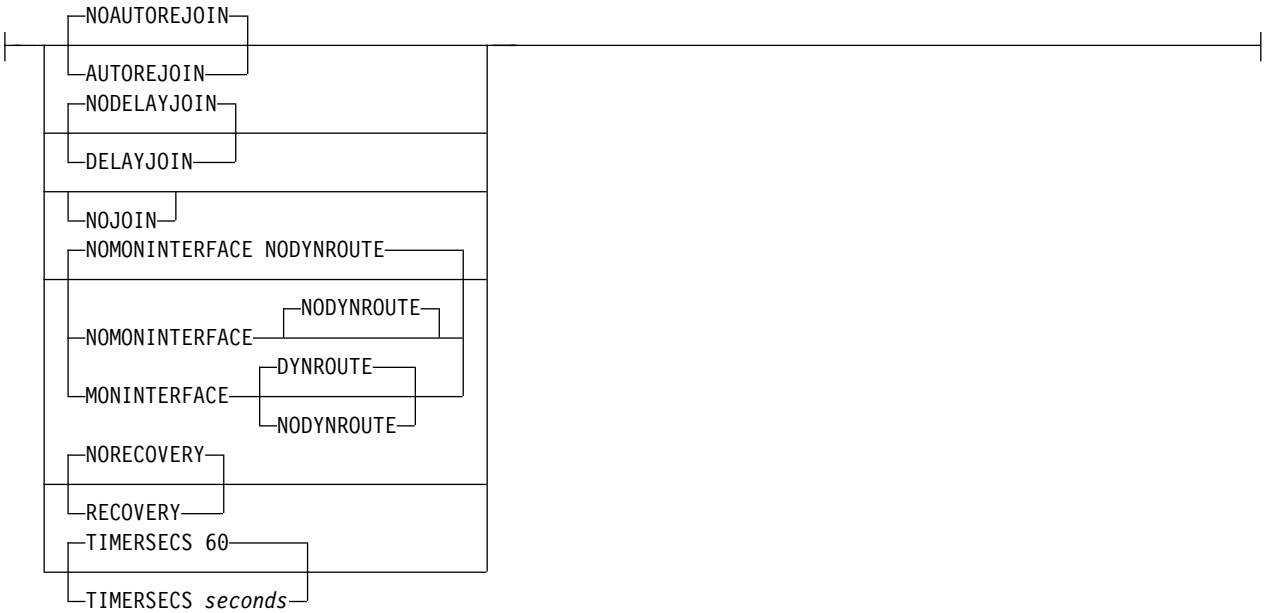
Use the GLOBALCONFIG statement to pass global configuration parameters to TCP/IP.

Syntax

Tip: Specify the parameters for this statement in any order.


GLOBALCONFig
AUTOIQDX
ALLTRAFFIC
NOLARGEDATA
NOAUTOIQDX
ECSALimit 0K
ECSALimit —ecsa_limitK
ECSALimit —ecsa_limitM
NOEXPLICITBINDPORTRANGE
EXPLICITBINDPORTRANGE 1st_port num_ports
NOIQDMULTIWRITE
IQDMULTIWRITE
IQDVLANid vlan_id
MAXRECS 100
MAXRECS *
MAXRECS recs
NOMLSCHKTERMinate
MLSCHKTERMinate
POOLLimit 0K
POOLLimit —pool_limitK
POOLLimit —pool_limitM
NOSEGMENTATIONOFFLoad
SEGMENTATIONOFFLoad
NOSMCR
SMCR
PFID— pfid
PORTNum—1
PORTNum—num
MTU—1024
MTU—mtusize
FIXEDMemory—256
FIXEDMemory—mem_size
TCPKEEPmininterval—300
TCPKEEPmininterval—interval
SYSPLEXMONitor
Sysplex options
SYSPLEXMONitor
Sysplex options
SYSPLEXWLMPoll 60
SYSPLEXWLMPoll seconds
NOTCPIPStatistics
TCPIPStatistics
NOWLMPRIORITYQ
WLMPRIORITYQ
default_control_values
IOPRIn control_values
XCFGRPid group_id
ZIIP
NOIPSECURITY
IPSECURITY
NOIQDIOMULTIWRITE
IQDIOMULTIWRITE

Sysplex options:



Parameters

AUTOIQDX | NOAUTOIQDX
Specifies whether to use dynamic Internal Queued Direct I/O extensions (IQDX) interfaces for connectivity to the intraensemble data network.

See "Steps for modifying" on page 39 for details about changing this parameter while the TCP/IP stack is active. See z/OS Communications Server: IP Configuration Guide for information about the intraensemble data network and the dynamic IQDX function.

NOAUTOIQDX
Do not use dynamic IQDX interfaces.

AUTOIQDX
Use dynamic IQDX interfaces when an IQD CHPID has been configured with the Internal Queued Direct I/O extensions (IQDX) function. This value is the default value.

ALLTRAFFIC
Use IQDX interfaces for all eligible outbound traffic on the intraensemble data network. This value is the default value.

NOLARGEDATA
Do not use IQDX interfaces for outbound TCP socket data transmissions of length 32KB or larger. Use IQDX interfaces for all other eligible outbound traffic. See z/OS Communications Server: IP Configuration Guide for more information about performance considerations for the IEDN-enabled HiperSockets™ function.

ECSALIMIT *ecsalimit* **K | M**
Specifies the maximum amount of extended common service area (ECSA) that TCP/IP can use. This limit can be expressed as a number followed by a K (which represents 1024 bytes), or a number followed by an M (which represents 1048576 bytes). If the K suffix is used, *ecsalimit* must be in the range

10240K and 2096128K inclusive or 0. If the M suffix is used, *ecsalimit* must be in the range 10M and 2047M inclusive or 0. The default is no limit, and it can be specified as 0 K or 0 M. The minimum value for ECSALIMIT and POOLLIMIT is not allowed to be set to a value if the current storage in use would be greater than or equal to 80% of that value (for example, not allowed to set it such that there is an immediate storage shortage).

ECSALIMIT ensures that TCP/IP does not overuse common storage. It is intended to improve system reliability by limiting TCP/IP's storage usage. The limit must account for peak storage usage during periods of high system activity or TCP/IP storage abends might occur. The limit does not include storage used by communications storage manager (CSM). CSM ECSA storage is managed independently of the TCP/IP ECSALIMIT. See z/OS Communications Server: SNA Network Implementation Guide for more information about CSM.

Specifying a nonzero ECSALIMIT enables warning messages EZZ4360I, EZZ4361I, and EZZ4362I to appear if a storage shortage occurs.

EXPLICITBINDPORTRANGE | NOEXPLICITBINDPORTRANGE

NOEXPLICITBINDPORTRANGE
Indicates that this stack does not participate in the allocation of ports from a pool of ports. The ports in the pool are guaranteed to be unique across the sysplex in that they are allocated to only one requestor in the sysplex at any one time, when processing an explicit bind() of a TCP socket to the IPv4 INADDR_ANY address, or to the IPv6 unspecified address (in6addr_any), and port 0.

EXPLICITBINDPORTRANGE
Indicates that this stack participates in the allocation of ports from a pool of ports guaranteed to be unique across the sysplex, when processing an explicit bind() of a TCP socket to the IPv4 INADDR_ANY address, or to the IPv6 unspecified address (in6addr_any), and port 0. This parameter also designates the range of ports that defines that pool. This parameter defines the range used by all stacks participating in EXPLICITBINDPORTRANGE port allocation processing throughout the sysplex. The most recently processed profile or OBEYFILE command that specifies EXPLICITBINDPORTRANGE defines the range for the sysplex.

Use this parameter so that you can specify distributed DVIPAs as the source IP address on DESTINATION or JOBNAME rules in a SRCIP block. See SRCIP statement.

1st_port
The starting port for the range of ports. The *1st_port* value is in the range 1024 - 65535. The sum of the *1st_port* value plus the *num_ports* value minus 1 cannot exceed 65535.

num_ports
The number of ports in the range. The *num_ports* value is in the range 1 - 64512. The sum of the *1st_port* value plus the *num_ports* value minus 1 cannot exceed 65535.

Guidelines:

- All TCP/IP stacks in the sysplex that participate in EXPLICITBINDPORTRANGE processing should have the same port range specified. To ensure this, specify the GLOBALCONFIG

EXPLICITBINDPORTRANGE statement in a file that is specified in an INCLUDE statement in the TCP profiles data set of all the participating stacks.

- The port range defined on the EXPLICITBINDPORTRANGE parameter should not overlap any existing port reservations of any TCP/IP stacks in the sysplex. Any reserved ports that are within the EXPLICITBINDPORTRANGE range are excluded from the EXPLICITBINDPORTRANGE port pool, effectively making the pool smaller.
- The EXPLICITBINDPORTRANGE port range must be large enough to accommodate all applications in the sysplex that might issue explicit bind() calls for the IPv4 INADDR_ANY address, or for the IPv6 unspecified address (in6addr_any), and port 0.
- If additional TCP/IP stacks or systems are introduced into the sysplex, the extent of the port range defined by EXPLICITBINDPORTRANGE should be re-evaluated.
- If the size of the port range defined by the EXPLICITBINDPORTRANGE parameter is too large, there are fewer ports available for local ephemeral port allocation.
- If you specify the EXPLICITBINDPORTRANGE parameter in a sysplex that contains pre-V1R9 TCP/IP stacks, each distributor, backup, and target TCP/IP stack of a distributed SYSPLEXPORTS DVIPA that is configured as a source IP address on a SRCIP profile statement must have one of the following characteristics:
  - Run on a V1R9 or later system.
  - Use the PORTRANGE profile statement on the pre-V1R9 stacks to reserve the ports that are configured on the V1R9 or later stacks with the EXPLICITBINDPORTRANGE parameter.

  Failure to meet these characteristics can result in connection failures because unique ports assignments are no longer be assured throughout the sysplex for a SYSPLEXPORTS distributed DVIPA; the same port value could be assigned from the following pools:
  - The DVIPA-specific pool by a pre-V1R9 system
  - The EXPLICITBINDPORTRANGE pool by a V1R9 or later system

Restriction: In a common INET (CINET) environment, this parameter is accepted, but the EXPLICITBINDPORTRANGE function is supported in a limited set of conditions only. It is supported when CINET is managing one stack only on the system or when the affected application has established stack affinity. Otherwise, results can be unpredictable.

IQDMULTIWRITE | NOIQDMULTIWRITE

Specifies whether HiperSockets interfaces should use multiple write support. HiperSockets multiple write might reduce CPU usage and might provide a performance improvement for large outbound messages that are typically generated by traditional streaming workloads such as file transfer, and interactive web-based services workloads such as XML or SOAP. This parameter applies to all HiperSockets interfaces, including IUTIQDIO and IQDIOINTF6 interfaces created for Dynamic XCF.

Restriction: HiperSockets multiple write is effective only on an IBM System z10™ or later and when z/OS is not running as a guest in a z/VM® environment.

See the modifying information in this topic for details about changing this parameter while the TCP/IP stack is active. See the HiperSockets multiple

write information in z/OS Communications Server: IP Configuration Guide for more information about HiperSockets multiple write support.

NOIQDMULTIWRITE
HiperSockets interfaces do not use the multiple write support. This is the default.

IQDMULTIWRITE
HiperSockets interfaces do use the multiple write support.

IQDVLANID *vlan_id*
Specifies a VLAN ID to be used when HiperSockets (iQDIO) connectivity is used for dynamic XCF support. VLAN IDs are used to partition communication across HiperSockets. Stacks on the same CPC using the same HiperSockets CHPID that use the same VLAN ID can establish communications; stacks on the same CPC using the same HiperSockets CHPID that use different VLAN IDs cannot.

The specified value, *vlan_id*, is used for both IPv4 and IPv6 DYNAMICXCF HiperSockets connectivity. This parameter is intended to be used in conjunction with the GLOBALCONFIG XCFGRPID parameter to support subplexing.

Subplexing enables TCP/IP participation in a Sysplex to be partitioned into subsets based on the XCFGRPID value. When using subplexing, TCP/IP stacks with the same XCFGRPID value should specify the same IQDVLANID value. Stacks with different XCFGRPID values should have different IQDVLANID values. If you have stacks in the default subplex (that is, stacks that do not specify an XCFGRPID value) that use the same HiperSockets CHPID as stacks within a non-default subplex (an XCFGRPID value was specified), then the stacks in the default subplex should specify an IQDVLANID value that is different from the other IQDVLANID values specified by the other non-default subplex stacks that use the same HiperSockets CHPID.

Restriction: The IQDVLANID parameter can be specified only in the initial profile.

Valid VLAN IDs are in the range 1 - 4094. For more information about VLANs and Hipersockets see z/OS Communications Server: IP Configuration Guide.

MAXRECS
Specifies the maximum number of records to be displayed by the DISPLAY TCPIP,,NETSTAT operator command. The term *records* refers to the number of entries displayed on each report. For example, for the connection-related reports, a record is a TCP connection or listener, or a UDP endpoint. This configured value is used when the MAX parameter is not explicitly specified on the command. The default value is 100. If the number of output lines exceeds the maximum number of lines for a multi-line Write to Operator (WTO), the report output is truncated. See the information about the Display TCPIP,,NETSTAT command in z/OS Communications Server: IP System Administrator's Commands for more details about the command.

* A value of asterisk (*) specifies that all records are to be displayed.

recs This value specifies the number of records to be displayed. The valid range is 1 - 65535.

MLSCHKTERMINATE | NOMLSCHKTERMINATE

NOMLSCHKTERMINATE
Specifies that the stack should remain active after writing an

informational message when inconsistent configuration information is discovered in a multilevel-secure environment.

Informational message EZD1217I is written to the system console summarizing the number of problems found. Additional informational messages between EZD1219I and EZD1234I are written to the job log for each configuration inconsistency found.

This is the default value.

MLSCHKTERMINATE
Specifies that the stack should be terminated after writing an informational message when inconsistent configuration information is discovered in a multilevel-secure environment.

Informational message EZD1217I is written to the system console summarizing the number of problems found. Additional informational messages between EZD1219I and EZD1234I are written to the job log for each configuration inconsistency found.

POOLLIMIT *pool_limit* **K | M**
Specifies the maximum amount of authorized private storage that TCP/IP can use within the TCP/IP address space. This limit can be expressed as a number followed by a K (which represents 1024 bytes), or a number followed by an M (which represents 1048576 bytes). If the K suffix is used, *pool_limit* must be in the range 10240K and 2096128K inclusive or 0. If the M suffix is used, *pool_limit* must be in the range 10M and 2047M inclusive or 0. The default is no limit, and it can be specified as 0K or 0M. The minimum value for ECSALIMIT and POOLLIMIT is not allowed to be set to a value if the current storage in use would be greater than or equal to 80% of that value (for example, not allowed to set it such that there is an immediate storage shortage).

POOLLIMIT ensures that TCP/IP does not overuse its authorized private storage. Most systems can use the default POOLLIMIT (no limit). Systems with limited paging capacity can use POOLLIMIT to help limit TCP/IP storage usage. If the limit is used, it must account for peak storage usage during periods of high system activity or TCP/IP storage abends might occur.

POOLLIMIT can be higher than the REGION size on the TCP/IP start procedure because POOLLIMIT applies to authorized storage, whereas REGION applies to unauthorized storage. Specifying a nonzero POOLLIMIT enables warning messages EZZ4364I, EZZ4365I, and EZZ4366I to appear if a storage shortage occurs.

SEGMENTATIONOFFLOAD | NOSEGMENTATIONOFFLOAD
Specifies whether the stack should offload TCP segmentation for IPv4 packets to OSA-Express features. TCP segmentation offload support transfers the overhead of segmenting outbound data into individual TCP packets to QDIO-attached OSA-Express devices whose features that support this function. Offloading segmentation of streaming-type workloads reduces CPU use and increases throughput. This parameter is ignored for OSA-Express features that do not support segmentation offload.

Guideline: The support for specifying IPv4 segmentation offload on the GLOBALCONFIG profile statement has been deprecated. The parameters are still supported on the GLOBALCONFIG statement, but the support for specifying these parameters on the GLOBALCONFIG statement will be dropped in a future release. It is recommended to specify these parameters on the IPCONFIG profile statement instead.

Rule: The SEGMENTATIONOFFLOAD and NOSEGMENTATIONOFFLOAD parameters specified on the IPCONFIG statement override the equivalent parameters specified on the GLOBALCONFIG statement.

See the Modifying topic for information about changing this parameter while the TCP/IP stack is active. See TCP segmentation offload information in z/OS Communications Server: IP Configuration Guide for more information about TCP segmentation offload support.

NOSEGMENTATIONOFFLOAD
TCP segmentation is performed by the TCP/IP stack. This is the default.

SEGMENTATIONOFFLOAD
TCP segmentation is offloaded to the OSA-Express feature.

SMCR | NOSMCR
Specifies whether this stack uses Shared Memory Communications over Remote Direct Memory Access (RDMA), or SMC-R, for intraensemble data network (IEDN) or external data network communications. For more information about SMC-R, see Shared Memory Communications over Remote Direct Memory Access in z/OS Communications Server: IP Configuration Guide.

NOSMCR
Specifies that this stack should not use SMC-R for IEDN or external data network communications. This is the default setting.

SMCR
Specifies that this stack should use SMC-R for IEDN or external data network communications. Use this parameter to define the "RoCE Express" features that this stack should use for SMC-R communications. You can use this parameter to define additional operational characteristics for SMC-R communications.

If you specify the SMCR parameter without any subparameters, you get one of the following results:

- If this is the first time that you specify the SMCR parameter, no Peripheral Component Interconnect Express (PCIe) function IDs are defined and the FIXEDMEMORY and TCPKEEPMININTERVAL subparameters are set to default values.
- If you previously specified the SMCR parameter with subparameters, TCP/IP retains the knowledge of the subparameter settings, even if SMC-R processing is stopped by issuing the VARY TCPIP,,OBEYFILE command with a data set that contains a GLOBALCONFIG NOSMCR parameter. Therefore, a subsequent specification of a GLOBALCONFIG SMCR profile statement resumes SMC-R processing with the previous subparameter settings.

PFID *pfid*
Specifies the Peripheral Component Interconnect Express (PCIe) function ID (PFID) value for a "RoCE Express" feature that this stack uses. A *pfid* is a 2-byte hexadecimal value in the range 0 - 0FFF that identifies this TCP/IP stack's representation of a "RoCE Express" feature.

Rules:

- You must code at least one PFID subparameter for this stack to use SMC-R communications.

- You can specify a maximum of 16 PFID subparameter values on the SMCR parameter.
- The value for each PFID and PORTNUM pair must be unique.
- When the RoCE Express feature operates in a shared RoCE environment, you cannot simultaneously activate a "RoCE Express" feature that uses the same PFID value from different TCP/IP stacks within the same logical partition (LPAR).

PORTNUM *num*

Specifies the "RoCE Express" port number to use for a particular PFID. Configure each PFID to use only a single port. The port number can be 1 or 2; 1 is the default value.

You do not need to configure PORTNUM for IBM RoCE Express2 features. The correct port number for these features is configured in the Hardware Configuration Definition (HCD) and is learned by VTAM and the TCP/IP stack during PFID activation. VTAM ignores the GLOBALCONFIG SMCR PORTNUM value if it differs from the port number configured in the HCD for the IBM RoCE Express2 feature.

Rules:

- If the "RoCE Express" feature operates in a dedicated RoCE environment, you can activate either port 1 or port 2 but not both simultaneously for an individual PFID value. If PORTNUM 1 and PORTNUM 2 definitions for the same PFID value are created, the port that is first activated is used.
- If the "RoCE Express" feature operates in a shared RoCE environment, you can use both port 1 and port 2 on an individual RNIC adapter, but the PFID value that is associated with each port must be different. You cannot simultaneously activate PORTNUM 1 and PORTNUM 2 definitions for the same PFID value.

  For example, if PFID 0013 and PFID 0014 are both defined in HCD to represent the RNIC adapter with PCHID value 0140, you can configure `PFID 0013 PORT 1 PFID 0014 PORT 2` to use both ports on the RNIC adapter. However, if you specify `PFID 0013 PORT 1 PFID 0013 PORT 2`, only the first port that is activated will be used.

MTU *mtusize*

Specifies the maximum transmission unit (MTU) value to be used for a particular PFID. The MTU value can be 1024 or 2048. The default value is 1024 and can be used for most workloads. If you set the MTU size to 2048, you must also enable jumbo frames on all switches in the network path for all peer hosts. For more information about the RoCE maximum transmission unit, see z/OS Communications Server: IP Configuration Guide.

FIXEDMEMORY *mem_size*

Specifies the maximum amount of 64-bit storage that the stack can use for the send and receive buffers that are required for SMC-R communications. The *mem_size* value is an integer in

the range 30 - 9999, and represents the maximum storage in megabytes of data. The default value is 256 megabytes.

TCPKEEPMININTERVAL *interval*
This interval specifies the minimum interval that TCP keepalive packets are sent on the TCP path of an SMC-R link.

Rules:

- If a keepalive interval is also specified on the INTERVAL parameter of the TCPCONFIG statement or is set for a specific SMC-R link socket by the TCP_KEEPALIVE setsockopt() option, the largest of the three interval values is used.
- The valid range for this interval is 0-2147460 seconds, and the default is 300 seconds.
- A value of 0 disables TCP keepalive probe packets on the TCP path of an SMC-R link.
- The SO_KEEPALIVE setsockopt() option must be set for keepalive processing to be used.

Result: The TCPKEEPMININTERVAL setting has no effect on keepalive processing for the SMC-R path of an SMC-R link.

For more information about TCP keepalive processing for the TCP path and the SMC-R path of SMC-R links, see TCP keepalive in z/OS Communications Server: IP Configuration Guide.

SYSPLEXMONITOR
Specifies SYSPLEXMONITOR subparameters to configure the operation of the sysplex autonomics function. For more information about connectivity problems in a sysplex, see z/OS Communications Server: IP Configuration Guide.

If the SYSPLEXMONITOR parameter is not specified in the initial TCP/IP profile, then the sysplex autonomics function uses the default values for all SYSPLEXMONITOR subparameters. If the SYSPLEXMONITOR parameter is specified but not all subparameters are specified in the initial TCP/IP profile, then the sysplex autonomics function uses the default values for those SYSPLEXMONITOR subparameters that are not specified. For example, if SYSPLEXMONITOR is specified without RECOVERY or NORECOVERY specified in the initial profile, then the NORECOVERY action is in effect.

Rule: If you specify the GLOBALCONFIG statement in a data set associated with a VARY TCPIP,,OBEYFILE command and the SYSPLEXMONITOR parameter is specified without any subparameters, an informational message is issued and the parameter is ignored.

AUTOREJOIN | NOAUTOREJOIN
Specifies whether TCP/IP should automatically rejoin the TCP/IP sysplex group when a detected problem is relieved after the stack has left the sysplex group.

NOAUTOREJOIN
Do not rejoin the TCP/IP sysplex group when a detected problem is relieved. This is the default value.

AUTOREJOIN
When all detected problems (that caused the stack to leave the

sysplex group) are relieved, the stack automatically rejoins the sysplex group and reprocesses the saved VIPADYNAMIC block configuration.

Restriction: AUTOREJOIN cannot be configured when NORECOVERY is configured (or set to the default value).

Guideline: AUTOREJOIN should be used when RECOVERY is configured to allow the stack to rejoin the sysplex group without operator intervention.

DELAYJOIN | NODELAYJOIN
Specify whether TCP/IP should delay joining or rejoining the TCP/IP sysplex group (EZBTCPCS) during stack initialization, or rejoining the sysplex group following a VARY TCPIP,,OBEYFILE command.

NODELAYJOIN
Attempt to join the TCP/IP sysplex group. When specified during stack initialization, the stack attempts to join the sysplex group. This is the default value.

DELAYJOIN
Delay joining the TCP/IP sysplex group and processing any VIPADYNAMIC block or DYNAMICXCF statements during stack initialization until OMPROUTE is started and active.

DYNROUTE | NODYNROUTE
Specifies whether TCP/IP should monitor the presence of dynamic routes over monitored network links or interfaces.

NODYNROUTE
The TCP/IP stack should not monitor the presence of dynamic routes over monitored network links or interfaces. When MONINTERFACE is not configured, this is the default value.

DYNROUTE
The TCP/IP stack should monitor the presence of dynamic routes over monitored network links or interfaces.

Tip: This level of monitoring is useful in detecting problems that OMPROUTE is having in communicating with other routing daemons on the selected network interfaces.

If no dynamic routes are present in the TCP/IP stack from that network, a specific interface attached to that network might not be active or routers attached to that network might not be active or healthy. In either case, when these conditions are detected, they provide a reasonable indication that client requests for DVIPAs or distributed DVIPAs owned by this TCP/IP stack might not reach this stack over that interface. These checks can help further qualify the state of a network interface on this TCP/IP stack. When the MONINTERFACE parameter is specified, This is the default value.

Restriction: DYNROUTE cannot be specified when NOMONINTERFACE is configured (or is the default value).

Rules:

- Specify DYNROUTE only when OMPROUTE is configured and started; otherwise, the TCP/IP stack might be forced to leave the TCP/IP sysplex group if RECOVERY is coded.

- If DYNROUTE is specified, also specify DELAYJOIN to avoid a scenario where the TCP/IP stack leaves the TCP/IP sysplex group before OMPROUTE is started.

NOJOIN

Specifies that the TCP/IP stack should not join the TCP/IP sysplex group (EZBTCPCS) during stack initialization. If this value is specified, the TCP/IP stack does not process any VIPADYNAMIC block or DYNAMICXCF statements. Any other GLOBALCONFIG SYSPLEXMONITOR parameter settings (configured or default) are ignored, and the settings are saved in case you want the TCP/IP stack to join the sysplex group at a later time.

If you subsequently issue a VARY TCPIP,,SYSPLEX,JOINGROUP command, the NOJOIN setting is overridden and the saved GLOBALCONFIG SYSPLEXMONITOR parameter settings become active. For example, if you configure NOJOIN and DELAYJOIN, DELAYJOIN is initially ignored. If you subsequently issue a V TCPIP,,SYSPLEX,JOINGROUP command, NOJOIN is overridden, DELAYJOIN becomes active, and the stack joins the sysplex group if OMPROUTE is initialized.

Any sysplex-related definitions within the TCP/IP profile, such as VIPADYNAMIC or IPCONFIG DYNAMICXCF statements, are not processed until the TCP/IP stack joins the sysplex group.

Restriction: You can specify this parameter only in the initial profile; you cannot specify it when you issue a VARY TCPIP,,OBEYFILE command.

MONINTERFACE | NOMONINTERFACE

NOMONINTERFACE

The TCP/IP stack should not monitor the status of any network links or interfaces. This is the default.

MONINTERFACE

The TCP/IP stack should monitor the status of specified network link or interfaces. The interfaces or links being monitored are those that are configured with the MONSYSPLEX keyword on the LINK or INTERFACE statement. See Summary of DEVICE and LINK statements or Summary of INTERFACE statements for more information.

Guideline: This level of monitoring can further qualify the health of the TCP/IP stack by ensuring that at least one key interface is active and available. This option can be useful in environments where the dynamic XCF interface is not configured as an alternate network path for this stack (for example, where no dynamic routes are advertised over dynamic XCF interfaces and no static or replaceable static routes are defined over those interfaces).

RECOVERY | NORECOVERY

Specify the action to be taken when a sysplex problem is detected.

NORECOVERY

When a problem is detected, issue messages regarding the problem but take no further action. This is the default value.

RECOVERY

When a problem is detected, issue messages regarding the

problem, leave the TCP/IP sysplex group, and delete all DVIPA resources owned by this stack. As allowed by a configuration with backup capabilities, other members of the TCP/IP sysplex automatically take over the functions of this member that was removed from the TCP/IP sysplex group.

Recovery is the preferred method of operation because other members of the TCP/IP sysplex can automatically take over the functions of a member with no actions needed by an operator. IBM Health Checker for z/OS enhancements can be used to check whether the RECOVERY parameter has been specified when the IPCONFIG DYNAMICXCF or IPCONFIG6 DYNAMICXCF parameters have been specified. For more details about IBM Health Checker for z/OS enhancements, see the IBM Health Checker for z/OS enhancements information in the z/OS Communications Server: IP Diagnosis Guide.

TIMERSECS *seconds*
Time value specified in seconds. Determines how quickly the sysplex monitor reacts to problems with needed sysplex resources. Valid values are in the range 10 - 3600 seconds. The default value is 60 seconds.

SYSPLEXWLMPOLL *seconds*
Time value specified in seconds. Determines how quickly the sysplex distributor and its target servers poll WLM for new weight values. A short time results in quicker reactions to changes in target status. Valid values are in the range is 1 - 180 seconds. The default value is 60 seconds.

TCPIPSTATISTICS | NOTCPIPSTATISTICS

NOTCPIPSTATISTICS
Indicates that the TCP/IP counter values are not to be written to the output data set designated by the CFGPRINT JCL statement.

The NOTCPIPSTATISTICS parameter is confirmed by the message:

```
EZZ0613I TCPIPSTATISTICS IS DISABLED
```

This is the default value.

TCPIPSTATISTICS
Prints the values of several TCP/IP counters to the output data set designated by the CFGPRINT JCL statement. These counters include number of TCP retransmissions and the total number of TCP segments sent from the MVS™ TCP/IP system. These TCP/IP statistics are written to the designated output data set only during termination of the TCP/IP address space.

The TCPIPSTATISTICS parameter is confirmed by the message:

```
EZZ0613I TCPIPSTATISTICS IS ENABLED
```

The SMFCONFIG TCPIPSTATISTICS parameter (see SMFCONFIG statement) serves a different purpose. It requests that SMF records of subtype 5 containing TCP/IP statistics be created. These statistics are recorded in SMF type 118 or 119, subtype 5 records.

WLMPRIORITYQ | NOWLMPRIORITYQ
Specifies whether OSA-Express QDIO write priority values should be assigned to packets associated with WorkLoad Manager service classes, and to forwarded packets. See the information about prioritizing outbound

OSA-Express data using the WorkLoad Manager service class in z/OS Communications Server: IP Configuration Guide .

NOWLMPRIORITYQ
Specifies that OSA-Express QDIO write priority values should not be assigned to packets associated with WorkLoad Manager service class values or to forwarded packets. This value is the default.

WLMPRIORITYQ
Specifies that OSA-Express QDIO write priority values should be assigned to packets associated with WorkLoad Manager service class valuesand to forwarded packets.

You can assign specific OSA-Express QDIO write priority values by using the IOPRI*n* subparameters, where *n* is one or more of the priority values in the range 1 - 4. For each subparameter, you can specify a control value in the range 0 - 6, which correlates to the WLM services classes, or you can specify the keyword FWD for forwarded packets. WLM supports a service class for the SYSTEM value, but this value is always assigned the OSA-Express QDIO write priority 1 and its assignment cannot be configured; therefore, a control value is not assigned for the SYSTEM WLM service class.

You can use the default assignment by specifying the WLMPRIORITYQ parameter without any IOPRI*n* subparameters. See the description of the *default_control_values* variable in this topic to understand the default assignment.

control_values
Control values are used to represent the WLM service classes and forwarded packets. Valid control values are the digits 0 - 6, which represent WLM service classes, or the keyword FWD, which represents forwarded packets. Table 3 identifies the control value, the type of packet that it represents, and the default QDIO priority assigned to the packet:

Table 3. WLM Service Class Importance Levels

Control value	Type of packet	Default QDIO priority
0	System-defined service class (SYSSTC) used for high-priority started tasks	1
1	User-defined service classes with importance level 1	2
2	User-defined service classes with importance level 2	3
3	User-defined service classes with importance level 3	3
4	User-defined service classes with importance level 4	4
5	User-defined service classes with importance level 5	4
6	User-defined service classes associated with a discretionary goal	4
FWD	Forwarded packets	4

default_control_values
When the WLMPRIORITYQ parameter is specified without any IOPRIn subparameters, then the OSA-Express QDIO write priority values are assigned as shown Table 3 on page 36.

IOPRI*n control_values*
Use the IOPRIn subparameters to correlate control values with specific OSA-Express QDIO write priority values. You can use one or more of the following subparameter keywords:

- IOPRI1
- IOPRI2
- IOPRI3
- IOPRI4

Each subparameter keyword corresponds to one of the four QDIO write priority values, 1 through 4. Each subparameter can be specified once on a GLOBALCONFIG statement.

control_values
Indicates the type of packet to which the QDIO write priority value should be assigned. Valid values are:

Digits 0 - 6
Causes the QDIO write priority value that is specified by the IOPRI*n* subparameter to be assigned to packets associated with the WLM service classes represented by the control value.

FWD This keyword causes the QDIO write priority value indicated by the IOPRIn subparameter to be assigned to forwarded packets.

Rules:

- IOPRIn must be followed by one or more priority level releases.
- You can specify more than one control value for an IOPRIn subparameter. Each control value must be separated by at least one blank.
- A specific control value can be specified only once in the set of IOPRIn subparameters on a GLOBALCONFIG statement.
- If any control value is not explicitly specified on an IOPRI*n* subparameter, then the associated packets are assigned a default QDIO write priority 4.

In the following example, QDIO priority 1 is assigned to packets associated with control values 0 and 1, QDIO priority 2 is assigned to packets associated with control value 2 and to forwarded packets, QDIO priority 3 is assigned to packets associated with control values 3 and 4, and QDIO priority 4 is assigned to packets associated with control values 5 and 6.

```
WLMPRIORITYQ  IOPRI1 0 1
              IOPRI2 2 FWD
              IOPRI3 3 4
              IOPRI4 5 6
```

XCFGRPID *group_id*
This parameter is needed only if you want subplexing. If specified, the value provides a 2-digit suffix that is used in generating the XCF group name that the TCP/IP stack joins. Valid values are in the range 2 - 31. The group name is

EZBT*vvtt*, where the *vv* value is the VTAM XCF group ID suffix (specified with the XCFGRPID VTAM start option) and the *tt* value is the *group_id* value supplied on this parameter, used as a 2-digit value converted to character format. If no VTAM XCF group ID suffix was specified, the group name is EZBTCP*tt*. If no VTAM XCF group ID suffix and no TCP XCF group ID suffix is specified, the group name is EZBTCPCS.

These characters are also used as a suffix for the EZBDVIPA and EZBEPORT structure names, in the form EZBDVIPA*vvtt* and EZBEPORT*vvtt*. If no VTAM XCF group ID suffix was specified, the structure names are EZBDVIPA01*tt* and EZBEPORT01*tt*.

If XCFGRPID is not specified, the XCF group name is EZBTvvCS and the structure names are EZBDVIPA*vv* and EZBEPORT*vv*. If no VTAM XCF group id suffix was specified, the group name is EZBTCPCS and the structure names are EZBDVIPA and EZBEPORT.

Restriction: XCFGRPID can be specified only in the initial profile.

This allows multiple TCP/IP stacks to join separate Sysplex groups and access separate Coupling Facility structures, isolating sets of TCP/IP stacks into subplexes with XCF communication only with other TCP/IP stacks within the same subplex.

If HiperSockets is supported on this system, the IQDVLANID parameter, on the GLOBALCONFIG statement, must be specified if XCFGRPID is specified. Stacks on the same CPC using the same HiperSockets CHPID that specify the same XCFGRPID value must specify the same IQDVLANID value.

Stacks on the same CPC using the same HiperSockets CHPID specifying different XCFGRPID values must specify different IQDVLANID values. This allows partitioning of connectivity across the Sysplex to include partitioning of connectivity across HiperSockets.

Creating TCP/IP and VTAM subplexes can add some complexity to your VTAM and TCP/IP configurations and requires careful planning. Before setting this parameter you should review the information about setting up a subplex in the z/OS Communications Server: IP Configuration Guide.

ZIIP

Specifies subparameters that control whether TCP/IP displaces CPU cycles onto a System z9® Integrated Information Processor (zIIP). You must specify at least one subparameter. If the ZIIP parameter is specified with no subparameters, an informational message is issued and the parameter is ignored.

IPSECURITY | NOIPSECURITY

Specifies whether TCP/IP should displace CPU cycles for IPSec workload to a zIIP. For more information about this function, see the Additional IPSec assist using z9® Integrated Information Processor (zIIP IP security) topic in z/OS Communications Server: IP Configuration Guide.

NOIPSECURITY

Do not displace CPU cycles for IPSec workload to a zIIP. This is the default value.

IPSECURITY

When possible, displace CPU cycles for IPSec workload to a zIIP. Workload Manager (WLM) definitions should be examined and possible changes made before this option is used. See the more detailed description in the additional IPSec Assist by way of z9

Integrated Information Processor (zIIP IPSECURITY) topic in z/OS Communications Server: IP Configuration Guide.

NOIQDIOMULTIWRITE | IQDIOMULTIWRITE
Specifies whether TCP/IP should displace CPU cycles for large outbound TCP messages that are typically created by traditional streaming work loads such as file transfer, and interactive web-based service workloads such as XML or SOAP. The TCP/IP outbound message must be at 32KB in length before the write processing is off-loaded to an available zIIP specialty engine. For more information about this function, see the information about additional IPSec Assist by way of z9 Integrated Information Processor (zIIP IPSECURITY) in z/OS Communications Server: IP Configuration Guide.

NOIQDIOMULTIWRITE
Do not displace CPU cycles for the writing of large TCP outbound messages to a zIIP. This is the default value.

IQDIOMULTIWRITE
When possible, displace CPU cycles for the writing of large TCP outbound messages to a zIIP.

Rules:

- You cannot specify IQDIOMULTIWRITE as a ZIIP parameter when GLOBALCONFIG IQDMULTIWRITE is not configured. When GLOBALCONFIG IQDMULTIWRITE is not configured, HiperSockets interfaces do not use the multiple write support.
- Only large TCP outbound messages (32KB and larger) are processed on the zIIP specialty engine.
- The TCP message must be originating from this node. Routed TCP messages are not eligible for zIIP assistance.

Tip: These ZIIP parameters apply to pre-defined HiperSockets interfaces, as well as HiperSockets interfaces that are created and used by dynamic XCF definitions.

Steps for modifying

To modify parameters for the GLOBALCONFIG statement, you must respecify the statement with the new parameters.

The following list describes how to modify individual parameters:

AUTOIQDX and NOAUTOIQDX
If you use the VARY TCPIP,,OBEYFILE command to change this parameter from AUTOIQDX to NOAUTOIQDX, no new dynamic IQDX interfaces will be activated. All active dynamic IQDX interfaces will remain active and available for use. To stop existing interfaces, you must issue a V TCPIP,,STOP command for each active IQDX interface.

If you use the VARY TCPIP,,OBEYFILE command to change this parameter from NOAUTOIQDX to AUTOIQDX, active OSX interfaces are not affected, but the stack will attempt to activate a dynamic IQDX interface on any subsequent OSX activations.

EXPLICITBINDPORTRANGE and NOEXPLICITBINDPORTRANGE
If you specified the EXPLICITBINDPORTRANGE parameter and then you change to the NOEXPLICITBINDRANGE parameter, then the stack stops allocating more ports from the EXPLICITBINDPORTRANGE pool.

However, the existing active range for the EXPLICITBINDPORTRANGE pool in the coupling facility is unaffected unless you are changing the parameter on the last stack in the sysplex using this function.

If you specified the NOEXPLICITBINDPORTRANGE parameter and then you change to the EXPLICITBINDPORTRANGE parameter, then a range of ports used for the EXPLICITBINDPORTRANGE pool is set. The stack uses ports from that pool for explicit bind() requests to the IPv4 INADDR_ANY address, or to the IPv6 unspecified address (in6addr_any), and port 0. If the range specified on the EXPLICITBINDPORTRANGE parameter is different from the currently active range for the EXPLICITBINDPORTRANGE pool in the coupling facility, the new range replaces that value.

Changing the starting port (*1st_port*), the number of ports (*num_ports*), or both for the EXPLICITBINDPORTRANGE parameter changes the port numbers in the pool of ports that is guaranteed to be unique across the sysplex for future port allocation

Guidelines:

- Changing the range specified on the EXPLICITBINDPORTRANGE parameter of the GLOBALCONFIG statement affects every stack in the sysplex that has configured a GLOBALCONFIG EXPLICITBINDPORTRANGE value. Future port allocations for all such stacks use the new port range.
- Ports in the EXPLICITBINDPORTRANGE range are usually assigned to a stack in blocks of 64 ports. When expanding the range, use multiples of 64 multiplied by the number of stacks that use a GLOBALCONFIG EXPLICITBINDPORTRANGE configuration.

IQDMULTIWRITE and NOIQDMULTIWRITE

If this parameter is changed with the VARY TCPIP,,OBEYFILE command, the new value does not take effect for any active HiperSockets (iQDIO) interfaces. For a change in this parameter to take effect for an active iQDIO interface, you must stop and restart both the IPv4 and IPv6 interface for the change to be effective.

IQDVLANID

If the IQDVLANID parameter was previously specified and you modify that value, then you must stop and restart the TCP/IP stack for the change to take effect.

MLSCHKTERMINATE

You cannot change the MLSCHKTERMINATE parameter to the NOMLSCHKTERMINATE parameter when the RACF® option MLSTABLE is on and the RACF option MLQUIET is off. You can always change the NOMLSCHKTERMINATE parameter to the MLSCHKTERMINATE parameter, but this change is ignored if the value is specified in the data set of a VARY TCPIP,,OBEYFILE command and consistency errors are detected at the same time.

SEGMENTATIONOFFLOAD and NOSEGMENTATIONOFFLOAD:

If this parameter is changed with the VARY TCPIP,,OBEYFILE command, the new value does not take effect for any active OSA-Express QDIO interfaces. For a change in these parameters to take effect, all the OSA-Express QDIO interfaces that support TCP segmentation offload must be stopped and restarted.

SMCR and NOSMCR

- If SMCR support is not enabled, you can specify the SMCR parameter in a VARY TCPIP,,OBEYFILE command data set to activate the support.

  Result: TCP/IP retains knowledge of the last set of SMCR subparameter values that are specified on the GLOBALCONFIG statement, even if GLOBALCONFIG NOSMCR was specified subsequently. If you issue a VARY TCPIP,,OBEYFILE command with GLOBALCONFIG SMCR specified, TCP/IP uses the saved last set of SMCR subparameters, unless new values for the subparameters are coded on the GLOBALCONFIG SMCR statement. This allows you to temporarily stop SMC-R processing by issuing a VARY TCPIP,,OBEYFILE command with GLOBALCONFIG NOSMCR specified. Then you can resume SMC-R processing with the previous subparameter settings by issuing a second VARY TCPIP,,OBEYFILE command with just GLOBALCONFIG SMCR specified.
- If SMCR support is enabled, you can specify the NOSMCR parameter in a VARY TCPIP,,OBEYFILE command data set to deactivate the support.
  - No new TCP connections that use SMC-R processing will be established.
  - Existing TCP connections that use SMC-R will continue to use SMC-R processing.
- You cannot change the SMCR PFID parameter values that are currently configured when the associated "RoCE Express" interfaces are active. To change the SMCR PFID parameter values that are currently configured, you must perform the following steps in order:
  1. Stop the associated "RoCE Express" interfaces.
  2. Issue the VARY TCPIP,,OBEYFILE command with the new PFID values that are coded in the command data set. The new PFID values replace the existing PFID values.
- To add PFID values when you have one or more PFID values coded, you must specify the existing PFID values and the additional PFID values on the SMCR parameter in the VARY TCPIP,,OBEYFILE command data set. Existing PFID values and any existing "RoCE Express" interfaces are not affected.

SYSPLEXMONITOR

AUTOREJOIN and NOAUTOREJOIN

If you change NOAUTOREJOIN to AUTOREJOIN after the stack has left the sysplex and before the problem that caused it to leave has been relieved, the stack automatically rejoins the sysplex group when the problem is relieved. However, if you change NOAUTOREJOIN to AUTOREJOIN after the problem that caused the stack to leave the group has been relieved, you must issue a VARY TCPIP,,SYSPLEX,JOINGROUP command to cause the stack to rejoin the sysplex.

DELAYJOIN and NODELAYJOIN

Changing from DELAYJOIN to NODELAYJOIN while the TCP/IP stack is in the process of delaying joining the sysplex group because OMPROUTE is not active causes the TCP/IP stack to immediately join the sysplex group.

Changing from NODELAYJOIN to DELAYJOIN has no immediate effect until the TCP/IP stack leaves the sysplex group and then attempts to rejoin while OMPROUTE is not active.

SYSPLEXWLMPOLL
You can change the polling rate for WLM values while the TCP/IP stack is active. In order for the change to be effective, you should change the polling rate on all stacks that participate in sysplex distribution (all active distributing stacks, any backup stacks that might take over distribution, and all target stacks).

WLMPRIORITYQ
If you specify WLMPRIORITYQ with the VARY TCPIP,,OBEYFILE command, the IOPRI*n* values are changed to the values specified for the *default_control_values* variable. The new values take effect immediately for all workloads influenced by this function.

WLMPRIORITYQ IOPRIn *control_values*
If you specify this parameter with the VARY TCPIP,,OBEYFILE command, and you do not specify all the control values, the QDIO priority 4 is assigned to packets associated with all control values omitted. The new values immediately take effect for all workloads influenced by this function.

Rule: You cannot modify individual IOPRI*n* control values. If you attempt to modify IOPRI*n* control values, but you specify only those control values that you want to modify, then the QDIO priority 4 is assigned to packets that are associated with any control values that you omitted.

XCFGRPID
For a change in this parameter to take effect, you must stop and restart the TCP/IP stack.

Examples

This example shows the use of the SYSPLEXMONITOR parameter on the GLOBALCONFIG statement that enables many of the sysplex autonomics functions:

```
GLOBALCONFIG SYSPLEXMONITOR AUTOREJOIN DELAYJOIN MONINTERFACE DYNROUTE RECOVERY
```

The following example shows the use of the EXPLICITBINDPORTRANGE parameter to define 1024 ports in the range 5000 - 6023. The ports are used for explicit binds to the IPv4 INADDR_ANY address, or to the IPv6 unspecified address (in6addr_any), and port 0:

```
GLOBALCONFIG EXPLICITBINDPORTRANGE 5000 1024
```

| The following example shows the use of the SMCR parameter to define two "RoCE
| Express" features that use PFID values 0018 and 0019 and port numbers 1 and 2, and to limit the stack to 500 megabytes of 64-bit storage for SMC-R communications.

```
GLOBALCONFIG SMCR PFID 0018 PORTNUM 1 PFID 0019 PORTNUM 2 FIXEDMEMORY 500
```

Related topics

- SMFCONFIG statement
- For more information about TCP/IP networking in a multilevel-secure environment, see the security information in z/OS Communications Server: IP Configuration Guide.

Chapter 4. IP Programmer's Guide and Reference

Type 119 SMF Records

TCP/IP profile event record (subtype 4)

TCP/IP profile record Global configuration section

This section provides Global configuration information from the GLOBALCONFIG profile statement. There is only one of these sections in the record.

Table 4 shows the TCP/IP profile record Global configuration section.

Table 4. TCP/IP profile record Global configuration section

Offset	Name	Length	Format	Description
0(X'0')	NMTP_GBCFEye	4	EBCDIC	GBCF eyecatcher

Table 4. TCP/IP profile record Global configuration section (continued)

Offset	Name	Length	Format	Description
4(X'4')	NMTP_GBCFFlags	2	Binary	Flags: **X'8000', NMTP_GBCFExpBindPortRange:** If set, fields NMTP_GBCFExpBindPortRangeBegNum and NMTP_GBCFExpBindPortRangeEndNum contain the beginning and ending port numbers of the range of reserved TCP ports in the sysplex. **X'4000', NMTP_GBCFIqdMultiWrite:** If set, multiple write support is enabled for HiperSockets interfaces. **X'2000', NMTP_GBCFMlsCheckTerminate:** If set, the stack terminates if multi-level secure configuration inconsistencies are encountered. **X'1000', NMTP_GBCFSegOffload:** If set, TCP segmentation is offloaded to an OSA-Express feature. **Guideline:** This flag is deprecated. Use NMTP_V4CFSegOffload instead. **X'0800', NMTP_GBCFTcpipStats:** If set, several counters are written to the CFGPRINT DD data set when the TCP/IP stack terminates. **X'0400', NMTP_GBCFZiip:** If set, field NMTP_GBCFZiipOptions indicates for which workloads CPU cycles are displaced to a zIIP. **X'0200', NMTP_GBCFWlmPriorityQ:** If set, the following fields indicate the OSA-Express QDIO priority values that are assigned for packets associated with WLM service classes and for forwarded packets according to the control values for the WLMPRIORITYQ parameter: • NMTP_GBCFWPQCV0Pri • NMTP_GBCFWPQCV1Pri • NMTP_GBCFWPQCV2Pri • NMTP_GBCFWPQCV3Pri • NMTP_GBCFWPQCV4Pri • NMTP_GBCFWPQCV5Pri • NMTP_GBCFWPQCV6Pri • NMTP_GBCFWPQFwdPri **X'0100', NMTP_GBCFSMCR:** If set, this stack is enabled for SMC-R communications.

Table 4. TCP/IP profile record Global configuration section (continued)

Offset	Name	Length	Format	Description
6(X'6')	NMTP_GBCFSysMonOptions	2	Binary	The following are sysplex monitor subparameter settings: **X'8000', NMTP_GBCFSysMonAutoRejoin:** If set, the stack automatically rejoins the sysplex group after problems that caused it to leave the sysplex group are resolved. **X'4000', NMTP_GBCFSysMonDelayJoin:** If set, the stack delays joining the sysplex group until OMPROUTE is active. **X'2000', NMTP_GBCFSysMonDynRoute:** If set, the TCP/IP stack monitors the presence of dynamic routes over those network interfaces for which the MONSYSPLEX parameter was specified. This setting is dynamically changed if the MONINTERFACE or NOMONINTERFACE subparameters are specified. **X'1000', NMTP_GBCFSysMonMonIntf:** If set, the TCP/IP stack monitors the status of network interfaces for which the MONSYSPLEX parameter was specified. **X'0800', NMTP_GBCFSysMonRecovery:** If set, the TCP/IP stack issues error messagess, leaves the sysplex group, and deletes all DVIPA interfaces when a sysplex problem is detected. **X'0400', NMTP_GBCFSysMonNoJoin:** If set, the TCP/IP stack does not join the sysplex group until the V TCPIP,,SYSPLEX,JOINGROUP command is issued.
8(X'8')	NMTP_GBCFIqdVlanId	2	Binary	VLAN ID for the dynamic XCF HiperSockets interface. If not specified the value is 0.
10(X'A')	NMTP_GBCFSysWlmPoll	1	Binary	The number of seconds used by the sysplex distributor and its target servers, when polling WLM for new weight values.
11(X'B')	NMTP_GBCFZiipOptions	1	Binary	Workloads whose CPU cycles should be displaced to a zIIP. This field is valid only if the NMTP_GBCFZiip flag is set. The following are valid values: **X'80', NMTP_GBCFZiipIPSecurity:** If set, CPU cycles for IPSec workloads are displaced to a zIIP, when possible. **X'40', NMTP_GBCFZiipIqdioMultiWrite:** If set, CPU cycles for large TCP outbound messages are displaced to a zIIP
12(X'C')	NMTP_GBCFSysMonTimerSecs	2	Binary	The number of seconds used by the sysplex monitor function to react to problems with needed sysplex resources.
14(X'E')	NMTP_GBCFXcfGroupId	2	EBCDIC	The 2-digit suffix used to generate the sysplex group name that the TCP/IP stack joins. If not specified the value is zero.
16(X'10')	NMTP_GBCFExpBindPortRangeBegNum	2	Binary	If flag NMTP_GBCFExpBindPortRange is set, this field contains the beginning port number in the reserved range.

Table 4. TCP/IP profile record Global configuration section (continued)

Offset	Name	Length	Format	Description
18(X'12')	NMTP_GBCFExpBindPortRangeEndNum	2	Binary	If flag NMTP_GBCFExpBindPortRange is set, this field contains the ending port number in the reserved range.
20(X'14')	NMTP_GBCFMaxRecs	4	Binary	Configured maximum records value for the D TCPIP,,NETSTAT command. The value range is 1 - 65535. The value 65536 indicates that the * (asterisk) value was specified. This means all records.
24(X'18')	NMTP_GBCFEcsaLimit	4	Binary	The maximum ECSA storage size in bytes that can be used by the TCP/IP stack.
28(X'1C')	NMTP_GBCFPoolLimit	4	Binary	The maximum private storage size in bytes that can be used in the TCP/IP address space.
32(X'20')	NMTP_GBCFWPQCV0Pri	1	Binary	The OSA-Express QDIO priority value that is assigned to packets represented by control value 0. This field is valid only if flag NMTP_GBCFWlmPriorityQ is set.
33(X'21')	NMTP_GBCFWPQCV1Pri	1	Binary	The OSA-Express QDIO priority value that is assigned to packets represented by control value 1. This field is valid only if flag NMTP_GBCFWlmPriorityQ is set.
34(X'22')	NMTP_GBCFWPQCV2Pri	1	Binary	The OSA-Express QDIO priority value that is assigned to packets represented by control value 2. This field is valid only if flag NMTP_GBCFWlmPriorityQ is set.
35(X'23')	NMTP_GBCFWPQCV3Pri	1	Binary	The OSA-Express QDIO priority value that is assigned to packets represented by control value 3. This field is valid only if flag NMTP_GBCFWlmPriorityQ is set.
36(X'24')	NMTP_GBCFWPQCV4Pri	1	Binary	The OSA-Express QDIO priority value that is assigned to packets represented by control value 4. This field is valid only if flag NMTP_GBCFWlmPriorityQ is set.
37(X'25')	NMTP_GBCFWPQCV5Pri	1	Binary	The OSA-Express QDIO priority value that is assigned to packets represented by control value 5. This field is valid only if flag NMTP_GBCFWlmPriorityQ is set.
38(X'26')	NMTP_GBCFWPQCV6Pri	1	Binary	The OSA-Express QDIO priority value that is assigned to packets represented by control value 6. This field is valid only if flag NMTP_GBCFWlmPriorityQ is set.
39(X'27')	NMTP_GBCFWPQFwdPri	1	Binary	The OSA-Express QDIO priority value that is assigned to forwarded packets. This field is valid only if flag NMTP_GBCFWlmPriorityQ is set.
40(X'28')	NMTP_GBCFAutoIQDX	1	Binary	AutoIQDX settings. If no flag bits are set, the NOAUTOIQDX parameter value is in effect. **X'02', NMTP_GBCFAutoIQDX_NoLargeData:** If this flag bit is set, dynamic IQDX interfaces are used for all eligible traffic, except for TCP data traffic that is sent with socket transmissions of 32 K or larger. **X'01', NMTP_GBCFAutoIQDX_AllTraffic:** If this flag bit is set, dynamic IQDX interfaces are used for all eligible traffic to the intraensemble data network.
41(X'29')	NMTP_GBCFPFidCnt	1	Binary	SMCR PFID count - the current number of configured PFID, port, and MTU entries in the NMTP_GBCFPFs array.

Table 4. TCP/IP profile record Global configuration section (continued)

Offset	Name	Length	Format	Description
42(X'2A')		2	Binary	Reserved
44(X'2C')	NMTP_GBCFFixedMemory	4	Binary	SMCR FIXEDMEMORY value in megabytes
48(X'30')	NMTP_GBCFTcpKeepMinInt	4	Binary	SMCR TCPKEEPMININTERVAL value in seconds
52(X'34')	NMTP_GBCFPFs(16)	96	Binary	SMCR PFID array that contains up to 16 entries. Each entry contains the following information: • PFID (2-byte hexadecimal value) • PortNum • MTU value **Note:** When PFID represents a 10 GbE RoCE Express2 feature, the PortNum value is the port number configured for the PFID in the Hardware Configuration Definition (HCD). This port number is learned by VTAM and TCP/IP during activation of the PFID and might be different from the value coded for PORTNUM for this PFID on the GLOBALCONFIG SMCR statement.
148(X'94')		4	Binary	Reserved

RDMA network interface card (RNIC) interface statistics record (subtype 44)

The RNIC Interface statistics record is collected at user specified intervals. The record provides data only for "RoCE Express" interfaces, one interface specific section for one "RoCE Express" interface. Any interface in the process of being deleted from the stack at the time of interval reporting is ignored.

Each interface specific section reports statistical data about the "RoCE Express" interface for the previous recording interval. For those fields that provide an interval value, to determine a cumulative value for the given statistic, add the values reported for the statistic in the individual interface statistics interval records. Other fields provide the current or highest value of a statistic and are not interval values. If interface statistics recording is turned off dynamically, or the TCP stack terminates, a final RNIC interface statistics record is generated to report close-out data. If a given "RoCE Express" interface is deleted during a recording interval, any data related to that interface during the recording interval is lost (for example, is not reported in the next interval record).

See Table 5 for the contents of the TCP/IP stack identification section. For the RNIC interface statistics record, the TCP/IP stack identification section indicates SMCR as the subcomponent and one of the six possible interval record reason settings, depending on whether the reporting is because of interval expiration, statistics collection termination, or collection shutdown.

Table 5 shows the RNIC interface statistics record self-defining section.

Table 5. RNIC interface statistics record self-defining section

Offset	Name	Length	Format	Description
0(X'0')	Standard SMF Header	24		Standard SMF header; subtype is 44(X'2C')
Self-defining section				
24(X'18')	SMF119SD_TRN	2	Binary	Number of triplets in this record (2)

Table 5. RNIC interface statistics record self-defining section (continued)

Offset	Name	Length	Format	Description
26(X'1A')		2	Binary	Reserved
28(X'1C')	SMF119IDOff	4	Binary	Offset to TCP/IP identification section
32(X'20')	SMF119IDLen	2	Binary	Length of TCP/IP identification section
34(X'22')	SMF119IDNum	2	Binary	Number of TCP/IP identification sections
36(X'24')	SMF119S1Off	4	Binary	Offset to first RNIC interface section
40(X'28')	SMF119S1Len	2	Binary	Length of each RNIC interface section
42(X'2A')	SMF119S1Num	2	Binary	Number of RNIC interface sections

Table 6 shows the RNIC interface statistics specific section (one per "RoCE Express" interface).

Table 6. RNIC interface statistics specific section

Offset	Name	Length	Format	Description
0(X'0)	SMF119SM_RSDuration	8	Binary	Duration of stack recording interval in microseconds, where bit 51 is equivalent to one microsecond.
8(X'8')	SMF119SM_RSNam	16	EBCDIC	Interface name
24(X'18')	SMF119SM_RSPNetID	16	EBCDIC	Physical network ID
40(X'28')	SMF119SM_RSBytesIn	8	Binary	Bytes received across this "RoCE Express" interface
48(X'30')	SMF119SM_RSInOperations	8	Binary	Inbound operations across this "RoCE Express" interface
56(X'38')	SMF119SM_RSBytesOut	8	Binary	Bytes sent across this "RoCE Express" interface
64(X'40')	SMF119SM_RSOutOperations	8	Binary	Outbound operations across this "RoCE Express" interface
72(X'48')	SMF119SM_RSSMCLinks	4	Binary	Total number of SMC-R links established across this "RoCE Express" interface
76(X'4C')	SMF119SM_RSTCPConns	4	Binary	Total number of TCP connections established across this "RoCE Express" interface
80(X'50')	SMF119SM_RSRcvBufInuse	4	Binary	Current amount of fixed 64-bit storage that is in use for inbound processing

Table 6. RNIC interface statistics specific section (continued)

Offset	Name	Length	Format	Description
84(X'54')	SMF119SM_RSFlags	1	Binary	Flags **X'80': PNetID provided** If on, SMF119SM_RSPNetID contains the Physical network ID. **X'40': Associated RNIC interface** If on, this interface is associated with those active interfaces that the SMF subtype 6 records return. The SMF subtype 6 records have the following attributes: • The interface is defined by the INTERFACE statement with CHPID TYPE OSD. • The interface is enabled for SMC-R. • The SMF119SM_RSPNetID value that is reported for the "RoCE Express" interface matches the SMF119IS_IFPNetID value that is reported for the OSD interface. An associated RNIC interface can be used for SMC-R links and load balancing.
85(X'55')	SMF119SM_RSGen	1	Binary	"RoCE Express" feature generation level **X'01'** IBM 10 GbE RoCE Express feature **X'02'** IBM 10 GbE RoCE Express2 feature
86(X'66')		2	Binary	Reserved
88(X'88')	SMF119SM_RSSpeed	4	Binary	HSpeed

Chapter 5. IP Diagnosis Guide

Diagnosing problems with SMC-R

SMC-R problems are often related to switch configuration, physical network ID (PNetID) configuration, and other configuration issues. Common problems with using SMC-R communication include the following categories:

- "Switch configuration issues"
- "Physical network ID configuration issues" on page 52
- "No associated subnet mask" on page 52
- "PFID status remains STARTING" on page 53
- "Problem with SMC-R interaction with security function" on page 53
- VTAM message IST2444I seen during PFID activation

The SMCReason field of the Netstat ALL/-A report and the SMCR field of the Netstat DEvlinks/-d report provide information that is related to SMC-R problems. For a complete list of SMCReason codes in the Netstat ALL/-A report and the SMCR Disabled reasons in the Netstat DEvlinks/-d report, see z/OS Communications Server: IP System Administrator's Commands.

Switch configuration issues

Remote Direct Memory Access (RDMA) processing requires standard 10 GbE switch support, and distance limitations might exist. Enable the global pause frame (a standard Ethernet switch feature for Ethernet flow control that is described in the IEEE 802.3x standard) on the switch.

When the SMCReason field of the Netstat ALL/-A report is 00005013 - RDMA CONNECTIVITY FAILURE, VTAM was not able to complete the SMC-R Link Confirm flow, which usually indicates a switch configuration issue. The Link Confirm message is the first data sent over the RDMA over Converged Ethernet (RoCE) fabric. Check for the following issues:

- If you are using VLANs, verify that the VLAN configuration on the RoCE switch ports is consistent with the VLAN configuration on the OSD switch ports.

  For example, the OSD switch ports might be configured properly, with no VLAN ID or the default VLAN ID, but the RoCE switch ports have a different VLAN ID configured, such as trunk mode with VLAN IDs 400 and 500.

  For more information about configuring VLANs, see VLANID considerations in z/OS Communications Server: IP Configuration Guide.
- Verify that your cable is plugged into the correct port on the "RoCE Express" feature and into the correct port on the switch.

  For example, the cable might be plugged into the correct port on the "RoCE Express" feature but into the wrong port on the switch, or the cable might be plugged into the correct port on the switch but into the wrong port on the "RoCE Express" feature.
- Verify that the MTU value configured on the switch is large enough to support your configured MTU size on GLOBALTCPIP SMCR MTU for this interface.

  Enable jumbo frame support on the RoCE switch ports.

- Multiple switches are in use but the switch uplinks are not configured properly.
- For some switches (for example the IBM RackSwitch G8264), you might need to configure the RoCE switch ports as edge ports. This places the port in the forwarding state as soon as the link is up, reducing delays due to Spanning Tree Protocol processing.

Verify that you have Ethernet flow control enabled on your switch. Ethernet flow control is implemented by using pause frames. If the control is not enabled, this can cause the switch to be overrun leading to packet loss.

Physical network ID configuration issues

The TCP/IP stack must be able to determine which physical network is connected to a particular "RoCE Express" interface, so that the "RoCE Express" interface can be associated with the SMC-R capable IPAQENET or IPAQENET6 interfaces that connect to that same physical network.

Use the Netstat DEvlinks/-d and D NET,TRL,TRLE=xxxx commands to verify the physical network ID (PNetID) value on the OSD interfaces and the "RoCE Express" interfaces.

- If the Netstat DEvlinks/-d report for your OSD interface indicates SMCR: DISABLED (NO PNETID), ensure that you configured the PNetID value on the correct OSD port in the HCD definitions.
- If you receive message EZD2028I with reason PNETID IS NOT CONFIGURED during "RoCE Express" interface activation, ensure that you configured the PNetID value on the correct "RoCE Express" port in the HCD definitions.
- If the Netstat DEvlinks/-d report for your OSD interface indicates SMCR: Yes and your "RoCE Express" interfaces initialized successfully, verify that the PNetID value of the OSD interface matches that of the intended "RoCE Express" interfaces.

In the HCD definitions, the same PNetID values have different meaning for different types of devices.

Device type	PNetID 1	PNetID 2	PNetID 3	PNetID 4
OSD adapter	Represents port 0	Represents port 1	Not used	Not used
RoCE Express	Represents port 1	Represents port 2	Not used	Not used
RoCE Express2	Represents the device	Not used	Not used	Not used

For more information about configuring PNetIDs, see Physical network considerations in z/OS Communications Server: IP Configuration Guide.

No associated subnet mask

SMC-R is used only between peers whose IPv4 interfaces have the same subnet value or whose IPv6 interfaces have at least one prefix in common.

- For IPv4, if the SMCR field of the Netstat DEvlinks/-d report for an OSD interface is DISABLED (NO SUBNET MASK), it means no subnet mask value is configured for the OSD interface.

- For IPv4, if the SMCReason code in the Netstat ALL/-A report is 521E PEER SUBNET/PREFIX MISMATCH, the interfaces on the peer stacks use different subnets.
- For IPv6, if the SMCReason code in the Netstat ALL/-A report is 521E PEER SUBNET/PREFIX MISMATCH, the interfaces on the peer stacks do not have a prefix in common.

For information about associating your interfaces with the appropriate subnet or prefix, see Configuring Shared Memory Communications – RDMA in z/OS Communications Server: IP Configuration Guide.

PFID status remains STARTING

The PFIDSTATUS field is the RNIC interface Peripheral Component Interconnect Express® (PCIe) function ID (PFID) status. The following list describes the possible status values:

- READY

  READY indicates that the initialization sequence with the PFID is complete and the PFID is ready.
- NOT ACTIVE

  NOT ACTIVE indicates that the PFID was never started or was stopped after it was started.
- STARTING

  STARTING indicates that a START of the PFID was issued and TCP/IP sent an activation request to the Data Link Control (DLC) layer. This means z/OS Communications Server did not receive a port state change event that indicates the port is active from the "RoCE Express" feature. Until the port state change event is received, the PFIDSTATUS remains in STARTING state.

  Take the following actions if the PFIDSTATUS field does not change from STARTING to READY:
  - Check that your cables are connected properly.
  - Verify that the switch ports are enabled.
  - If the RoCE adapters are hard-wired to each other, the STARTING status is expected until the partner side has started the RNIC interface.
  - Verify that the optical cable used for the RoCE adapter is not damaged.

Problem with SMC-R interaction with security function

Generally, security functions that require TCP/IP to examine TCP packets cannot be used with SMC-R communications because data that is sent over SMC-R links is not converted into TCP packets. For more information, see Security functions in z/OS Communications Server: IP Configuration Guide.

VTAM message IST2444I seen during PFID activation

You should not code the PORTNUM operand on the GLOBALCONFIG SMCR statement when the PFID represents an IBM 10 GbE RoCE Express2 feature. The correct port number is configured in the Hardware Configuration Definition (HCD) and is learned by VTAM and the TCP/IP stack during PFID activation.

If you code a value for PORTNUM on GLOBALCONFIG, and it is not the same as the HCD port number value, VTAM issues message IST2444I during PFID activation. For instance, if you configured GLOBALCONFIG SMCR PFID 51

PORTNUM 2, but the correct port number is port 1, the following message is generated when VTAM activates PFID 51:

```
IST2444I PORTNUM 2 IGNORED FOR SMC-R PFID 0051, ACTIVATION CONTINUES
```

This is just an informational message, so you do not have to take any action. If you want to avoid getting this message during any subsequent PFID activation attempts, you can remove the PORTNUM value from the GLOBALCONFIG SMCR statement.

Any VARY OBEYFILE processing involving PFID 51 should work regardless of whether you correct the incorrect PORTNUM value.

Chapter 6. IP System Administrator's Commands

Monitoring the TCP/IP network

Netstat

Netstat report details and examples

Netstat ALL/-A report:
Displays detailed information about TCP connections and UDP sockets, including some recently closed ones. The purpose of this report is to aid in debugging problems with TCP connections and UDP sockets.

Report field descriptions:

- The following fields are displayed for a TCP connection entry:

  Client Name
  See the Client name or User ID information in Netstat report general concept for a detailed description.

  Client ID
  See the Client ID or Connection Number information in Netstat report general concept for a detailed description.

  Local Socket
  See the Local Socket information in Netstat report general concept for a detailed description.

  Foreign Socket
  See the Foreign Socket information in Netstat report general concept for a detailed description.

  StartDate
  Date of the last one of the following events that occurred for the TCP connection or UDP endpoint:
  - UDP bind
  - TCP bind
  - TCP listen
  - TCP connection establishment

  StartTime
  Time of the last one of the following events that occurred for the TCP connection or UDP endpoint:
  - UDP bind
  - TCP bind
  - TCP listen
  - TCP connection establishment

  BytesIn
  The number of bytes of data the stack has received for this connection. This includes both the total bytes that the application has received and the total bytes in the receive buffer that have not yet been read by the application.

Restriction: The TCP/IP stack maintains 64-bit counters for TCP connections and UDP endpoints. However, if you are running an IPv4-only stack, and the Netstat output is in the SHORT format, only the lower 32-bit counter value is displayed. If a large amount of data has been received, the number of bytes can exceed a 32-bit counter so the value displayed will appear to have been reset. Use the FORMAT/-M LONG output option on the Netstat command to cause Netstat to use the LONG format for the output. The LONG format displays the full 64-bit counter value. You can also specify the FORMAT parameter on the IPCONFIG profile statement to set FORMAT LONG as the default value for all Netstat commands.

BytesOut
The number of bytes of data the application has sent. This includes all the data that has been sent to the remote connection and all the data that has not been sent but is buffered and waiting to be sent by the local stack.

Restriction: The TCP/IP stack maintains 64-bit counters for TCP connections and UDP endpoints. However, if you are running an IPv4-only stack, and the Netstat output is in the SHORT format, only the lower 32-bit counter value is displayed. If a large amount of data has been sent, the number of bytes can exceed a 32-bit counter so the value displayed will appear to have been reset. Use the FORMAT/-M LONG output option on the Netstat command to cause Netstat to use the LONG format for the output. The LONG format displays the full 64-bit counter value. You can also specify the FORMAT parameter on the IPCONFIG profile statement to set FORMAT LONG as the default value for all Netstat commands.

SegmentsIn
The number of non-retransmitted TCP packets received for this connection.

Guideline: This value, when displayed for a TCP connection across an SMC-R link, includes the number of Remote Direct Memory Access (RDMA) inbound operations.

SegmentsOut
The number of non-retransmitted TCP packets sent for this connection.

Guideline: This value, when displayed for a TCP connection across an SMC-R link, includes the number of RDMA outbound operations.

Last touched
See the Last touched time information in Netstat report general concept for a detailed description.

State Describes the state of the TCP connection. See TCP connection status for more information.

RcvNxt
The sequence number of the next byte this side of the connection is expecting to receive. Each byte that is sent or received in a TCP connection has its own unique, ascending sequence number.

SndNxt
The sequence number of the next byte that the stack can send.

ClientRcvNxt
The sequence number of the next byte that the application will read from the receive buffer.

ClientSndNxt
The sequence number of the next byte of data that the application can add to the send buffer.

InitRcvSeqNum
The first sequence number that was received from the remote stack host when establishing the connection.

InitSndSeqNum
The first sequence number that the local stack sent out when establishing the connection.

CongestionWindow
The value that is used when congestion is detected in the network to limit the amount of data that is sent by the local stack. This value represents the maximum amount of data that is sent without waiting for an acknowledgment from the remote socket.

SlowStartThreshold
The slow-start threshold is used to determine whether the connection is recovering from congestion. If the congestion window is smaller than the slow-start threshold, the connection will take actions to more quickly recover from congestion.

IncomingWindowNum
The incoming window number is the maximum sequence number that the remote socket can send until the local application reads more data from the local socket.

OutgoingWindowNum
The outgoing window number is the maximum sequence number that can be sent without waiting for the remote socket to read data (see the send window).

SndWl1
The sequence number from the segment that last updated the SndWnd field.

SndWl2
The acknowledgment number from the segment that last updated the SndWnd field.

SndWnd
The amount of available buffer space that is advertised by the remote side into which data can be sent.

MaxSndWnd
The largest send window the remote socket has sent to the local socket.

SndUna
This value is the sequence number of the first byte of data in the local socket's send buffer that has not been acknowledged by the remote socket.

rtt_seq
The sequence number of the byte of data sent in a packet for which the

local socket is measuring the round-trip time (the time it takes between the local socket sending a packet and receiving an acknowledgment from the remote socket).

MaximumSegmentSize
The largest amount of data the local socket can send in a single packet.

DSField
The Differentiated Services Code Point value being used for this connection.

The DSField represents one of the following values:

– If there is a Service Policy Agent policy in effect for this entry, one of the following value is used:
  - The ToS value defined by RFC 791 and RFC 1349.
  - The Differentiated Services field value defined by RFC 2474.
– If there is no Service Policy Agent policy in effect for this entry, the value is 0.

Round-trip information
The round-trip time is the amount of time that elapses between the time a packet is sent and the time an acknowledgment for that packet is received.

Smooth trip time
The average amount of time it has taken for a packet to be sent and an acknowledgment to be received for this connection, measured in milliseconds.

SmoothTripVariance
The average variation in round-trip time, measured in milliseconds.

ReXmt
The total number of times a packet has been retransmitted for this connection. This count is historical for the life of the connection.

ReXmtCount
The number of times the last packet that was sent has been retransmitted.

DupACKs
The total number of duplicate acknowledgments that have been received by this connection.

RcvWnd
The amount of available buffer space that is advertised to the remote side into which data can be received.

SockOpt
Socket option flag. For TCP/IP stacks that are not IPv6 enabled, it is a one-byte hexadecimal value of common socket options. For IPv6-enabled TCP/IP stacks, it is a one-byte hexadecimal value of common socket options, followed by a one-byte hexadecimal value of IPv6-specific socket options.

Common socket options:

80 1... ....
Indicates that the socket option SO_REUSEADDR has been set

for this socket. This socket option allows the socket to be bound to the same port that other sockets are bound to.

40 .1.. ....
Indicates that the socket option SO_OOBINLINE has been set for this socket. If this socket option is set, out-of-band data is returned in a normal read operation. If this socket option is not set, out-of-band data can be retrieved only by setting the MSG_OOB flag on a read operation.

20 ..1. ....
Indicates that the socket option SO_LINGER has been set for this socket. The SO_LINGER socket option allows an application to specify whether unsent data is discarded when the socket is closed, and how long to wait if the data is not discarded.

10 ...1 ....
Indicates that the socket option SO_DONTROUTE has been set for this socket. If this socket option is set, data is sent without regard to routes. This is equivalent to the MSG_DONTROUTE flag on a write operation.

08 .... 1...
Indicates the socket option TCP_NODELAY has been set for this socket. Unless this socket option is set, the TCP/IP stack will attempt to optimize the sending of small data packets by holding them briefly in case it has more data to send.

04 .... .1..
Indicates that the SO_KEEPALIVE socket option has been set for this socket. If this socket option is set, the TCP/IP stack will periodically send empty packets to the remote stack to make sure the connection is still alive.

IPv6 socket options:

80 1... ....
Indicates that the IPV6_UNICAST_HOPS option has been set for this socket.

20 ..1. ....
Indicates that the IPV6_USE_MIN_MTU for unicast option has been set for this socket.

10 ...1 ....
Indicates that the IPV6_TCLASS option has been set for this socket.

08 .... 1...
Indicates that the IPV6_RECVTCLASS option has been set for this socket.

04 .... .1..
Indicates that the IPV6_RECVHOPLIMIT option has been set for this socket.

02 .... ..1.
Indicates that the IPV6_V6ONLY option has been set for this socket.

Any other value
Used for diagnostic purposes only under the direction of IBM Service personnel.

TcpTimer
TCP timer flag. It is a one-byte hexadecimal value that is used for diagnostic purposes only under the direction of IBM Service personnel.

TcpSig
TCP signal flag. It is a one-byte hexadecimal value and can have one of the following values:

80 1... ...
Indicates the application has requested to receive the SIGURG signal when urgent data is received on this socket.

40 .1.. ....
Indicates the application has requested to receive the SIGIO signal when data is received on this socket.

Any other value
Is used for diagnostic purposes only under the direction of IBM Service personnel.

TcpSel TCP select flag. It is a one-byte hexadecimal value that is used for diagnostic purposes only under the direction of IBM Service personnel.

TcpDet
Special TCP protocol flag. It is a one-byte hexadecimal value:

04 .... .1..
Indicates the TCP_KEEPALIVE socket option has been set for this socket. This socket option is used to set a socket-specific time interval value for use with the SO_KEEPALIVE socket option. See the description of field SockOpt for an explanation of the SO_KEEPALIVE socket option. The TCP_KEEPALIVE time interval value is in effect only if the SO_KEEPALIVE socket option is set for the socket.

Any other value
Is used for diagnostic purposes only under the direction of IBM Service personnel.

TcpPol
TCP poll flag. It is a one-byte hexadecimal value to be used for diagnostic purposes only under the direction of IBM Service personnel.

TcpPrf A 1-byte hexadecimal TCP performance flag that can have the following values:

40 .1.. ....
Indicates that Dynamic Right Sizing (DRS) is active for this connection so the stack is automatically tuning the advertised receive window. For more information about DRS, see TCP receive window in z/OS Communications Server: IP Configuration Guide. The RcvWnd field shows the current size of the receive window for this connection.

02 .... ..1.
Indicates that DRS was active for this connection, but has been disabled. This is caused by the associated application not reading the data as fast as the data arrives.

Any other value
Used for diagnostic purposes only under the direction of IBM Service personnel.

QOSPolicy
Indicates whether a matching QoS policy rule has been found for this connection. This field can have the following values:

No Indicates that a matching QoS policy rule was not found for this connection.

Yes
Indicates that a matching QoS policy rule was found for this connection. When the QOSPolicy field has the value `Yes`, the following information is displayed:

QOSRuleName
The name of the Policy rule that is in use for this connection. This policy is for outbound traffic only.

TTLSPolicy
Indicates whether a matching Application Transparent Transport Layer Security (AT-TLS) policy rule has been found for this connection. This set of fields is not displayed if the AT-TLS function was disabled when the connection was established (NOTTLS was specified on the TCPCONFIG statement or is in effect by default) or policy lookup has not yet occurred.

– **TTLSPolicy: No** indicates that no matching AT-TLS policy rule was found for this connection. There is no rule or action listed.
– **TTLSPolicy: Yes** indicates one of the following case:
  - A matching AT-TLS policy rule was found for this connection with an indication that AT-TLS should be enabled (TTLSEnabled ON was specified on the TTLSGroupAction). The rule and actions are displayed.
  - A matching AT-TLS policy rule was found for this connection with an indication that AT-TLS should be disabled (TTLSEnabled OFF was specified on the TTLSGroupAction). The rule and actions are displayed.

TTLSRule
The name of the AT-TLS policy rule that is in use for this connection, followed by `(Stale)` when the rule is no longer available for use by new connections. This field is not displayed when the connection does not match a policy rule.

TTLSGrpAction
The name of the AT-TLS policy group action that is in use for this connection, followed by `(Stale)` when the action is no longer available for use by new connections. This field is not displayed when the connection does not match a policy rule.

TTLSEnvAction
The name of the AT-TLS policy environment action that is in use for this connection, followed by `(Stale)` when the action is no longer available for use by new connections. This field is not displayed when the connection does not match a policy rule or when no TTLSEnvironmentAction was specified.

TTLSConnAction
The name of the AT-TLS policy connection action that is in use for this connection, followed by `(Stale)` when the action is no longer available for use by new connections. This field is not displayed when the connection does not match a policy rule or when no TTLSConnectionAction was specified.

RoutingPolicy
Indicates whether a matching routing policy rule has been found for this connection. This field can have the following values:

No Indicates that no matching routing policy rule was found for this connection.

For an Enterprise Extender (EE) UDP socket entry, the RoutingPolicy value is always `No`. Display the routing policy information for an Enterprise Extender (EE) UDP socket entry by using the DISPLAY NET,EEDIAG,TEST=YES command. See z/OS Communications Server: SNA Operation for details.

Yes Indicates that a matching routing policy rule was found for this connection.

When the RoutingPolicy value is `Yes`, the following information is displayed:

RoutingTableName
The name of the routing table that was used to find the route for this connection or `*NONE*` if a route was not found. The value `EZBMAIN` is displayed when the main routing table was used.

RoutingRuleName
The name of the routing policy rule in use for this connection.

ReceiveBufferSize
The number of bytes received from the remote application that this connection is allowed to maintain in a buffer. All the data that is received is kept in a buffer until the local application reads the data.

SendBufferSize
The number of bytes the local application has sent that this connection is allowed to maintain in a buffer. All data that the application has sent is kept in the buffer until the remote side acknowledges receiving the sent data.

TcpClusterConnFlag
TCP cluster connection type flag. It is a one-byte hexadecimal field and can have one of the following values:

80 1... ....
Indicates that the SO_CLUSTERCONNTYPE socket option or the SIOCGPARTNERINFO ioctl was requested.

08 .... 1...
If the SO_CLUSTERCONNTYPE socket option or the SIOCGPARTNERINFO ioctl was issued for this socket, this bit indicates that the communication from this node to the stack hosting the partner application is not sent on links/interfaces exposed outside the cluster (sysplex).

04 .... .1..
If the SO_CLUSTERCONNTYPE socket option or the SIOCGPARTNERINFO ioctl was issued for this socket, this bit indicates that the connection partners are in the same MVS image.

02 .... ..1.
If the SO_CLUSTERCONNTYPE socket option or the SIOCGPARTNERINFO ioctl was issued for this socket, this bit indicates that the connection partners are in the same cluster.

01 1
If the SO_CLUSTERCONNTYPE socket option or the SIOCGPARTNERINFO ioctl was issued for this socket, this bit indicates that the connection partners are not in the same cluster.

00 ....
If the TcpTrustedPartner flag indicates that the SIOCSPARTNERINFO ioctl has been successfully issued or inherited from the listener socket, this value indicates that the SO_CLUSTERCONNTYPE socket option or the SIOCGPARTNERINFO ioctl has not been issued for this socket.

Any other value
Used for diagnostic purposes only under the direction of IBM Service personnel.

For more information about the cluster connection type, see the z/OS Communications Server: IP Sockets Application Programming Interface Guide and Reference. For more information about the SIOCGPARTNERINFO ioctl, see z/OS Communications Server: IP Programmer's Guide and Reference.

TcpTrustedPartner
The TCP trusted connection flag is displayed in the following situations:

- Security credentials of a partner within a sysplex or subplex have been retrieved over a trusted TCP connection using the SIOCGPARTNERINFO ioctl.
- The SIOCSPARTNERINFO ioctl has been issued for the socket.

The TCP trusted connection flag is a 1-byte hexadecimal field and can have the following values:

80 1... ....
This bit indicates that the partner address-space user ID has been retrieved, as well as the task-level user ID if it is available.

40 .1.. ....
This bit indicates that the partner address-space UTOKEN has been retrieved, as well as the task-level UTOKEN if it is available.

20 ..1. ....
This bit indicates that the SIOCSPARTNERINFO ioctl has been successfully issued or inherited from the listener socket.

For information about trusted TCP/IP connections and the SIOCGPARTNERINFO and SIOCSPARTNERINFO ioctl calls, see z/OS Communications Server: IP Programmer's Guide and Reference.

ReceiveDataQueued
The number of bytes of data on the receive queue from the remote application yet to be read. This field is not displayed for a connection that is in listen state. The amount of data queued can be up to double the ReceiveBufferSize size. When the number of bytes is not zero, the following information is displayed:

OldQDate
The date of the oldest data on the receive queue.

OldQTime
The time of the oldest data on the receive queue. This value does not include leap seconds.

The ReceiveDataQueued information is not displayed for a connection that is in listen state.

SendDataQueued
The number of bytes of data on the send queue waiting for the remote side to acknowledge. This field is not displayed for a connection that is in listen state. The amount of data queued can be up to double the size of the SendBufferSize. When the number of bytes is not zero, the following information is displayed:

OldQDate
The date of the oldest data on the send queue.

OldQTime
The time of the oldest data on the send queue. This value does not include leap seconds.

The SendDataQueued information is not displayed for a connection that is in listen state.

SendStalled
Indicates whether this connection's send data flow is stalled. The send data flow is considered stalled if one or more of the following conditions are true:

- The TCP send window size is less than 256 or is less than the smaller of the largest send window that has been seen for the connection and the default MTU. The TCP send window size is set based on values provided by the TCP peer. The default MTU for IPv4 is 576. The default MTU for IPv6 is 1280.
- The TCP send queue is full and the data is not being retransmitted.

This field is not displayed for a connection that is in listen state. If the value is Yes, then this connection's send data flow is stalled.

SMC Information
The SMC information. This section is displayed for connections when at least one Peripheral Component Interconnect Express (PCIe) function ID (PFID) was defined by using the SMCR parameter of the GLOBALCONFIG statement. The `SMC Information` section contains the following information:

SMCStatus
Indicates whether this connection is traversing a Shared Memory Communications over Remote Direct Memory Access (SMC-R) link. This field can have the following values:

Inactive
Indicates that this connection does not use an SMC-R link.

When the `SMCStatus` value is `Inactive`, the following information is displayed:

SMCReason ***reasonCode - reasonText***
This field provides an explanation for why the connection is not using an SMC-R link. The reason code and text can be one of the following values:

5013 - RDMA connectivity failure
SMC-R communications cannot be used for this connection because the first attempt to send data over RDMA encountered an error. A likely reason for this error is a configuration problem in the switch that is connected to the RNIC interface. For example, an incorrect VLANID value was configured on the switch port for the RNIC interface.

5203 - Insufficient virtual storage
SMC-R communications cannot be used for this connection because TCP private 64-bit virtual storage could not be allocated for an RMB buffer.

5204 - SMCR FIXEDMemory limit exceeded reached
SMC-R communications cannot be used for this connection because the required SMC-R memory could not be allocated.

5205 - TCP connection limit reached
SMC-R communications cannot be used for this connection because another RMB for a new connection could not be obtained.

5206 - VLAN ID not found
SMC-R communications cannot be used for this connection because no VLAN that was enabled by SMC-R was found.

5209 - No qualifying active RNICs
No active "RoCE Express" interfaces are detected in the SMC-R layer that can be used for this TCP connection.

5219 - Peer is out of synch
SMC-R communications cannot be used for this connection because the peer is out of synchronization condition during negotiation.

521E - Peer subnet/prefix mismatch
SMC-R communications cannot be used for this connection because the peer does

not have an active interface in the same subnet that is eligible for SMC-R.

5301 - Peer did not accept SMC-R request
The remote connection peer is not configured to use SMC-R communications.

5302 - Route not SMC-R eligible
SMC-R communications cannot be used for this connection because of connectivity issues or the absence of an active interface that supports SMC-R processing.

5303 - No active RNICs for the PNetID
No active "RoCE Express" features are detected for the PNetID.

5304 - Connection is local
The connection peers are on the same TCP/IP stack.

5306 - No storage for SMC-R negotiation
Storage for SMC-R negotiation over this TCP connection cannot be obtained.

5307 - Connection uses IPSec
SMC-R communications cannot be used for this connection because the connection is using IP security.

5308 - FRCA server
SMC-R communications cannot be used for this connection because the connection is used by a Fast Response Cache Accelerator (FRCA) server.

5309 - Pascal application
SMC-R communications cannot be used because the connection is used by a Pascal API application.

530A - NOSMCR Port server
SMC-R communications cannot be used for this connection because the server port was configured with the NOSMCR option.

530B - Invalid MTU from peer
SMC-R communications cannot be used for this connection because the peer had an invalid MTU size for this SMC-R link.

530C - No prefix on interface
SMC-R communications could not be used for this connection because of no valid IPv6 prefixes for the associated OSD interface.

reasonCode **- Internal error**
SMC-R communications cannot be used for this connection because of an internal error.

reasonCode **- *Peer generated***
SMC-R communications cannot be used for this connection because the peer reported an error. See the peer product's documentation for additional details.

Active Indicates that this connection uses an SMC-R link.

When the `SMCStatus` value is `Active`, the following information is displayed:

SMCGroupId
This field identifies the SMC-R link group that includes the individual SMC-R link that this connection traverses. This TCP/IP stack generates the SMC-R link group identifier dynamically.

LocalSMCLinkId
This field identifies the SMC-R link on this TCP/IP stack that this connection traverses. This TCP/IP stack generates the SMC-R link identifier dynamically.

RemoteSMCLinkId
This field identifies the SMC-R link on the remote peer that this connection traverses. The remote peer generates this SMC-R link identifier and provides it to this TCP/IP stack during SMC-R link activation.

LocalSMCRcvBuf
This field indicates the size of the RMB element that the local host uses for receiving data on this connection from the remote host.

RemoteSMCRcvBuf
This field indicates the size of the RMB element that the remote host uses for receiving data on this connection from the local host.

Ancillary Input Queue
Indicates whether this connection is registered to the TCP bulk data ancillary input queue. This field is not displayed for a connection that is in listen state. This field can have the following values:

N/A Indicates that this connection is not registered to the TCP bulk data ancillary input queue.

Yes Indicates that this connection is registered to the TCP bulk data ancillary input queue.

When the Ancillary Input Queue value is Yes, the following information is displayed:

BulkDataIntfName
This field indicates the name of the interface over which the inbound traffic is being received.

ConnectionsIn
The number of connections that a server has accepted. This field is displayed only for a connection that is in listen state. Once a connection has been accepted, communication can begin between the client and server applications.

ConnectionsDropped
The number of connection requests that have been received by the server and dropped because the maximum number of connection requests was already in the backlog queue. This field is displayed only for a connection that is in listen state.

MaximumBacklog
The maximum number of connections that a server maintains on the backlog queue. This field is displayed only for a connection that is in listen state. Connection requests that are received when the maximum number of connections requests is already on the backlog queue are typically discarded. A high maximum backlog queue value causes more simultaneous connection requests than a server can handle without having to drop requests.

ConnectionFlood
Indicates whether this server is experiencing a potential connection flood attack. A server is considered under a potential connection flood attack when backlog queue expansion is required to handle the incoming connection requests. The point where a potential connection flood attack is detected is based on the initial size of the backlog queue. A small initial backlog queue (for example, 10 entries) is allowed to expand twice before the server is considered under attack, while a server with a large initial backlog queue (for example, 500 entries) can expand once, up to a maximum of 768 entries, before it is considered under attack. This field is displayed only for a connection that is in listen state. If the value is Yes, then this server is experiencing a potential connection flood attack.

CurrentBacklog
The number of connections that are currently in the backlog queue. This field is displayed only for a connection that is in listen state. This value includes connections that are fully established and that are ready to be accepted by the server application; it also includes connections that are not yet fully established (the TCP connection establishment handshake is not yet complete). To determine the number of connections in the backlog queue that are not fully established, subtract the ServerBacklog value from the CurrentBacklog value. If the server application uses the Fast Response Cache Accelerator (FRCA) feature, fully established connections that are being serviced by TCP/IP from the FRCA cache are also included in the CurrentBacklog value. The FRCABacklog value in this report indicates the number of these connections.

ServerBacklog
The number of connections currently in the backlog queue that are established and that have not yet been accepted.

FRCABacklog
The number of connections currently in the backlog queue that are established FRCA connections and that are being serviced by

TCP/IP from the FRCA cache. These connections do not need to be accepted by the server application. This field is applicable only for server applications that use the FRCA feature.

CurrentConnections
The number of currently established connections to the server. This field is displayed only for a connection that is in listen state.

SEF The server accept efficiency fraction (SEF) is a measure, calculated at intervals of approximately one minute, of the efficiency of the server application in accepting new connection setup requests and managing its backlog queue. The value is displayed as a percentage. A value of 100 indicates that the server application is successfully accepting all its new connection setup requests. A value of 0 indicates that the server application is not responding to new connection setup requests. This field is displayed only for a connection that is in listen state.

When using SHAREPORTWLM, the SEF value is used to modify the WLM server-specific weights, thereby influencing how new connection setup requests are distributed to the servers sharing this port. When using SHAREPORT, the SEF value is used to weight the distribution of new connection setup requests among the SHAREPORT servers. Whether SHAREPORT or SHAREPORTWLM are specified, the SEF value is reported back to the distributor to be used as part of the target server responsiveness fraction calculation, which influences how new connection setup requests are distributed to the target servers.

Quiesced
Indicates whether this server application has been quiesced for DVIPA sysplex distributor workload balancing. This field is displayed only for a connection that is in listen state. If the value is Dest, then this server will receive no new DVIPA sysplex distributor workload connections until the server application has been resumed. When the server application is resumed, the quiesced value changes to No.

SharePort
Indicates that multiple TCP listening servers are sharing the same port. This field is displayed only for a connection that is in listen state. The method used by TCP to distribute incoming connections to the listeners is indicated by Base or WLM described below. See the PORT profile statement in the z/OS Communications Server: IP Configuration Reference for more information on sharing a TCP port.

Base Connections are proportionally distributed among the available shareport listeners using the SEF value. This value corresponds to the SHAREPORT parameter on the PORT profile statement.

WLM Connections are distributed among the available shareport listeners using the normalized WLM server-specific weights. This value corresponds to the SHAREPORTWLM parameter on the PORT profile statement.

RawWeight
The raw composite weight for this server. The composite weight is based on the application's general CPU, zAAP, and zIIP processor utilization.

NormalizedWeight
The normalized values of the WLM server-specific weights. The original raw weights received from WLM are proportionally

reduced for use by the distribution algorithm. Connections are distributed to these servers in a weighted round-robin fashion using the normalized weights if SHAREPORTWLM is specified on the PORT profile statement. The displayed normalized weight is shown after it has been modified by the SEF value. This field is shown regardless of the distribution method (Base or WLM) that is used.

Abnorm

Indicates whether the server application is experiencing conditions that cause transactions to complete abnormally. The value represents a rate of abnormal transaction completions per 1000 total transaction completions. It is applicable only for TCP applications that act as Subsystem Work Managers and report transaction status using Workload Management Services, such as IWMRPT. For example, the value 100 indicates that 10% of all transactions processed by the server application are completing abnormally. Under normal conditions, this value is 0. A nonzero value indicates that the server application has reported some abnormal transactions completions to WLM and that WLM has reduced the recommendation provided to sysplex distributor for this server instance. This reduction in the WLM recommendation enables more new TCP connections to be directed to servers that are not experiencing problem conditions that lead to abnormal transaction completions.

The greater the Abnorm rate field value, the greater the reduction WLM applies to the recommendation for this target instance. For more information about the conditions that cause the abnormal transaction completions for a given server application, see the documentation provided by the server application.

If applications do not provide this transaction status to WLM or SHAREPORTWLM is not configured, then this field has the value 0. For more information about workload management interfaces, see z/OS MVS Programming: Workload Management Services.

Health

The server application health indicator. This health indicator is available only for applications that provide this information to WLM using the IWM4HLTH or IWMSRSRG services. It provides a general health indication for an application or subsystem. Under normal circumstances, the value of this field is 100, indicating that the server is 100% healthy. Any value that is less than 100 indicates that the server is experiencing problem conditions that might prevent new work requests from being successfully processed. A value of less than 100 also causes the WLM to reduce the recommendation provided to the sysplex distributor for this server instance. This reduction in the WLM recommendation enables more new TCP connections to be directed to servers that are not experiencing problem conditions.

The reduction in the WLM recommendation is proportional to value of the Health indicator. For example, if the health value is 20%, WLM reduces the recommendation for this server by 80%.

For more information about the conditions leading to a health indicator of less than 100, see the documentation for the server application.

If applications do not provide this health indicator to WLM or SHAREPORTWLM is not configured, then the value of this field is 100. For more information about workload management interfaces, see z/OS MVS Programming: Workload Management Services.

RawCP
The raw WLM server-specific general CP weight.

RawzAAP
The raw WLM server-specific zAAP weight.

RawzIIP
The raw WLM server-specific zIIP weight.

PropCP
The RawCP value modified by the proportion of CP capacity that is currently being consumed by the application's workload as compared to the other processors (zIIP and zAAP).

PropzAAP
The RawzAAP value modified by the proportion of zAAP capacity that is currently being consumed by the application's workload as compared to the other processors (CP and zIIP).

PropzIIP
The RawzIIP value modified by the proportion of zIIP capacity that is currently being consumed by the application's workload as compared to the other processors (CP and zAAP).

ILWeighting
The weighting factor the workload manager (WLM) uses when it compares displaceable capacity at different importance levels (ILs) in order to determine a SERVERWLM recommendation for each system.

XcostzAAP
The crossover cost that is applied to the workload that was targeted to run on a zAAP processor but that ran on the conventional processor.

XcostzIIP
The crossover cost that is applied to the workload that was targeted to run on a zIIP processor but that ran on the conventional processor.

Application Data
The application data that makes it easy for users to locate and display the connections that are used by the application. The beginning of the application data identifies the format of the application data area. For z/OS Communications Server applications, see application data in the z/OS Communications Server: IP Programmer's Guide and Reference for a description of the format, content, and meaning of the data supplied by the application. For other applications, see the documentation that is supplied by the application. The data is displayed in character format if application data is present. Non-printable characters, if any, are displayed as dots.

- The following fields are displayed for a UDP socket entry:

  Client Name
  See the Client name or User ID information in Netstat report general concept for a detailed description.

  Client ID
  See the Client ID or Connection Number information in Netstat report general concept for a detailed description.

  Local Socket
  See the Local Socket information in Netstat report general concept for a detailed description.

  Foreign Socket
  See the Foreign Socket information in Netstat report general concept for a detailed description.

  BytesIn
  The number of bytes of data the stack has received for this UDP socket. Includes both the total bytes that all applications have received for this socket and the total bytes in stack buffers that have not yet been read by any application.

  BytesOut
  Number of outbound bytes of user data sent from this socket.

  DgramIn
  The number of datagrams the stack has received for this UDP socket. This includes both the total datagrams that all applications have received for this socket and the total datagrams in stack buffers that have not yet been read by any application. A datagram is the group of data bytes contained in a UDP packet.

  DgramOut
  Number of outbound datagrams sent from this socket.

  Last touched time
  See the Last touched time information in Netstat report general concept for a detailed description.

  MaxSendLim
  Maximum allowed size of a user datagram sent from this socket.

  MaxRecvLim
  Maximum allowed size of a user datagram received on this socket.

  SockOpt
  Socket option flag. For TCP/IP stacks that are not IPv6 enabled, it is a one-byte hexadecimal value of common socket options. For IPv6-enabled TCP/IP stacks, it is a one-byte hexadecimal value of common socket options, followed by a three-byte hexadecimal value of IPv6-specific socket options.

  IPv4 socket options:

  80 1... ....
  Allow use of broadcast address (IPv4 only)

  40 .1.. ....
  Allow loopback of datagrams

  20 ..1. ....
  Bypass normal routing

10 ...1 ....
Forward ICMP messages (Pascal API)

08 .... 1...
Last sent a multicast packet

04 .... .1..
Multicast packets can be received by this socket

02 .... ..1.
Reuse address

other values
reserved

IPv6 socket options:

Byte 1

80 1... ....
AF_INET6 socket

40 .1.. ....
IPV6_V6ONLY option set

20 ..1. ....
IPV6_RECVPKTINFO option set

10 ...1 ....
IPV6_RECVHOPLIMIT option set

08 .... 1...
IPV6_USE_MIN_MTU for unicast option

04 .... .1..
IPV6_PKTINFO src IP@ option set

02 .... ..1.
IPV6_PKTINFO interface index option set

01 1
IPV6_UNICAST_HOPS option set

Byte 2

80 1... ....
IPV6_USE_MIN_MTU for multicast option set

40 .1.. ....
IPV6_RECVRTHDR option set

20 ..1. ....
IPV6_RECVHOPOPTS option set

10 ...1 ....
IPV6_RECVDSTOPTS option set

08 .... 1...
IPV6_RECVTCLASS option set

04 .... .1..
IPV6_NEXTHOP option set

02 .... ..1.
IPV6_RTHDR option set

01 1
IPV6_HOPOPTS option set

Byte 3

80 1... ....
IPV6_DSTOPTS option set

40 .1.. ....
IPV6_RTHDRDSTOPTS option set

20 ..1. ....
IPV6_TCLASS option set

10 ...1 ....
IPV6_DONTFRAG option set

08 .... 1...
IPV6_RECVPATHMTU option set

other values
reserved

DSField
The Differentiated Services Code Point value being used for this connection.

The DSField represents one of the following values:

– If there is a Service Policy Agent policy in effect for this entry, one of the following value is used:
  - The ToS value defined by RFC 791 and 1349
  - The Differentiated Services field value defined by RFC 2474
– For UDP entries for which there is no Service Policy Agent policy in effect but the entry is being used for an Enterprise Extender connection, the hexadecimal value of one of the following VTAM IP Type of Service values is displayed:

  20 Low
  40 Medium
  80 High
  C0 Network

  See the z/OS Communications Server: SNA Network Implementation Guide for additional information.
– If neither of these is true, this value is 0.

QOSPolicy
Indicates whether a matching QoS policy rule has been found for this connection. This field can have the following values:

No Indicates that a matching QoS policy rule was not found for this connection.

Yes
Indicates that a matching QoS policy rule was found for this connection. When the QOSPolicy field has the value Yes, the following information is displayed:

QOSRuleName
The name of the Policy rule that is in use for this connection. This policy is for outbound traffic only.

RoutingPolicy
Indicates whether a matching routing policy rule has been found for this connection. This field can have the following values:

No Indicates that no matching routing policy rule was found for this connection.

Yes Indicates that a matching routing policy rule was found for this connection.

When the RoutingPolicy field has the value `Yes`, the following information is displayed:

RoutingTableName
The name of the routing table that was used to find the route for this connection or `*NONE*` if a route was not found. The value `EZBMAIN` is displayed when the main routing table was used.

RoutingRuleName
The name of the routing policy rule in use for this connection.

ReceiveDataQueued
The number of bytes of data on the receive queue from the remote application yet to be read. When the number of bytes is not zero, the following information is displayed:

OldQDate
The date of the oldest datagram on the receive queue.

OldQTime
The time of the oldest datagram on the receive queue.

ReceiveMsgCnt
The number of datagrams on the receive queue.

Multicast Specific
Indicates that there is multicast data associated with this socket.

For outgoing multicast data the following field descriptions apply:

HopLimit
The time-to-live value.

LoopBack
Indicates whether datagrams are sent to loopback.

OutgoingIpAddr
The IPv4 IP address of the link on which the datagrams are sent. The value of this field is 0.0.0.0 if the socket has not been set with the IP_MULTICAST_IF setsockopt option. This field is not applicable for an IPv6 multicast entry.

OutgoingIntf
The IPv6 interface name on which the datagrams are sent. The value of this field is blank if the socket has not been set with the IPV6_MULTICAST_IF setsockopt option. This field is not applicable for an IPv4 multicast entry.

For incoming multicast data the following field descriptions apply:

Group The multicast IP addresses (up to a maximum of 20) for which data is being received.

IncomingIpAddr
The IPv4 IP address of the link over which multicast datagrams are accepted. This field is not applicable for an IPv6 multicast entry.

IncomingIntf
The IPv6 interface name over which multicast datagrams are accepted. This field is not applicable for an IPv4 multicast entry.

SrcFltMd
The source filter mode, which can have a value of either `Include` or `Exclude`. A source filter applies only to incoming multicast data. This source filter function is set by an application for the UDP socket. See the information about Designing multicast programs in the z/OS Communications Server: IP Sockets Application Programming Interface Guide and Reference for details. The source filter applies to all the IP addresses in the SrcAddr fields for the associated IncomingIPAddr address or IncomingIntf interface.

Include
Indicates that the socket receives only multicast datagrams that have a source IP address that matches an IP address indicated in the SrcAddr field.

Exclude
Indicates either that the source filter function is not active for the socket or that the application has requested to receive only multicast datagrams that have a source IP address that does not match an IP address indicated in the SrcAddr field. If the source filter function is not active or if the source filter function is active but no SrcAddr value is set, then the SrcAddr field contains the value `None`.

SrcAddr
Source address information for the socket.

ipaddr The source IP addresses (up to a maximum of 64), used in conjunction with the SrcFltMd value, that is used to determine which incoming multicast datagrams should be passed to an application.

None This value is displayed only when the source filter function is not active for the socket or when no source IP address is associated with group multicast address, IncomingIPAddr address, or IncomingIntf interface. The value of the corresponding SrcFltMd field is `Exclude`.

StartDate
See the StartDate information in Netstat report general concept.

StartTime
See the StartTime information in Netstat report general concept.

Netstat CONFIG/-f report:
Displays TCP/IP configuration information about IP, TCP, UDP, SMF parameters, GLOBALCONFIG profile statement, network monitor, data trace, and autolog settings.

Report field descriptions:

- **TCP Configuration Table**

  Display the following configured TCP information that is defined in the TCPCONFIG and SOMAXCONN profile statements. For more information about each field, see the TCPCONFIG or SOMAXCONN profile statement information in z/OS Communications Server: IP Configuration Reference.

  DefaultRcvBufSize
  The TCP receive buffer size that was defined using the TCPRCVBUFRSIZE parameter in the TCPCONFIG statement. The size is between 256 and TCPMAXRCVBUFRSIZE; the default size is 65536 (64 KB). This value is used as the default receive buffer size for those applications that do not explicitly set the buffer size using SETSOCKOPT(). If the TCPRCVBUFRSIZE parameter was not specified in the TCPCONFIG statement, then the default size 65536 (64 KB) is displayed.

  DefaultSndBufSize
  The TCP send buffer size that was defined using the TCPSENDBFRSIZE parameter in the TCPCONFIG statement. The size is between 256 bytes and TCPMAXSENDBUFRSIZE; the default size is 65536 (64 KB). This value is used as the default send buffer size for those applications that do not explicitly set the buffer size using SETSOCKOPT(). If the TCPSENDBFRSIZE parameter was not specified in the TCPCONFIG statement, then the default size 65536 (64 KB) is displayed.

  DefltMaxRcvBufSize
  The TCP maximum receive buffer size that was defined using the TCPMAXRCVBUFRSIZE parameter in the TCPCONFIG statement. The maximum receive buffer size is the maximum value that an application can set as its receive buffer size using SETSOCKOPT(). The minimum acceptable value is the value that is coded on the TCPRCVBUFRSIZE parameter, the maximum size is 2 MB, and the default size is 256 KB. If you do not have large bandwidth interfaces, you can use this parameter to limit the receive buffer size that an application can set. If the TCPMAXRCVBUFRSIZE parameter was not specified in the TCPCONFIG statement, then the default size 262144 (256 KB) is displayed.

  SoMaxConn
  The maximum number of connection requests that can be queued for any listening socket, as defined by the SOMAXCONN statement. The minimum value is 1, the maximum value is 2147483647, and the default value is 1024.

  MaxReTransmitTime
  The maximum retransmit interval in seconds. The range is 0 - 999.990. The default value is 120.

  Rules:

- If none of the following parameters is specified, this MAXIMUMRETRANSMITTIME parameter is used and the MINIMUMRETRANSMITTIME parameters of the following statements are not used.
  - MAXIMUMRETRANSMITTIME on the BEGINROUTES statement
  - MAXIMUMRETRANSMITTIME on the GATEWAY statement
  - MAXIMUMRETRANSMITTIME on the ROUTETABLE statement
  - Max_Xmit_Time on the OSPF_INTERFACE statement
  - Max_Xmit_Time on the RIP_INTERFACE statement
- The TCPCONFIG version is used if no route parameter has been explicitly specified. If the TCPCONFIG version of maximum retransmit time is used, the MINIMUMRETRANSMITTIME value that is specified on the route parameter is not used, which means the value of the minimum retransmit time is 0.

DefaultKeepAlive
The default keepalive interval that was defined using the INTERVAL parameter in the TCPCONFIG statement. It is the number of minutes that TCP waits after it receives a packet for a connection before it sends a keepalive packet for that connection. The range is 0 - 35791 minutes; the default value is 120. The value 0 disables the keepalive function. If the INTERVAL parameter was not specified in the TCPCONFIG statement, then the default interval 120 is displayed.

DelayAck
Indicates whether the DELAYACKS option is enabled or disabled. The value `Yes` indicates that acknowledgments are delayed when a packet is received (the DELAYACKS parameter was defined in the TCPCONFIG profile statement or is in effect by default); the value `No` indicates that acknowledgments are not delayed when a packet is received (the NODELAYACKS parameter was defined in the TCPCONFIG statement).

RestrictLowPort
Indicates whether ports in the range 1 - 1023 are reserved for users by the PORT and PORTRANGE statements. The value `Yes` indicates that RESTRICTLOWPORTS is in effect (the RESTRICTLOWPORTS parameter was defined in the TCPCONFIG profile statement); the value `No` indicates that RESTRICTLOWPORTS is not in effect (the UNRESTRICTLOWPORTS parameter was defined in the TCPCONFIG statement or is in effect by default).

SendGarbage
Indicates whether the keepalive packets sent by TCP contain 1 byte of random data. The value `Yes` indicates that SENDGARBAGE TRUE is in effect (SENDGARBAGE TRUE was defined in the TCPCONFIG profile statement); the value `No` indicates that SENDGARBAGE TRUE is not in effect (SENDGARBAGE FALSE was defined in the TCPCONFIG statement or is in effect by default).

TcpTimeStamp
Indicates whether the TCP Timestamp Option is enabled or disabled. The value `Yes` indicates that TCPTIMESTAMP is in effect (the TCPTIMESTAMP parameter was defined in the TCPCONFIG profile statement or is in effect by default); the value `No` indicates that TCPTIMESTAMP is not in effect (the NOTCPTIMESTAMP parameter was defined in the TCPCONFIG statement).

FinWait2Time
The FinWait2Time number that was defined using the FINWAIT2TIME parameter in the TCPCONFIG statement. It is the number of seconds a TCP connection should remain in the FINWAIT2 state. The range is 60 - 3600 seconds; the default value is 600 seconds. When this timer expires, it is reset to 75 seconds; when this timer expires a second time, the connection is dropped. If the FINWAIT2TIME parameter was not specified in the TCPCONFIG statement, then the default value 600 is displayed.

TimeWaitInterval
The number of seconds that a connection remains in TIMEWAIT state. The range is 0 - 120. The default value is 60.

Note: For local connections, a TIMEWAITINTERVAL of 50 milliseconds is always used.

DefltMaxSndBufSize
The maximum send buffer size. The range is the value that is specified on TCPSENDBFRSIZE to 2 MB. The default value is 256K.

RetransmitAttempt
The number of times a segment is retransmitted before the connection is aborted. The range is 0 - 15. The default value is 15.

ConnectTimeOut
The total amount of time before the initial connection times out. This value also applies to TCP connections that are established over SMC-R links. The range is 5 - 190 seconds. The default value is 75.

ConnectInitIntval
The initial retransmission interval for the connect(). The range is 100 to 3000 milliseconds (ms). The default value is 3000.

KAProbeInterval
The interval in seconds between keepalive probes. The range is 1 - 75. The default value is 75.

This parameter does not change the initial keepalive timeout interval. It controls the time between the probes that are sent only after the initial keepalive interval has expired.

You can specify setsockopt() TCP_KEEPALIVE to override the parameter.

KeepAliveProbes
The number of keepalive probes to send before the connection is aborted. The range is 1 - 10. The default value is 10.

This parameter does not change the initial keepalive timeout interval. It controls the number of probes that are sent only after the initial keepalive interval has expired.

You can specify setsockopt() TCP_KEEPALIVE to override this parameter.

Nagle Indicates whether the Nagle option is enabled or disabled. The value Yes indicates that packets with less than a full maximum segment size (MSS) of data are buffered unless all data on the send queue has been acknowledged.

QueuedRTT
The threshold at which outbound serialization is engaged. The range is 0 - 50 milliseconds. The default value is 20 milliseconds.

FRRTheshold
The threshold of duplicate ACKs for FRR to engage. The range is 1 - 2048. The default value is 3.

TTLS Indicates whether Application Transparent Transport Layer Security (AT-TLS) is active in the TCP/IP stack. The value `Yes` indicates that AT-TLS is active (the TTLS parameter was specified in the TCPCONFIG profile statement). The value `No` indicates that AT-TLS is not active (the NOTTLS parameter was specified in the TCPCONFIG profile statement or is in effect by default).

EphemeralPorts
The range of ephemeral ports that was defined using the EPHEMERALPORTS parameter in the TCPCONFIG statement or by default. The range specified must be within the range of 1024 to 65535. If the EPHEMERALPORTS parameter was not specified in the TCPCONFIG statement, then the default range 1024 - 65535 is displayed.

SelectiveACK
Indicates whether Selective Acknowledgment (SACK) support is active in the TCP/IP stack. This field can have the following values:

Yes Indicates that SACK options are exchanged with partners when transmitting data. The SELECTIVEACK parameter was specified on the TCPCONFIG profile statement.

No Indicates that SACK options will not be exchanged. The NOSELECTIVEACK parameter was specified on the TCPCONFIG profile statement or is in effect by default.

Note: The values displayed in the MaxReTransmitTime, MinReTransmitTime, RoundTripGain, VarianceGain, VarianceMultiplier, and MaxSegLifeTime fields are actual default values that are assigned by the TCP/IP stack; you cannot configure them externally using the TCPCONFIG profile statement. You can override the MaxReTransmitTime, MinReTransmitTime, RoundTripGain, VarianceGain, VarianceMultiplier values on a per-destination basis using either the BEGINROUTES configuration statement, the old GATEWAY configuration statement, or the configuration file for OMPROUTE.

- **UDP Configuration Table**

Display the following configured UDP information defined in the UDPCONFIG profile statement. For more information about each UDP parameter, see UDPCONFIG profile statement information in the z/OS Communications Server: IP Configuration Reference.

DefaultRcvBufSize
The UDP receive buffer size that was defined using the UDPRCVBUFRSIZE parameter in the UDPCONFIG statement. The size is in the range 1 - 65535; the default size is 65535. If the UDPRCVBUFRSIZE parameter was not specified in the UDPCONFIG statement, then the default size 65535 is displayed.

DefaultSndBufSize
The UDP send buffer size that was defined using the UDPSENDBFRSIZE parameter in the UDPCONFIG statement. The size is in the range 1 - 65535; the default size is 65535. If the

UDPSENDBFRSIZE parameter was not specified in the UDPCONFIG statement, then the default size 65535 is displayed.

CheckSum
Indicates whether UDP does check summing. The value `Yes` indicates that UDP check summing is in effect (the UDPCHKSUM parameter was defined in the UDPCONFIG profile statement or is in effect by default); the value `No` indicates that UDP check summing is not in effect (the NOUDPCHKSUM parameter was defined in the UDPCONFIG statement).

EphemeralPorts
The range of ephemeral ports that was defined using the EPHEMERALPORTS parameter in the UDPCONFIG statement or by default. The range specified must be within the range of 1024 to 65535. If the EPHEMERALPORTS parameter was not specified in the UDPCONFIG statement, then the default range 1024 - 65535 is displayed.

RestrictLowPort
Indicates whether ports 1 - 1023 are reserved for users by the PORT and PORTRANGE statements. The value `Yes` indicates that ports in the range 1 - 1023 are reserved (the RESTRICTLOWPORTS parameter was defined in the UDPCONFIG profile statement); the value `No` indicates that the ports are not reserved (the UNRESTRICTLOWPORTS parameter was defined in the UDPCONFIG statement or is in effect by default).

UdpQueueLimit
Indicates whether UDP should have a queue limit on incoming datagrams. The value `Yes` indicates that there is a UDP queue limit in effect (the UDPQUEUELIMIT parameter was defined in the UDPCONFIG profile statement or is in effect by default); the value `No` indicates that a UDP queue limit is not in effect (the NOUDPQUEUELIMIT parameter was defined in the UDPCONFIG statement).

- **IP Configuration Table**

Displays the following configured IP information defined in the IPCONFIG profile statement. For more information about each IP parameter, see the IPCONFIG profile statement information in the z/OS Communications Server: IP Configuration Reference.

Forwarding
Indicates whether the transfer of data between networks is enabled for this TCP/IP stack. Possible values are:

Pkt Indicates that packets that are received but not destined for this stack are forwarded and use multipath routes if they are available on a per-packet basis (the DATAGRAMFWD FWDMULTIPATH PERPACKET was specified in the IPCONFIG profile statement).

Yes Indicates that packets that are received but not destined for this stack are forwarded but do not use multipath routes even if they are available. (the DATAGRAMFWD NOFWDMULTIPATH was specified in the IPCONFIG profile statement or is in effect by default).

No Indicates that packets that are received but that are not destined

for this stack are not forwarded in route to the destination (the NODATAGRAMFWD parameter was specified in the IPCONFIG profile statement).

TimeToLive
The time to live value that was defined using the TTL parameter in the IPCONFIG statement. The time to live value is the number of hops that packets originating from this host can travel before reaching the destination. Valid values are in the range 1 - 255; the default value is 64. If the TTL parameter was not specified in the IPCONFIG statement, then the default value 64 is displayed.

RsmTimeOut
The reassembly timeout value that was defined using the REASSEMBLYTIMEOUT parameter in the IPCONFIG statement. It is the amount of time (in seconds) that is allowed to receive all parts of a fragmented packet before discarding the packets received. Valid values are in the range 1 - 240; the default value is 60. If the REASSEMBLYTIMEOUT parameter was not specified in the IPCONFIG statement, then the default value 60 is displayed.

IpSecurity
Indicates whether the IP filtering and IPSec tunnel support is enabled. The value `Yes` indicates that IP security is in effect (the IPSECURITY parameter was defined on the IPCONFIG profile statement). The value `No` indicates that IP security is not in effect.

ArpTimeout
The ARP timeout value that was defined using the ARPTO parameter in the IPCONFIG statement. It indicates the number of seconds between creation or revalidation and deletion of ARP table entries. Valid values are in the range 60 - 86400; the default value is 1200. If the ARPTO parameter was not specified in the IPCONFIG statement, then the default value 1200 is displayed.

MaxRsmSize
The maximum packet size that can be reassembled. If an IP datagram is fragmented into smaller packets, the complete reassembled datagram cannot exceed this value. Valid values are in the range 576 - 65535; the default value is 65535.

Restriction: The value that is displayed in the MaxRsmSize field is the actual default value that was assigned by the TCP/IP stack; users cannot configure this value externally using the IPCONFIG profile statement.

Format
The stack-wide command format that was defined using the FORMAT parameter in the IPCONFIG statement or that was assigned by default by TCP/IP stack. This field can have the following values:

SHORT
Indicates that the command report is displayed in the short format (the FORMAT SHORT parameter was specified in the IPCONFIG profile statement).

LONG
Indicates that the command report is displayed in the long format (the FORMAT LONG parameter was specified in the IPCONFIG profile statement).

If the FORMAT parameter was not specified in the IPCONFIG profile statement, then the TCP/IP stack assigned the default format based on whether the stack was IPv6 enabled or not. If the stack is IPv6 enabled, then the format value LONG is assigned by default. If the stack is configured for IPv4-only operation, then the format value SHORT is assigned by default. You can override the stack-wide command format using the Netstat FORMAT/**-M** option.

IgRedirect
Indicates whether TCP/IP is to ignore ICMP Redirect packets. This field can have the following values:

Yes Indicates that IGNOREREDIRECT is in effect. The IGNOREREDIRECT parameter was defined on the IPCONFIG profile statement, OMPROUTE has been started and IPv4 interfaces are configured to OMPROUTE, or intrusion detection services (IDS) policy is in effect to detect and discard ICMP Redirects.

No Indicates that ICMP Redirects are not ignored.

SysplxRout
Indicates whether this TCP/IP host is part of an MVS sysplex domain and should communicate interface changes to the workload manager (WLM). This field can have the following values:

Yes Indicates that SYSPLEXROUTING is in effect (the SYSPLEXROUTING parameter was specified in the IPCONFIG profile statement).

No Indicates that SYSPLEXROUTING is not in effect (the NOSYSPLEXROUTING parameter was specified in the IPCONFIG profile statement or is in effect by default).

DoubleNop
Indicates whether to force channel programs for CLAW devices to have two NOP CCWs to end the channel programs. This field can have the following values:

Yes Indicates that CLAWUSEDOUBLENOP is in effect (the CLAWUSEDOUBLENOP parameter was defined on the IPCONFIG profile statement).

No Indicates that CLAWUSEDOUBLENOP is not in effect.

StopClawEr
Indicates whether to stop channel programs (HALTIO and HALTSIO) when a device error is detected. This field can have the following values:

Yes Indicates that STOPONCLAWERROR is in effect (the STOPONCLAWERROR parameter was specified in the IPCONFIG profile statement).

No Indicates that STOPONCLAWERROR is not in effect.

SourceVipa
Indicates whether the TCP/IP stack uses the corresponding virtual IP address in the HOME list as the source IP address for outbound datagrams that do not have an explicit source address. This field can have the following values:

Yes Indicates that SOURCEVIPA is in effect (the SOURCEVIPA parameter was specified in the IPCONFIG profile statement).

No Indicates that SOURCEVIPA is not in effect (the NOSOURCEVIPA parameter was specified in the IPCONFIG profile statement or is in effect by default).

MultiPath
Indicates whether the multipath routing selection algorithm for outbound IP traffic is enabled for this TCP/IP stack. Possible values are:

Pkt Indicates that outbound traffic uses the multipath routes in a round-robin fashion for each outbound packet (the MULTIPATH PERPACKET parameter was specified in the IPCONFIG profile statement).

Conn Indicates that outbound traffic uses the multipath routes in a round-robin fashion for each outbound connection request (the MULTIPATH PERCONNECTION parameter was specified in the IPCONFIG profile statement).

No Indicates that outbound traffic always uses the first active route in a multipath group (the NOMULTIPATH parameter was specified in the IPCONFIG profile statement or is in effect by default).

PathMtuDsc
Indicates whether TCP/IP is to dynamically discover the PMTU, which is the smallest MTU of all the hops in the path. This field can have the following values:

Yes Indicates that PATHMTUDISCOVERY is in effect (the PATHMTUDISCOVERY parameter was specified in the IPCONFIG profile statement),

No Indicates that PATHMTUDISCOVERY is not in effect (the NOPATHMTUDISCOVERY parameter was specified in the IPCONFIG profile statement or is in effect by default).

DevRtryDur
The retry period duration (in seconds) for a failed device or interface that was defined using the DEVRETRYDURATION parameter in the IPCONFIG statement. TCP/IP performs reactivation attempts at 30 second intervals during this retry period. The default value is 90 seconds. The value 0 indicates an infinite recovery period; reactivation attempts are performed until the device or interface is either successfully reactivated or manually stopped. The maximum value is 4294967295. If the DEVRETRYDURATION parameter was not specified in the IPCONFIG statement, then the default value 90 is displayed.

DynamicXCF
Indicates whether IPv4 XCF dynamic support is enabled for this TCP/IP stack. This field can have the following values:

Yes Indicates that XCF dynamic support is in effect (the DYNAMICXCF parameter was specified in the IPCONFIG profile statement).

No Indicates that XCF dynamic support is not in effect (the NODYNAMICXCF parameter was specified in the IPCONFIG profile statement or is in effect by default).

When XCF dynamic support is in effect, the following information is displayed:

IpAddr
The IPv4 address that was specified for DYNAMICXCF in the IPCONFIG profile statement.

Subnet
The subnet mask that was specified for DYNAMICXCF in the IPCONFIG profile statement.

Guidelines:

1. If the IpAddr/PrefixLen format was used for DYNAMICXCF in the IPCONFIG profile statement, then it is displayed in the same format in the Netstat report. The PrefixLen is the integer value in the range 1 - 32 that represents the number of left-most significant bits for the address mask.
2. If the IPv6_address/prefix_route_len format was used for DYNAMICXCF in the IPCONFIG6 profile statement, then it is displayed in the same format in the Netstat report. The length of routing prefix is an integer value in the range 1 - 128.

Metric The interface routing metric represents the configured cost_metric value to be used by dynamic routing daemons for routing preferences. It is configured using the cost_metric value in the IPCONFIG DYNAMICXCF statement.

SecClass
Indicates the IP Security security class value that is associated with the dynamic XCF link. Valid values are in the range 1 - 255.

SrcVipaInt
The source VIPA interface name that was defined using the DYNAMICXCF SOURCEVIPAINTERFACE parameter in the IPCONFIG statement. It must be a VIRTUAL interface. This field indicates the value No if the SOURCEVIPAINTERFACE subparameter was not specified for the DYNAMICXCF in the IPCONFIG statement.

QDIOAccel
Indicates whether QDIO Accelerator is enabled for this TCP/IP stack. This field can have the following values:

Yes Indicates that the QDIO Accelerator is enabled (the QDIOACCELERATOR parameter was specified in the IPCONFIG profile statement).

SD only
Indicates that the QDIO Accelerator is enabled (the QDIOACCELERATOR parameter was specified in the IPCONFIG profile statement), but only for Sysplex Distributor traffic and not for routed traffic. This might be the case if IP forwarding is disabled on this stack, or if IP filters or defensive filters require this stack to perform special processing for routed traffic. For more information, see QDIO Accelerator and IP security in z/OS Communications Server: IP Configuration Guide.

No Indicates that the QDIO Accelerator is not enabled (the NOQDIOACCELERATOR parameter was specified in the IPCONFIG profile statement or is in effect by default).

QDIOAccelPriority
Indicates which QDIO outbound priority level should be used if the QDIO Accelerator is routing packets to a QDIO device. If the NOQDIOACCELERATOR parameter was specified in the IPCONFIG profile statement or is in effect by default, then the QDIOAccelPriority field is not displayed.

IQDIORoute
Indicates whether HiperSockets Accelerator is enabled for this TCP/IP stack. This field can have the following values:

Yes Indicates that HiperSockets Accelerator is enabled (the IQDIOROUTING parameter was specified in the IPCONFIG profile statement).

No Indicates that HiperSockets Accelerator is not enabled (the NOIQDIOROUTING parameter was specified in the IPCONFIG profile statement or is in effect by default).

n/a Indicates that HiperSockets Accelerator does not apply because QDIO Accelerator is enabled.

QDIOPriority
Indicates which QDIO outbound priority level should be used if the HiperSockets Accelerator is routing packets to a QDIO device. If the NOIQDIOROUTING parameter was specified in the IPCONFIG profile statement or is in effect by default, then the QDIOPriority field is not displayed. This field is displayed only when the IQDIORoute field value is `Yes`.

TcpStackSrcVipa
The IPv4 address that was defined using the TCPSTACKSOURCEVIPA parameter in the IPCONFIG statement. It must be the source IP address for outbound TCP connections if SOURCEVIPA has been enabled. This field has the value `No` if the TCPSTACKSOURCEVIPA parameter was not specified in the IPCONFIG statement

ChecksumOffload
Indicates whether the IPv4 checksum offload function is enabled or disabled. This field can have the following values:

Yes Indicates that the checksum processing for IPv4 packets is offloaded to OSA-Express interfaces that support the checksum offload function. The CHECKSUMOFFLOAD parameter was specified on the IPCONFIG profile statement or the value was set by default.

No Indicates that the checksum processing is performed by the TCP/IP stack. The NOCHECKSUMOFFLOAD parameter was specified on the IPCONFIG profile statement.

SegOffload
Indicates whether the IPv4 TCP segmentation offload function is enabled or disabled. This field can have the following values:

Yes Indicates that IPv4 TCP segmentation is performed by OSA-Express interfaces that support the segmentation offload function. The SEGMENTATIONOFFLOAD parameter was specified on the IPCONFIG profile statement.

No Indicates that the segmentation is performed by the TCP/IP

stack. The NOSEGMENTATIONOFFLOAD parameter was specified on the IPCONFIG profile statement or the value was set by default.

- **IPv6 Configuration Table if the TCP/IP stack is IPv6 enabled**

  Displays the following configured IPv6 information that is defined in the IPCONFIG6 profile statement For more information about each IPv6 IP parameter, see the IPCONFIG6 profile statement information in the z/OS Communications Server: IP Configuration Reference.

  Forwarding
  Indicates whether the transfer of data between networks is enabled for this TCP/IP stack. Possible values are:

  Pkt Indicates that packets that are received but that are not destined for this stack are forwarded and use multipath routes if available on a per-packet basis (the DATAGRAMFWD FWDMULTIPATH PERPACKET was specified in the IPCONFIG6 profile statement).

  Yes Indicates that packets that are received but that are not destined for this stack are forwarded but do not use multipath routes even if they are available. (the DATAGRAMFWD NOFWDMULTIPATH was specified in the IPCONFIG6 profile statement or is in effect by default).

  No Indicates that packets that are received but that are not destined for this stack are not forwarded in route to the destination (the NODATAGRAMFWD parameter was specified in the IPCONFIG6 profile statement).

  HopLimit
  The hop limit value that was defined using the HOPLIMIT parameter in the IPCONFIG6 statement. It is the number of hops that a packet that originates at this host can travel in route to the destination. Valid values are in the range 1 - 255; the default value is 255. If the HOPLIMIT parameter was not specified in the IPCONFIG6 statement, then the default value 255 is displayed.

  IgRedirect
  Indicates whether TCP/IP is to ignore ICMP Redirect packets. This field can have the following values:

  Yes Indicates that IGNOREREDIRECT is in effect. The IGNOREREDIRECT parameter was defined on the IPCONFIG6 profile statement, OMPROUTE has been started and IPv6 interfaces are configured to OMPROUTE, or intrusion detection services (IDS) policy is in effect to detect and discard ICMP Redirects.

  No Indicates that ICMP Redirects are not ignored.

  SourceVipa
  Indicates whether to use a virtual IP address that is assigned to the SOURCEVIPAINT interface as the source address for outbound datagrams that do not have an explicit source address. You must specify the SOURCEVIPAINT parameter on the INTERFACE profile statement for each interface where you want the SOURCEVIPA address to take effect. This field can have the following values:

  Yes Indicates that SOURCEVIPA is in effect (the SOURCEVIPA parameter was specified in the IPCONFIG6 profile statement).

No Indicates that SOURCEVIPA is not in effect (the NOSOURCEVIPA parameter was specified in the IPCONFIG6 profile statement or is in effect by default).

MultiPath
Indicates whether the multipath routing selection algorithm for outbound IP traffic is enabled for this TCP/IP stack. Possible values are:

Pkt Indicates that outbound traffic uses the multipath routes in a round-robin fashion for each outbound packet (the MULTIPATH PERPACKET parameter was specified in the IPCONFIG6 profile statement).

Conn Indicates that outbound traffic uses the multipath routes in a round-robin fashion for each outbound connection request (the MULTIPATH PERCONNECTION parameter was specified in the IPCONFIG6 profile statement).

No Indicates that outbound traffic always uses the first active route in a multipath group (the NOMULTIPATH parameter was specified in the IPCONFIG6 profile statement is in effect by default).

IcmperrLim
The ICMP error limit value that was defined using the ICMPERRORLIMIT parameter in the IPCONFIG6 statement. It controls the rate at which ICMP error messages can be sent to a particular IPv6 destination address. The number displayed is the number of messages per second. Valid values are in the range 1 - 20; the default value is 3. If the ICMPERRORLIMIT parameter was not specified in the IPCONFIG6 statement, then the default value 3 is displayed.

IgRtrHopLimit
Indicates whether the TCP/IP stack ignores a hop limit value that is received from a router in a router advertisement. This field can have the following values:

Yes Indicates that IGNOREROUTERHOPLIMIT is in effect (the IGNOREROUTERHOPLIMIT parameter was defined on the IPCONFIG6 profile statement).

No Indicates that IGNOREROUTERHOPLIMIT is not in effect (the NOIGNOREROUTERHOPLIMIT parameter was defined on the IPCONFIG6 profile statement or is in effect by default).

IpSecurity
Indicates whether the IP filtering and IPSec tunnel support is enabled.

Yes Indicates that IP security is in effect (the IPSECURITY parameter was defined on the IPCONFIG6 profile statement). When IP security is in effect, the following information is displayed:

OSMSecClass
Indicates the IP Security security class value that is associated with the OSM interfaces. Valid values are in the range 1 - 255.

No Indicates that IP security is not in effect.

DynamicXCF
Indicates whether IPv6 XCF dynamic support is enabled for this TCP/IP stack. This field can have the following values:

Yes Indicates that XCF dynamic support is in effect (the DYNAMICXCF parameter was specified in the IPCONFIG6 profile statement).

No Indicates that XCF dynamic support is not in effect (the NODYNAMICXCF parameter was specified in the IPCONFIG6 profile statement or is in effect by default).

When XCF dynamic support is in effect, the following information is displayed:

IpAddr
The IPv6 address that was specified for DYNAMICXCF in the IPCONFIG6 profile statement.

Tip: If the IpAddr/PrefixRouteLen format was used for DYNAMICXCF in the IPCONFIG6 profile statement, then it is displayed in the same format in the Netstat report. The PrefixRouteLen is the integer value in the range 1 - 128.

IntfId The 64-bit interface identifier in colon-hexadecimal format that was specified using INTFID subparameter for DYNAMICXCF in the IPCONFIG6 profile statement. If the INTFID subparameter was not specified, then this field is `not` displayed.

SrcVipaInt
The source VIPA interface name that was defined using the DYNAMICXCF SOURCEVIPAINTERFACE parameter in the IPCONFIG6 statement. It must be a VIRTUAL6 interface. This field indicates the value `No` if the SOURCEVIPAINTERFACE subparameter was not specified for the DYNAMICXCF in the IPCONFIG6 statement.

SecClass
Indicates the IP Security security class value that is associated with the IPv6 dynamic XCF interfaces. Valid values are in the range 1 - 255.

TcpStackSrcVipa
The IPv6 interface name that was defined using the TCPSTACKSOURCEVIPA parameter in the IPCONFIG6 statement. It must be the source interface for outbound TCP connections if SOURCEVIPA has been enabled. This field indicates the value `No` if the TCPSTACKSOURCEVIPA parameter was not specified in the IPCONFIG6 statement

TempAddresses
Indicates whether the TCP/IP stack generates IPv6 temporary addresses for IPv6 interfaces for which stateless address autoconfiguration is enabled. This field can have the following values:

Yes Indicates that this behavior is enabled (the TEMPADDRS parameter was defined on the IPCONFIG6 profile statement).

No Indicates that this behavior is not enabled (the NOTEMPADDRS parameter was defined on the IPCONFIG6 profile statement or is in effect by default).

When TEMPADDRS support is in effect, the following information is displayed:

PreferredLifetime
The preferred lifetime for IPv6 temporary addresses, which was defined using the PREFLIFETIME parameter in the IPCONFIG6 statement.

At the expiration of the preferred lifetime, a new temporary address is generated and the existing address is deprecated. The number that is displayed is the preferred lifetime, in hours. Valid values are in the range of 1 - 720 hours (30 days). The default value is 24 hours.

ValidLifetime
The valid lifetime for IPv6 temporary addresses that was defined using the VALIDLIFETIME parameter in the IPCONFIG6 statement.

When the valid lifetime expires, the temporary address is deleted. The number displayed is the valid lifetime in hours. Valid values are in the range 2 - 2160 hours (90 days). The default value is 7 times the preferred lifetime value, with a maximum of 90 days.

ChecksumOffload
Indicates whether the IPv6 checksum offload function is enabled or disabled. This field can have the following values:

Yes Indicates that the checksum processing for IPv6 packets is offloaded to OSA-Express interfaces that support the checksum offload function. The CHECKSUMOFFLOAD parameter was specified on the IPCONFIG6 profile statement or the value was set by default.

No Indicates that the checksum processing is performed by the TCP/IP stack. The NOCHECKSUMOFFLOAD parameter was specified on the IPCONFIG6 profile statement.

SegOffload
Indicates whether the IPv6 TCP segmentation offload function is enabled or disabled. This field can have the following values:

Yes Indicates that the IPv6 TCP segmentation is offloaded to OSA-Express interfaces that support the segmentation offload function. The SEGMENTATIONOFFLOAD parameter was specified on the IPCONFIG6 profile statement.

No Indicates that the segmentation is performed by the TCP/IP stack. The NOSEGMENTATIONOFFLOAD parameter was specified on the IPCONFIG6 profile statement or the value was set by default.

- **SMF parameters**

  Display the following configured SMF information defined in the SMFCONFIG profile statement. For more information about each SMF parameter, see SMFCONFIG profile statement information in the z/OS Communications Server: IP Configuration Reference.

  Type 118

  TcpInit
  Indicates whether SMF subtype 1 records are created when TCP connections are established. A value of the subtype indicates that TYPE118 TCPINIT is in effect (the TCPINIT or TYPE118

TCPINIT was specified on the SMFCONFIG profile statement or a nonzero value of inittype was specified on the SMFPARMS profile statement).

The value 0 indicates that TYPE118 TCPINIT is not in effect (the NOTCPINIT or TYPE118 NOTCPINIT was specified in the SMFCONFIG profile statement (or is in effect by default), or zero value of inittype was specified on the SMFPARMS profile statement).

TcpTerm
Indicates whether SMF subtype 2 records are created when TCP connections are established. A value of the subtype indicates that TYPE118 TCPTERM is in effect (the TCPTERM or TYPE118 TCPTERM was specified on the profile SMFCONFIG statement or a non zero value of termtype was specified on the SMFPARMS profile statement).

The value 0 indicates that TYPE118 TCPTERM is not in effect (the NOTCPTERM or TYPE118 NOTCPTERM was specified in the SMFCONFIG profile statement (or is in effect by default), or zero value of termtype was specified on the SMFPARMS profile statement).

FTPClient
Indicates whether SMF subtype 3 records are created when TCP connections are established. A value of the subtype indicates that TYPE118 FTPCLIENT is in effect (the FTPCLIENT or TYPE118 FTPCLIENT was specified on the SMFCONFIG profile statement or a non zero value of clienttype was specified on the SMFPARMS profile statement).

The value 0 indicates that TYPE118 FTPCLIENT is not in effect (the NOFTPCLIENT or TYPE118 NOFTPCLIENT was specified in the SMFCONFIG profile statement (or is in effect by default), or zero value of clienttype was specified on the SMFPARMS profile statement).

TN3270Client
Indicates whether SMF subtype 4 records are created when TCP connections are established. A value of the subtype indicates TYPE118 TN3270CLIENT is in effect (the TN3270CLIENT or TYPE118 TN3270CLIENT was specified on the SMFCONFIG profile statement or a non zero value of clienttype was specified on the SMFPARMS profile statement).

The value 0 indicates that TYPE118 TN3270CLIENT is not in effect (the NOTN3270CLIENT or TYPE118 NOTN3270CLIENT was specified in the SMFCONFIG profile statement (or is in effect by default), or zero value of clienttype was specified on the SMFPARMS profile statement).

TcpIpStates
Indicates whether SMF subtype 5 records are created when TCP connections are established. A value of the subtype indicates that TYPE118 TCPIPSTATISTICS is in effect (the TCPIPSTATISTICS or TYPE118 TCPIPSTATISTICS was specified on the SMFCONFIG statement).

The value 0 indicates that TYPE118 TCPIPSTATISTICS is not in effect (the NOTCPIPSTATISTICS or TYPE118 NOTCPIPSTATISTICS was specified in the SMFCONFIG profile statement or is in effect by default).

Type 119

TcpInit
Indicates whether SMF records of subtype 1 are created when TCP connections are established. This field can have the following values:

Yes Indicates that TYPE119 TCPINIT is in effect (the TYPE119 TCPINIT was specified on the SMFCONFIG statement).

No Indicates that TYPE119 TCPINIT is not in effect (the TYPE119 NOTCPINIT was specified in the SMFCONFIG profile statement or is in effect by default).

TcpTerm
Indicates whether SMF subtype 2 records are created when TCP connections are established. This field can have the following values:

Yes Indicates that TYPE119 TCPTERM is in effect (the TYPE119 TCPTERM was specified on the SMFCONFIG statement).

No Indicates that TYPE119 TCPTERM is not in effect (the TYPE119 NOTCPTERM was specified in the SMFCONFIG profile statement or is in effect by default).

FTPClient
Indicates whether SMF subtype 3 records are created when TCP connections are established. This field can have the following values:

Yes Indicates that TYPE119 FTPCLIENT is in effect (the TYPE119 FTPCLIENT was specified on the SMFCONFIG statement).

No Indicates that TYPE119 FTPCLIENT is not in effect (the TYPE119 NOFTPCLIENT was specified in the SMFCONFIG profile statement or is in effect by default).

TcpIpStats
Indicates whether SMF subtype 5 records are created when TCP connections are established. This field can have the following values:

Yes Indicates that TYPE119 TCPIPSTATISTICS is in effect (the TYPE119 TCPIPSTATISTICS was specified on the SMFCONFIG statement).

No Indicates that TYPE119 TCPIPSTATISTICS is not in effect (the TYPE119 NOTCPIPSTATISTICS was specified in the SMFCONFIG profile statement or is in effect by default).

IfStats Indicates whether SMF subtype 6 and subtype 44 records are created. This field can have the following values:

Yes Indicates that TYPE119 IFSTATISTICS is in effect (the TYPE119 IFSTATISTICS was specified on the SMFCONFIG statement).

No Indicates that TYPE119 IFSTATISTICS is not in effect (the TYPE119 NOIFSTATISTICS was specified in the SMFCONFIG profile statement or is in effect by default).

PortStats
Indicates whether SMF subtype 7 records are created when TCP connections are established. This field can have the following values:

Yes Indicates that TYPE119 PORTSTATISTICS is in effect (the TYPE119 PORTSTATISTICS was specified on the SMFCONFIG statement).

No Indicates that TYPE119 PORTSTATISTICS is not in effect (the TYPE119 NOPORTSTATISTICS was specified in the SMFCONFIG profile statement or is in effect by default).

Stack Indicates whether SMF subtype 8 records are created when TCP connections are established. This field can have the following values:

Yes Indicates that TYPE119 TCPSTACK is in effect (the TYPE119 TCPSTACK was specified on the SMFCONFIG statement).

No Indicates that TYPE119 TCPSTACK is not in effect (the TYPE119 NOTCPSTACK was specified in the SMFCONFIG profile statement or is in effect by default).

UdpTerm
Indicates whether SMF subtype 10 records are created when TCP connections are established. This field can have the following values:

Yes Indicates that TYPE119 UDPTERM is in effect (the TYPE119 UDPTERM was specified on the SMFCONFIG statement).

No Indicates that TYPE119 UDPTERM is not in effect (the TYPE119 NOUDPTERM was specified in the SMFCONFIG profile statement or is in effect by default).

TN3270Client
Indicates whether SMF subtype 22 and 23 records are created when TCP connections are established. This field can have the following values:

Yes Indicates that TYPE119 TN3270CLIENT is in effect (the TYPE119 TN3270CLIENT was specified on the SMFCONFIG statement).

No Indicates that TYPE119 TN3270CLIENT is not in effect (the TYPE119 NOTN3270CLIENT was specified in the SMFCONFIG profile statement or is in effect by default).

IPSecurity
Indicates whether SMF records of subtypes 77, 78, 79, and 80 are

created when dynamic tunnels are removed and when manual tunnels are activated and deactivated. This field can have the following values:

Yes Indicates that TYPE119 IPSECURITY is in effect (the TYPE119 IPSECURITY was specified on the SMFCONFIG statement).

No Indicates that TYPE119 IPSECURITY is not in effect (the TYPE119 NOIPSECURITY was specified or is in effect by default in the SMFCONFIG profile statement).

Profile

Indicates whether SMF subtype 4 event records are created when the TCP/IP stack is initialized or when a profile change occurs. This record provides TCP/IP stack profile information. This field can have the following values:

Yes Indicates that this behavior is enabled (the TYPE119 PROFILE parameter was specified on the SMFCONFIG statement).

No Indicates that this behavior is not enabled (the TYPE119 NOPROFILE parameter was specified on the SMFCONFIG statement or is in effect by default).

DVIPA

Indicates whether SMF subtypes 32, 33, 34, 35, 36, and 37 event records are created for sysplex events. These records provide information about changes to dynamic virtual IP addresses (DVIPAs), DVIPA targets, and DVIPA target servers. This field can have the following values:

Yes Indicates that this behavior is enabled (the TYPE119 DVIPA parameter was specified on the SMFCONFIG statement).

No Indicates that this behavior is not enabled (the TYPE119 NODVIPA parameter was specified on the SMFCONFIG statement or is in effect by default).

SmcrGrpStats

Indicates whether SMF subtype 41 records are created. These records are SMC-R link group statistics records. The records collect information about Shared Memory Communications over Remote Direct Memory Access (SMC-R) link groups and the SMC-R links within each group. This field can have the following values:

Yes Indicates that this behavior is enabled. The TYPE119 SMCRGROUPSTATISTICS parameter was specified on the SMFCONFIG statement.

No Indicates that this behavior is not enabled. The TYPE119 NOSMCRGROUPSTATISTICS parameter was specified on the SMFCONFIG statement or is in effect by default.

SmcrLnkEvent

Indicates whether SMF subtype 42 and 43 records are created. The SMF records of subtype 42 are created when SMC-R links are started, and the SMF records of subtype 43 are created when SMC-R links are ended. This field can have the following values:

Yes Indicates that this behavior is enabled. The TYPE119 SMCRLINKEVENT parameter was specified on the SMFCONFIG statement.

No Indicates that this behavior is not enabled. The TYPE119 NOSMCRLINKEVENT parameter was specified on the SMFCONFIG statement or is in effect by default.

Note: The TCPIP statistics field under SMF Parameters displays the subtype value used when creating the SMF type 118 record (if the value is nonzero). The TCPIP statistics field under Global Configuration Information indicates whether the TCP/IP stack will write statistics messages to the TCP/IP job log when TCP/IP is terminated. For the Type 119 fields, the subtype cannot be changed and the setting indicates if the record is requested (Yes) or not (No).

- **Global Configuration Information**

  Display the following global configured information defined in the GLOBALCONFIG profile statement. For more information about each global parameter, see GLOBALCONFIG profile statement information in the z/OS Communications Server: IP Configuration Reference.

  TcpIpStats
  Indicates whether the several TCP/IP counter values are to be written to the output data set designated by the CFGPRINT JCL statement. The value Yes indicates that TCPIPSTATISTICS is in effect (the TCPIPSTATISTICS parameter was specified in the GLOBALCONFIG profile statement). The value No indicates that TCPIPSTATISTICS is not in effect (the NOTCPIPSTATISTICS parameter was specified in the GLOBALCONFIG profile statement or is in effect by default).

  Tip: The TCPIPSTATS field that is shown under the SMF PARAMETERS section of the Netstat CONFIG/**-f** output reflects the TcpIpStatistics value or NoTcpIpStatistics value that is specified on the SMFCONFIG statement in the TCP/IP Profile or Obeyfile. The TCPIPSTATS field that is shown under the GLOBAL CONFIGURATION section of the Netstat CONFIG/**-f** output reflects the value from the GLOBALCONFIG statement in the TCP/IP Profile or Obeyfile.

  ECSALimit
  The maximum amount of extended common service area (ECSA) that was defined using the ECSALIMIT parameter in the GLOBALCONFIG statement. This limit can be expressed as a number followed by the letter K (which represents 1024 bytes), or a number followed by the letter M (which represents 1048576 bytes). If the K suffix is used, then the value displayed must be in the range 10240K - 2096128K inclusive, or 0K. If the M suffix is used, the value displayed must be in the range 10M - 2047M inclusive, or 0K. If the ECSALIMIT parameter was not specified in the GLOBALCONFIG statement, then the default value 0K is displayed (which means no limit).

  PoolLimit
  The maximum amount of authorized private storage that was defined using the POOLLIMIT parameter in the GLOBALCONFIG statement. This limit can be expressed as a number followed by the letter K (which represents 1024 bytes), or a number followed by the letter M (which represents 1048576 bytes). If the K suffix is used, then the value displayed must be in the range 10240K to 2096128K inclusive, or 0K. If the M suffix is used, value is displayed must be in the range 10M -

2047M inclusive, or 0K. If the POOLLIMIT parameter was not specified in the GLOBALCONFIG statement, then the default value 0K is displayed (which means no limit).

MlsChkTerm
Indicates whether the stack should be terminated when inconsistent configuration information is discovered in a multilevel-secure environment. The value `Yes` indicates that MLSCHKTERMINATE is in effect (the MLSCHKTERMINATE parameter was specified in the GLOBALCONFIG profile statement). The value `No` indicates that MLSCHKTERMINATE is not in effect (the NOMLSCHKTERMINATE parameter was specified in the GLOBALCONFIG profile statement or is in effect by default).

XCFGRPID
Displays the TCP 2-digit XCF group name suffix. The two digits displayed are used to generate the XCF group that the TCP/IP stack has joined. The group name is EZBT*vvtt*, where *vv* is the VTAM XCF group ID suffix (specified as a VTAM start option) and *tt* is the displayed XCFGRPID value. If no VTAM XCF group ID suffix was specified, the group name is EZBTCP*tt*. You can use the D TCPIP,,SYSPLEX,GROUP command to display the group name that the TCP/IP stack has joined.

These digits are also used as a suffix for the EZBDVIPA and EZBEPORT structure names in the form EZBDVIPA*vvtt* and EZBEPORT*vvtt*. If no VTAM XCF group ID suffix was specified, the structure names are EZBDVIPA01*tt* and EZBEPORT01*tt*. If no XCFGRPID value was specified on the GLOBALCONFIG statement in the TCP/IP profile, then no value is displayed for XCFGRPID field in the Netstat output.

IQDVLANID
Displays the TCP/IP VLAN ID that is to be used when a HiperSockets link or interface is generated for dynamic XCF connectivity between stacks on the same CPC. The VLAN ID provides connectivity separation between TCP/IP stacks using HiperSockets for dynamic XCF when subplexing is being used (when XCFGRPID was specified on the GLOBALCONFIG statement). TCP/IP stacks with the same XCFGRPID value (stacks in the same subplex) should specify the same IQDVLANID value if the stacks are in the same CPC and use the same CHPID value. TCP/IP stacks with different XCFGRPID values should specify different IQDVLANID values if the stacks are in the same CPC and use the same CHPID value. If no IQDVLANID value was specified on the GLOBALCONFIG statement in the TCP/IP profile, then the value 0 (no value) is displayed for the IQDVLANID field in the Netstat output.

SysplexWLMPoll
The rate, in seconds, at which the sysplex distributor and its target servers poll WLM for new weight recommendations. A shorter rate indicates a quicker response; however, shorter rates might result in unneeded queries.

MaxRecs
The maximum number of records that are displayed by the DISPLAY TCPIP,,NETSTAT operator command, if the MAX parameter is not specified on that command. The maximum number of records is specified on the MAXRECS parameter of the GLOBALCONFIG profile statement. An asterisk (*) indicates that all records are displayed.

ExplicitBindPortRange
The range of ephemeral ports that is assigned uniquely across the sysplex when an explicit bind() is issued using INADDR_ANY or the unspecified IPv6 address (in6addr_any) and when the specified port is 0.

Tip: This range is the range that was configured on this stack. It might not be the actual range that is in use throughout the sysplex at this time, because another stack that was started later with a different explicit bind port range configured (or with a VARY OBEYFILE command specifying a file with a different EXPLICITBINDPORTRANGE value) can override the range that is configured by this stack. Use the Display TCPIP,,SYSPLEX,PORTS command to display the currently active port range.

AutoIQDX
Indicates whether dynamic Internal Queued Direct I/O extensions function (IQDX) interfaces are used for connectivity to the intraensemble data network (IEDN). This field can have the following values:

No Indicates that access to the IEDN using HiperSockets (IQD CHPIDs) with the IQDX is disabled. The NOAUTOIQDX parameter was specified on the GLOBALCONFIG statement.

AllTraffic
Indicates that IQDX interfaces are used for all eligible outbound traffic to the IEDN. The AUTOIQDX ALLTRAFFIC parameter was specified on the GLOBALCONFIG statement. This value is the default value for the AutoIQDX field.

NoLargeData
Indicates that IQDX interfaces are used for all eligible outbound traffic to the IEDN, except for large outbound TCP protocol traffic. The AUTOIQDX NOLARGEDATA parameter was specified on the GLOBALCONFIG statement. Large outbound TCP traffic is sent to the IEDN by using OSX OSA-Express interfaces.

IQDMultiWrite
Indicates whether all HiperSockets interfaces are configured to move multiple output data buffers using a single write operation. You must stop and restart the interface for a change in this value to take effect for an active HiperSockets interface. This field can have the following values:

Yes Indicates that the HiperSockets interfaces are configured to use HiperSockets multiple write support when this function is supported by the IBM System z environment (the IQDMULTIWRITE parameter was specified on the GLOBALCONFIG profile statement).

No Indicates that the HiperSockets interfaces are not configured to use HiperSockets multiple write support (the NOIQDMULTIWRITE parameter was specified on the GLOBALCONFIG profile statement or the value was set by default).

WLMPriorityQ
Indicates whether OSA-Express QDIO write priority values are being assigned to outbound OSA-Express packets that are associated with Workload Manager (WLM) service classes, and to forwarded packets

that are not being accelerated. The displayed priorities are applied only when the IPv4 type of service (ToS) byte or the IPv6 traffic class value in the IP header is 0 and the packet is sent from an OSA-Express device that is in QDIO mode. This field can have the following values:

Yes Indicates that QDIO write priority values are assigned to outbound OSA-Express packets that are associated with Workload Manager (WLM) service classes, and to forwarded packets that are not being accelerated (the WLMPRIORITYQ parameter was specified on the GLOBALCONFIG profile statement). When the WLMPriorityQ field has the value `Yes`, the following information is displayed:

IOPRIn control_values
Indicates which QDIO priority value is assigned to each control value. The QDIO priority values are in the range of 1 - 4. These QDIO priority values are displayed as the identifiers `IOPRI1`, `IOPRI2`, `IOPRI3`, and `IOPRI4`. The values that follow the identifiers are the control values. The control values represent Workload Manager service classes and forwarded packets. Most of the control values correlate directly to Workload Manager service class importance levels. See the WLMPRIORITYQ parameter in the GLOBALCONFIG profile statement information in z/OS Communications Server: IP Configuration Reference for more details about the control values. If no control value was specified for a specific QDIO priority value, then the identifier for that QDIO priority value is not displayed.

No Indicates that QDIO write priority values are not assigned to outbound OSA-Express packets that are associated with Workload Manager (WLM) service classes or to forwarded packets that are not accelerated (the NOWLMPRIORITYQ parameter was specified on the GLOBALCONFIG profile statement or is in effect by default).

Sysplex Monitor
Displays the parameter values for the Sysplex Problem Detection and Recovery function.

TimerSecs
Displays the timer value (in seconds) that is used to determine how soon the sysplex monitor timer reacts to problems with needed sysplex resources. This value can be configured using the SYSPLEXMONITOR parameter on the GLOBALCONFIG profile statement. Valid values are in the range 10 - 3600 seconds; the default value is 60 seconds.

Recovery
Indicates the action that is to be taken when a sysplex problem is detected.

The value `Yes` indicates that when a problem is detected, the stack issues messages about the problem, leaves the sysplex group, and deactivates all DVIPA resources that are owned by this stack; the VIPADYNAMIC configuration is restored if the stack rejoins the sysplex group. The default value is `No`. The value `Yes` can be configured by specifying the RECOVERY

keyword for the SYSPLEXMONITOR parameter on the GLOBALCONFIG profile statement.

The value `No` indicates that when a problem is detected, the stack issues messages regarding the problem but takes no other action. The value `No` can be configured by specifying the NORECOVERY keyword for the SYSPLEXMONITOR parameter on the GLOBALCONFIG profile statement.

DelayJoin
Indicates whether the TCP/IP stack delays joining the sysplex group during stack initialization or rejoining the sysplex group following a VARY TCPIP,,OBEYFILE command.

The value `No` indicates that TCP/IP immediately joins the sysplex group during stack initialization. The default value is `No` and can be configured by specifying the NODELAYJOIN keyword for the SYSPLEXMONITOR parameter on the GLOBALCONFIG profile statement.

The value `Yes` indicates that TCP/IP delays joining the sysplex group during stack initialization until the following conditions true:

- OMPROUTE is started and active
- At least one of monitored interfaces is defined and active (if MONINTERFACE is configured)
- At least one dynamic route over the monitored interfaces is available (if MONINTERFACE DYNROUTE is configured)

Any sysplex-related definitions within the TCP/IP profile (for example, VIPADYNAMIC or IPCONFIG/IPCONFIG6 DYNAMICXCF statements) are not processed until the sysplex group is joined. The value `Yes` can be configured by specifying the DELAYJOIN keyword for the SYSPLEXMONITOR parameter on the GLOBALCONFIG profile statement.

Join Indicates whether the TCP/IP stack joins the sysplex group during stack initialization.

The value `Yes` indicates that the TCP/IP stack immediately attempts to join the sysplex group during stack initialization. This is the default setting.

The value `No` indicates that the TCP/IP stack does not join the sysplex group during stack initialization. You can configure the value `No` by specifying the NOJOIN keyword for the SYSPLEXMONITOR parameter on the GLOBALCONFIG profile statement.

If NOJOIN is configured, the TCP/IP stack does not process any VIPADYNAMIC block or DYNAMICXCF statements. Any other GLOBALCONFIG SYSPLEXMONITOR parameter settings (configured or default) are ignored, and the settings are saved in case you want the TCP/IP stack to join the sysplex group at a later time.

If you subsequently issue a VARY TCPIP,,SYSPLEX,JOINGROUP command, the NOJOIN setting is overridden and the saved GLOBALCONFIG SYSPLEXMONITOR parameter settings become active. For example, if you configure NOJOIN and

DELAYJOIN, DELAYJOIN is initially ignored. After you issue a V TCPIP,,SYSPLEX,JOINGROUP command, NOJOIN is overridden, DELAYJOIN becomes active, and the stack joins the sysplex group if OMPROUTE is initialized.

Any sysplex-related definitions within the TCP/IP profile, such as VIPADYNAMIC or IPCONFIG DYNAMICXCF statements, are not processed until the TCP/IP stack joins the sysplex group.

MonIntf
Indicates whether the TCP/IP stack is monitoring the status of specified network interfaces.

The value `No` indicates that the TCP/IP stack is not monitoring the status of network interfaces. The default value is `No` and it can be configured by specifying the NOMONINTERFACE keyword for the SYSPLEXMONITOR parameter on the GLOBALCONFIG profile statement.

The value `Yes` indicates that the TCP/IP stack is monitoring the status of network interfaces that have the MONSYSPLEX attribute specified on the LINK or INTERFACE profile statement. The value `Yes` can be configured by specifying the MONINTERFACE keyword for the SYSPLEXMONITOR parameter on the GLOBALCONFIG profile statement.

DynRoute
Indicates whether the TCP/IP stack is monitoring the presence of dynamic routes over the monitored network interfaces.

The value `No` indicates that the TCP/IP stack is not monitoring the presence of dynamic routes over monitored network interfaces. The default value is `No` and it can be configured by specifying the NODYNROUTE keyword for the SYSPLEXMONITOR MONINTERFACE parameter on the GLOBALCONFIG profile statement.

The value `Yes` indicates that the TCP/IP stack is monitoring the presence of dynamic routes over monitored network interfaces that have the MONSYSPLEX attribute specified on the LINK or INTERFACE statement. It can be configured by specifying the DYNROUTE keyword for the SYSPLEXMONITOR MONINTERFACE parameter on the GLOBALCONFIG profile statement.

AutoRejoin
Indicates whether the TCP/IP stack automatically rejoins the sysplex group when all detected problems that caused the stack to leave the group are relieved.

The value `No` indicates that the stack does not rejoin the group or restore its VIPADYNAMIC definitions when all detected problems have been relieved. The default value is `No` and it can be configured by specifying the NOAUTOREJOIN keyword for the SYSPLEXMONITOR parameter on the GLOBALCONFIG profile statement.

The value `Yes` indicates that the stack automatically rejoins the sysplex group and restores all of its VIPADYNAMIC configuration definitions. The value `Yes` can be configured by

specifying the AUTOREJOIN keyword for the SYSPLEXMONITOR parameter on the GLOBALCONFIG profile statement.

Restriction: You can specify the AUTOREJOIN keyword only if the RECOVERY keyword is also specified (or is currently enabled) on the SYSPLEXMONITOR parameter on the GLOBALCONFIG profile statement.

zIIP Displays information about displacing CPU cycles for various functions onto a System z Information Integration Processor (zIIP). The value Yes for a function indicates that cycles can be displaced to a zIIP when at least one zIIP device is online. Issue the MVS D M=CPU command to display zIIP status. See displaying system configuration information details in z/OS MVS System Commands for more information about displaying processor status.

IPSecurity
Indicates whether the stack is configured to displace CPU cycles for IPSec workload onto a zIIP. This field can have the following values:

Yes Indicates that IPSec CPU cycles are displaced to a zIIP as long as at least one zIIP device is online.

No Indicates that IPSec CPU cycles are not being displaced to a zIIP.

IQDIOMultiWrite
Indicates whether the stack is configured to displace CPU cycles for HiperSockets multiple write workload onto a zIIP. This field can have the following values:

Yes Indicates that the stack is configured to permit HiperSockets multiple write CPU cycles to be displaced to a zIIP.

No Indicates that the stack is configured to not permit HiperSockets multiple write CPU cycles to be displaced to a zIIP.

SMCR

Indicates whether this stack supports Shared Memory Communications over Remote Direct Memory Access (SMC-R) for external data network communications. This field can have the following values:

Yes Indicates that this stack can communicate with other stacks on the external data network by using SMC-R. The SMCR parameter was specified on the GLOBALCONFIG profile statement. When the `SMCR` field has the value `Yes`, the following information is displayed:

FixedMemory
Indicates the maximum amount, in megabytes, of 64-bit private storage that the stack can use for the send and receive buffers that are required for SMC-R communications. The fixed memory value was defined by using the SMCR FIXEDMEMORY parameter on the GLOBALCONFIG. If the SMCR FIXEDMEMORY parameter was not specified in the GLOBALCONFIG statement, the default value of 256 is displayed.

TcpKeepMinInt
Indicates the minimum supported TCP keepalive interval for SMC-R links. Use the SMCR TCPKEEPMININTERVAL parameter on the GLOBALCONFIG statement to define the interval. For applications that are using the TCP_KEEPALIVE setsockopt() option, this interval indicates the minimum interval that TCP keepalive packets are sent on the TCP path of an SMC-R link. The range is 0 - 2147460 seconds. If the interval value is set to 0, TCP keepalive probe packets on the TCP path of an SMC-R link are disabled. If the SMCR TCPKEEPMININTERVAL parameter was not specified in the GLOBALCONFIG statement, then the default interval value of 300 is displayed.

PFID Indicates the Peripheral Component Interconnect Express (PCIe) function ID (PFID) value that was defined using SMCR PFID parameter. The combination of PFID and port number uniquely identifies an "RoCE Express". The stack uses "RoCE Express" for SMC-R communications with other stacks on the external data network. The PFID is a 2-byte hexadecimal value.

PortNum
Indicates the "RoCE Express" that is used for the associated PFID. The PortNum value was specified with the PFID value on the SMCR parameter of the GLOBALCONFIG statement in the TCP/IP profile. The port number can be 1 or 2; the default port is 1.

Note: When PFID represents a 10 GbE RoCE Express2 feature, the PortNum value is the port number configured for the PFID in the Hardware Configuration Definition (HCD). The port number is learned by VTAM during activation of the PFID and might be different from the value coded for PORTNUM for this PFID on the GLOBALCONFIG SMCR statement.

MTU Indicates the configured maximum transmission unit (MTU) value that is used for the associated PFID. The MTU value can be 1024 or 2048 and the default MTU value is 1024.

No Indicates that this stack cannot communicate with other stacks on the external data network by using SMC-R communications. The NOSMCR parameter was specified on the GLOBALCONFIG profile statement or the value was set by default.

- **Network Monitor Configuration information**

  Display the following configured network monitor information defined in the NETMONITOR profile statement. For more information about each network monitor parameter, see the NETMONITOR profile statement information in the z/OS Communications Server: IP Configuration Reference.

  PktTrcSrv
  Indicates whether the packet trace service is enabled or disabled. The value `Yes` indicates that PKTTRCSERVICE is in effect (the PKTTRCSERVICE parameter was specified in the NETMONITOR profile statement). The value `No` indicates that PKTTRCSERVICE is not in effect

(the NOPKTTRCSERVICE parameter was specified in the NETMONITOR profile statement or is in effect by default).

TcpCnnSrv
Indicates whether the TCP connection information service is enabled or disabled. The value `Yes` indicates that TCPCONNSERVICE is in effect (the TCPCONNSERVICE parameter was specified in the NETMONITOR profile statement). The value `No` indicates that TCPCONNSERVICE is not in effect (the NOTCPCONNSERVICE parameter was specified in the NETMONITOR profile statement or is in effect by default).

MinLifTim
The minimum lifetime for a new TCP connection to be reported by the service when the TCP connection information service is enabled. If the NOTCPCONNSERVICE parameter was specified in the NETMONITOR profile statement or is in effect by default, then the MinLifTim field is not displayed.

NtaSrv
Indicates whether the OSAENTA trace service is enabled or disabled. The value `Yes` indicates that NTATRCSERVICE is in effect (the NTATRCSERVICE parameter was specified in the NETMONITOR profile statement). The value `No` indicates that NTATRCSERVICE is not in effect (the NONTATRCSERVICE parameter was specified in the NETMONITOR profile statement or is in effect by default).

SmfSrv
Indicates whether the real-time SMF information service is enabled or disabled. The value `Yes` indicates that SMFSERVICE is enabled (the SMFSERVICE parameter was specified in the NETMONITOR profile statement). The value `No` indicates that SMFSERVICE is disabled (the NOSMFSERVICE parameter was specified in the NETMONITOR profile statement or is disabled by default).

IPSecurity
Indicates whether the real-time SMF service is providing IPSec SMF records. The value `Yes` indicates that IPSec SMF records are being provided (either the SMFSERVICE parameter was specified with the IPSECURITY subparameter on the NETMONITOR profile statement or the SMFSERVICE parameter was specified without any subparameters). The value `No` indicates that IPSec SMF records are not being provided (the SMFSERVICE parameter was specified with the NOIPSECURITY subparameter on the NETMONITOR profile statement). This field is displayed only if the SmfSrv value is `Yes`.

Profile
Indicates whether the real-time SMF service is providing TCP/IP profile SMF records. The value `Yes` indicates that TCP/IP profile SMF records are being provided (either the SMFSERVICE parameter was specified with the PROFILE subparameter on the NETMONITOR profile statement, or the SMFSERVICE parameter was specified without any subparameters). The value `No` indicates that TCP/IP profile SMF records are not being provided (the SMFSERVICE parameter was specified with the NOPROFILE subparameter on the NETMONITOR profile statement). This field is displayed only if the SmfSrv value is `Yes`.

CSSMTP
Indicates whether the real-time SMF service is providing CSSMTP SMF 119 records for subtype 48, 49, 51 and 52. The value YES indicates that CSSMTP SMF records are being provided (either the SMFSERVICE parameter was specified with the CSSMTP subparameter on the NETMOINTOR profile statement or the SMFSERVICE parameter was specified without any sub parameters). The value NO indicates that CSSMTP SMF records are not being provided (the SMFSERVICE parameter was specified with the NOCSSMTP subparameter on the NETMONITOR profile statement). This field is displayed only if the SMFSrv value is YES.

CSMAIL
Indicates whether the real-time SMF service is providing CSSMTP SMF 119 records for subtype 50. The value YES indicates that CSSMTP SMF mail records are being provided (either the SMFSERVICE parameter was specified with the CSSMTP subparameter on the NETMOINTOR profile statement or the SMFSERVICE parameter was specified without any subparameters). The value NO indicates that CSSMTP SMF mail records are not being provided (the SMFSERVICE parameter was specified with the NOCSSMTP subparameter on the NETMONITOR profile statement). This field is displayed only if the SMFSrv value is YES.

DVIPA
Indicates whether the real-time SMF service is providing sysplex event SMF records. The value `Yes` indicates that sysplex event SMF records are being provided (either the SMFSERVICE parameter was specified with the DVIPA subparameter on the NETMONITOR profile statement, or the SMFSERVICE parameter was specified without any subparameters). The value `No` indicates that sysplex event SMF records are not being provided (the SMFSERVICE parameter was specified with the NODVIPA subparameter on the NETMONITOR profile statement). This field is displayed only if the SmfSrv value is `Yes`.

- **Autolog Configuration Information**

  WaitTime
  The time, displayed in seconds, that is specified on the AUTOLOG statement that represents the length of time TCP/IP waits for a procedure to stop if the procedure is still active at startup and TCP/IP is attempting to start the procedure again. The procedure could still be active if it did not stop when TCP/IP was last shut down.

  ProcName
  The procedure that the TCP/IP address space starts.

  JobName
  The job name used for the PORT reservation statement. The job name might be identical to the procedure name; however, for z/OS UNIX jobs that spawn listener threads, the names are not the same.

  ParmString
  A string to be added following the START ProcName value. The ParmString value can be up to 115 characters in length and can span multiple lines. If the PARMSTRING parameter on the AUTOLOG profile

statement was not specified or if the *parm_string* value was specified with a blank string, then this field displays blanks.

DelayStart
Indicates whether TCP/IP delays starting this procedure until the TCP/IP stack has completed one or more processing steps. This field can have the following values:

Yes Indicates that the TCP/IP stack does not start this procedure until it has completed all of the processing steps identified by the following subparameters:

DVIPA
TCP/IP delays starting this procedure until after the TCP/IP stack has joined the sysplex group and processed its dynamic VIPA configuration (DELAYSTART was specified on the entry for this procedure in the AUTOLOG profile statement with no additional subparameters, or DELAYSTART was specified with the DVIPA subparameter).

TTLS TCP/IP delays starting this procedure until after the Policy Agent has successfully installed the AT-TLS policy in the TCP/IP stack and AT-TLS services are available (DELAYSTART was specified with the TTLS subparameter on the entry for this procedure in the AUTOLOG profile statement).

No Indicates that this procedure is started when TCP/IP is started (DELAYSTART was not specified on the entry for this procedure in the AUTOLOG profile statement).

- **Data Trace Settings if socket data trace is on**

JobName
The application address space name specified on the DATTRACE command or asterisk (*), if not specified.

TrRecCnt
The number of packets traced for this DATTRACE command.

Length
The value of the ABBREV keyword of the DATTRACE command or FULL to capture the entire packet.

IpAddr
The IP address from the IP keyword of the DATTRACE command or asterisk (*), if not specified.

SubNet
The subnet mask from the SUBNET keyword of the DATTRACE command or asterisk (*), if not specified.

PrefixLen
The prefix length specified on the DATTRACE command.

PortNum
The port number from the PORTNUM keyword of the DATTRACE command or an asterisk (*), if a value was not specified.

Netstat DEvlinks/-d report:
Displays information about interfaces that are defined to the TCP/IP stack.

Not IPv6 enabled (SHORT format):

```
NETSTAT DEVLINKS
MVS TCP/IP NETSTAT CS V2R1       TCPIP Name: TCPCS           14:23:39
DevName: LOOPBACK          DevType: LOOPBACK
  DevStatus: Ready
  LnkName: LOOPBACK          LnkType: LOOPBACK   LnkStatus: Ready
    ActMtu: 65535
  Routing Parameters:
    MTU Size: n/a               Metric: 00
    DestAddr: 0.0.0.0           SubnetMask: 0.0.0.0
  Multicast Specific:
    Multicast Capability: No
  Link Statistics:
    BytesIn                          = 24943
    Inbound Packets                  = 100
    Inbound Packets In Error         = 0
    Inbound Packets Discarded        = 0
    Inbound Packets With No Protocol  = 0
    BytesOut                         = 24943
    Outbound Packets                 = 100
    Outbound Packets In Error        = 0
    Outbound Packets Discarded       = 0

DevName: LCS1              DevType: LCS       DevNum: 0D00
  DevStatus: Ready
  LnkName: TR1               LnkType: TR          LnkStatus: Ready
    NetNum: 0    QueSize: 0
    MacAddrOrder: Non-Canonical    SrBridgingCapability: Yes
    IpBroadcastCapability: Yes     ArpBroadcastType: All Rings
    MacAddress: 08005A0D97A2
    ActMtu: 1492
    SecClass: 8                      MonSysplex: Yes
  Routing Parameters:
    MTU Size: 02000             Metric: 100
    DestAddr: 0.0.0.0           SubnetMask: 255.255.255.128
  Packet Trace Setting:
    Protocol: *                 TrRecCnt: 00000006  PckLength: FULL
    Discard : NONE
    SrcPort: *                  DestPort: *         PortNum: *
    IpAddr: *                   SubNet: *
```

```
  Multicast Specific:
    Multicast Capability: Yes
    Group             RefCnt      SrcFltMd
    -----             ------      --------
    224.0.0.1         0000000001  Include
      SrcAddr: 9.1.1.1
               9.1.1.2
               9.1.1.3
    224.9.9.3         0000000001  Include
      SrcAddr: 9.1.1.1
    224.9.9.4         0000000001  Exclude
      SrcAddr: 9.2.2.1
               9.2.2.2
    225.9.9.4         0000000003  Exclude
      SrcAddr: None
  Link Statistics:
    BytesIn                           = 9130
    Inbound Packets                   = 2
    Inbound Packets In Error          = 0
    Inbound Packets Discarded         = 0
    Inbound Packets With No Protocol  = 0
    BytesOut                          = 60392
    Outbound Packets                  = 11
    Outbound Packets In Error         = 0
    Outbound Packets Discarded        = 0

DevName: OSAQDIO4          DevType: MPCIPA
  DevStatus: Ready         CfgRouter: Non  ActRouter: Non
  LnkName: OSAQDIOLINK       LnkType: IPAQENET   LnkStatus: Ready
    Speed: 0000000100
    IpBroadcastCapability: No
    VMACAddr:   000629DC21BC  VMACOrigin: Cfg  VMACRouter: All
    ArpOffload: Yes                   ArpOffloadInfo: Yes
    ActMtu: 1492
    VLANid: 1260                      VLANpriority: Enabled
    DynVLANRegCfg: Yes                DynVLANRegCap: No
    ReadStorage: GLOBAL (8064K)       InbPerf: Balanced
    ReadStorage: GLOBAL (8064K)
    InbPerf: Balanced
    ChecksumOffload: Yes              SegmentationOffload: Yes
    SecClass: 8                       MonSysplex: Yes
  Routing Parameters:
    MTU Size: n/a               Metric: 00
    DestAddr: 0.0.0.0           SubnetMask: 255.255.255.192
  Multicast Specific:
    Multicast Capability: Yes
    Group             RefCnt        SrcFltMd
    -----             ------        --------
    224.0.0.1         0000000001    Exclude
      SrcAddr: None
  Link Statistics:
    BytesIn                           = 11476
    Inbound Packets                   = 10
    Inbound Packets In Error          = 0
    Inbound Packets Discarded         = 0
    Inbound Packets With No Protocol  = 0
    BytesOut                          = 6707
    Outbound Packets                  = 10
    Outbound Packets In Error         = 0
    Outbound Packets Discarded        = 0
```

```
DevName: OSATRL90          DevType: ATM
  DevStatus: Not Active
  LnkName: OSA90LINK1        LnkType: ATM         LnkStatus: Not Active
    ActMtu: Unknown
    SecClass: 8                      MonSysplex: Yes
  Routing Parameters:
    MTU Size: n/a               Metric: 00
    DestAddr: 0.0.0.0           SubnetMask: 255.0.0.0
  ATM Specific:
    ATM portName:  OSA90
    ATM PVC Name:  STEPH             PVC Status: Not Active

    ATM LIS Name:  LIS1
    SubnetValue:   9.67.1.0          SubnetMask:    255.255.255.0
    DefaultMTU:    0000009180        InactvTimeOut: 0000000300
    MinHoldTime:   0000000060        MaxCalls:      0000001000
    CachEntryAge:  0000000900        ATMArpReTry:   0000000002
    ATMArpTimeOut: 0000000003        PeakCellRate:  0000000000
    NumOfSVCs:     0000000000        BearerClass:   C

    ATMARPSV Name: ARPSV1
    VcType:        PVC               ATMaddrType: NSAP
    ATMaddr:
    IpAddr:        0.0.0.0
  Multicast Specific:
    Multicast Capability: No
  Link Statistics:
    BytesIn                           = 0
    Inbound Packets                   = 0
    Inbound Packets In Error          = 0
    Inbound Packets Discarded         = 0
    Inbound Packets With No Protocol  = 0
    BytesOut                          = 0
    Outbound Packets                  = 0
    Outbound Packets In Error         = 0
    Outbound Packets Discarded        = 0

DevName: CLAW2             DevType: CLAW      DevNum: 0D10
  DevStatus: Ready         CfgPacking: Packed ActPacking: Packed
  LnkName: CLAW2LINK         LnkType: CLAW        LnkStatus: Ready
    ActMtu: 2600
    SecClass: 8                      MonSysplex: No
  Routing Parameters:
    MTU Size: n/a               Metric: 00
    DestAddr: 0.0.0.0           SubnetMask: 255.255.255.0
  Multicast Specific:
    Multicast Capability: No
  Link Statistics:
    BytesIn                           = 0
    Inbound Packets                   = 0
    Inbound Packets In Error          = 0
    Inbound Packets Discarded         = 0
    Inbound Packets With No Protocol  = 0
    BytesOut                          = 0
    Outbound Packets                  = 0
    Outbound Packets In Error         = 0
    Outbound Packets Discarded        = 0
```

```
DevName: IUTIQDIO          DevType: MPCIPA
  DevStatus: Ready
  LnkName: IQDIOLNK0A3D0001  LnkType: IPAQIDIO   LnkStatus: Ready
    IpBroadcastCapability: No
    CfgRouter: Non                   ActRouter: Non
    ArpOffload: Yes                  ArpOffloadInfo: No
    ActMtu: 8192
    ReadStorage: GLOBAL (2048K)
    SecClass: 255
    IQDMultiWrite: Enabled
  Routing Parameters:
    MTU Size: 8192              Metric: 00
    DestAddr: 0.0.0.0           SubnetMask: 255.255.0.0
  Multicast Specific:
    Multicast Capability: Yes
    Group             RefCnt        SrcFltMd
    -----             ------        --------
    224.0.0.1         0000000001    Exclude
      SrcAddr: None
  Link Statistics:
    BytesIn                           = 0
    Inbound Packets                   = 0
    Inbound Packets In Error          = 0
    Inbound Packets Discarded         = 0
    Inbound Packets With No Protocol  = 0
    BytesOut                          = 0
    Outbound Packets                  = 0
    Outbound Packets In Error         = 0
    Outbound Packets Discarded        = 0

IntfName: OSAQDIOINTF       IntfType: IPAQENET   IntfStatus: Ready
    PortName: OSAQDIO2  Datapath: 0E2A     DatapathStatus: Ready
    CHPIDType: OSD   SMCR: Yes
    PNetID: NETWORK3
    Speed: 0000000100
    IpBroadcastCapability: No
    VMACAddr:   020629DC21BD  VMACOrigin: Cfg  VMACRouter: All
    SrcVipaIntf: VIPAV4
    CfgRouter: Non                   ActRouter: Non
    ArpOffload: Yes                  ArpOffloadInfo: Yes
    CfgMtu: 1492                     ActMtu: 1492
    IpAddr: 100.1.1.1/24
    VLANid: 1261                     VLANpriority: Enabled
    DynVLANRegCfg: Yes               DynVLANRegCap: No
    ReadStorage: GLOBAL (8064K)      InbPerf: Balanced
    ReadStorage: GLOBAL (8064K)
    InbPerf: Dynamic
      WorkloadQueueing: Yes
    ChecksumOffload: Yes             SegmentationOffload: Yes
    SecClass: 9                      MonSysplex: Yes
    Isolate: Yes                     OptLatencyMode: Yes
  Multicast Specific:
    Multicast Capability: Yes
    Group             RefCnt        SrcFltMd
    -----             ------        --------
    224.0.0.1         0000000001    Exclude
  SrcAddr: None
  Interface Statistics:
    BytesIn                           = 12834
    Inbound Packets                   = 16
    Inbound Packets In Error          = 0
    Inbound Packets Discarded         = 0
    Inbound Packets With No Protocol  = 0
    BytesOut                          = 5132
    Outbound Packets                  = 10
    Outbound Packets In Error         = 0
    Outbound Packets Discarded        = 0
  Associated RNIC interface: EZARIUT10005
  Associated RNIC interface: EZARIUT10006
```

```
IntfName: IQDINTF1          IntfType: IPAQIDIO   IntfStatus: Ready
    TRLE: IUTIQ4QD  Datapath: 0E2A     DatapathStatus: Ready
    CHPID: D1
    IpBroadcastCapability: No
    SrcVipaIntf: VIPAV4
    ArpOffload: Yes                  ArpOffloadInfo: No
    CfgMtu: 8192                     ActMtu: 8192
    IpAddr: 100.1.1.1/24
    VLANid: 1261
    ReadStorage: GLOBAL (2048K)
    SecClass: 255
    IQDMultiWrite: Enabled
  Multicast Specific:
    Multicast Capability: Yes
    Group             RefCnt        SrcFltMd
    -----             ------        --------
    224.0.0.1         0000000001    Exclude
      SrcAddr: None
  Interface Statistics:
    BytesIn                           = 0
    Inbound Packets                   = 0
    Inbound Packets In Error          = 0
    Inbound Packets Discarded         = 0
    Inbound Packets With No Protocol  = 0
    BytesOut                          = 0
    Outbound Packets                  = 0
    Outbound Packets In Error         = 0
    Outbound Packets Discarded        = 0
  IntfName: VDEV1             IntfType: VIPA       IntfStatus: Ready
    IpAddr: 100.1.1.1/24
  Multicast Specific:
    Multicast Capability: No
```

```
IntfName: OSXC9INT1         IntfType: IPAQENET   IntfStatus: Ready
    PortName: IUTXP0C9  Datapath: 0E56     DatapathStatus: Ready
    CHPIDType: OSX      CHPID: C9
    PNetID: IEDN
    Speed: 0000001000
    IpBroadcastCapability: No
    VMACAddr: 420001AA0E56  VMACOrigin: OSA  VMACRouter: All
    CfgRouter: Non                 ActRouter: Non
    ArpOffload: Yes                ArpOffloadInfo: No
    CfgMtu: None                   ActMtu: 8992
    IpAddr: 172.16.0.1/16
    VLANid: 401                    VLANpriority: Disabled
    DynVLANRegCfg: No              DynVLANRegCap: Yes
    ReadStorage: GLOBAL (512K)
    InbPerf: Dynamic
      WorkloadQueueing: No
    ChecksumOffload: No            SegmentationOffload: No
    SecClass: 255                  MonSysplex: No
    Isolate: No                    OptLatencyMode: No
  Multicast Specific:
    Multicast Capability: Yes
    Group             RefCnt      SrcFltMd
    -----             ------      --------
    224.0.0.1         0000000001  Exclude
      SrcAddr: None
  Interface Statistics:
    BytesIn                          = 0
    Inbound Packets                  = 0
    Inbound Packets In Error         = 0
    Inbound Packets Discarded        = 0
    Inbound Packets With No Protocol  = 0
    BytesOut                         = 0
    Outbound Packets                 = 0
    Outbound Packets In Error        = 0
    Outbound Packets Discarded       = 0
  Associated IQDX interface: EZAIQXC9  IQDX Status: Ready
    BytesIn                          = 0
    Inbound Packets                  = 0
    BytesOut                         = 0
    Outbound Packets                 = 0


IntfName: EZAIQXC9          IntfType: IPAQIQDX    IntfStatus: Ready
    Datapath: 0E0E     DatapathStatus: Ready
    VMACAddr: 820001AA0E0E
    ReadStorage: MAX (2048K)
    IQDMultiWrite: Disabled
  Multicast Specific:
    Multicast Capability: No
  Interface Statistics:
    BytesIn                          = 0
    Inbound Packets                  = 0
    Inbound Packets In Error         = 0
    Inbound Packets Discarded        = 0
    Inbound Packets With No Protocol  = 0
    BytesOut                         = 0
    Outbound Packets                 = 0
    Outbound Packets In Error        = 0
    Outbound Packets Discarded       = 0
```

```
IntfName: EZARIUT10005      IntfType: RNIC       IntfStatus: Ready
  PFID: 0005  PortNum: 1  TRLE: IUT10005
  PNetID: NETWORK3
  Speed: 0000010000 Gen: RoCE Express2
  VMACAddr: 02000012F030
  GIDAddr:  fe80::200:ff:fe12:f030
  Interface Statistics:
    BytesIn                          = 18994
    Inbound Operations               = 146
    BytesOut                         = 19139
    Outbound Operations              = 811
    SMC Links                        = 2
    TCP Connections                  = 1
    Intf Receive Buffer Inuse        = 64K
IntfName: EZARIUT10006      IntfType: RNIC       IntfStatus: Ready
  PFID: 0006  PortNum: 1  TRLE: IUT10006
  PNetID: NETWORK3
  Speed: 0000010000 Gen: RoCE Express2
  VMACAddr: 02000012EF50
  GIDAddr:  fe80::200:ff:fe12:ef50
  Interface Statistics:
    BytesIn                          = 226
    Inbound Operations               = 4
    BytesOut                         = 29
    Outbound Operations              = 4
    SMC Links                        = 2
    TCP Connections                  = 1
    Intf Receive Buffer Inuse        = 64K

IPv4 LAN Group Summary
 LanGroup: 001

   Name             Status      ArpOwner         VipaOwner
   -------          ------      --------         ---------
   OSXC9INT1        Active      OSXC9INT1        Yes
   TR1              Active      TR1              No

 LanGroup: 002

   Name             Status      ArpOwner         VipaOwner
   -------          ------      --------         ---------
   OSAQDIOLINK      Active      OSAQDIOLINK      Yes
   OSAQDIOINTF      Active      OSAQDIOINTF      No
```

IPv6 enabled or request for LONG format:

```
NETSTAT DEVLINKS
MVS TCP/IP NETSTAT CS V2R1       TCPIP Name: TCPCS           14:23:39
DevName: LOOPBACK          DevType: LOOPBACK
  DevStatus: Ready
  LnkName: LOOPBACK          LnkType: LOOPBACK   LnkStatus: Ready
    ActMtu: 65535
  Routing Parameters:
    MTU Size: n/a               Metric: 00
    DestAddr: 0.0.0.0           SubnetMask: 0.0.0.0
  Multicast Specific:
    Multicast Capability: No
  Link Statistics:
    BytesIn                           = 7665
    Inbound Packets                   = 100
    Inbound Packets In Error          = 0
    Inbound Packets Discarded         = 0
    Inbound Packets With No Protocol  = 0
    BytesOut                          = 7665
    Outbound Packets                  = 100
    Outbound Packets In Error         = 0
    Outbound Packets Discarded        = 0

IntfName: LOOPBACK6        IntfType: LOOPBACK6 IntfStatus: Ready
    ActMtu: 65535
  Multicast Specific:
    Multicast Capability: No
  Interface Statistics:
    BytesIn                           = 0
    Inbound Packets                   = 0
    Inbound Packets In Error          = 0
    Inbound Packets Discarded         = 0
    Inbound Packets With No Protocol  = 0
    BytesOut                          = 0
    Outbound Packets                  = 0
    Outbound Packets In Error         = 0
    Outbound Packets Discarded        = 0

DevName: LCS1              DevType: LCS       DevNum: 0D00
  DevStatus: Ready
  LnkName: TR1               LnkType: TR          LnkStatus: Ready
    NetNum: 0    QueSize: 0
    MacAddrOrder: Non-Canonical    SrBridgingCapability: Yes
    IpBroadcastCapability: Yes     ArpBroadcastType: All Rings
    MacAddress: 08005A0D97A2
    ActMtu: 1492
    SecClass: 8                      MonSysplex: Yes
  Routing Parameters:
    MTU Size: 02000             Metric: 100
    DestAddr: 0.0.0.0           SubnetMask: 255.255.255.128
  Packet Trace Setting:
    Protocol: *                 TrRecCnt: 00000006  PckLength: FULL
    Discard : NONE
    SrcPort: *                  DestPort: *         PortNum: *
    IpAddr: *                   SubNet: *
```

```
  Multicast Specific:
    Multicast Capability: Yes
    Group             RefCnt      SrcFltMd
    -----             ------      --------
    224.9.9.1         0000000002  Include
      SrcAddr: 9.1.1.1
               9.1.1.2
               9.1.1.3
    224.9.9.3         0000000001  Include
      SrcAddr: 9.1.1.1
    224.9.9.4         0000000001  Exclude
      SrcAddr: 9.2.2.1
               9.2.2.2
    225.9.9.4         0000000003  Exclude
      SrcAddr: None
  Link Statistics:
    BytesIn                           = 9130
    Inbound Packets                   = 2
    Inbound Packets In Error          = 0
    Inbound Packets Discarded         = 0
    Inbound Packets With No Protocol  = 0
    BytesOut                          = 60392
    Outbound Packets                  = 11
    Outbound Packets In Error         = 0
    Outbound Packets Discarded        = 0

DevName: OSAQDIO4          DevType: MPCIPA
  DevStatus: Ready
  LnkName: OSAQDIOLINK       LnkType: IPAQENET   LnkStatus: Ready
    Speed: 0000000100
    IpBroadcastCapability: No
    VMACAddr:   000629DC21BC  VMACOrigin: Cfg  VMACRouter: All
    CfgRouter: Non                   ActRouter: Non
    ArpOffload: Yes                  ArpOffloadInfo: Yes
    ActMtu: 1492
    VLANid: 1260                     VLANpriority: Enabled
    DynVLANRegCfg: Yes               DynVLANRegCap: No
    ReadStorage: GLOBAL (8064K)      InbPerf: Balanced
    ReadStorage: GLOBAL (8064K)
    InbPerf: Balanced
    ChecksumOffload: Yes             SegmentationOffload: Yes
    SecClass: 8                      MonSysplex: Yes
  Routing Parameters:
    MTU Size: n/a               Metric: 00
    DestAddr: 0.0.0.0           SubnetMask: 255.255.255.192
  Multicast Specific:
    Multicast Capability: Yes
    Group             RefCnt        SrcFltMd
    -----             ------        --------
    224.0.0.1         0000000001    Exclude
      SrcAddr: None
  Link Statistics:
    BytesIn                           = 11476
    Inbound Packets                   = 10
    Inbound Packets In Error          = 0
    Inbound Packets Discarded         = 0
    Inbound Packets With No Protocol  = 0
    BytesOut                          = 6707
    Outbound Packets                  = 10
    Outbound Packets In Error         = 0
    Outbound Packets Discarded        = 0
```

```
IntfName: OSAQDIO46        IntfType: IPAQENET6   IntfStatus: Ready
    PortName: OSAQDIO4  Datapath: 0E2B     DatapathStatus: Ready
    CHPIDType: OSD      SMCR: Yes
    PNetID: NETWORK3
    QueSize: 0  Speed: 0000000100
    VMACAddr:   000629DC21BC  VMACOrigin: Cfg  VMACRouter: All
    SrcVipaIntf: VIPAV6
    DupAddrDet: 1
    CfgRouter: Pri                    ActRouter: Pri
    RtrHopLimit: 5
    CfgMtu: 4096                      ActMtu: 1492
    VLANid: 1261                      VLANpriority: Enabled
    DynVLANRegCfg: Yes                DynVLANRegCap: No
    IntfID: 0000:0000:0000:0001
    ReadStorage: GLOBAL (8064K)
    InbPerf: Balanced
    ChecksumOffload: Yes              SegmentationOffload: Yes
    SecClass: 8                       MonSysplex: Yes
    Isolate: Yes                      OptLatencyMode: Yes
    TempPrefix: 2001:0db8:3454:a3cf::/64
                2001:0db8:58cd::/48

  Packet Trace Setting:
    Protocol: *                 TrRecCnt: 00000000  PckLength: FULL
    SrcPort:  *                 DestPort: *
    IpAddr/PrefixLen: 9::44/128
  Multicast Specific:
    Multicast Capability: Yes
    Group:     ff02::1:ff15:5
      RefCnt:  0000000001  SrcFltMd: Exclude
      SrcAddr: 2e00::11
               2e00::22
    Group:     ff02::1:ffdc:217c
      RefCnt:  0000000001  SrcFltMd: Exclude
      SrcAddr: None
    Group:     ff02::1
      RefCnt:  0000000001  SrcFltMd: Exclude
      SrcAddr: None
    Group:     ff02::1:ff00:2
      RefCnt:  0000000001  SrcFltMd: Exclude
      SrcAddr: None
  Interface Statistics:
    BytesIn                           = 12655
    Inbound Packets                   = 12
    Inbound Packets In Error          = 0
    Inbound Packets Discarded         = 0
    Inbound Packets With No Protocol  = 0
    BytesOut                          = 4590
    Outbound Packets                  = 11
    Outbound Packets In Error         = 0
    Outbound Packets Discarded        = 0
  Associated RNIC interface: EZARIUT10005
  Associated RNIC interface: EZARIUT10006
```

```
IntfName: V6SAMEH          IntfType: MPCPTP6   IntfStatus: Not Active
    TRLE: IUTSAMEH   DevStatus: Not Active
    SrcVipaIntf: VIPAV6
    ActMtu: Unknown
    IntfID: 0000:0000:0000:0001
    SecClass: 8
  Multicast Specific:
    Multicast Capability: No
  Interface Statistics:
    BytesIn                          = 0
    Inbound Packets                  = 0
    Inbound Packets In Error         = 0
    Inbound Packets Discarded        = 0
    Inbound Packets With No Protocol  = 0
    BytesOut                         = 0
    Outbound Packets                 = 0
    Outbound Packets In Error        = 0

IntfName: VIPAV6           IntfType: VIPA6     IntfStatus: Ready
  Packet Trace Setting:
    Protocol: *                TrRecCnt: 00000000  PckLength: FULL
    SrcPort:  *                DestPort: *         PortNum: *
    IpAddr:   *                SubNet:   *
  Multicast Specific:
    Multicast Capability: No
```

```
IntfName: SZQIDIO6          IntfType: IPAQIDIO6  IntfStatus: Not Active
    TRLE: IUTIQDD1  Datapath: 0E3A     DatapathStatus: Not Active
    CHPID: D1
    ActMtu: Unknown
    VLANid: 3
    SecClass: 044                   MonSysplex: No
  Multicast Specific:
    Multicast Capability: Unknown
    Group:     ff02::1:ff00:2
      RefCnt:  0000000002  SrcFltMd: Exclude
      SrcAddr: None
  Interface Statistics:
    BytesIn                          = 0
    Inbound Packets                  = 0
    Inbound Packets In Error         = 0
    Inbound Packets Discarded        = 0
    Inbound Packets With No Protocol  = 0
    BytesOut                         = 0
    Outbound Packets                 = 0
    Outbound Packets In Error        = 0
```

```
IntfName: OSAQDIOINTF       IntfType: IPAQENET   IntfStatus: Ready
    PortName: OSAQDIO2  Datapath: 0E2A     DatapathStatus: Ready
    CHPIDType: OSD         SMCR: Yes
    PNetID: ZOSNET
    Speed: 0000000100
    IpBroadcastCapability: No
    VMACAddr:   020629DC21BD  VMACOrigin: Cfg  VMACRouter: All
    SrcVipaIntf: VIPAV4
    CfgRouter: Non                    ActRouter: Non
    ArpOffload: Yes                   ArpOffloadInfo: Yes
    CfgMtu: 1492                      ActMtu: 1492
    IpAddr: 100.1.1.1/24
    VLANid: 1261                      VLANpriority: Enabled
    DynVLANRegCfg: Yes                DynVLANRegCap: No
    ReadStorage: GLOBAL (8064K)
    InbPerf: Balanced
    ChecksumOffload: Yes              SegmentationOffload: Yes
    SecClass: 9                       MonSysplex: Yes
    Isolate: Yes
  Multicast Specific:
    Multicast Capability: Yes
    Group             RefCnt        SrcFltMd
    -----             ------        --------
    224.0.0.1         0000000001    Exclude
      SrcAddr: None
  Interface Statistics:
    BytesIn                           = 12834
    Inbound Packets                   = 16
    Inbound Packets In Error          = 0
    Inbound Packets Discarded         = 0
    Inbound Packets With No Protocol  = 0
    BytesOut                          = 5132
    Outbound Packets                  = 10
    Outbound Packets In Error         = 0
    Outbound Packets Discarded        = 0
  Associated RNIC interface: EZARIUT10005
  Associated RNIC interface: EZARIUT10006
```

```
IntfName: OSXC9INT2         IntfType: IPAQENET6  IntfStatus: Ready
    PortName: IUTXP0C9  Datapath: 0E56     DatapathStatus: Ready
    CHPIDType: OSX      CHPID: C9
    PNetID: IEDN
    QueSize: 0    Speed: 0000001000
    VMACAddr: 620001AA0E56   VMACOrigin: OSA    VMACRouter: All
    DupAddrDet: 1
    CfgMtu: None                      ActMtu: 9000
    VLANid: 602                       VLANpriority: Disabled
    DynVLANRegCfg: No                 DynVLANRegCap: Yes
    ReadStorage: GLOBAL (512K)
    InbPerf: Dynamic
      WorkloadQueueing: No
    ChecksumOffload: No               SegmentationOffload: No
    SecClass: 255                     MonSysplex: No
    Isolate: No                       OptLatencyMode: No
    TempPrefix: All
  Multicast Specific:
    Multicast Capability: Yes
    Group:     ff02::1:ffaa:e56
      RefCnt:  0000000001  SrcFltMd: Exclude
      SrcAddr: None
    Group:     ff01::1
      RefCnt:  0000000001  SrcFltMd: Exclude
      SrcAddr: None
    Group:     ff02::1
      RefCnt:  0000000001  SrcFltMd: Exclude
      SrcAddr: None
    Group:     ff02::1:ff01:1
      RefCnt:  0000000001  SrcFltMd: Exclude
      SrcAddr: None
    Group:     ff02::1:ff00:2
      RefCnt:  0000000001  SrcFltMd: Exclude
      SrcAddr: None
    Group:     ff02::1:ff00:1
      RefCnt:  0000000002  SrcFltMd: Exclude
      SrcAddr: None
  Interface Statistics:
    BytesIn                           = 0
    Inbound Packets                   = 0
    Inbound Packets In Error          = 0
    Inbound Packets Discarded         = 0
    Inbound Packets With No Protocol  = 0
    BytesOut                          = 688
    Outbound Packets                  = 7
    Outbound Packets In Error         = 0
    Outbound Packets Discarded        = 0
  Associated IQDX interface: EZ6IQXC9  IQDX Status: Ready
    BytesIn                           = 0
    Inbound Packets                   = 0
    BytesOut                          = 0
    Outbound Packets                  = 0
```

```
IntfName: EZ6IQXC9          IntfType: IPAQIQDX6   IntfStatus: Ready
    Datapath: 0E0E          DatapathStatus: Ready
    VMACAddr: 820001AA0E0E
    ReadStorage: MAX (2048K)
    IQDMultiWrite: Disabled
  Multicast Specific:
    Multicast Capability: ND only
    Group:     ff02::1:ffaa:e56
      RefCnt:  0000000001  SrcFltMd: Exclude
      SrcAddr: None
    Group:     ff02::1:ff01:1
      RefCnt:  0000000001  SrcFltMd: Exclude
      SrcAddr: None
    Group:     ff02::1:ff00:2
      RefCnt:  0000000001  SrcFltMd: Exclude
      SrcAddr: None
    Group:     ff02::1:ff00:1
      RefCnt:  0000000002  SrcFltMd: Exclude
      SrcAddr: None
  Interface Statistics:
    BytesIn                          = 0
    Inbound Packets                  = 0
    Inbound Packets In Error         = 0
    Inbound Packets Discarded        = 0
    Inbound Packets With No Protocol  = 0
    BytesOut                         = 0
    Outbound Packets                 = 0
    Outbound Packets In Error        = 0
    Outbound Packets Discarded       = 0

IntfName: EZARIUT10005      IntfType: RNIC       IntfStatus: Ready
  PFID: 0005  PortNum: 1  TRLE: IUT10005 PFIDStatus: Ready
  PNetID: NETWORK3
  Speed: 0000010000
  VMACAddr: 02000012F030
  GIDAddr:  fe80::200:ff:fe12:f030
  Interface Statistics:
    BytesIn                          = 18994
    Inbound Operations               = 146
    BytesOut                         = 19139
    Outbound Operations              = 811
    SMC Links                        = 2
    TCP Connections                  = 1
    Intf Receive Buffer Inuse        = 64K

IntfName: EZARIUT10006      IntfType: RNIC       IntfStatus: Ready
  PFID: 0006  PortNum: 1  TRLE: IUT10006 PFIDStatus: Ready
  PNetID: NETWORK3
  Speed: 0000010000
  VMACAddr: 02000012EF50
  GIDAddr:  fe80::200:ff:fe12:ef50
  Interface Statistics:
    BytesIn                          = 226
    Inbound Operations               = 4
    BytesOut                         = 29
    Outbound Operations              = 4
    SMC Links                        = 2
    TCP Connections                  = 1
    Intf Receive Buffer Inuse        = 64K
```

```
IPv4 LAN Group Summary
 LanGroup: 001

   Name              Status      ArpOwner          VipaOwner
   -------           ------      --------          ---------
   TR1               Active      TR1               No

 LanGroup: 002

   Name              Status      ArpOwner          VipaOwner
   -------           ------      --------          ---------
   OSAQDIOLINK       Active      OSAQDIOLINK       Yes
   OSAQDIOINTF       Active      OSAQDIOINTF       No

IPv6 LAN Group Summary
 LanGroup: 004

   Name              Status      NDOwner           VipaOwner
   --------          ------      --------          ---------
   OSAQDIO46         Active      OSAQDIO46         Yes
```

```
NETSTAT DEVLINKS SMC
MVS TCP/IP NETSTAT CS V2R1       TCPIP Name: TCPIP1          12:04:57
IntfName: EZARIUT10005      IntfType: RNIC       IntfStatus: Ready
  PFID: 0005  PortNum: 1  TRLE: IUT10005
  PNetID: NETWORK3
  VMACAddr: 02000012F030
  GIDAddr:  fe80::200:ff:fe12:f030
  Interface Statistics:
    BytesIn                          = 18994
    Inbound Operations               = 146
    BytesOut                         = 19139
    Outbound Operations              = 811
    SMC Links                        = 2
    TCP Connections                  = 1
    Intf Receive Buffer Inuse        = 64K
  SMC Link Information:
    LocalSMCLinkId: FB710601  RemoteSMCLinkId: 72420601
      SMCLinkGroupId: FB710600  VLANid: 100  MTU: 1024
      LocalGID:  fe80::200:ff:fe12:f030
        LocalMACAddr:  02000012F030  LocalQP:  00004B
      RemoteGID: fe80::200:1ff:fe12:f030
        RemoteMACAddr: 02000112F030  RemoteQP: 00004A
      SMCLinkBytesIn:            498
      SMCLinkInOperations:       12
      SMCLinkBytesOut:           294
      SMCLinkOutOperations:      13
      TCP Connections:           0
      Link Receive Buffer Inuse: 0K
        64K   Buffer Inuse:      0K

  SMC Link Information:
    LocalSMCLinkId: FB710701  RemoteSMCLinkId: 72420701
      SMCLinkGroupId: FB710700  VLANid: 100  MTU: 4096
      LocalGID:  fe80::200:ff:fe12:f030
        LocalMACAddr:  02000012F030  LocalQP:  00004C
      RemoteGID: fe80::200:1ff:fe12:f030
        RemoteMACAddr: 02000112F030  RemoteQP: 00004D
      SMCLinkBytesIn:            293
      SMCLinkInOperations:       8
      SMCLinkBytesOut:           490
      SMCLinkOutOperations:      15
      TCP Connections:           1
      Link Receive Buffer Inuse: 64K
        64K   Buffer Inuse:      64K


IntfName: EZARIUT10006      IntfType: RNIC       IntfStatus: Ready
  PFID: 0006  PortNum: 1  TRLE: IUT10006
  PNetID: NETWORK3
  VMACAddr: 02000012EF50
  GIDAddr:  fe80::200:ff:fe12:ef50
  Interface Statistics:
    BytesIn                          = 226
    Inbound Operations               = 4
    BytesOut                         = 29
    Outbound Operations              = 4
    SMC Links                        = 2
    TCP Connections                  = 1
    Intf Receive Buffer Inuse        = 64K
```

```
SMC Link Information:
    LocalSMCLinkId: FB710602  RemoteSMCLinkId: 72420602
      SMCLinkGroupId: FB710600  VLANid: 100  MTU: 2048
      LocalGID:  fe80::200:ff:fe12:ef50
        LocalMACAddr:  02000012EF50  LocalQP:  00004A
      RemoteGID: fe80::200:1ff:fe12:ef50
        RemoteMACAddr: 02000112EF50  RemoteQP: 00004B
      SMCLinkBytesIn:            226
      SMCLinkInOperations:       5
      SMCLinkBytesOut:           29
      SMCLinkOutOperations:      4
      TCP Connections:           1
      Link Receive Buffer Inuse: 64K
        64K   Buffer Inuse:      64K

  SMC Link Information:
    LocalSMCLinkId: FB710702  RemoteSMCLinkId: 72420702
      SMCLinkGroupId: FB710700  VLANid: 100  MTU: 1024
      LocalGID:  fe80::200:ff:fe12:ef50
        LocalMACAddr:  02000012EF50  LocalQP:  00004D
      RemoteGID: fe80::200:1ff:fe12:ef50
        RemoteMACAddr: 02000112EF50  RemoteQP: 00004C
      SMCLinkBytesIn:            0
      SMCLinkInOperations:       0
      SMCLinkBytesOut:           0
      SMCLinkOutOperations:      0
      TCP Connections:           0
      Link Receive Buffer Inuse: 0K
        64K   Buffer Inuse:      0K
SMC Link Group Information:
  SMCLinkGroupId: FB710600  PNetID: NETWORK3
    Redundancy: Full
    Link Group Receive Buffer Total: 3M
      64K   Buffer Total: 1M

    LocalSMCLinkId  RemoteSMCLinkId
    --------------  ---------------
    FB710601        72420601
    FB710602        72420602

  SMCLinkGroupId: FB710700  PNetID: NETWORK3
    Redundancy: Full
    Link Group Receive Buffer Total: 3M
      64K   Buffer Total: 1M

    LocalSMCLinkId  RemoteSMCLinkId
    --------------  ---------------
    FB710701        72420701
    FB710702        72420702
```

Example output for an OSAENTA interface:

```
OSA-Express Network Traffic Analyzer Information:
  OSA PortName: QDIO4101          OSA DevStatus:     Ready
    OSA IntfName: EZANTAQDIO4101  OSA IntfStatus:    Ready
    OSA Speed:    1000            OSA Authorization: Logical Partition
    OSAENTA Cumulative Trace Statistics:
      DataMegs:   0                     Frames:          8
      DataBytes:  760                   FramesDiscarded: 4
      FramesLost: 0
    OSAENTA Active Trace Statistics:
      DataMegs:   0                     Frames:          8
      DataBytes:  760                   FramesDiscarded: 4
      FramesLost: 0                     TimeActive:      8
    OSAENTA Trace Settings:           Status: On
      DataMegsLimit: 1024               FramesLimit:     2147483647
      Abbrev:        224                TimeLimit:       10080
      Discard:       ALL
    OSAENTA Trace Filters:            Nofilter: ALL
      DeviceID: *
      Mac:      *
      VLANid:   *
      ETHType:  *
      IPAddr:   *
      Protocol: *
      PortNum:  *
```

Report field descriptions:

DevName
The device name that is configured on the DEVICE statement.

DevType
The device type that is configured on the DEVICE statement.

DevNum
The device number that is configured on the DEVICE statement. This field is significant only for device types CTC, CLAW, LCS, and CDLC.

DevStatus
The device status. You can use this field if you are having activation problems with the device or interface. Table 7 describes the possible status values:

Table 7. Possible device status values

Device status	Description
Starting	A START of the device has been issued by the operator, and TCP/IP has sent an Activation request to the Data Link Control (DLC) layer.
Sent SETUP	DLC has acknowledged the TCP/IP Activation request, and TCP/IP has requested DLC to perform the initial I/O sequence with the device.
Enabling	DLC has acknowledged the TCP/IP Activation request, and TCP/IP has requested DLC to allow data connections to be established for the device.
Connecting	DLC has accepted the Initial I/O Sequence request.
Connecting2	The control connection for a CLAW device has been established, and the second connection (on which IP traffic is carried) is being established.
Negotiating	The initial I/O sequence with the device is complete, and TCP/IP is performing additional link-layer initialization.
Ready	The initialization sequence with the device is complete. The device is now ready.

Table 7. Possible device status values (continued)

Device status	Description
Deactivating	DLC has performed the first stage of an orderly device deactivation.
Not active	The device is not active. (The device has never been started, or has been stopped after having been started.)

Configured router status (CfgRouter)
The router attribute (PRIROUTER/SECROUTER/NONROUTER) that is specified on the DEVICE or INTERFACE statement. This field is significant only for MPCIPA devices and for IPAQENET and IPAQENET6 interfaces. This field is not displayed if virtual MAC (VMAC) has been configured.

Actual router status (ActRouter)
The router attribute in effect for the device or interface. It matches the configured router status unless the configured value conflicted with the configured value of another stack that is sharing the adapter. This field is significant only for MPCIPA devices and for IPAQENET and IPAQENET6 interfaces. The router attribute is determined when the device or interface starts. This field is not displayed if virtual MAC (VMAC) has been configured.

Virtual MAC address (VMACAddr)
The virtual local hardware address for this link or interface. This field is significant for the following types of devices:

- An IPAQENET link or interface, or an IPAQENET6 interface, where a virtual MAC address was configured by specifying the VMAC parameter. The value `n/a` is displayed if VMAC was configured but a virtual MAC address was not configured.
- An RNIC interface that is created when an IPAQENET or IPAQENET6 interface specified SMCR. The VMAC address is provided by VTAM, and is not configured on the INTERFACE profile statement. `VMACAddr` is displayed for active RNIC interfaces only.

Virtual MAC origin (VMACOrigin)
Displays whether the virtual MAC address (VMACAddr) was configured on the LINK or INTERFACE statement, or was generated by OSA-Express. This field is significant only for IPAQENET links or interfaces and for IPAQENET6 interfaces for which virtual MAC (VMAC) has been configured. The following list shows the possible values:

Cfg The virtual MAC address is configured on the LINK statement or on the INTERFACE statement.

OSA The virtual MAC address has been generated by OSA-Express.

Virtual MAC router status (VMACRouter)
Displays the virtual MAC router attribute that was specified on the LINK or INTERFACE statement using the ROUTEALL or ROUTELCL keywords. This field is significant only for IPAQENET links or interfaces and for IPAQENET6 interfaces for which virtual MAC (VMAC) has been configured. See OSA Routing information in the z/OS Communications Server: IP Configuration Guide for more information about Virtual MAC router attributes. The following list shows the possible values:

All Corresponds to the ROUTEALL keyword. Indicates that all IP traffic destined to the Virtual MAC is forwarded by the OSA-Express device to the TCP/IP stack

Local Corresponds to the ROUTELCL keyword. Indicates that only traffic destined to the Virtual MAC whose destination IP address is registered with the OSA-Express device by this TCP/IP stack is forwarded by the OSA-Express device.

Configured packing status (CfgPacking)
This field is the packing attribute (Packed/None) specified on the DEVICE statement. This field is significant only for CLAW devices.

Actual packing status (ActPacking)
This field indicates the packing attribute in effect for the device. It will match the configured packing status unless packing was requested and the device does not support packing. This field is significant only for a CLAW device and is determined when the device starts.

LnkName/IntfName
This field is the link name or the interface name of the particular device or interface being displayed. If the device or interface is configured, this field is the link name configured in the LINK statement or the interface name configured in the INTERFACE statement. If the link name or interface name is dynamically generated by the TCP/IP stack, this field is the dynamically generated link name or interface name.

LnkType/IntfType
This field is the link type or the interface type of the particular device or interface being displayed. If the device or interface is configured, this field is the link type configured in the LINK statement or the interface type configured in the INTERFACE statement. If the link type or interface type is dynamically generated by the TCP/IP stack, this field is the dynamically generated link type or interface type. A 10 GbE RoCE Express interface has an IntfType value equal to RNIC.

LnkStatus/IntfStatus
This field is the link or interface status. The following list describes the possible link or interface status values:

Link/Interface status	Description
Ready	A START of the device/interface has been issued by the operator, and TCP/IP has been sent an Activation request to the Data Link Control (DLC) layer.
Not Active	The link or interface is not active. There is no command to start a link; link activation is normally performed during START device processing. Interface activation is performed during START interface processing. A link or interface is marked Not Active when: • The device or interface has not yet been started. • A failure has been encountered during the link or interface activation phase. (Such a failure produces an error message to the operator console, indicating the cause.)
DAD Pend	Duplicate Address Detection (DAD) for the link-local address is in progress on the IPv6 interface.

PortName
The name of the OSA-Express port. This is the value that was specified on the PORTNAME parameter on the INTERFACE statement. This field is significant only for IPAQENET and IPAQENET6 interfaces.

Datapath
The subchannel address that is associated with the TRLE definition. This value is one of the addresses that was specified on the DATAPATH parameter on the TRLE definition and is the subchannel address that VTAM assigned to this interface. If VTAM has not yet assigned a subchannel address to this interface, then this field contains the value `Unknown`. This field is significant only for IPAQENET, IPAQIDIO, IPAQENET6, and IPAQIDIO6 interfaces.

DatapathStatus
The datapath status. This field is significant only for IPAQENET, IPAQIDIO, IPAQENET6 , and IPAQIDIO6 interfaces. This field contains information that is useful if the interface is not activating correctly. See Table 7 on page 123 for possible status values.

CHPIDType
The CHPID type that is associated with this interface. This value was specified on the CHPIDTYPE parameter on the INTERFACE statement (or was generated by the stack) for OSA-Express QDIO interfaces. This field is significant only for IPAQENET and IPAQENET6 interfaces. The possible values and meanings are:

OSD A CHPID with connectivity to the external data network

OSX A CHPID with connectivity to the intra ensemble data network

OSM A CHPID with connectivity to the intra node management network

IPAddr
The IP address and optional number of bits (leftmost significant bits), which identifies the subnet mask of the interface. This value was specified on the IPADDR parameter on the INTERFACE statement. This field is significant for IPAQENET interfaces only. If the interface is defined with the TEMPIP keyword, the IP address is 0.0.0.0.

CHPID
The CHPID value that is associated with this interface. For HiperSockets, this value was specified on the CHPID parameter on the INTERFACE statement for predefined HiperSockets interfaces or is the value obtained from VTAM for HiperSockets interfaces that are created by dynamic XCF definitions. For OSA-Express QDIO interfaces that are configured with CHPIDTYPE OSX, this value was specified on the CHPID parameter. This field is significant only for IPAQIDIO6, IPAQENET, or IPAQENET6 interfaces.

SMCR
Indicates whether this interface can be used for new TCP connections for Shared Memory Communications over Remote Direct Memory Access (SMC-R) for external data network communications. This value was specified on the SMCR or NOSMCR parameter on the INTERFACE statement for OSA-Express QDIO interfaces. This field is significant only for IPAQENET and IPAQENET6 interfaces. The possible values and meanings are:

YES Indicates that this interface can be used for new TCP connections to communicate with other stacks on the external data network by using SMC-R.

For an inactive interface, Yes means the interface is configured for SMC-R. An interface is configured for SMC-R when the SMCR parameter was specified on the INTERFACE statement or is in effect by default.

For an active interface, Yes means the interface is enabled for SMC-R. An interface is enabled for SMCR when the following conditions are true:

- The SMCR parameter was specified on the INTERFACE statement or is in effect by default.
- The TCP/IP stack is enabled for SMC-R. A TCP/IP stack is enabled for SMC-R when the SMCR parameter was specified on the GLOBALCONFIG statement.
- A physical network ID value was configured in HCD for this interface.

NO Indicates that this interface cannot be used for new TCP connections to communicate with other stacks on the external data network by using SMC-R. The NOSMCR parameter was specified on the INTERFACE statement.

Disabled (*reason_text*)
Indicates that this interface was configured to communicate with other stacks on the external data network by using SMC-R, but SMC-R cannot be used for new TCP connections because of one of the following reasons:

No PNetID
No physical network ID value was configured in HCD for this interface. The physical network ID is learned during interface activation so this reason text is only valid for an active interface.

GLOBALCONFIG NOSMCR
The TCP/IP stack was not enabled for SMC-R.

No Subnet Mask
No subnet mask was configured on the INTERFACE statement for this interface.

PFID The Peripheral Component Interconnect Express (PCIe) function ID (PFID) value that defines a "RoCE Express". This value is specified on the SMCR PFID parameter of the GLOBALCONFIG TCP/IP profile statement. This field is significant only for RNIC interfaces that are created when an IPAQENET or IPAQENET6 interface specifies SMCR or takes SMCR as the default setting.

PortNum
Specifies the port number that is used for the associated PFID.

- When PFID represents an IBM 10 GbE RoCE Express feature, the PortNum value is specified with the PFID value on the SMCR parameter of the GLOBALCONFIG statement in the TCP/IP profile.
- When PFID represents an IBM 10 GbE RoCE Express2 feature, the PortNum value is the port number configured for the PFID in the Hardware Configuration Definition (HCD). The port number is learned by VTAM during activation of the PFID and might be different from the value coded for PORTNUM for this PFID on the GLOBALCONFIG SMCR statement.

PNetID
The physical network ID value that is configured in HCD for an interface. This field is significant only for IPAQENET interfaces defined by using the INTERFACE statement, IPAQENET6 interfaces, and active RNIC interfaces.

Interface	Value
Active OSD interfaces	• If a physical network ID is configured in HCD for the OSD interface, the configured value is displayed. • If no physical network ID is configured in HCD for the OSD interface, the value*None* is displayed. If the OSD interface is configured to use SMCR, a value of Disabled (No PNetID) is displayed in the SMCR field.
Active OSX interfaces	The reserved value IEDN is used.
Active RNIC interfaces	The value that is configured in HCD for the RNIC interface is displayed. If no value is configured in HCD, activation of the RNIC interface fails.

TRLE The name of the TRLE that is associated with this interface. This field is significant only for MPCPTP6, IPAQIDIO, IPAQIDIO6 and RNIC interfaces.

For MPCPTP6 interfaces
This value was specified on the TRLE parameter of the INTERFACE statement for predefined MPC interfaces or is the value obtained from VTAM for MPC interfaces that are created by dynamic XCF definitions.

For IPAQIDIO or IPAQIDIO6 interfaces
This value is obtained from VTAM for IPAQIDIO or IPAQIDIO6 interfaces that INTERFACE definitions create. This value is displayed for active interfaces only.

For RNIC interfaces
This value is obtained from VTAM for RNIC interfaces that are created for PFIDs configured on the GLOBALCONFIG statement when SMC-R is enabled. This value is displayed only when the PFIDStatus value of the interface is Starting or Ready.

PFIDStatus
This field is the RNIC interface PFID status. The following list describes several status values:

PFID status	Description
Ready	The initialization sequence with the PFID is complete. The PFID is ready.
Not Active	The PFID is not active. The PFID has never been started, or has been stopped after having been started.
Starting	A START command of the PFID has been issued, and TCP/IP has sent an Activation request to the Data Link Control (DLC) layer.

PFID status	Description
Deactivating	DLC has performed the first stage of an orderly PFID deactivation.

GidAddr
The group identifier (GID) value that is associated with the RNIC interface. This value is obtained from VTAM for RNIC interfaces that are created for PFIDs configured on the GLOBALCONFIG statement when SMC-R is enabled. This value is displayed for active RNIC interfaces only.

NetNum
The adapter number that was specified on the LINK statement. This field is significant only for CTC and LCS links.

QueSize
The queue size represents the number of outbound packets for this link or interface that are queued and waiting for ARP or neighbor resolution. This field is significant only for links on ATM and LCS devices and for IPAQENET6 interfaces.

Speed Indicates the interface speed (in million bits per second) that is reported by the device. This field is significant only for IPAQENET links or interfaces, ATM and IPAQTR links, IPAQENET6 interfaces, and RNIC interfaces, and only if the link or interface is active.

Gen Indicates the generation level for the "RoCE Express" feature, and is significant only if the interface is active. Possible values are:

RoCE Express
The feature is an IBM 10 GbE RoCE Express feature.

RoCE Express2
The feature is an IBM 10 GbE RoCE Express2 feature.

MAC address order (MacAddrOrder)
Indicates the canonical option (CANON/NONCANON) that is specified on the LINK statement. This field is significant only for token-ring links.

SrBridgingCapability
Indicates whether the link supports source route bridging. This field is significant only for token-ring links.

IpBroadcastCapability
Indicates whether the link is broadcast capable. This field is significant only for links on LCS and MPCIPA devices and IPAQENET interfaces.

ArpBroadcastType
Indicates the ARP broadcast option (ALLRINGSBCAST/LOCALBCAST) that is specified on the LINK statement. This field is significant only for token-ring links.

ArpOffload
Indicates whether ARP processing is being offloaded to the adapter. This field is significant only for active links that support ARP offload.

ArpOffloadInfo
Indicates whether the adapter reports ARP offload data to TCP/IP. If so, then the ARP cache data can be displayed with the Netstat ARP/**-R** report even though the ARP function is being offloaded. This field is significant only for active links that support ARP offload.

Routing Parameters

This section displays routing information for IPv4 links that are defined with the DEVICE and LINK profile statements.

MTU Size

This value is determined in one of the following ways:

- If you are using OMPROUTE and the link is defined to OMPROUTE, the value might have been specified on the MTU parameter on the OSPF_INTERFACE, RIP_INTERFACE, or INTERFACE statement for the link. If one of these OMPROUTE statements was specified for the link but the MTU parameter was not specified, OMPROUTE sets the **MTU Size** value to 576.
- If you are using OMPROUTE, the link is not defined to OMPROUTE, and OMPROUTE is not configured to ignore undefined links, OMPROUTE sets the **MTU Size** value to 576.
- If you are not using OMPROUTE (or if the link is not defined to OMPROUTE), OMPROUTE is configured to ignore undefined links, and a BSDROUTINGPARMS profile statement was specified for the link, then the **MTU Size** value is configured using the BSDROUTINGPARMS profile statement MTU parameter.
- If none of the previously described methods provides an MTU Size value or if the MTU Size parameter does not apply to this link, then the value `n/a` is displayed.

To determine the MTU Size value that is being used by the stack for a link, see the ActMtu field for the link. To determine the MTU Size value that is being used for a route over this link, see the MTU field on the Netstat ROUTe/**-r** report.

Metric The routing metric that is associated with the link. This value is determined in one of the following ways:

- If you use OMPROUTE and the link is defined to OMPROUTE using the OSPF_INTERFACE statement, then the Metric value is configured using the Cost0 parameter on the OSPF_INTERFACE statement. If the Cost0 parameter is not specified, then OMPROUTE sets the value to 1.
- If you use OMPROUTE and the link is defined to OMPROUTE using the RIP_INTERFACE statement, then the Metric value is configured using the In_Metric parameter on the RIP_INTERFACE statement. If the In_Metric parameter is not specified, then OMPROUTE sets the value to 1.
- If you use OMPROUTE and the link is defined to OMPROUTE using the INTERFACE statement or if the link is not defined to OMPROUTE and OMPROUTE is not configured to ignore undefined links, then OMPROUTE sets the Metric value to 0.
- If you are not using OMPROUTE (or if the link is not defined to OMPROUTE) and OMPROUTE is configured to ignore undefined links, the Metric value is configured in one of the following ways:
  - For dynamic XCF links, the Metric value is configured using the cost_metric value of the DYNAMICXCF parameter on the IPCONFIG profile statement.

- If a BSDROUTINGPARMS profile statement was specified for the link, the Metric value is configured using the cost_metric parameter of BSDROUTINGPARMS profile statement.

- If none of the previously described methods provided a Metric value, the stack sets the value to 0

DestAddr

The destination address applies to point-to-point links only and is the IP Address of the other side of the point-to-point link. This value is determined in one of the following ways:

- If you are using OMPROUTE and the link is defined to OMPROUTE, then the value is configured using the Destination_Addr parameter on the OSPF_INTERFACE, RIP_INTERFACE, or INTERFACE statement. If the Destination_Addr parameter is not specified, then OMPROUTE sets the value to 0.
- If you are using OMPROUTE but the link is not defined to OMPROUTE and OMPROUTE is not configured to ignore undefined links, then OMPROUTE sets the value to 0.
- If you are not using OMPROUTE (or if the link is not defined to OMPROUTE), OMPROUTE is configured to ignore undefined links, and a BSDROUTINGPARMS profile statement was specified for the link, then the value is configured using the dest_addr parameter for this statement.
- If none of these methods has provided a destination address value, then the stack sets a default value in one of the following ways:
  - For links other than point-to-point links, the value is set to 0.
  - For point-to-point links, the value is set as follows:
    - If routes are defined over the link, then the stack sets the value using the gateway address of an indirect route or the destination address of a direct host route.
    - If no routes are defined over the link, then the value is set to 0.

SubnetMask

The subnet mask that is associated with the link. This value is determined in one of the following ways:

- If you are using OMPROUTE and the link is defined to OMPROUTE, then the value is configured using the Subnet_Mask parameter on the OSPF_INTERFACE, RIP_INTERFACE, or INTERFACE statement.
- If you are using OMPROUTE, the link is not defined to OMPROUTE, and OMPROUTE is not configured to ignore undefined links, then OMPROUTE assigns a value based on the IP address that is assigned to the link.
- If you are not using OMPROUTE (or if the link is not defined to OMPROUTE) and OMPROUTE is configured to ignore undefined links, then the value is assigned in one of the following ways:
  - For dynamic XCF links, the value is configured using the *subnet_mask* or *num_mask_bits* value of the DYNAMICXCF parameter on the IPCONFIG profile statement.

- For dynamic VIPA links, the value is configured using the *address_mask* parameter on the VIPADEFINE, VIPABACKUP, or the VIPARANGE profile statement.
- If a BSDROUTINGPARMS profile statement was specified for the link, the value is configured using the *subnet_mask* parameter for the BSDROUTINGPARMS profile statement.

• If none of the previously described methods provides a subnet mask value, then the stack assigns a value based on the IP address that is assigned to the link.

Packet trace settings

Use the PKTTRACE statement to control the packet tracing facility in TCP/IP. You can use this statement to select IP packets as candidates for tracing and subsequent analysis. An IP packet must meet all of the conditions specified on the statement for it to be traced.

Protocol

The protocol number from the PROT keyword of the PKTTRACE command or * if not specified.

TrRecCnt

The number of packets traced for this PKTTRACE command.

PckLength

The value of the ABBREV keyword of the PKTTRACE command or FULL to capture the entire packet.

SrcPort

The port number from the SRCPORT parameter of the PKTTRACE command or profile statement. If an asterisk (*) is displayed, then either a port number was not specified for the SRCPORT parameter, or the PORTNUM parameter was also specified. If both the SrcPort and PortNum fields contain a value *, then the IP packets are not being filtered by the source port.

DestPort

The port number from the DESTPORT parameter of the PKTTRACE command or profile statement. If an asterisk (*) is displayed, then either a port number was not specified for the DESTPORT parameter, or the PORTNUM parameter was also specified. If both the DestPort and PortNum fields contain an asterisk (*), then the IP packets are not being filtered by destination port.

PortNum

The port number from the PORTNUM parameter of the PKTTRACE command or profile statement. If an asterisk (*) is displayed, then either a port number was not specified for the PORTNUM parameter, or the DESTPORT or SRCPORT parameters were also specified. If the PortNum, SrcPort, and DestPort fields all contain an asterisk (*), then the IP packets are not being filtered by port.

Discard

The value specified for the PKTTRACE DISCARD parameter. A numerical value is a discard reason code. The value NONE, which is the default, indicates that only packets that were delivered are being traced. The value ALL indicates that only discarded IP

packets are being traced. The value asterisk (*) indicates that discarded IP packets and delivered IP packets are being traced.

IpAddr
The IP address from the IPADDR keyword of the PKTTRACE command or asterisk (*) if not specified.

SubNet
The IP subnet mask from the SUBNET keyword of the PKTTRACE command or asterisk (*) if not specified.

ATM Specific
This section contains information about ATM links:

ATM PortName
The PORTNAME value specified on the DEVICE statement.

For an ATM link configured as a Permanent Virtual Circuit (PVC), the following additional fields are displayed:

ATM PVC Name
The name of the PVC specified on the ATMPVC statement.

PVC Status
This field can have the following values:

ATM PVC status	Description
Not Active	The PVC is not active. There is no command to start a PVC; PVC activation is normally attempted during START device processing. A PVC is marked Not Active when: • The device has not yet been started. • The remote side of the PVC is not active. • A failure has been encountered during the PVC activation phase. (Such a failure produces an error message to the operator.)
Ready	The initialization sequence for the PVC is complete. The PVC is now ready for use.

For an ATM link configured as a Switched Virtual Circuit (SVC), the following additional fields are displayed:

ATM LIS Name
The name of the ATM Logical IP Subnet (LIS) specified on the ATMLIS statement.

SubnetValue
The subnet_value specified on the ATMLIS statement.

SubnetMask
The subnet_mask specified on the ATMLIS statement.

DefaultMTU
The DFLTMTU value specified on the ATMLIS statement.

InactvTimeOut
The INACTVTO value specified on the ATMLIS statement.

MinHoldTime
The MINHOLD value specified on the ATMLIS statement.

MaxCalls
The maximum number of SVCs that can be active for this ATMLIS.

CachEntryAge
The CEAGE value specified on the ATMLIS statement.

ATMArpReTry
The ARPRETRIES value specified on the ATMLIS statement.

ATMArpTimeOut
The ARPTO value specified on the ATMLIS statement.

PeakCellRate
The PEAKCR value specified on the ATMLIS statement.

NumOfSVCs
The number of currently active SVCs for this ATMLIS.

BearerClass
The BEARERCLASS value specified on the ATMLIS statement.

For an ATM SVC link that is configured with an ATM ARP server, the following additional fields are displayed:

ATMARPSV Name
The name of the ATM ARP server specified on the ATMARPSV statement.

VcType
Indicates whether the ATM ARP server connection is a PVC or an SVC. This value comes from the ATMARPSV statement.

ATMaddrType
The ATM address type specified on the ATMARPSV statement. The only supported value is NSAP.

ATMaddr
The ATM address of the ATM ARP server. If the connection to the ATM ARP server is an SVC, then this is the physical_addr value specified on the ATMARPSV statement. For a PVC connection to the ATM ARP server, this is the remote ATM address learned by TCP/IP when the PVC was activated.

IpAddr
The IP address of the ATM ARP server. If the connection to the ATM ARP server is an SVC, then this is the ip_addr value specified on the ATMARPSV statement. For a PVC connection to the ATM ARP server, this is the remote IP address learned by TCP/IP when the PVC was activated.

Multicast Specific
This section displays multicast information for the link or interface.

Multicast Capability
Indicates whether the link or interface is multicast capable.

- For point-to-point interfaces, the value of this field is always `Yes`.
- For LCS and MPCIPA links and IPAQENET, IPAQENET6, IPAQIDIO, and IPAQIDIO6 interfaces, the multicast capability is known only after the link or interface is active. If the link or interface is not active, the multicast capability value is `Unknown`.
- For IPAQIQDX6 interfaces, the value of this field is always `ND only`, the interface is multicast capable but multicast processing is used only for neighbor discovery.

If the link or interface is multicast capable then the following additional fields are displayed for each multicast group for which the link or interface is receiving data. There is no limit to the number of multicast groups for which a link or interface can receive data. For IPAQIQDX6 interfaces, the multicast groups indicate only neighbor discovery processing.

Group The multicast group address for which this link or interface is receiving data.

RefCnt
The number of applications that are receiving data for this multicast group.

SrcFltMd
The source filter mode indicates the type of multicast source IP address filtering that has been configured at the interface. Source IP address filtering can be done by either an IGMPv3 or MLDv2-capable multicast router on a per interface basis or by the host on a per socket basis. The host provides its source filter mode and source IP address filter list for each multicast group that an application has joined on the interface with any IGMPv3 and MLDv2-capable multicast routers that are connected to the interface. This permits IGMPv3-capable and MLDv2-capable multicast routers to send only multicast packets that have been requested by at least one host on the subnet to which the interface is connected. If the multicast packets are not filtered by an IGMPv3-capable or MLDv2-capable multicast router (for example the router does not support IGMPv3 or MLDv2), or if there are multiple hosts on the local area network that have either a different source filter mode or a different source IP address filter list for a given multicast group, the host uses the source IP address filter information to ensure that each application receives only packets that it has requested.

The value is either Include or Exclude. A source filter applies only to incoming multicast data. The source filter applies to all the IP addresses in the SrcAddr fields for the associated multicast group address and the link or the interface. The source filter mode and the corresponding source filter IP addresses are configured by applications for their UDP or RAW sockets that have joined the multicast group for this interface. See the information about Designing multicast programs in the z/OS Communications Server: IP Sockets Application Programming Interface Guide and Reference for details about how applications configure these values for a socket.

Include
Indicates that the interface or link receives only multicast datagrams that have a source IP address that matches an IP address indicated in the SrcAddr field.

Exclude
Indicates either that the source filter function is not active or that the interface or link receives only multicast datagrams that have a source IP address that does not match an IP address indicated in the SrcAddr field. If the source filter function is not active or if the source filter

function is active but no SrcAddr value is set, the SrcAddr field contains the value None.

SrcAddr
Source address information for the socket.

ipaddr The source IP address that is used in conjunction with the SrcFltMd value to determine which incoming multicast datagrams are received by the interface.

None This value is displayed only when the source filter function is not configured for the interface or when the source filter mode is Exclude but there was no intersection of excluded source IP addresses among the sockets for the same multicast group address and interface.

Source VIPA interface (SrcVipaIntf)
The name of the VIPA that is used for this interface if source VIPA is in effect. This is the value that was specified on the SOURCEVIPAINTERFACE parameter on the INTERFACE statement. This field is significant only for IPAQENET, IPAQENET6, IPAQIDIO6, and MPCPTP6 interfaces.

Duplicate address detection (DupAddrDet)
The DUPADDRDET value specified on the INTERFACE statement. This field is significant only for IPAQENET6 interfaces.

Interface ID (IntfID)
The INTFID value specified on the INTERFACE statement. This field is significant only for IPAQENET6, IPAQIDIO6, and MPCPTP6 interfaces.

MAC address (MacAddress)
The local hardware address for this link or interface. This field is significant only for links on LCS devices and for IPAQENET6 interfaces. This field is displayed only if the link or interface is active and if virtual MAC (VMAC) is not configured.

Router Hop Limit (RtrHopLimit)
The value that is placed in the Hop Count field of the IP header for outgoing IP packets. This value was obtained from a received router advertisement and is significant only for IPAQENET6 interfaces. This field is displayed only when a nonzero hop limit value was received in a router advertisement over this interface and IGNOREROUTERHOPLIMIT is not configured on the IPCONFIG6 profile statement.

CfgMtu
The MTU value that was configured on the INTERFACE statement (or `None` if an MTU value was not configured). This field is significant only for IPAQENET, IPAQENET6, or IPAQIDIO interfaces.

ActMtu
The largest MTU that is supported by an active link or interface. If the link or interface is inactive, then this field displays Unknown. This field is significant for all links and interfaces except virtual ones.

VLANid
This field is significant only for IPAQENET links or interfaces, IPAQIDIO links, or IPAQENET6 and IPAQIDIO6 interfaces. This field indicates whether a virtual LAN ID was configured on the VLANID parameter on the LINK or INTERFACE profile statement. The following values can be displayed in this field:

None
This value indicates that the VLANID parameter was not specified on the LINK or INTERFACE profile statement for the interface. For an IPAQIDIO link or IPAQIDIO6 interface that is dynamically generated as part of dynamic XCF HiperSockets processing, this value indicates that the IQDVLANID parameter was not specified on the GLOBALCONFIG profile statement.

n/a
This value indicates that the VLANID parameter was specified on the LINK or INTERFACE profile statement, but the interface does not support VLAN IDs.

vlanid
If an OSA-Express device is active and supports virtual LAN IDs, this field indicates that all IP packets through this OSA-Express link or interface from this stack are being tagged with this VLAN ID. For an active HiperSockets link or interface that supports virtual LAN IDs, this field indicates that all IP packets through this HiperSockets link or interface from this stack are associated with this VLAN ID.

VLANpriority
This field is significant only for active IPAQENET links or interfaces or IPAQENET6 interfaces. This field indicates whether all IP packets through this OSA-Express link or interface from this stack are being tagged with a VLAN priority. The possible values are:

Enabled
Indicates that all IP packets through this OSA-Express link or interface are being tagged with a VLAN priority. See z/OS Communications Server: IP Configuration Reference for information about the SetSubnetPrioTosMask statement and details about how to configure VLAN priorities.

Disabled
Indicates that the OSA-Express link or interface supports VLAN priority, but currently no VLAN priority values are defined. If the VLANid field displays `None` or `n/a`, all IP packets through this OSA-Express link or interface are not VLAN tagged. All other values indicate that all IP packets are VLAN tagged, but only with VLAN IDs, not with VLAN priority.

Unknown
Indicates that the VLAN priority tagging support for the OSA-Express is unknown because the link or interface is not yet active.

DynVLANRegCfg
This field is significant only for IPAQENET links or interfaces and IPAQENET6 interfaces. This field is displayed only under the following conditions:

- The link or interface is not yet active and a VLAN ID was specified.
- The link or interface is active, a VLAN ID value was specified, and the OSA-Express feature has accepted the VLAN ID value.

This field indicates whether dynamic VLAN ID registration was configured on the LINK or INTERFACE statement. The possible values are:

Yes
Indicates that the DYNVLANREG parameter was specified on the LINK or INTERFACE statement.

No Indicates that the NODYNVLANREG parameter was specified on the LINK or INTERFACE statement or is in effect by default.

DynVLANRegCap

This field indicates whether the OSA-Express feature that is represented by the LINK or INTERFACE statement is capable of supporting dynamic VLAN ID registration.This field is significant only for IPAQENET links or interfaces and IPAQENET6 interfaces. This field is displayed only under the following conditions:

- The link or interface is not yet active and a VLAN ID was specified.
- The link or interface is active, a VLAN ID value was specified, and the OSA-Express feature has accepted the VLAN ID value.

The possible values are:

Yes
Indicates that the OSA-Express feature is capable of supporting dynamic VLAN ID registration.

No Indicates that the OSA-Express feature is not capable of supporting dynamic VLAN ID registration.

Unknown
Indicates that the dynamic VLAN ID registration capability of the OSA-Express feature is unknown because the link or interface is not yet active.

ChecksumOffload
This field is significant only for active IPAQENET and IPAQENET6 links or interfaces. This field indicates whether the checksum offload support is in effect and is displayed only when the link or interface is active. The possible values are:

Yes Indicates that the checksum offload function is enabled on the adapter for this interface.

No Indicates that the checksum offload function is not enabled on the adapter for this interface.

Unsupported
Indicates that the checksum offload function is not supported on the adapter for this interface.

SegmentationOffload
This field is significant only for active IPAQENET and IPAQENET6 links or interfaces. This field indicates whether the TCP segmentation offload support is in effect and is displayed only when the link or interface is active. Possible values are:

Yes Indicates that the segmentation offload function is enabled on the adapter for this interface.

No Indicates that the segmentation offload function is not enabled on the adapter for this interface.

Unsupported
Indicates that the segmentation offload function is not supported on the adapter for this interface.

SecClass

This field identifies the security class value for IP filtering. This field applies to all IPv4 and IPv6 interfaces except virtual and loopback, but the value is in effect only if the IPSec function is active for the applicable IP version. You can use the Netstat CONFIG/**-f** command to determine whether IPSec is active. Valid security class values are in the range 1 - 255. The displayed value was defined by one of the following methods:

- By the SECCLASS parameter on the LINK or INTERFACE profile statement
- For dynamic XCF interfaces, by the DYNAMICXCF SECCLASS subparameter on the IPCONFIG or IPCONFIG6 profile statement
- For OSM interfaces, by the TCP/IP stack's automatic configuration of the interface, or by the IPSECURITY OSMSECCLASS subparameter on the IPCONFIG6 profile statement

MonSysplex

Indicates whether the status of this link or interface is being monitored by Sysplex Autonomics. This field is significant for all IPv4 links or interfaces except virtual, loopback, and all dynamically configured links, and for all IPv6 interfaces except virtual, loopback, and all dynamically configured interfaces.

Yes Indicates that the status of this link or interface is being monitored by Sysplex Autonomics. It is configured by specifying the MONSYSPLEX keyword on the LINK or INTERFACE profile statement and specifying the MONINTERFACE keyword for the SYSPLEXMONITOR parameter on the GLOBALCONFIG profile statement. If DYNROUTE keyword is also coded on the GLOBALCONFIG SYSPLEXMONITOR profile statement, then the presence of dynamic routes over this link or interface is also monitored.

Configured

Indicates that this link or interface was configured to be monitored by Sysplex Autonomics. It was configured by specifying the MONSYSPLEX keyword on the LINK or INTERFACE profile statement, but the link or interface is not currently being monitored because the MONINTERFACE keyword was not specified on the SYSPLEXMONITOR parameter on the GLOBALCONFIG profile statement.

No Indicates that the status of this link or interface is not being monitored by Sysplex Autonomics because the MONSYSPLEX keyword was not specified on the LINK or INTERFACE profile statement.

Isolate

This field is significant only for IPAQENET interfaces (defined using the INTERFACE statement) and for IPAQENET6 interfaces. This field ndicates whether the OSA-Express device is prevented from routing packets directly to another stack that is sharing the OSA-Express connection. For more details, see OSA-Express connection isolation information in z/OS Communications Server: IP Configuration Guide.

No Indicates that this interface is eligible for OSA-Express direct routing. Therefore, the OSA-Express device can route packets

directly to another stack that is sharing the OSA-Express connection (as long as the interface from the other stack is also eligible for direct routing).

Yes Indicates that this interface is not eligible for OSA-Express direct routing. Therefore, the OSA-Express device cannot routing packets directly to another stack that is sharing the OSA-Express connection.

OptLatencyMode
This field is significant only for IPAQENET interfaces (defined using the INTERFACE statement) and for IPAQENET6 interfaces. The field indicates whether optimized latency mode (OLM) was configured for this OSA-Express interface. For more information about optimized latency mode, see optimized latency mode information in z/OS Communications Server: IP Configuration Guide. Possible values are:

No Indicates that the OSA-Express interface is not configured with optimized latency mode.

Yes
Indicates that the OSA-Express interface is configured with optimized latency mode. Optimized latency mode optimizes interrupt processing for both inbound and outbound data.

Disabled
Indicates that the OSA-Express interface was configured with optimized latency mode, but the function could not be enabled when the interface was activated. The most likely reason is that the OSA-Express interface does not support this function.

IQDMultiWrite
This field is significant only for active HiperSockets devices or interfaces. This field indicates whether the HiperSockets multiple write facility is currently being used for the device or interface. To configure the stack to use the HiperSockets multiple write facility, specify the IQDMULTIWRITE parameter on the GLOBALCONFIG profile statement. The possible values are:

Enabled
Indicates that the HiperSockets multiple write facility is currently being used for the device or interface.

Enabled (ZIIP)
Indicates that the HiperSockets multiple write facility is currently being used for the device or interface. Additionally, CPU cycles that are associated with the HiperSockets multiple write facility are to be displaced to an available zIIP.

Disabled
Indicates that the HiperSockets multiple write facility is not currently being used for the device or interface.

Unsupported
Indicates that the IBM System z environment does not support the HiperSockets multiple write facility.

ReadStorage
This field is significant only for active IPAQENET and IPAQIDIO links or

interfaces, IPAQTR links, and for IPAQIDIO6 and IPAQENET6 interfaces. This field indicates the amount of storage (in kilobytes) that is being used for read processing.

InbPerf
This field is significant only for IPAQENET links or interfaces, IPAQTR links, and IPAQENET6 interfaces. This field indicates how frequently the adapter interrupts the host. This field indicates how the processing of inbound traffic is performed. If the interface is not active, then this field shows the configured value. If the interface is active, then this field shows the value that is in effect. The possible values are:

Balanced
Indicates that the adapter is to use a static interrupt-timing value that strikes a balance between MinCPU and MinLatency.

Dynamic
This setting is significant only for IPAQENET links, and IPAQENET and IPAQENET6 interfaces. It indicates that the stack and the adapter are to dynamically update the frequency with which the adapter interrupts the host for inbound traffic.

WorkloadQueueing
This field is displayed only for IPAQENET and IPAQENET6 interfaces. It indicates whether QDIO inbound workload queueing is enabled. Possible values are:

Yes QDIO inbound workload queueing is in effect. The QDIO interface is defined using the INTERFACE statement with INBPERF DYNAMIC WORKLOADQ specified.

No QDIO inbound workload queueing is not in effect. The QDIO interface is defined using the INTERFACE statement with INBPERF DYNAMIC or INBPERF DYNAMIC NOWORKLOADQ specified.

Unsupported
QDIO inbound workload queueing was requested on the INTERFACE statement but the OSA-Express interface does not support it. QDIO inbound workload queueing is supported on OSA-Express3 or later features on an IBM System z10 GA3 or later CPC.

MinCPU
Indicates that the adapter is to use a static interrupt-timing value that minimizes host interrupts, and therefore minimizes host CPU consumption.

MinLatency
Indicates that the adapter is to use a static interrupt-timing value that minimizes latency delay by more aggressively presenting received packets to the host.

TempPrefix
This field is significant only for IPAQENET6 interfaces with stateless address autoconfiguration enabled. One or more TempPrefix fields are displayed. Together the TempPrefix fields indicate the set of prefixes for which temporary IPv6 addresses can be generated, if temporary addresses

are enabled on the IPCONFIG6 statement. The set of prefixes is specified on the TEMPPREFIX parameter on the INTERFACE statement. The possible values displayed are:

All IPv6 temporary addresses are generated for all prefixes that are learned from a router advertisement over this interface. This is the default.

Disabled
Autoconfiguration of temporary addresses for the interface is disabled because duplicate addresses were detected. Temporary addresses are not generated for this interface.

None Temporary addresses are not generated for this interface.

IPv6 prefix/prefix length
IPv6 temporary addresses are generated for all prefixes that are learned from a router advertisement over this interface and that are included in one of the prefixes in this prefix list.

Link/Interface Statistics
This section is significant for all links and interfaces except virtual ones. The following statistical information is displayed:

BytesIn
Number of bytes received over an interface.

Inbound Packets
The number of unicast inbound packets received over an interface. This value applies to all links and interfaces except for RNIC interfaces.

Inbound Packets In Error
Number of inbound packets discarded because of an error validating the packet. This value applies to all links and interfaces except for RNIC interfaces.

Inbound Packets Discarded
Number of inbound packets discarded because of an out-of-storage condition. This value applies to all links and interfaces except for RNIC interfaces.

Inbound Packets With No Protocol
Number of inbound packets discarded because of an unknown protocol type. This value applies to all links and interfaces except for RNIC interfaces.

BytesOut
Number of bytes transmitted over an interface.

Outbound Packets
The number of unicast outbound packets transmitted over an interface. This value applies to all links and interfaces except for RNIC interfaces.

Outbound Packets In Error
Number of outbound packets discarded because of errors other than an out-of-storage condition. This value applies to all links and interfaces except for RNIC interfaces.

Outbound Packets Discarded
Number of outbound packets discarded because of an

out-of-storage condition. This value applies to all links and interfaces except for RNIC interfaces.

Inbound Operations
Number of Remote Direct Memory Access (RDMA) inbound operations processed across this interface. This value applies to RNIC interfaces only.

Outbound Operations
Number of RDMA outbound operations processed across this interface. This value applies to RNIC interfaces only.

SMC Links
Current number of SMC-R links between this stack and other stacks across this interface. This value applies to RNIC interfaces only.

TCP Connections
Number of TCP connections across all the SMC-R links that are associated with this interface. One or more TCP connections can use the same SMC-R link. This value applies to RNIC interfaces only.

Intf Receive Buffer Inuse
Amount of RMB storage in use by the TCP connections that are using the SMC-R links associated with this interface. This value applies to RNIC interfaces only.

IPv4 LAN Group Summary
The IPv4 LAN group summary lists links or interfaces that are takeover candidates for each other. The stack creates a LAN group when it detects redundant connectivity to a LAN. For each link or interface in the LAN group, this summary displays which link or interface owns ARP responsibility for that link or interface. The summary also displays which link or interface owns the ARP responsibility in the LAN group for any VIPAs.

IPv6 LAN Group Summary
The IPv6 LAN group summary lists interfaces that are takeover candidates for each other. The stack creates a LAN group when it detects redundant connectivity to a LAN. For each interface in the LAN group, this summary displays which interface owns neighbor discovery (ND) address resolution responsibility for that interface. The summary also displays which interface owns the ND Address Resolution responsibility in the LAN group for any VIPAs.

LanGroup
Identifies the LAN group. This identifier is assigned by the stack and represents a group of interfaces on the same LAN. This identifier is not a VLAN ID.

Name The link name configured on the LINK statement or the interface name configured on the INTERFACE statement.

Status The link or interface status. Valid values are Active or Not Active.

ArpOwner
The link or interface name that owns ARP responsibility for this link or interface in the LAN group. An active link or interface owns its ARP responsibility.

NDOwner
The interface name that owns neighbor discovery (ND) responsibility for this interface in the LAN group. An active interface owns its ND responsibility.

VipaOwner
Indicates whether the link or interface owns the ARP or ND responsibility for the VIPAs in the LAN group.

Associated IQDX Interface
The name of the Internal Queued Direct I/O extensions function (IQDX) interface that is associated with this OSX interface. This section is significant for OSX interfaces that use an IQDX interface for intraensemble data network (IEDN) connectivity. The following information is displayed:

IQDX Status
The status of the IQDX interface. See the description of the LnkStatus/IntfStatus field for the possible interface status values.

BytesIn
The number of bytes that have been received over the associated IQDX interface.

Inbound Packets
The number of unicast inbound packets that have been received over the associated IQDX interface.

BytesOut
The number of bytes that have been transmitted over the associated IQDX interface.

Outbound Packets
The number of unicast outbound packets that have been transmitted over the associated IQDX interface.

Associated RNIC Interface
The dynamic interface name that is generated for "RoCE Express" that this stack uses for SMC-R communications. This field is significant only for active IPAQENET and IPAQENET6 interfaces that specify SMCR or take SMCR as the default value.

SMC Link Information
The SMC link information. This section is displayed for each RNIC interface only when the SMC modifier or the SMCID/-U filter is specified. The following fields and statistics are displayed.

Guideline: An SMC-R link is uniquely identified by the combination of the VLAN number, local GID, local VMAC address, local QP number, remote GID, remote VMAC address, and remote QP number.

LocalSMCLinkId
The SMC-R link identifier that this TCP/IP stack dynamically creates to represent the link.

RemoteSMCLinkId
The SMC-R link identifier that the remote peer uses to represent the link. The value is provided to this TCP/IP stack during link activation.

SMCLinkGroupId
The group identifier that this TCP/IP stack dynamically creates to represent the SMC-R link group that includes this individual link.

VLANid
The virtual LAN ID for this SMC-R link. The value None is displayed if a virtual LAN ID has not been configured.

MTU The negotiated MTU size that is used for this SMC-R link.

LocalGid
The local GID value that is associated with this SMC-R link. This is the same information that is displayed in the `GidAddr` field.

LocalMACAddr
The local virtual MAC address that is associated with this SMC-R link.

LocalQP
The local queue pair (QP) value that is associated with this SMC-R link.

RemoteGid
The peer GID value that is associated with this SMC-R link.

RemoteMACAddr
The peer virtual MAC address that is associated with this SMC-R link.

RemoteQP
The peer QP value that is associated with this SMC-R link.

SMCLinkBytesIn
Number of inbound data bytes transferred across this SMC-R link.

SMCLinkInOperations
Number of Remote Direct Memory Access (RDMA) inbound operations processed across this SMC-R link.

SMCLinkBytesOut
Number of outbound data bytes transferred across this SMC-R link.

SMCLinkOutOperations
Number of RDMA outbound operations processed across this SMC-R link.

TCP Connections
Number of TCP connections across this SMC-R link.

Link Receive Buffer Inuse
Amount of RMB storage in use by the active TCP connections that are associated with this SMC-R link.

32K Buffer Inuse
Amount of 32K RMB storage in use by the active TCP connections that are associated with this SMC-R link.

64K Buffer Inuse
Amount of 64K RMB storage in use by the active TCP connections that are associated with this SMC-R link.

128K Buffer Inuse
Amount of 128K RMB storage in use by the active TCP connections that are associated with this SMC-R link.

256K Buffer Inuse
Amount of 256K RMB storage in use by the active TCP connections that are associated with this SMC-R link.

Other Buffer Inuse
For RMB storage that is allocated as buffers larger than 256K, the amount of these other buffers that are in use by the active TCP connections that are associated with this SMC-R link. If no buffers larger than 256K are allocated, this information is not displayed.

Guidelines:

1. The LOOPBACK device and link are displayed. The LOOPBACK6 interface is displayed if the stack is enabled for IPv6.
2. The byte counts for number of bytes received and number of bytes transmitted are always 0 for VIPA links and interfaces.
3. If an MTU was configured on the INTERFACE statement, then the actual MTU is the minimum of the configured MTU and the physical MTU value supported by the interface.

Restrictions:

1. No link-related information, packet trace settings, or BSD parameters are displayed for a device that has no link defined.
2. The packet trace setting is displayed only when it is defined and set to ON.
3. ATM specific information is displayed only for ATM devices that have links defined.

OSA-Express Network Traffic Analyzer Information
This section displays all currently defined OSA interfaces that are dynamically created by VARY TCPIP,,OSAENTA commands or OSAENTA PROFILE statements.

OSA PortName
The port name value of the OSA that is currently defined for performing the OSA-Express network traffic analyzer (OSAENTA) function. This value was specified on the PORTNAME parameter of a VARY TCPIP,,OSAENTA command or on an OSAENTA PROFILE statement. The following information is specific to this *PortName* value.

OSA DevStatus
The device status. The following list shows the possible values:

Starting
An OSAENTA ON command or statement has been processed and TCP/IP has sent an activation request to the data link control (DLC) layer.

Sent SETUP
DLC has acknowledged the TCP/IP activation request and TCP/IP has requested that DLC perform the initial I/O sequence with the device.

Enabling
DLC has acknowledged the TCP/IP activation request and TCP/IP has requested that DLC allow data connections to be established for the device.

Connecting
DLC has accepted the initial I/O sequence request.

Negotiating
The initial I/O sequence with the device is complete and TCP/IP is performing additional link-layer initialization.

Ready The initialization sequence with the device is complete. The device is now ready.

Deactivating
DLC has performed the first stage of an orderly device deactivation.

Not Active
The device is not active. (The device has never been started or has been stopped after having been started.)

OSA IntfName
The name of the interface that is dynamically created to communicate with the OSA Express2 adapter.

OSA IntfStatus
The trace collection interface status. The following list shows the possible values:

Ready The OSA interface used for OSAENTA is accepting all trace requests from the host.

Not Active
The OSA interface that is used for OSAENTA is not active. Either trace collection is disabled or else an error occurred during activation of the OSA interface that is to be used for trace collection. Such an error condition generates an error message on the operator console.

OSA Speed
The speed reported by the interface (in millions of bits per second).

OSA Authorization
The value of the OSA HMC authorization parameter. Possible values are Disabled, Logical Partition, PORT, CHPID, or UNKNOWN. The value is set to UNKNOWN until the first OSAENTA ON command has completed.

Disabled
The OSA does not allow the NTA function to trace any frames for the OSA.

Logical Partition
The OSA allows the NTA function to trace frames only for the current logical partition.

PORT The OSA allows the NTA function to trace frames for all stacks that share this OSA port.

CHPID
The OSA allows the NTA function to trace frames for all stacks that share the OSA.

UNKNOWN
The NTA trace interface has not been activated.

OSAENTA Cumulative Trace Statistics

Statistics accumulated for all frames that have been traced since the OSAENTA interface was first activated. These values are not reset by the OSAENTA ON command or statement.

DataMegs
The number of bytes of trace data (in megabytes) that have been received.

Frames
The total number of frames that have been traced.

DataBytes
The number of bytes of trace data that have been received.

FramesDiscarded
The number of frames that were traced but that the OSA device was not able to either forward to a host image or deliver outbound. These packets are available for formatting in the CTRACE SYSTCPOT component, but have not been delivered to any user.

FramesLost
The number of frames that could not be recorded by TCP/IP in the SYSTCPOT buffers.

OSAENTA Active Trace Statistics

Statistics that have accumulated since the OSAENTA ON command or statement was last issued.

DataMegs
The number of bytes of trace data (in megabytes) that have been collected.

Frames
The total number of frames that have been collected.

DataBytes
The number of bytes of trace data that have been collected.

FramesDiscarded
The number of frames that were collected but that the OSA device was not able to either forward to a host image or deliver outbound. These packets are available for formatting in the CTRACE SYSTCPOT component, but have not been delivered to any user.

FramesLost
The number of frames that were not collected by TCP/IP in the SYSTCPOT buffers.

TimeActive
The number of minutes that have elapsed since the last OSAENTA ON command or statement.

OSAENTA Trace Settings

The current trace settings that are in effect for this OSAENTA interface.

Status The current trace status. Possible values are:

ON Tracing is enabled.

OFF Tracing is disabled.

DataMegsLimit
The amount of data (in megabytes) to be collected before the trace is automatically stopped. This value was specified on the DATA parameter.

FramesLimit
The number of frames to be collected before the trace is automatically stopped. This value was specified on the FRAMES parameter.

TimeLimit
The amount of time (in minutes) that data is collected before the trace is automatically stopped. This value was specified on the TIME parameter.

Abbrev
The size limit for the frames (in bytes) that are to be traced. This value was specified on the ABBREV parameter. This value can be modified to reflect the size limit set by the OSA.

Discard
Identifies which frames being discarded by the OSA-Express device are to be traced. This value was specified on the DISCARD parameter. Possible values are:

All All frames discarded by the OSA-Express device are traced.

Exception
Frames discarded by the OSA-Express device for exception conditions are traced.

None No discarded frames are traced.

list A list of from one to eight values, that indicate the type of discarded frames that are to be traced by the OSA-Express device. This list includes decimal discard codes and the keyword parameter EXCEPTION.

OSAENTA Trace Filters
The values of the current accumulated filter variables from OSAENTA commands or statements for this OSA. If a filter variable has not been specified using OSAENTA commands or statements, then an asterisk is shown.

Nofilter
The filtering behavior when all filters (DEVICEID, MAC, ETHTYPE, VLANID, IPADDR, PROTOCOL, and PORTNUM) have been cleared or are inactive. This behavior applies when no filters have been specified, if the CLEARFILTER parameter is specified, or when the current setting for every filter is an asterisk (*). This filtering behavior applies only to packets that were not discarded by the OSA-Express device. This value was specified on the NOFILTER parameter. Possible values are:

All All frames are traced.

None No frames are traced.

DeviceID
Up to eight hexadecimal device identifiers that are specified on the DEVICEID keyword of an OSAENTA command or statement. The value is an asterisk (*) if no device identifiers were specified.

Mac Up to eight hexadecimal MAC addresses that are specified on the MAC keyword of an OSAENTA command or statement. The value is an asterisk (*) if no MAC addresses were specified.

VLANid
Up to eight decimal VLAN identifiers that are specified on the VLANID keyword of an OSAENTA command or statement. The value is an asterisk (*) if no VLAN identifiers were specified.

ETHType
Up to eight hexadecimal Ethernet types that are specified on the ETHTYPE keyword of an OSAENTA command or statement. The value is an asterisk (*) if no Ethernet types were specified. The name of the Ethernet type filter is displayed for commonly used Ethernet types, such as ARP, IPv4, IPv6, and SNA.

IPAddr
Up to eight dotted decimal IPv4 IP addresses and up to eight colon hexadecimal IPv6 IP addresses that are specified on the IPADDR keyword of an OSAENTA command or statement. The value is an asterisk (*) if no IP addresses were specified.

Protocol
Up to eight decimal protocol identifiers that are specified on the PROTOCOL keyword of an OSAENTA command or statement. The value is an asterisk (*) if no protocol identifiers were specified. The name of the protocol filter is displayed for commonly used protocols, while the protocol number is displayed for all others.

PORTNum
Up to eight decimal port numbers that are specified on the PORTNUM keyword of an OSAENTA command or statement. The value is an asterisk (*) if no port numbers were specified.

SMC Link Group Information
The information of the SMC link group. This section is displayed for each RNIC interface only when the SMC modifier or the SMCID/-U filter is specified. The following fields are displayed:

SMCLinkGroupId
The group identifier that this TCP/IP stack dynamically creates to represent the SMC-R link group that includes this individual link.

PNetID
The physical network ID value that is configured in HCD for this SMC-R link group.

Redundancy
The recovery and load balancing capabilities of the link group. The following list shows the possible values:

Full The link group has redundant active SMC-R links. Both the local and remote stacks have full failover capability. The z/OS server performs load balancing of TCP connections across the SMC-R links that are members of the link group.

Partial (Single local internal path)
The link group has redundant active SMC-R links. Both the local and remote stacks have failover capability. The z/OS server performs load balancing of TCP connections across the SMC-R links that are members of the link group. However, the links on the local stack have the same internal path.

Partial (Single local PCHID, unique ports)
The link group has redundant active SMC-R links. Both the local and remote stacks have failover capability. The z/OS server performs load balancing of TCP connections across the SMC-R links that are members of the link group. However, the links on the local stack have the same PCHID with unique ports.

Partial (Single local PCHID and port)
The link group has redundant active SMC-R links. Both the local and remote stacks have failover capability. The z/OS server performs load balancing of TCP connections across the SMC-R links that are members of the link group. However, the links on the local stack have the same PCHID and port.

Partial (Single local RNIC)
The link group has multiple active SMC-R links and the remote stack has full failover capability, but the local stack has no failover capability. The z/OS server does not perform load balancing of TCP connections.

Partial (Single remote RNIC)
The link group has multiple active SMC-R links and the local stack has full failover capability, but the remote stack has no failover capability. The z/OS server does not perform load balancing of TCP connections.

None (Single local and remote RNIC)
The link group has a single active SMC-R link. Neither the local stack nor the remote stack has failover capability. The z/OS server cannot perform load balancing of TCP connections.

Link Group Receive Buffer Total
Amount of remote memory buffer (RMB) storage that is assigned to this SMC-R link group.

32K Buffer Total
Amount of 32K RMB storage that is assigned to this SMC-R link group.

64K Buffer Total
Amount of 64K RMB storage that is assigned to this SMC-R link group.

128K Buffer Total
Amount of 128K RMB storage that is assigned to this SMC-R link group.

256K Buffer Total
Amount of 256K RMB storage that is assigned to this SMC-R link group.

Other Buffer Total
For RMB storage that is allocated as buffers larger than 256K, the amount of these other buffers that are assigned to this SMC-R link group. If no buffers larger than 256K are allocated, this information is not displayed.

LocalSMCLinkId
The link identifier this TCP/IP stack dynamically creates to represent the SMC-R link in this SMC-R link group.

RemoteSMCLinkId
The SMC-R link identifier that the remote peer uses to represent the link in this SMC-R link group. The value is provided to this TCP/IP stack during link activation.

Chapter 7. IP and SNA Codes

Data link control (DLC) status codes

DLC status codes provide information about errors that are encountered during the use of high performance data transfer (HPDT) services. They are displayed in some messages and in the IUTx VIT entry.

DLC status codes are 4 bytes long. The bytes contain the following information:

Byte **Contents**

0 Category

1 Reporting layer identifier and location

2 and 3
Completion code

The following tables show the possible values that can appear in each byte and their meaning.

Table 8. Byte 0 (category) of the DLC status code

Hexadecimal Value	**Meaning**
X'00'	Request successful **Explanation:** The specific primitive has been processed with no error. The receiver of this primitive successfully forwarded or replied to this primitive successfully. **Note:** The completion code could have informational errors.
X'08'	Request rejected **Explanation:** All aspects of the primitive were understood but a transitory system or network error occurred which prevented the execution of this request. An example of this could be storage shortage. **Note:** This category is one that an upper layer protocol (ULP) might choose to try the failed primitive again.
X'10'	Request error **Explanation:** This primitive was rejected due to inaccurate information in the primitive (for example, incorrect token, incorrect information element).
X'20'	State error **Explanation:** A primitive was received “out of order.”
X'40'	Usage error **Explanation:** Primitive rejected due to incorrect use of either the primitive itself or a parameter that is associated with the primitive.
X'80'	Permanent error **Explanation:** Request rejected due to failure of either a system or network function.

Table 9. Byte 1 (reporting layer identifier and location) of the DLC status code

Hexadecimal Value	Meaning
X'10'	LLC layer local error **Explanation:** A primitive was processed and an error was found by the local VTAM.
X'20'	LLC layer path error **Explanation:** A primitive was processed and an error was found by the local VTAM while trying to send a primitive out on an MPC group.
X'30'	LLC layer remote error **Explanation:** A primitive was processed and an error was found by the remote VTAM. This value should be used when a remote VTAM is sending common status back to an adjacent host.
X'12'	Port Control Manager (PCM) local error **Explanation:** A primitive was processed and an error was found by the IBM Open System Adapter's PCM.
X'22'	Port Control Manager path-related error **Explanation:** A primitive was processed and an error was found by the IBM Open System Adapter's PCM while trying to send a primitive out on an MPC group or sending a primitive to the ATM network.
X'32'	Port Control Manager remote error **Explanation:** A primitive was processed and an error was found by the remote node; for example, the local ATM switch experienced a failure.
X'1C'	Service-specific component local error **Explanation:** A primitive was processed and an error was found by a service-specific component part of the ATM adaptation layer (AAL) sublayer.
X'2C'	Service-specific component path-related error **Explanation:** A primitive was processed and an error was found by a service-specific component part of the AAL sublayer, while trying to send a primitive to the ATM network.
X'3C'	Service-specific component remote error **Explanation:** A primitive was processed and an error was found by the remote node; for example, the local ATM switch experienced a failure.
X'1A'	Common-part component local error **Explanation:** A primitive was processed and an error was found by a common-part component that includes the ATM layer function and non-service-specific sublayers of the AAL layer.
X'2A'	Common-part component path-related error **Explanation:** A primitive was processed and an error was found by a common-part component that includes the ATM layer function and non-service-specific sublayers of the AAL layer while trying to send a primitive to the ATM network.
X'3A'	Common-part component remote error **Explanation:** A primitive was processed and an error was found by a remote partner in its common-part component that includes the ATM layer function and non-service-specific sublayers of the AAL layer.

Table 10. Bytes 2 and 3 (completion code) of the DLC status code

Hexadecimal Code	Meaning
X'00nn'	n/a **Explanation:** Codes starting with X'00' are specific to the VTAM product implementation.
X'0000'	Successful **Explanation:** The primitive completed successfully.
X'0001'	Initialization failure **Explanation:** A failure occurred during the initialization of support code. Notify VTAM operator to determine cause of failure.
X'0018'	VTAM is not available **Explanation:** Request returned as a result of VTAM termination. Termination might be normal due to an operator initiated action or due to some abnormal condition.
X'0021'	Connection constructor error **Explanation:** Failure occurred during the construction of the connection object. Notify the VTAM operator of the failure to determine cause and possible corrective actions.
X'0022'	State error **Explanation:** Failure occurred during the execution of the request due to a state error indicating a protocol violation. Notify the VTAM operator of the failure to determine cause of inconsistency and possible corrective actions.
X'0023'	TRLE activation/deactivation state error **Explanation:** User issued an activate or deactivation request and an internal state error was encountered.
X'0024'	Provider ID error **Explanation:** Provider ID supplied on the primitive is either incorrect or cannot be found. Condition indicates an interface inconsistency. Notify the VTAM operator of the failure to determine cause of inconsistency and possible corrective actions.
X'0025'	Selective Retransmit Not Supported **Explanation:** A request to set up a connection was received, and Selective Retransmit service was requested for that connection. Selective Retransmit is not supported now, so the request was rejected. Condition indicates that the remote partner expects Selective Retransmit, which might be a configuration mismatch. Notify the VTAM operator of the failure to determine cause of inconsistency and possible corrective actions.
X'0027'	OpenPathReq error **Explanation:** Internal command OPENPATH_request, which causes the initial activation of the channel paths and either the XID or IDX exchange, failed. Failure might be due to a channel problem or an error condition that is discovered during the initial activation sequence. Notify the VTAM operator of the failure to determine cause and possible corrective actions. It might also be necessary to notify the operator of the platform containing the remote MPC instance.
X'0029'	DactPathReq error **Explanation:** Internal command DACTPATH_request, which causes the termination of an MPC group, failed for some reason. MPC will complete system takedown of the group but the user should notify the VTAM operator of the failure to determine cause and possible corrective actions. Failure to take corrective action might lead to the inability to reactivate the path.

Table 10. Bytes 2 and 3 (completion code) of the DLC status code (continued)

Hexadecimal Code	Meaning
X'002A'	ActPathRsp error **Explanation:** Internal command ACTPATH_response, which causes the allocation of devices and the construction of the MPC environment, failed. Notify the VTAM operator of the failure to determine cause and possible corrective actions.
X'002B'	OpenPathRsp error **Explanation:** Internal command OPENPATH_response, which causes the initial activation of the channel paths and either the XID or IDX exchange, failed. Failure might be due to a channel problem or an error condition that is discovered during the initial activation sequence. Notify the VTAM operator of the failure to determine cause and possible corrective actions. It might also be necessary to notify the operator of the platform containing the remote MPC instance.
X'002F'	MPC connection does not support high performance data transfer. **Explanation:** Either the local definitions or the remote partner does not support high performance data transfer data interface. Check Hardware Configuration Definition (HCD) and VTAM definitions for possible mismatch.
X'0030'	Storage error **Explanation:** Storage incorrect or not obtainable.
X'0040'	INOP-deact SAP **Explanation:** SAP becomes inoperative.
X'0041'	INOP-connection **Explanation:** Data connection becomes inoperative.
X'0042'	INOP-signaling connection **Explanation:** Signaling connection becomes inoperative.
X'0043'	INOP-device **Explanation:** Local device becomes inoperative.
X'0044'	INOP-soft **Explanation:** The connection or MPC group is inoperative; however, recovery of the connection is possible.
X'0045'	INOP-hard **Explanation:** The connection or MPC group is inoperative, and is not expected to recover without intervention.
X'0046'	Incorrect token **Explanation:** User specified an incorrect token on a data connection.
X'0047'	Incorrect token **Explanation:** Internally specified token incorrect.
X'0048'	Duplicate data activation request **Explanation:** ULP has sent multiple data activation requests for a single connection.
X'0049'	Selector value error **Explanation:** A primitive was processed that specified a selector that did not match the selector of the provider token that was received.

Table 10. Bytes 2 and 3 (completion code) of the DLC status code (continued)

Hexadecimal Code	Meaning
X'004A'	Protocol value error **Explanation:** A primitive was processed that did not specify a known protocol value.
X'004B'	VCNAME value error **Explanation:** A primitive was processed that did not specify a known virtual circuit value.
X'0050'	Multiple TCP/IP instances trying to register filters for incoming calls **Explanation:** Multiple TCP/IPs requested identical filter values.
X'0051'	Buffer size error **Explanation:** An activation SAP request was issued with an incorrect bufsize, or an incorrect combination of buffer size and buffer number for a TCP/IP read or write device.
X'0052'	Missing XBFL **Explanation:** An attempt was made to execute a data primitive and an XBFL (extended buffer list) was not provided. An XBFL is required for data primitives.
X'0053'	Empty XBFL **Explanation:** An XBFL was provided for a data primitive that has no entries within the list; for example, XBFLBEGN=0.
X'0054'	Incorrect XBFL entry **Explanation:** An XBFL was provided for a data primitive that has an incorrect entry within the list (for example, XBFLAREA=0).
X'0055'	Packet and XBFL length mismatch **Explanation:** An XBFL was provided for a data primitive where the total length of all entries does not match the packet length.
X'0056'	XBFL free option not specified **Explanation:** An XBFL was provided for a data primitive where the XBFL free option (XBFL_FREE_OPT) was not specified. The free option is required for all data primitives.
X'0057'	Incorrect packet length **Explanation:** The packet length was 0 or too large; for example, exceeds the defined values for the device.
X'0058'	Incorrect parameter list version **Explanation:** The parameter list version is incorrect.
X'0060'	Connection not active **Explanation:** The data activation request for a specific connection was received before the connection was active.
X'0061'	Data not enabled with data activation request **Explanation:** Data activation request has not been received so data cannot be processed.
X'0062'	Class value error **Explanation:** A primitive was processed that does not specify a known class value.

Table 10. Bytes 2 and 3 (completion code) of the DLC status code (continued)

Hexadecimal Code	Meaning
X'0063'	Control value error **Explanation:** A primitive was processed that does not specify a known control value which is permitted for this primitive.
X'0064'	MPC Group in Use **Explanation:** An MPC group is defined as EXCLUSIVE USE (MPCUSAGE = EXC on TRLE), and is already in use. Activation is rejected.
X'0065'	iQDIO Prohibited **Explanation:** iQDIO activation is prohibited by VTAM start option IQDCHPID = NONE.
X'0066'	iQDIO CHPID Ambiguous **Explanation:** iQDIO activation is not allowed due to an ambiguous configuration with specifying IQDCHPID = ANY (default), and configuring (HCD/IOCDS) multiple IQD CHPIDs to this logical partition (LPAR). When IQDCHPID = ANY is specified (or defaulted) only one IQD CHPID can be configured for this LPAR. If multiple IQD CHPIDs must be configured to this LPAR, then define IQDCHPID = 'HEXCHPID' (the specific hex IQDCHPID that this LPAR should use).
X'0067'	iQDIO or QDIO Devices Not Available **Explanation:** An attempt was made to build a dynamic TRLE for a QDIO OSA-Express device or a HiperSockets device, but VTAM could not find the minimum number of required subchannel devices (CUAs) for the device. For a HiperSockets device, at least 3 CUAs are required to the same HiperSockets CHPID. For a QDIO OSA-Express device, the OSA-Express CHPID must be configured with 2 consecutive device addresses beginning with an even number for the control channels, and at least one additional device address for a DATAPATH channel. Verify the HCD or IOCDS configuration for accuracy for this logical partition (LPAR).
X'0068'	iQDIO CHPID Conflict **Explanation:** The user defined an iQDIO device CHPID and it conflicts with the sysplex IQD CHPID. This is defined by the IQDCHPID start option and is used for DYNAMICXCF communication. For more information, see the IQDCHPID start option in z/OS Communications Server: SNA Resource Definition Reference.
X'0069'	Processor not iQDIO capable **Explanation:** The user attempted to activate an iQDIO device and the processor does not support iQDIO devices.
X'006A'	iQDIO IQD CHPID multiple channel subsystem error **Explanation:** Multiple channel subsystem capable machine but the Internal Channel ID (CHID) is not available.
X'006B'	Frame invalidation mismatch **Explanation:** Frame invalidation is not supported by the stack that is issuing ActSap and frame invalidation was enabled by the first stack to issue ActSap.
X'006C'	Too many input queues requested by the stack **Explanation:** The stack specified more input queues than supported.
X'006D'	Input queue ID out of range **Explanation:** An internal Communications Server error occurred.

Table 10. Bytes 2 and 3 (completion code) of the DLC status code (continued)

Hexadecimal Code	Meaning
X'006E'	Input queue ID not registered **Explanation:** An internal Communications Server error occurred.
X'006F'	QDIO or IQDIO CHPID Not Available **Explanation:** An attempt was made to build a dynamic TRLE for a QDIO OSA-Express device or a HiperSockets device, and a CHPID for this device could not be found. If the CHPID was configured, for example on an MPCIPA HiperSockets device statement or using the CHPID parameter on an OSA-Express QDIO Interface statement, that particular CHPID was not defined to the system. If the CHPID was searched for dynamically, for example activating a dynamic IUTIQDIO link for HiperSockets with VTAM start option IQDCHPID=ANY or an OSA-Express OSM device, a CHPID for that particular channel type was not defined to the system. Verify the configured CHPID parameter or the HCD or IOCDS configuration for accuracy for this logical partition (LPAR).
X'0070'	QDIO device control channels not available **Explanation:** An attempt was made to build a dynamic TRLE for a QDIO OSA-Express device. A CHPID was found, but two consecutively numbered device addresses beginning with an even number could not be found. For QDIO OSA-Express devices, an even-numbered device address is required for the READ control channel, and the next consecutive odd address for the WRITE control channel. Verify the HCD or IOCDS configuration for accuracy for this logical partition (LPAR).
X'30nn'	n/a **Explanation:** Codes starting with X'30' can be errors that are detected in the interface between TCP/IP and VTAM, between VTAM and the IBM Open System Adapter, or between VTAM and TCP/IP channel units. These errors result from either a software or definitional problem. Use the specific return code to help identify the problem.
X'3001'	Incorrect control information field **Explanation:** The control information field of the primitive contains data that is blank, in an incorrect format, or cannot be recognized.
X'3002'	Incorrect identifier **Explanation:** The value that is specified in the identifier/token parameter of the control information field is blank, in an incorrect format, or cannot be recognized.
X'3003'	Incorrect identifier type **Explanation:** The value that is specified in the identifier type parameter of the control information field is incorrect; for example, the ID type says it is an SAP but the identifier is a filter.
X'3004'	Incorrect primitive **Explanation:** The value that is specified in the primitive code parameter of the control information field is incorrect.
X'3005'	State error **Explanation:** An illogical or incorrect primitive was received for the current SAP or the call instance state of the Port Connection Manager.
X'3007'	Incorrect information data **Explanation:** Either the primitive's data information field is missing data, or it contains blank, syntactically incorrect, or unrecognizable data.

Table 10. Bytes 2 and 3 (completion code) of the DLC status code (continued)

Hexadecimal Code	Meaning
X'3008'	Resource not available **Explanation:** The requested resource is not available.
X'300A'	Task ABEND **Explanation:** An error occurred that prevents the processing of the primitive.
X'300E'	Incorrect service type **Explanation:** The ServiceType parameter in the primitive's Control Information field is either blank, syntactically incorrect, or unrecognizable. Service Type is REQ/CNF/IND/RSP.
X'3011'	IBM Open Systems Adapter disabled **Explanation:** The IBM Open Systems Adapter has been disabled by user command.
X'3012'	PVC removed from IBM Open Systems Adapter **Explanation:** A PVC definition has been removed from IBM Open Systems Adapter while that PVC connection was active. The PVC connection is being deactivated.
X'3013'	PCM signaling virtual channel is not active **Explanation:** The signaling virtual channel (VCI=5, VPCI=0) between the IBM Open Systems Adapter and the ATM switch that carries signaling requests is not active.
X'3014'	Incorrect entry point **Explanation:** The entry point/interpret routine indicated contains a null character or incorrect value.
X'3016'	Incorrect Port Control Manager name **Explanation:** The value that is specified in the Port Control Manager name parameter is blank, in an incorrect format, or cannot be recognized. **Note:** 1. The port name is specified in multiple places and **MUST** be the same in the IBM Open Systems Adapter/SF configuration file, on the PORTNAME operand on the TRLE definition statement in the TRL major node, and (in the case of APPN communication) on the PORTNAME operand on the PORT definition statement in the XCA major node. The port name must be the same in all places that it is specified. If it is not, correct the mismatches. 2. The user request is failed if the requested TRLE cannot be activated because of one of the following conditions. • TRL major node has not been activated. • The TRLE entry is missing from the activated TRL major node. • The TRLE entry has an error that does not allow it to be defined. • The TRLE has been activated but it is inoperative.
X'3017'	Incorrect user call instance identifier **Explanation:** The value that is specified in the user call instance identifier parameter of the control information field is missing, blank, in an incorrect format, or cannot be recognized.
X'3018'	Incorrect provider call instance identifier **Explanation:** The value that is specified in the provider call instance identifier parameter of the control information field is missing, blank, in an incorrect format, or cannot be recognized.

Table 10. Bytes 2 and 3 (completion code) of the DLC status code (continued)

Hexadecimal Code	Meaning
X'3019'	Incorrect user SAP identifier **Explanation:** The value that is specified in the user SAP identifier parameter of the control information field is missing, blank, in an incorrect format, or cannot be recognized.
X'301A'	Incorrect provider SAP identifier **Explanation:** The value that is specified in the provider SAP identifier parameter of the control information field is missing, blank, in an incorrect format, or cannot be recognized.
X'301B'	Incorrect provider call enabling identifier **Explanation:** The value that is specified in the P_CE_ID parameter of the control information field is missing, blank, in an incorrect format, or cannot be recognized.
X'301C'	Incorrect user call enabling identifier **Explanation:** The value that is specified in the U_CE_ID parameter of the control information field is missing, blank, in an incorrect format, or cannot be recognized.
X'3022'	Incorrect control information field length **Explanation:** The value that is specified in the control information field length parameter contains an incorrect value. **Note:** Each primitive has a unique fixed control information field.
X'3023'	Incorrect data information field length **Explanation:** The value that is specified in the data information field length parameter contains a value that is incorrect or unrecognized.
X'3024'	Incorrect action code **Explanation:** The value that is specified in the action code specified in the control information on the Call_Setup response field is missing, blank, in an incorrect format, or cannot be recognized.
X'3025'	Missing data information field **Explanation:** The data information field must be complete for the primitive to work.
X'3026'	Incorrect logical link value **Explanation:** The value that is specified in the logical link identifier parameter is outside the valid range of 0-31, decimal.
X'3027'	PCM TRLE cannot support selector **Explanation:** The user issued an activate request that specified a selector that is not valid for the TRLE found by RNAME.
X'3028'	Datapath device activation failed **Explanation:** A storage error occurred during early processing of a datapath channel address for a QDIO device.
X'3029'	Datapath device activation negative **Explanation:** An error occurred attempting to allocate or activate a datapath channel address for a QDIO device.
X'302A'	Datapath device Open failed **Explanation:** An error occurred attempting to start a connection across a datapath channel address for a QDIO device.

Table 10. Bytes 2 and 3 (completion code) of the DLC status code (continued)

Hexadecimal Code	Meaning
X'302B'	Datapath Device Start Data failed **Explanation:** An error occurred attempting to start data flow on a connection across a datapath channel address for a QDIO device.
X'302C'	Enable Incoming connections for Port failed **Explanation:** A QDIO device rejected an attempt to allow connections to be enabled on this device.
X'302D'	No datapath devices available **Explanation:** A ULP cannot use a QDIO device because there are no datapath channel addresses available.
X'302E'	Activation failed to complete **Explanation:** A QDIO or iQDIO device failed to complete activation or properly register its HOME IP Address within 5 minutes.
X'302F'	Channel unit address not available **Explanation:** The channel is not the correct type for this device, there is no path for this channel, or the channel is not varied online.
X'3030'	Incorrect channel unit address specification **Explanation:** The channel unit address was either not specified by TCP/IP or is not a correct hexadecimal number.
X'3031'	Channel unit address already in use **Explanation:** The channel unit address specified by TCP/IP is already allocated to another user.
X'3032'	Maximum connections exceeded **Explanation:** The connection request attempted for this device exceeds the allowable maximum for this device type.
X'3033'	Lack of resources **Explanation:** The resources requested from the system could not be obtained (for example, memory errors).
X'3034'	Connection failed by the remote host with no cause code **Explanation:** A connection request was failed by the remote host for a given device, but a cause code indicating why the connection failed was not supplied.
X'3035'	QDIO CHPID type mismatch **Explanation:** An attempt was made to activate a QDIO device for a particular CHPID type, but the TRLE associated with this device was already active with channels of a different CHPID type. Verify the DEVICE name or PORTNAME are correctly configured for this device, and if the TRLE was configured, verify the device addresses are addresses for a CHPID of the correct type.
X'3036'	Secondary OSM Interface activated before primary **Explanation:** An attempt was made to activate EZ6OSM02 before EZ6OSM01. This failure can occur when there are no OSM CHPIDs available at TCP/IP stack initialization, and EZ6OSM02 is subsequently activated before EZ6OSM01. Activate EZ6OSM01 then EZ6OSM02.

Table 10. Bytes 2 and 3 (completion code) of the DLC status code (continued)

Hexadecimal Code	Meaning
X'3037'	OSX or OSM Interface activation not permitted **Explanation:** An attempt was made to activate an interface with CHPID type OSX or OSM. The activation attempt failed because the ENSEMBLE start option is set to NO, which does not permit TCP/IP connectivity to either the intraensemble data network or the intranode management network.
X'3038'	OSX or OSM Interface activation not permitted **Explanation:** An attempt was made to activate an interface with CHPID type OSX or OSM. The activation attempt failed because the central processor complex (CPC) is not configured as a member of an ensemble.
X'3039'	IQD activation not permitted against an IQDX device **Explanation:** A CHPID that is defined to HCD as IQDX cannot be used as an iQDIO device.
X'303A'	Function type not valid **Explanation:** The "RoCE Express" interface does not recognize the function identifier on the activation attempt.
X'303B'	Outbound request flood detected **Explanation:** The Internet Control Message Protocol (ICMP) time stamp request is rejected because CSM storage is constrained or too many time stamp requests are generated at the same time.
X'3053'	Maximum number of network interfaces exceeded **Explanation:** An attempt was made to activate an OSA-Express port in QDIO mode. The OSA-Express port, or another port on the same OSA-Express3 or later channel path identifier (CHPID), is currently operating in optimized latency mode for at least one network interface. Optimized latency mode limits the number of concurrent network interfaces allowed to share this port and this CHPID. This activation attempt exceeds that limit. See the information about the optimized latency mode in z/OS Communications Server: IP Configuration Guide for information about these limits.
X'31nn'	OSA-Express rejected an attempt to activate a port **Explanation:** Codes starting with X'31' are specific to OSA-Express QDIO Mode activation attempts. X'31' indicates that the OSA has rejected an activation attempt. The *nn* indicates the reason for the rejection. Specific *nn* codes are listed in this table. If you receive a code that is not listed in this table, contact IBM Service.
X'311B'	Duplicate port name **Explanation:** An attempt was made to activate an OSA-Express3 or later port in QDIO mode. The port name for this activation attempt was already in use on the other port that belongs to that CHPID. Two ports on the same CHPID cannot have the same port name.
X'3150'	Incorrect port name **Explanation:** An attempt was made to activate an OSA-Express port in QDIO mode. The port name for this activation attempt did not match the port name already assigned to this port by a previous user. All z/OS users of that port must activate with the same port name.
X'32nn'	n/a **Explanation:** Codes starting with X'32' are specific to ATM connection establishment. In particular, they relate to the inability of the IBM Open Systems Adapter to establish a reserved bandwidth connection because of lack of available resources.

Table 10. Bytes 2 and 3 (completion code) of the DLC status code (continued)

Hexadecimal Code	Meaning
X'3201'	Bytes per second exceeded **Explanation:** The IBM Open Systems Adapter received a request for a reserved bandwidth circuit. The number of bytes per second that were requested cannot be honored because the IBM Open Systems Adapter's capacity for bytes per second for reserved bandwidth connections would be exceeded.
X'3202'	Receive packets per second exceeded **Explanation:** The IBM Open Systems Adapter received a request for a reserved bandwidth circuit. The number of packets per second that were requested in the receive direction (to the IBM Open Systems adapter) cannot be honored because the IBM Open Systems Adapter's capacity for receive packets per second for reserved bandwidth connections would be exceeded.
X'3203'	Transmit packets per second exceeded **Explanation:** The IBM Open Systems Adapter received a request for a reserved bandwidth circuit. The number of packets per second that were requested in the transmit direction (from the IBM Open Systems Adapter) cannot be honored because the IBM Open Systems Adapter's capacity for transmit packets per second for reserved bandwidth connections would be exceeded.
X'3204'	No packet buffers available **Explanation:** The IBM Open Systems Adapter received a request for a reserved bandwidth circuit. The number of bytes per second that were requested cannot be honored because the IBM Open Systems Adapter's capacity for packet buffers for reserved bandwidth connections would be exceeded.
X'3205'	Bandwidth unavailable **Explanation:** The IBM Open Systems Adapter received a request for a reserved bandwidth circuit. The number of ATM cells per second that were requested cannot be honored because the total number of cells per second would exceed the physical capacity of the ATM link.
X'3210'	Network down **Explanation:** The IBM Open Systems Adapter has lost communications to the ATM switch to which it is attached. The OSA lost communication with the attached ATM network, or an attempt was made to activate an XCA while the OSA had lost communication with the network (a missing cable or a switch registration failure, for example.)
X'33nn'	n/a **Explanation:** Codes starting with X'33' are specific to ATM signaling or data transfer. Generally they are the result of either a ULP software or definitional problem in constructing an ATM primitive. Use the specific return code to identify incorrect parameter, termed an information element (IE), to perform diagnostics.
X'330B'	Call does not exist **Explanation:** The Port Control Manager received a primitive associated with a call that no longer or never existed.
X'330D'	Endpoint does not exist **Explanation:** The value of the endpoint reference identifier in the endpoint reference subfield is not currently assigned to a call endpoint.
X'3312'	Service access point not activated **Explanation:** The primitive is incorrect because the SAP is not activated or recognized.

Table 10. Bytes 2 and 3 (completion code) of the DLC status code (continued)

Hexadecimal Code	Meaning
X'3315'	User subfields too large **Explanation:** The subfields specified in the primitive exceed the number of allowable octets.
X'331B'	Subfields not allowed **Explanation:** The subfields contained in the specified primitive are not allowed.
X'331D'	Mandatory subfield missing **Explanation:** A required subfield not present.
X'3323'	Selected channel busy **Explanation:** The specified permanent virtual channel (PVC) is busy or allocated to another call.
X'3324'	Maximum calls exceeded **Explanation:** The call setup request was not executed because the required resource could not be allocated.
X'3329'	Maximum requests exceed **Explanation:** The limit on outstanding primitives was reached.
X'332A'	Call clear indication pending **Explanation:** A call clear indicate has been issued to the user. The user should respond. The call instance is cleared when the call clear response is received from the user.
X'332D'	Timeout on call **Explanation:** The call could not be processed within the time constraints of the network.
X'332F'	Lack of resources **Explanation:** The resources requested from the system (for example, memory errors) could not be obtained.
X'3330'	Operating system error **Explanation:** An operating system error was encountered.
X'3331'	Incorrect bearer capability **Explanation:** The length or the parameter information in the bearer capability subfield is incorrect.
X'3332'	Incorrect channel identification **Explanation:** The length or the parameter information in the channel identification subfield is incorrect or the channel not varied online properly by operator.
X'3333'	Incorrect calling party number **Explanation:** The length or the parameter information in the calling party number subfield is incorrect.
X'3334'	Incorrect called party number **Explanation:** The length or the parameter information in the called party number subfield is incorrect.
X'3335'	Incorrect calling party subaddress **Explanation:** The length or the parameter information in the calling party aubaddress subfield is incorrect.

Table 10. Bytes 2 and 3 (completion code) of the DLC status code (continued)

Hexadecimal Code	Meaning
X'3336'	Incorrect called party subaddress **Explanation:** The length or the parameter information in the called party subaddress subfield is incorrect.
X'3337'	Incorrect low-layer compatibility **Explanation:** The length or the parameter information in the low-layer compatibility subfield is incorrect.
X'3338'	Incorrect high-layer compatibility **Explanation:** The length or the parameter information in the high-layer compatibility subfield is incorrect.
X'3339'	Incorrect transit network selection **Explanation:** The length or the parameter information in the transit network selection subfield is incorrect.
X'333A'	Incorrect cause **Explanation:** The length or the parameter information in the cause subfield is incorrect.
X'333B'	Incorrect call status **Explanation:** The length or the parameter information in the call status subfield is incorrect.
X'333C'	No cause code specified **Explanation:** The incoming call clearing message from the network did not contain a cause code indicating why the call was being cleared.
X'3340'	Incorrect AAL parameters **Explanation:** The length or parameter values in the AAL parameters subfield is incorrect.
X'3341'	Duplicate AAL parameters **Explanation:** The AAL parameters subfield is specified more than once.
X'3342'	Incorrect endpoint identifier **Explanation:** The length or parameter value in the endpoint reference subfield is incorrect.
X'3343'	Duplicate endpoint reference **Explanation:** The endpoint reference is specified more than once.
X'3344'	Incorrect endpoint state **Explanation:** The length or parameter value in the endpoint status subfield is incorrect.
X'3346'	Incorrect QoS **Explanation:** The length or parameter values in the quality of service subfield is incorrect.
X'3347'	Duplicate QoS **Explanation:** The quality of service subfield is specified more than once.
X'3348'	Incorrect PCI **Explanation:** The length or the parameter value in the permanent connection identifier subfield is incorrect.

Table 10. Bytes 2 and 3 (completion code) of the DLC status code (continued)

Hexadecimal Code	Meaning
X'3349'	Duplicate PCI **Explanation:** The permanent connection identifier subfield is specified more than once.
X'334A'	Incorrect traffic descriptor **Explanation:** The length or the parameter value in the traffic descriptor subfield is incorrect.
X'334B'	Duplicate traffic descriptor **Explanation:** The traffic descriptor subfield is specified more than once.
X'3351'	Duplicate bearer capability **Explanation:** The bearer capability subfield was specified more than one time.
X'3352'	Duplicate channel identification **Explanation:** The channel identification subfield was specified more than one time.
X'3353'	Duplicate calling party number **Explanation:** The calling party number subfield was specified more than one time.
X'3354'	Duplicate called party number **Explanation:** The called party number subfield was specified more than one time.
X'3355'	Duplicate calling party subaddress **Explanation:** The calling party subaddress subfield was specified more than one time.
X'3356'	Duplicate called party subaddress **Explanation:** The called party subaddress subfield was specified more than one time.
X'3357'	Too many instances of low-layer information **Explanation:** More instances of low-layer information subfield are present than are allowed.
X'3358'	Duplicate high-layer compatibility **Explanation:** The high-layer compatibility subfield was specified more than one time.
X'3359'	Duplicate Transit network selection **Explanation:** The transit network selection subfield was specified more than one time.
X'335A'	Duplicate cause **Explanation:** The cause subfield was specified more than one time.
X'335B'	Duplicate call status **Explanation:** The call status subfield was specified more than one time.
X'335D'	Duplicate PCI **Explanation:** The permanent connection identifier subfield was specified more than one time.
X'3360'	Subfield of length zero present **Explanation:** One of the subfields in the data information field has a length of zero.

Table 10. Bytes 2 and 3 (completion code) of the DLC status code (continued)

Hexadecimal Code	Meaning
X'3361'	Incorrect calling party number length **Explanation:** In the calling party number subfield, the value that is specified in the SFNumberLength parameter disagrees with the length of the subfield contained in the SFLength parameter.
X'3362'	Incorrect called party number length **Explanation:** In the called party number subfield, the value that is specified in the SFNumberLength parameter disagrees with the length of the subfield contained in the SFLength parameter.
X'3363'	Incorrect calling party subaddress length **Explanation:** In the calling party subaddress subfield, the value that is specified in the SFSubaddrLength parameter disagrees with the length of the subfield contained in the SFLength parameter.
X'3364'	Incorrect called party subaddress length **Explanation:** In the called party subaddress subfield, the value that is specified in the SFSubaddrLength parameter disagrees with the length of the subfield contained in the SFLength parameter.
X'3366'	Incorrect call status value **Explanation:** In the call status subfield, the SFCallStatus parameter specifies a value that is incorrect.
X'3367'	Call status subfield missing **Explanation:** The call status subfield information is missing. This is required information for this primitive.
X'336A'	Subfields of the same type are not the same **Explanation:** Two or more subfields of the same type are specified in the data information field; however they are not contiguous.
X'336B'	Entry not unique **Explanation:** The filter registration request is rejected because the call routing information and subfield specifications indicated in the data information field do not make the entry unique. An entry exists in the Port Control Manager incoming call routing table that has the same “must match” information as this request.
X'336C'	First subfield is not primitive specific **Explanation:** The first subfield you specified in the data information field is not the primitive-specific subfield.
X'3371'	Path Control Manager internal error **Explanation:** The Path Control Manager associated with the call detected an internal error.
X'3374'	Permanent connection not defined **Explanation:** The permanent connection that was requested in the call setup request is not defined.
X'3375'	Incorrect ID type in current state **Explanation:** In the current state of the call instance, the identifier type is incorrect.

Table 10. Bytes 2 and 3 (completion code) of the DLC status code (continued)

Hexadecimal Code	Meaning
X'3376'	Call setup confirm for unsuccessful call queued **Explanation:** The Path Control Manager will not process this call clear request because the call that the user requested to be cleared failed.
X'337A'	Prior call control request outstanding **Explanation:** A call control request previously issued by the user has not been confirmed by the Path Control Manager. The user should try the request again after the confirmation is received from the Path Control Manager.
X'3380'	User software error **Explanation:** The user discovered an unexpected software error.
X'3393'	Incorrect usage indicator in primitive-specific subfield **Explanation:** The usage indicator provided in the primitive specific subfield on the filter registration request primitive is incorrect. Either the first primitive-specific subfield specified must meet the “must not match” criteria, or the second primitive-specific subfield specified must meet the “must match” criteria.
X'3394'	Incorrect called party address in filter registration request or data transmission flow control state is blocked. **Explanation:** If this error occurs during device activation, the called party number on the filter registration request is incorrect; either it was not supplied, or does not match an address registered to the Path Control Manager. Otherwise a halt data flow request has been sent so data is not flowing.
X'3395'	Connection state incorrect for data transfer **Explanation:** Data cannot be accepted until the data SAP has been processed.
X'3396'	Data transmit flow control blocked for pacing. **Explanation:** The connection over which this data flows is an ATM reserved bandwidth connection. More data has been requested to be sent than has been reserved. The data flow will be blocked for an interval of time to ensure data is not dropped by the ATM network. Data flow will be reopened when the interval of time passes.
X'3397'	Data transmit flow control blocked for remote **Explanation:** The connection over which this data flows is an ATM connection. The IBM Open Systems Adapter has reached a level of congestion and has requested that no more data be sent on this connection until the congestion is relieved. Data flow will be reopened by IBM Open Systems Adapter when the congestion condition has passed.
X'34nn'	n/a **Explanation:** Codes starting with X'34' are specific to the OSA-Express data path. These codes represent errors reported by the OSA-Express adapter relating to the read or write Storage Block Address List Entries (SBALEs).
X'3400'	Error reason unknown **Explanation:** The specific cause of the error cannot be determined.
X'3401'	Invalid buffer contents **Explanation:** The contents of the storage pointed to by the SBALE does not contain a valid OSA-Express header or IP header.

Table 10. Bytes 2 and 3 (completion code) of the DLC status code (continued)

Hexadecimal Code	Meaning
X'3402'	Block crosses 4k boundary **Explanation:** The last byte of the storage represented by the SBALE is not contained in the same 4K storage frame as the first byte.
X'3403'	Invalid fragment type **Explanation:** The SBALE fragment type does not correlate with the fragment type of the previous SBALE.
X'3404'	Real address invalid **Explanation:** The SBALE storage address exceeds the size of central storage.
X'40nn'	n/a **Explanation:** Codes starting with X'40' are specific to the VTAM/IBM Open Systems Adapter IDX channel interface.
X'4001'	VTAM/IBM Open Systems Adapter function level mismatch **Explanation:** The IBM Open Systems Adapter returned this code indicating request failed due to function mismatch between VTAM and the IBM Open Systems Adapter; for example, incompatible versions of the two products. Contact system operator to determine cause of the incompatibility.
X'4002'	Incorrect or no header size specified **Explanation:** The IBM Open Systems Adapter returned this code indicating request failed during IDX exchange due to MPC specifying an improper header size. Contact VTAM operator to determine cause of the incorrect size.
X'4003'	Incorrect or no block size specified **Explanation:** The IBM Open Systems Adapter returned this code indicating request failed during IDX exchange due to MPC specifying an improper I/O buffer size. Contact VTAM operator to determine cause of the incorrect size.
X'4004'	Channel path read write polarity mismatch **Explanation:** The IBM Open Systems Adapter returned this code indicating request failed during IDX exchange due to incorrect channel path polarity; for example, read defined as write or write defined as read. The paths were defined incorrectly in either the TRL entry for the device or during IBM Open Systems Adapter configuration. Contact VTAM operator to determine cause of the incorrect size.
X'4005'	VTAM name mismatch **Explanation:** The IBM Open Systems Adapter returned this code indicating request failed during IDX exchange because the same VTAM name was not received over both channel paths. This indicates a condition where two different VTAM instances are configured such that one is trying to use the Read path, the other the Write. Contact VTAM operator to determine correct definition of channel paths.
X'4010'	Channel path pair quiesced **Explanation:** The IBM Open Systems Adapter returned this code indicating that channel paths will be halted due to the failure of some internal IBM Open Systems Adapter process. Contact system operator to determine reason for the IBM Open System Adapter's action.

Table 10. Bytes 2 and 3 (completion code) of the DLC status code (continued)

Hexadecimal Code	Meaning
X'4011'	Incorrect data message size **Explanation:** The IBM Open Systems Adapter returned this code indicating an incorrect message size, normally too large. Channel operation is quiesced and the channel path to the IBM Open Systems Adapter becomes inoperative. Contact VTAM operator or system operator to determine correct maximum message size.
X'4080'	Normal termination **Explanation:** MPC uses this code to inform the IBM Open Systems Adapter that normal channel termination is required. It is not normally exposed to the ULP but might appear in the IBM Open Systems Adapter tracing facilities.
X'4081'	VTAM/IBM Open Systems Adapter level mismatch **Explanation:** MPC returned this code indicating initialization request failed due to function mismatch between VTAM and the IBM Open Systems Adapter; for example, incompatible versions of the two products. Contact VTAM operator or system operator to determine cause of the incompatibility.
X'4082'	Channel path read/write polarity error **Explanation:** MPC returned this code indicating initialization request failed due to the IBM Open Systems Adapter specifying an incorrect read or write channel address; the read channel address must be an "even" address and the associated write channel address must be the read address + 1.
X'4083'	Incorrect or no header size specified **Explanation:** MPC returned this code indicating initialization request failed due to the IBM Open Systems Adapter specifying an incorrect header segment size. Contact VTAM operator or system operator to determine cause of the incorrect size.
X'4084'	Incorrect or no buffer size **Explanation:** MPC returned this code indicating initialization request failed due to the IBM Open Systems Adapter specifying an incorrect I/O buffer size. Contact VTAM operator or system operator to determine cause of the I/O buffer size.
X'4085'	Data path failure **Explanation:** MPC returned this code indicating the channel paths to the IBM Open Systems Adapter are now inoperative due to a failure of the data path. Note, this is not a channel failure; it is the failure of a software component that processes data. Failure is normally due to an incorrect data primitive or the occurrence of a VTAM-detected processing error. Contact VTAM operator to perform problem diagnosis.
X'4086'	System failure **Explanation:** MPC returned this code indicating the failure of a process has caused an ABEND within MPC processing components. Failure might be due to an MPC software problem or an underlying system failure. Contact VTAM operator to perform problem diagnosis.
X'4087'	Channel path failure **Explanation:** MPC returned this code indicating the failure of the channel path between itself and the IBM Open Systems Adapter. Failure has been recorded as a long OBR record in the system log. Contact VTAM operator or the system operator to determine cause of failure.

Table 10. Bytes 2 and 3 (completion code) of the DLC status code (continued)

Hexadecimal Code	Meaning
X'4088'	Token failure **Explanation:** MPC uses this code to indicate that the IBM Open Systems Adapter has returned inconsistent token values over the two channel paths. The tokens returned must contain identical bit strings. Contact the system operator to determine cause of inconsistency.
X'4089'	State mismatch **Explanation:** MPC uses this code to indicate that an inconsistency in processing states exists between MPC and the IBM Open Systems Adapter. Contact the VTAM operator to determine cause of inconsistency.
X'408A'	Event Notification Facility offline signal **Explanation:** MPC uses this code to indicate that an Event Notification Signal (ENF) has been received indicating the channel paths have been varied offline. Contact the system operator to determine reason the paths were put offline.
X'408B'	No storage for I/O buffer **Explanation:** MPC uses this code to indicate that storage was not available for it to build the required channel I/O buffers for the data and header segments. System storage might be constrained due to competing requests for storage. Contact the VTAM operator to determine VTAM's current storage usage and the system operator to determine cause of storage scarcity.
X'408C'	Incorrect IBM Open Systems Adapter name **Explanation:** The name used to activate the IBM Open Systems Adapter does not match the defined value. Check your definitions.
X'408D'	Channel control failure **Explanation:** MPC uses this code to indicate a failure in its channel control (CC) component. The failure might have been caused by a software failure in the CC component or an underlying system failure. Contact the VTAM operator to determine failure cause. If a system failure, notify the system operator.
X'408E'	Signaling plane failure **Explanation:** MPC uses this code to indicate a failure in the signaling plane. Contact the VTAM operator to determine failure cause. If a system failure, notify the system operator.
X'50nn'	Shared Memory Communications over Remote Direct Memory Access (SMC-R) failures **Explanation:** Codes starting with X'50' are specific to SMC-R operation failures. Use the specific return code to help identify the problem.
X'5001'	Peripheral Component Interconnect Express (PCIe) function ID (PFID) is not valid **Explanation:** The PFID value that is specified on the activation attempt contained characters that are not valid or that did not match the PFID of any active "RoCE Express" interface.
X'5002'	The buffer size of the outbound buffer is not valid **Explanation:** The buffer size that is specified for a buffer to be used for outbound RDMA operations was too large or represented only a partial buffer.
X'5003'	The buffer size of the inbound buffer is not valid **Explanation:** The buffer size that is specified for a buffer to be used for inbound RDMA operations was too large or represented only a partial buffer.

Table 10. Bytes 2 and 3 (completion code) of the DLC status code (continued)

Hexadecimal Code	Meaning
X'5004'	The outbound RDMA buffer could not be registered **Explanation:** The buffer to be used for outbound RDMA operations could not be registered with the "RoCE Express" interface because the buffer descriptor on the primitive request did not contain the correct information.
X'5005'	The inbound RDMA buffer could not be registered **Explanation:** The buffer to be used for inbound RDMA operations could not be registered with the "RoCE Express" interface because the buffer descriptor on the primitive request did not contain the correct information.
X'5006'	Incorrect primitive **Explanation:** The value that is specified in the primitive code parameter of the control information field is not correct.
X'5008'	Maximum users exceeded **Explanation:** The activation request attempted for this adapter exceeds the allowable number of adapter users.
X'5009'	Internal state error **Explanation:** The primitive request is received in an unexpected adapter state.
X'500A'	Virtual LAN (VLAN) identifier is not valid **Explanation:** The value that is specified for the VLAN identifier on the activation request exceeds the maximum value allowed.
X'500B'	Incorrect SMC-R link activation message **Explanation:** The SMC-R link activation message that is received from the SMC-R peer contained no data or the data specified was incorrect.
X'500C'	Queue pair (QP) activation timed out **Explanation:** The attempt to activate a QP as part of SMC-R link establishment did not complete within an acceptable amount of time.
X'500D'	Internal abend **Explanation:** VTAM returns this code to indicate that the failure of a process caused an abnormal end of task (abend) within SMC-R processing components. A software problem or an underlying system failure might be the cause. Contact the VTAM operator to perform problem diagnosis.
X'500E'	Unable to schedule TCP/IP during interrupt processing **Explanation:** During a normal interrupt completion event, VTAM was unable to schedule the TCP/IP stack to process inbound data.
X'500F'	SMC-R VLAN disabled **Explanation:** The TCP/IP stack requested VTAM to disable a specific VLAN. As a result, all QPs that are associated with this VLAN are stopped.
X'5010'	RDMA over Converged Ethernet (RoCE) token is not valid **Explanation:** The value that is specified for the RoCE token on the primitive was 0 or did not match any currently assigned tokens.

Table 10. Bytes 2 and 3 (completion code) of the DLC status code (continued)

Hexadecimal Code	Meaning
X'5011'	VLAN token is not valid **Explanation:** The value that is specified for the VLAN token on the primitive did not match any currently assigned tokens.
X'5012'	QP token is not valid **Explanation:** The value that is specified for the QP token on the primitive was 0 or did not match any currently assigned tokens.
X'5013'	SMC-R link activation failure **Explanation:** VTAM could not successfully send the appropriate link activation message to the peer, preventing the SMC-R link from being activated.
X'5014'	Internal stall error detected **Explanation:** The SMC-R components determined that no outbound RDMA operations completed within an acceptable period. INOP processing is triggered for the "RoCE Express" interface.
X'5015'	Internal poll error detected **Explanation:** An attempt by the SMC-R components to poll the "RoCE Express" interface for information about outbound RDMA operations failed unexpectedly. INOP processing is triggered for the "RoCE Express" interface.
X'5016'	Outbound RDMA operations cannot be queued **Explanation:** The SMC-R components determined that pending outbound RDMA operations must be queued because of "RoCE Express" interface conditions, but this primitive indicated that it cannot be queued. The primitive is not queued.
X'5017'	Internal failure during "RoCE Express" interface cleanup **Explanation:** The SMC-R components could not perform a final poll of the "RoCE Express" interface for information about outbound RDMA operations before deactivating the "RoCE Express" interface.
X'5018'	Could not schedule stack to process RDMA data **Explanation:** The SMC-R components could not schedule a TCP/IP process to receive RDMA data.
X'5020'	A CSDUMP was taken with a defined RNICTRLE that matched this "RoCE Express" interface **Explanation:** A CSDUMP operation, with the RNICTRLE operand specified, requested that diagnostic data be gathered for a "RoCE Express" interface. The process of collecting this data rendered the "RoCE Express" feature inoperative for all users.
X'5021'	"RoCE Express" interface deactivated because a hardware diagnostic dump was taken **Explanation:** A "RoCE Express" interface was deactivated for one the following reasons: • An INOPDUMP was taken for the "RoCE Express" interface. • A CSDUMP was taken and a diagnostic dump was requested by using the RNICTRLE parameter. **Note:** The gathering of diagnostic data causes an inoperative condition for all users.
X'5022'	"RoCE Express" interface deactivated because "RoCE Express" internal error was detected **Explanation:** A "RoCE Express" interface was deactivated because the interface reported an internal error. To recover from the internal error, VTAM resets the "RoCE Express" interface and the "RoCE Express" interface is temporarily unavailable for all users.

Table 10. Bytes 2 and 3 (completion code) of the DLC status code (continued)

Hexadecimal Code	Meaning
X'51nn'	"RoCE Express" device driver failure **Explanation:** In response to specific RoCE verb invocation failures, the "RoCE Express" device driver sets the codes that start with X'51'. These codes are internally generated software codes that identify failures to communicate correctly with PCIe services or with the hardware. • For PCIe service failures, the "RoCE Express" device driver issues message IST2390I or IST2391I to report these failures. In these cases, the *nn* portion of the error code represents the return code that was recorded for the specific PCIe service failure. • For all other failures, the *nn* portion of the error is an internally generated value to uniquely identify the failure.
X'5113'	PFID is not defined **Explanation:** The "RoCE Express" device driver attempted to activate a "RoCE Express" interface, but the PFIDs value is not defined for this LPAR. The "RoCE Express" device driver issues message IST2392I to report this failure.
X'5115'	PFID is not online **Explanation:** The "RoCE Express" device driver attempted to activate a "RoCE Express" interface, but the PFID value is not configured online. The "RoCE Express" device driver issues message IST2393I to report this failure.
X'5116'	Command operation timeout **Explanation:** One of the following cases happened: • The 10 GbE RoCE Express device driver issued a Host channel adapter (HCA) configuration register (HCR) command to the RoCE hardware, but the hardware did not complete the operation within the internally specified timeout threshold. • The 10 GbE RoCE Express2 device driver issued a HCA command queue (HCQ) command to the RoCE hardware, but the hardware did not complete the operation within the internally specified timeout threshold. The "RoCE Express" device driver initiates INOP processing to recover from the error.
X'5117'	PCIe load operation failure **Explanation:** During the processing of an HCR operation for a 10 GbE RoCE Express feature or an HCQ operation for a 10 GbE RoCE Express2 feature, the "RoCE Express" device driver received an error in response to a PCIe store operation. The "RoCE Express" device driver might initiate INOP processing to recover from this error.
X'5118'	PCIe store operation failure **Explanation:** During the processing of an HCR operation for a 10 GbE RoCE Express feature or an HCQ operation for a 10 GbE RoCE Express2 feature, the "RoCE Express" device driver received an error in response to a PCIe store operation. The "RoCE Express" device driver might initiate INOP processing to recover from this error.
X'5121'	Command operation failure **Explanation:** One of the following cases happened: • The 10 GbE RoCE Express device driver issued an HCR command to the RoCE hardware, but the hardware rejected the operation with a specific status code. • The 10 GbE RoCE Express2 device driver issued an HCQ command to the RoCE hardware, but the hardware rejected the operation with a specific status code. The specific operation failed.

Table 10. Bytes 2 and 3 (completion code) of the DLC status code (continued)

Hexadecimal Code	Meaning
X'5131'	PCIe connect service call failure **Explanation:** The "RoCE Express" device driver received an error in response to a PCIe connect service call (IQP4CON) during the activation of a "RoCE Express" interface. The "RoCE Express" device driver issues message IST2391I to report this failure.
X'5132'	PCIe open service call failure **Explanation:** The "RoCE Express" device driver received an error in response to a PCIe open service call (IQP4OPN) during the activation of a "RoCE Express" interface. The "RoCE Express" device driver issues message IST2391I to report this failure.
X'5138'	PCIe deregister service call failure **Explanation:** The "RoCE Express" device driver received an error in response to a PCIe deregister service call (IQP4DMR) in one of the following situations: • When a "RoCE Express" interface is deactivated. • When the TCP/IP stack contracts a storage pool and attempts to deregister specific memory regions. The "RoCE Express" device driver issues message IST2391I to report this failure.
X'513B'	Software reset failure **Explanation:** While the "RoCE Express" device was initialized, the "RoCE Express" device driver received an error during a software reset of the "RoCE Express" feature. This call is issued during the activation of a "RoCE Express" interface. The "RoCE Express" interface does not activate.
X'5140'	PCIe close service call failure **Explanation:** The "RoCE Express" device driver received an error in response to a PCIe close service call (IQP4CLO) during the deactivation of a "RoCE Express" interface. The "RoCE Express" device driver issues message IST2391I to report this failure.
X'5141'	PCIe deallocation service call failure **Explanation:** The "RoCE Express" device driver received an error in response to a PCIe deallocation service call (IQP4DEA) during the deactivation of a "RoCE Express" interface. The "RoCE Express" device driver issues message IST2391I to report this failure.
X'5142'	PCIe address space not available **Explanation:** The "RoCE Express" device driver detected the PCIe address has not been initialized. The "RoCE Express" device driver requires PCIe service calls to activate a "RoCE Express" interface. The "RoCE Express" device driver fails the activation request.
X'5144'	PCIe allocation service call failure **Explanation:** The "RoCE Express" device driver received an error in response to a PCIe allocation service call (IQP4ALL) during the activation of a "RoCE Express" interface. The "RoCE Express" device driver issues message IST2391I to report this failure.
X'514A'	No physical network ID detected **Explanation:** The "RoCE Express" device driver issued a PCIe service call (IQP4GDI) to learn information about a "RoCE Express" interface. The "RoCE Express" device driver detected that no physical network ID (PNetID) was configured for this PFID. A "RoCE Express" interface without a configured PNetID cannot be used for SMC-R communications. The "RoCE Express" device driver issues message IST2391I to report this failure.

Table 10. Bytes 2 and 3 (completion code) of the DLC status code (continued)

Hexadecimal Code	Meaning
X'5150'	PCIe service processor call failure **Explanation:** The "RoCE Express" device driver received an error in response to a PCIe service processor call (IQP4SPC) to collect diagnostic hardware information during the INOPDUMP or the CSDUMP processing. The "RoCE Express" device driver issues message IST2391I to report this failure.
X'5151'	Incorrect operating environment detected for the IBM 10 GbE RoCE Express feature **Explanation:** A 10 GbE RoCE Express feature was configured in the hardware configuration definition (HCD) to run in a dedicated RoCE environment, but z/OS Communications Server expected the feature to run in a shared RoCE environment. Another possible situation is that a 10 GbE RoCE Express feature was configured to run in a shared RoCE environment, but z/OS Communications Server expected the feature to run in a dedicated RoCE environment. The first 10 GbE RoCE Express feature to be activated determines the operating environment for all subsequent features.
X'515B'	PCIe get device information service call failure **Explanation:** The "RoCE Express" device driver received an error in response to a PCIe get device information service call (IQP4GDI) during the activation of a "RoCE Express" interface. The "RoCE Express" device driver issues message IST2391I to report this failure.
X'52nn'	TCP/IP SMC-R component failures during SMC-R processing **Explanation:** Codes that start with X'52' are specific to failures that are encountered within the TCP/IP SMC-R components during SMC-R processing. These errors cause the TCP connection to not use the SMC-R protocols.
X'52E0'	SMC-R link failure, no failover processing **Explanation:** The TCP/IP stack detected that an SMC-R link failed and no alternative SMC-R link was available.
X'52E1'	SMC-R link failure, local and remote partners are out of synch **Explanation:** The TCP/IP stack attempted to establish an initial SMC-R link to the remote partner, but the partner detects that an SMC-R link exists between the two endpoints.
X'52F0'	SMC-R link failure, failover processing **Explanation:** The TCP/IP stack detected that an SMC-R link failed. The TCP/IP stack switched the TCP connections that were using the failing SMC-R link to an alternative link within the SMC-R link group.
X'52F1'	SMC-R link failure, loss of path detected **Explanation:** The TCP/IP stack was notified that the RDMA path for an SMC-R link failed.
X'52F2'	SMC-R link failure, protocol violation **Explanation:** The TCP/IP stack detected that an SMC-R link failed because of a violation of the Link Layer Control (LLC) protocol that is used to manage the link.
X'52F3'	SMC-R link failure, RDMA write operation failed **Explanation:** The TCP/IP stack detected that an attempt to write RDMA data over an SMC-R link failed.

Table 10. Bytes 2 and 3 (completion code) of the DLC status code (continued)

Hexadecimal Code	Meaning
X'52F4'	SMC-R link failure, remote buffer confirmation failed **Explanation:** The TCP/IP stack detected that the remote partner did not confirm that an SMC-R link used a remote buffer. The link was stopped and, if possible, the TCP connections that were using the stopped link were switched to an alternative link in the link group.
X'52F5'	SMC-R link failure, delete buffer failed **Explanation:** The TCP/IP stack detected that the remote partner did not acknowledge that a buffer was no longer available for an SMC-R link to use. The link was stopped and, if possible, the TCP connections that were using the stopped link were switched to an alternative link in the link group.
X'52F6'	SMC-R link failure, link deletion timed out **Explanation:** The TCP/IP stack attempted to delete an SMC-R link from a link group, but the remote partner did not acknowledge the request. The link was stopped and, if possible, the TCP connections that were using the stopped link were switched to an alternative link in the link group.
X'52F7'	SMC-R link failure, link test timed out **Explanation:** The TCP/IP stack tested the status of an SMC-R link, but the remote partner did not respond to the test request. The SMC-R link was assumed to be inactive and, if possible, the TCP connections that were using the stopped link were switched to an alternative link in the link group.
X'52F8'	SMC-R link failure, link addition timed out **Explanation:** The TCP/IP stack attempted to add an SMC-R link to a link group, but the remote partner did not acknowledge the request. The link was stopped and, if possible, the TCP connections that were using the stopped link were switched to an alternative link in the link group.
X'53nn'	TCP/IP stack failures during SMC-R processing **Explanation:** Codes that start with X'53' are specific to failures that the TCP/IP stack encountered during SMC-R processing. These errors cause the TCP connection to not use the SMC-R protocols.
X'54nn'	"RoCE Express" interrupt handler errors **Explanation:** Codes that start with X'54' are specific to failures that the "RoCE Express" interrupt handlers encountered. The "RoCE Express" interrupt handlers are associated with a "RoCE Express" interface. These failures cause VTAM to initiate INOP processing of the "RoCE Express" interface. For these failures, the *nn* portion of the error code represents the 1-byte event code that the "RoCE Express" interface generates.
X'5409'	Port state event **Explanation:** The disabled interrupt exit was driven by PCIe services to notify the "RoCE Express" device driver that the state of the "RoCE Express" port is inactive. The "RoCE Express" device driver initiates INOP processing for all TCP/IP stacks with active connections to this 10 GbE RoCE Express"RoCE Express" interface.
X'54F0'	Allocation error exit **Explanation:** PCIe services drove the "RoCE Express" allocation error exit to inform the "RoCE Express" device driver of a PCIe error event. The "RoCE Express" device driver initiates INOP processing for all TCP/IP stacks with active connections to this "RoCE Express" interface.

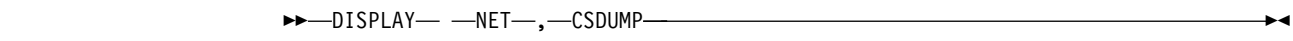
Table 10. Bytes 2 and 3 (completion code) of the DLC status code (continued)

Hexadecimal Code	Meaning
X'54F1'	Open error exit **Explanation:** PCIe services drove the "RoCE Express" open error exit to inform the TCP/IP stack that the PFID was deallocated. This code can be issued for one of the following reasons: • The "RoCE Express" device driver detected an error that caused the Force Close processing to take down the"RoCE Express" interface. • PCIe services detected a condition that required the deallocation of a PFID that VTAM allocated. In either case, the "RoCE Express" device driver initiates INOP processing for the reported TCP/IP stack.
X'54F2'	Event Queue (EQ) Doorbell error **Explanation:** The "RoCE Express" device driver did a PCIe store operation to notify the "RoCE Express" interface that the driver finished processing event queue elements. The store operation completed with an error. The "RoCE Express" device driver initiates INOP processing for all TCP/IP stacks with active connections to the "RoCE Express" interface.
X'55nn'	SMC-R link failure, RDMA write operation did not complete successfully **Explanation:** Codes that start with X'55' are specific to RDMA write-completion failures that are reported to the TCP/IP stack. These failures cause the TCP/IP stack to stop the SMC-R link that is associated with the failed RDMA write operation. If possible, the TCP/IP stack switches the TCP connections that are using the link to another link within the SMC-R link group. For these failures, the *nn* portion of the error code represents the 1-byte event code that the "RoCE Express" interface generates to report the write completion failure.

Chapter 8. SNA Operation

VTAM operator commands

DISPLAY CSDUMP command



Abbreviations

Operand	Abbreviation
DISPLAY	D

Purpose

The DISPLAY CSDUMP command displays the current dump triggers that were set by the MODIFY CSDUMP command or by the CSDUMP start option.

See "MODIFY CSDUMP command" on page 241 and CSDUMP start option in z/OS Communications Server: SNA Resource Definition Reference for more information.

Resulting display

The resulting display shows the current CSDUMP message and sense code triggers. If either the message or sense code trigger does not exist, then NONE is indicated.

Examples

The following sample output is displayed when both a message and a sense code trigger have been set using the MODIFY CSDUMP command or the CSDUMP start option:

```
d net,csdump
IST097I DISPLAY ACCEPTED
IST350I DISPLAY TYPE = CSDUMP TRIGGERS
IST1871I MESSAGE TRIGGER: MESSAGE = IST080I MATCHLIM = 1
IST1872I VALUE 1 = CSMAPPL1
IST1873I SENSE TRIGGER: SENSE = 08010000 RU = 810601 MATCHLIM = 1
IST314I END
```

The following sample output is displayed when both a message and a sense code trigger have been set and specified to dump the TCP/IP address space using the MODIFY CSDUMP command or the CSDUMP start option:

```
d net,csdump
IST097I DISPLAY ACCEPTED
IST350I DISPLAY TYPE = CSDUMP TRIGGERS
IST1871I MESSAGE TRIGGER: MESSAGE = IST080I MATCHLIM = 1
IST2234I MESSAGE TRIGGER: TCPNAME = TCPCS
IST1873I SENSE TRIGGER: SENSE = 08010000 RU = 810601 MATCHLIM = 1
IST2240I SENSE TRIGGER: TCPNAME = TCPCS
IST314I END
```

The following sample output is displayed when a message trigger has been set using the MODIFY CSDUMP command or the CSDUMP start option and the REMOTE operand was specified. The REMOTE operand provides a dump of the remote VTAM and this VTAM for any XCF link INOP.

```
d net,csdump
IST097I DISPLAY ACCEPTED
IST350I DISPLAY TYPE = CSDUMP TRIGGERS
IST1871I MESSAGE TRIGGER: MESSAGE = IST1504I MATCHLIM = 1
IST2235I REMOTE DUMP FOR XCF LINK INOP: YES
IST1875I SENSE TRIGGER: NONE
IST314I END
```

The following sample output is displayed when a message trigger has been set using the MODIFY CSDUMP command or the CSDUMP start option and the RNICTRLE operand was specified. The RNICTRLE operand provides a diagnostic dump of the "RoCE Express" feature associated with RNIC_TRLEName.

```
d net,csdump
IST097I DISPLAY ACCEPTED
IST350I DISPLAY TYPE = CSDUMP TRIGGERS
IST1871I MESSAGE TRIGGER: MESSAGE = IST1578I MATCHLIM = 1
IST2239I MESSAGE TRIGGER: RNICTRLE = IUT10003
IST1875I SENSE TRIGGER: NONE
IST314I END
```

The following sample output is displayed when neither a message nor a sense code trigger has been set using the MODIFY CSDUMP command or the CSDUMP start option:

```
d net,csdump
IST097I DISPLAY ACCEPTED
IST350I DISPLAY TYPE = CSDUMP TRIGGERS
IST1874I MESSAGE TRIGGER: NONE
IST1875I SENSE TRIGGER: NONE
IST314I END
```

The following sample output is displayed when only a sense code trigger has been set using the MODIFY CSDUMP command or the CSDUMP start option:

```
d net,csdump
IST097I DISPLAY ACCEPTED
IST350I DISPLAY TYPE = CSDUMP TRIGGERS
IST1874I MESSAGE TRIGGER: NONE
IST1873I SENSE TRIGGER: SENSE = 08010000 RU = 810601 MATCHLIM = 1
IST314I END
```

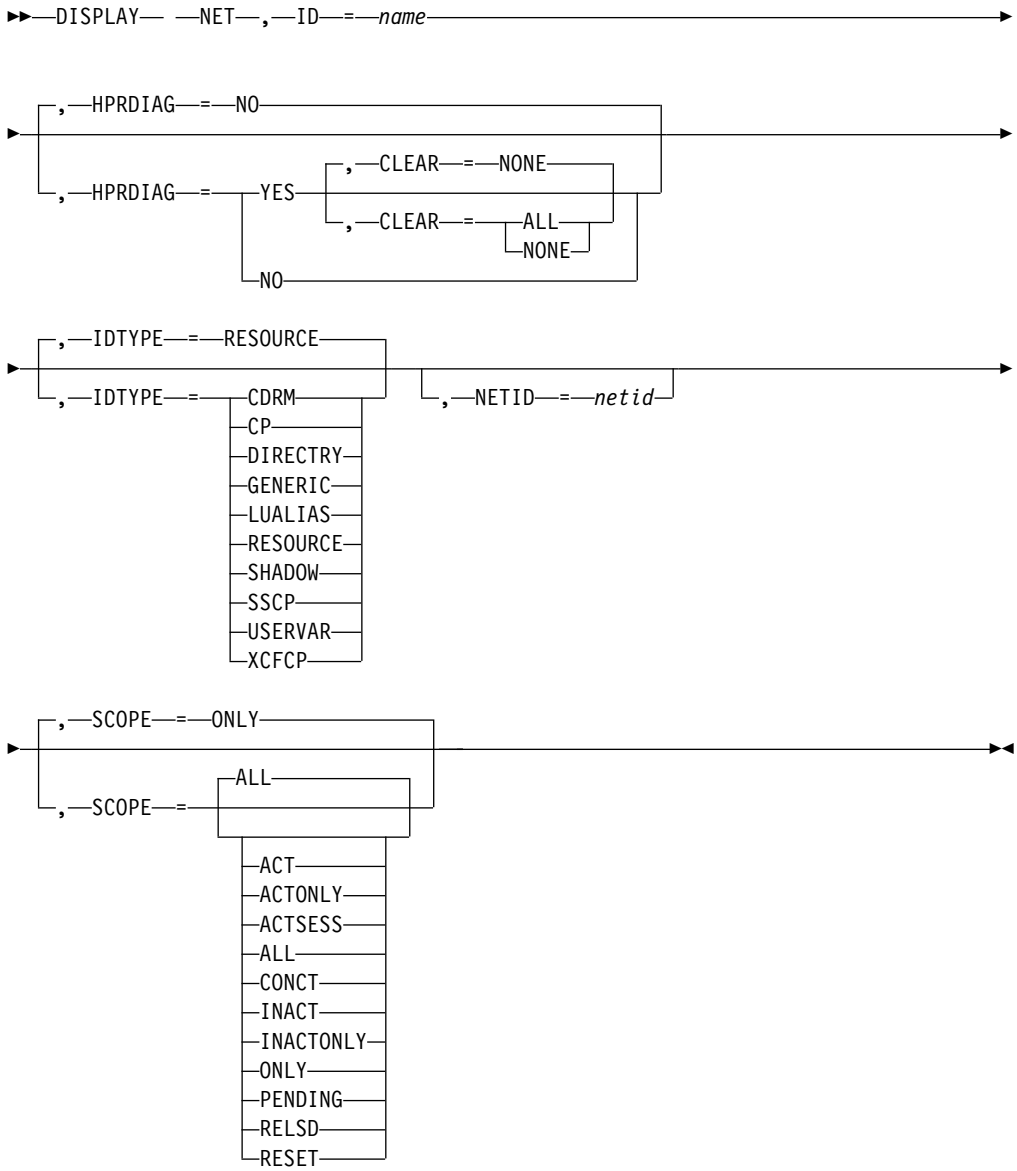
The following sample output is displayed when both the following conditions are true:

- A sense code trigger has been set by using the MODIFY CSDUMP command or the CSDUMP start option.
- At the same time, the sense code trigger has been specified to dump the TCP/IP address space.

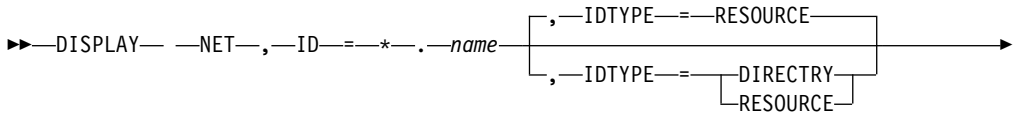
```
d net,csdump
IST097I DISPLAY ACCEPTED
IST350I DISPLAY TYPE = CSDUMP TRIGGERS
IST1874I MESSAGE TRIGGER: NONE
IST1873I SENSE TRIGGER: SENSE = 08010000 RU = 810601 MATCHLIM = 1
IST2240I SENSE TRIGGER: TCPNAME = TCPCS
IST314I END
```

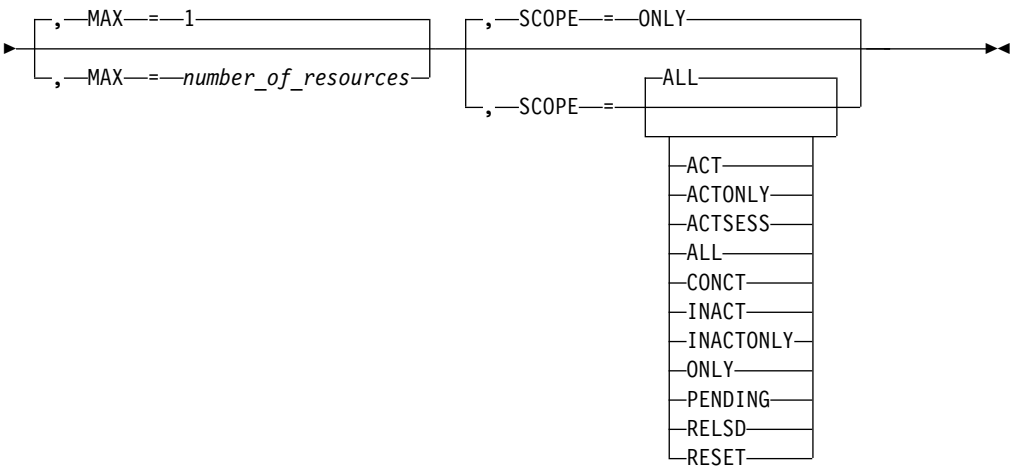
DISPLAY ID command

Display a resource:

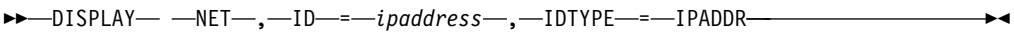


Display a resource name in any network:





Display a resource name using an IP address:



Abbreviations

Operand	Abbreviation
DISPLAY	D
HPRDIAG=YES	HPRDIAG or HPRDIAG=Y
SCOPE=ACT	ACT or A
SCOPE=ACTONLY	ACTONLY
SCOPE=ACTSESS	ACTSESS
SCOPE=ALL	EVERY or E
SCOPE=CONCT	CONCT
SCOPE=INACT	INACT or I
SCOPE=INACTONLY	INACTONL
SCOPE=ONLY	NONE or N
SCOPE=PENDING	PEND
SCOPE=RELSD	RELSD
SCOPE=RESET	RESET

When using an abbreviation in place of an operand, code the abbreviation exactly as shown in the table. For example, when coding the abbreviation for SCOPE=ALL, code only EVERY or E. Do not code SCOPE=E.

Purpose

The DISPLAY ID command provides information about a particular major node, minor node, or directory entry. Additional information can be displayed about the subordinate resources of the node.

Note: This command applies only to active major nodes and minor nodes within active major nodes.

Inactive subarea nodes (for example, NCP major nodes) that have been contacted by VTAM as a result of the activation of a cross-subarea link station can be displayed, if the name of the given subarea node is known to VTAM. Both the NCP being displayed and the NCP containing the link station must be an NCP V1R3 or later release level. In all other cases, inactive major nodes and their minor nodes are not known to VTAM and are therefore not displayed.

When the operator specifies:

- A switched line, the display indicates whether the line is dial-in, dial-out, or both dial-in and dial-out. For a dial-in line, the answer mode is indicated.
- An application program minor node or LU name, the associated z/OS UNIX System Services, interpret, and logon-mode table names and the default logon-mode entry are displayed.

  Note: Specifying ISTNOP, the name of the application program that represents the network operator, also displays the names of the message-flooding prevention table and the session awareness (SAW) data filter table.
- An NCP or host physical unit name, the following information is displayed:
  - The name and status of the associated dynamic path update members
  - The load module name of the NCP that was loaded (if different from the NCP PU name)
  - An indication of whether a nondisruptive load (MODIFY LOAD) is currently in progress
  - An indication of whether an NCP, MOSS, or CSP dump transfer (MODIFY DUMP) is currently in progress.
- The name of an FRSESET definition statement, an FRSESET display is issued. The display includes a message that shows how the FRSESET was defined, statically or dynamically. (Statically means that it was included in the NCP generation.)
- An application program minor node, the compression-level values are displayed.
- An application program, LU, or cross-domain resource name, the security data for data encryption and message authentication are displayed.
- An application program minor node, the 3270 Intrusion Detection Service (IDS) values are displayed.

Operands

CLEAR
Specifies whether to clear diagnostic counters for the RTP pipe.

CLEAR=ALL
The diagnostic counters of the specified RTP pipe are cleared.

CLEAR=NONE
The diagnostic counters are not cleared.

The HPRDIAG=YES operand is required when you specify the CLEAR operand. The resource identified by the ID operand must be an RTP physical unit in this host.

HPRDIAG
Specifies whether additional HPR diagnostic information is to be displayed for the Rapid Transport Protocol (RTP) physical unit.

HPRDIAG=YES
Specifies that additional HPR diagnostic information is to be displayed for the Rapid Transport Protocol (RTP) physical unit.

The resource identified by the ID operand must be an RTP physical unit in this host.

HPRDIAG=NO
Specifies that additional HPR diagnostic information is not to be displayed for the Rapid Transport Protocol (RTP) physical unit. If specified, the resource identified by the ID operand must be an RTP physical unit in this host.

ID=name
Specifies the name of a major node, minor node, USERVAR, generic resource name, LUALIAS, or resource in the directory database.

The name can be a network-qualified name. Regardless of whether you specify a network-qualified name on the ID operand, the resource name in the display output is network-qualified only for application programs, SSCPs, CDRSCs, and LUs. The resource name in the display output is not network-qualified for any other type of resource.

For an APPN node, to display information about a dynamic XCF local SNA PU representing the connection to another VTAM, you can specify one of the following names:

- The name of the PU
- The CP name (or SSCP name) of the other VTAM with IDTYPE=XCFCP

For a pure subarea node, to display information about a dynamic XCF TRLE representing the connectivity to another VTAM node, you can specify one of the following names:

- The name of the TRLE
- The SSCP name (or CP name) of the other VTAM with IDTYPE=XCFCP

Note:

1. If the name is an NCP major node, the name used must be the name specified on the ID operand when the NCP was activated. If PUNAME was specified on the BUILD definition statement, then *name* is the PUNAME.
2. If the name is an application program in this domain, the ID operand can specify either the application program minor node name or the name under which the application program opened its ACB.
3. For an application program minor node, you can specify the name of a conventionally defined application program, a model application program, or a dynamic application program built from a model application program definition. For a CDRSC minor node, you can specify the name of a conventionally defined CDRSC, a model CDRSC, a clone CDRSC built from a model CDRSC, or a dynamic CDRSC.

   If you are specifying a model resource (APPL or CDRSC), you can use wildcard characters in the name you specify. The use of wildcard characters on the ID operand of the DISPLAY ID command does not depend on the value of the DSPLYWLD start option. Unlike wildcard characters in other commands, the wildcard characters you specify on the ID operand of the DISPLAY ID command do not represent unspecified characters. They are interpreted as the actual characters, asterisk (*) and question mark (?).

Therefore, if you specify DISPLAY ID=APPL*, VTAM displays information about the model resource (APPL or CDRSC) named APPL*, but it does not display information about any other application programs or CDRSCs whose names begin with APPL, followed by zero to four valid characters in length. It also does not display detailed information about any clone resource (APPL or CDRSC) that was built from the model resource named APPL*.

In other words, using wildcard characters in the name that you specify on the ID operand of the DISPLAY ID command results in the display of at most one model application program or one model CDRSC. If you want to display information about all application programs or CDRSCs whose names match a pattern established by the placement of wildcard characters, use the DISPLAY RSCLIST command.

4. For a CDRM, you can specify a network-qualified name, but this does not remove the restriction that the non-network-qualified CDRM name must be unique across networks.
5. If the name is a non-network-qualified CDRSC, VTAM uses the network ID of the host from which the command is issued. If two or more CDRSCs exist with the same resource name, but different network identifiers, and DISPLAY ID=*non-network-qualified_name* is issued, then one of the following situations occurs:
   - Only one CDRSC is displayed. The displayed CDRSC is one of the following types:
     - The one that has been defined with VTAM's network identifier
     - The one that has been defined as cross-network, but specified with NQNMODE=NAME, either on its CDRSC definition or by the NQNMODE start option
   - None of the CDRSCs are displayed if they are all specified with NQNMODE=NQNAME, either on their CDRSC definitions or by the NQNMODE start option.
6. If you specify a non-network-qualified USERVAR name, VTAM uses the network ID of the host from which you issue the command.
7. You can specify an asterisk (*) as a wildcard character (or *NETWORK) as the network ID portion of a network-qualified name. The wildcard character (*) is useful for displaying a resource for which you do not know the network ID. The wildcard character (*) is also useful for displaying several resources with the same name that are found in multiple networks, if you also specify the MAX operand on the command.
8. If the name is a generic resource name, the output lists all the members known by that generic resource name.
9. If the name is a TN3270 client IP address in dotted decimal format (for example, ID=192.5.48.122) or in colon-hexadecimal format for IPv6 addresses and there is an associated z/OS Communications Server Telnet server APPL, CDRSC, or LU minor node resource name, it is displayed. The saving and displaying of the IP information for TN3270 clients is controlled by the IPINFO start option. See z/OS Communications Server: SNA Resource Definition Reference for more information about the IPINFO start option.
10. If the name is an RTP pipe, the number of fully active sessions is displayed in the IST1855I message.

Restriction: When you specify an IP address, **IDTYPE=IPADDR** is also required.

IDTYPE

Specifies the type of resource that the ID operand names. If several types of resources share the same name, IDTYPE can be used to identify which resource the command acts on. IDTYPE differs from MAX in that IDTYPE displays several representations of the same resource, whereas MAX displays several different resources with the same name.

IDTYPE=CDRM

Displays information only about the SSCP (represented as a CDRM).

IDTYPE=CP

Displays information only about the host CP (represented as an application) or an adjacent CP (represented as a CDRSC).

IDTYPE=DIRECTRY

Displays information from the directory database for the specified resource. The DISPLAY ID command with IDTYPE=DIRECTRY is valid only when it is issued at a network node or an interchange node.

IDTYPE=GENERIC

Displays the names of application program network names that are also generic resources.

IDTYPE=IPADDR

Displays the IP address of the currently connected TN3270 client applications and LUs. The IP address accepts a fully qualified dotted decimal format for IPv4 type addresses, or colon-hexadecimal format for IPv6 type addresses.

Note: The saving and displaying of the IP information for TN3270 clients is controlled by the IPINFO start option. See z/OS Communications Server: SNA Resource Definition Reference for more information.

IDTYPE=LUALIAS

Displays information only about the CDRSC whose name is associated with the LUALIAS. If a network-qualified name is specified, VTAM does not search for an LUALIAS with that resource name. For more information about CDRSCs that are defined with an LUALIAS, see z/OS Communications Server: SNA Resource Definition Reference.

IDTYPE=RESOURCE

Displays information about the resource named on the ID operand. VTAM searches for the resource in the following order:

1. VTAM searches for an SSCP (CDRM), a host CP (application), or an adjacent CP (CDRSC) by the name specified on the ID operand and displays information for any or all these resources it finds. If the resource is found and it is not the host CP, and you are issuing this command at a network node or interchange node, the display includes information from the directory database.
2. If VTAM does not find an SSCP, a host CP, or an adjacent CP, it searches for a resource with the name specified on the ID operand and displays information for the resource, if it finds it. If the resource is a CDRSC, and you are issuing this command at a network node or interchange node, the display includes information from the directory database.
3. If VTAM does not find a resource by that name, it searches for a USERVAR with the name specified on the ID operand and displays information for the resource, if it finds it.

4. If VTAM does not find a USERVAR by that name, or a USERVAR is found but the resource defined as the value of the USERVAR is not found, it searches for an LUALIAS with the name specified on the ID operand and displays information for the CDRSC, if it finds it.
5. If no resource is found with the name specified on the ID operand, and you are issuing this command at a network node or interchange node, VTAM displays information about the resource from the directory database, if it finds it.
6. If no resource is found and no entry exists in the directory database with the specified name, the command fails.

IDTYPE=SHADOW
Displays information only about a shadow resource, if it exists. Included in the information displayed is the real resource that caused the displayed resource to become a shadow resource.

For more information about shadow resources, see the z/OS Communications Server: SNA Network Implementation Guide

IDTYPE=SSCP
Displays information only about the SSCP (represented as a CDRM).

IDTYPE=USERVAR
Displays information only about the resource whose name is associated with the USERVAR.

IDTYPE=XCFCP
Displays information only about the dynamic XCF local SNA PU representing the connection to another VTAM in the XCF group, when the ID operand specifies the CP name of the other VTAM.

MAX=number_of_resources
Specifies the maximum number of resources to display when the resource name on the ID operand is specified as being in "any network". That is, the network ID portion of the network-qualified resource name is specified as * (or *NETWORK). For example, ID=*.a01n can be specified. MAX is valid only when the following conditions are both true:

1. An "any network" resource name is specified on the ID operand
2. IDTYPE=RESOURCE or IDTYPE=DIRECTRY is used

The value for MAX can be any integer from 1 to 200. The default is 1.

The resource name might exist in more networks than the number you specify on the MAX operand. However, VTAM searches only for the number of instances that you have specified. When that number is found, VTAM does not search any further. This saves processing time for the command and gives you control over the amount of display output generated by the command. If fewer resources are found than you have specified on MAX, VTAM displays only the resources that are found.

The display might show the same resource more than once if both subarea information and APPN directory information are available for a particular resource. The value specified for MAX does not consider this duplication of information for a particular resource, so you could specify a value such as MAX=3 and receive a display of up to six resources.

NETID=netid
Valid only for CDRSC major nodes and limits the scope of the display to CDRSCs within the indicated network and CDRSCs defined without a network identifier (not associated with any particular network). If you specify the

NETID operand, but do not identify a specific network (that is, a value for *netid* is not entered), all CDRSCs in the major node are displayed. CDRSCs are displayed in the order in which they were defined or added within the major node.

To display minor nodes and independent LUs, specify a network-qualified name on the ID operand, and do not use the NETID operand.

SCOPE
Specifies the wanted scope of the display.

Note: If you specify the SCOPE operand without specifying a value SCOPE=ALL is assumed.

The SCOPE operand is ignored for frame relay PUs or FRSESETs. Nor does SCOPE have any effect when you display resources in the directory database.

These values specify whether information is to be provided about the specified node's subordinate resources in addition to the information about the node itself. They are meaningful only for resources that have subordinate resources.

SCOPE=ACT
Specifies that, in addition to the resource specified on the ID operand, the name, and status of all its active, pending, and connectable subordinate resources, if any, are to be displayed. If this display is undesirably large, you can use SCOPE=ACTONLY or SCOPE=CONCT to further limit the display.

SCOPE=ACTONLY
Specifies that, in addition to the resource specified on the ID operand, the name, and status of all its active subordinate resources, if any, are to be displayed. The display does not include resources in pending or connectable states. If no resources are found in an active state, you can use SCOPE=ACT to broaden the scope of the display to active, connectable, and pending resources.

SCOPE=ACTSESS
Specifies that, in addition to the resource specified on the ID operand, the name of all its subordinate resources that are active with sessions, if any, are to be displayed.

SCOPE=ALL
Specifies that, in addition to the resource specified on the ID operand, the name, and status of all its subordinate resources, if any, are to be displayed (regardless of their status).

SCOPE=CONCT
Specifies that, in addition to the resource specified on the ID operand, the name, and status of all its subordinate resources in a CONCT (connectable) state, if any, are to be displayed. If no resources are found in a connectable state, you can use SCOPE=ACT to broaden the scope of the display to active, connectable, and pending resources.

SCOPE=INACT
Specifies that, in addition to the resource specified on the ID operand, the name, and status of all its inactive subordinate resources, if any, are to be displayed. If this display is undesirably large, you can use SCOPE=INACTONLY or SCOPE=RESET to further limit the display.

SCOPE=INACTONLY
Specifies that, in addition to the resource specified on the ID operand, the

name, and status of all its inactive subordinate resources, if any, are to be displayed. Resources in a RESET state are not included in the SCOPE=INACTONLY display.

SCOPE=ONLY
Tells VTAM not to display the name and status of any subordinate resources.

SCOPE=PENDING
Specifies that, in addition to the resource specified on the ID operand, the name, and status of all its pending subordinate resources, if any, are to be displayed. A pending state is a transient state to or from the fully active state.

SCOPE=RELSD
Specifies that the information is to be displayed about all PUs in a RELSD state within the specified major nodes.

SCOPE=RESET
Specifies that, in addition to the resource specified on the ID operand, the name, and status of all its subordinate resources in a RESET state, if any, are to be displayed.

Resulting display

The resources that are displayed depend on their relationship within the hierarchy that is specified on the ID operand. The following lists show what resources are displayed for each major node or minor node.

Note: Independent LUs that are defined under a PU do not always appear in this output. Only independent LUs that are currently using the PU as a boundary function for multiple concurrent sessions are displayed.

A DISPLAY ID command issued at an APPN node might show a resource name appearing in several networks even though the resource actually exists in only one network. This can happen if intermediate SSCPs are pre-V4R1 and they pass only the 8-character resource name. The real network ID is therefore lost and other network IDs might be subsequently assumed.

For a DISPLAY ID command with IDTYPE=RESOURCE or IDTYPE=DIRECTRY, if the resource type that is displayed is EN, the node might actually be a network node, end node, or SSCP. This is because in a mixed APPN and subarea network, CPs, and SSCPs that are found in or through a subarea network are represented in this host (the host where you are issuing this command) as end nodes which are served by the interchange node through which the resource was found.

Note: If model application program definitions are included in the display, any dynamic application programs built from those models that have been deactivated are not displayed. This is because dynamic application programs cannot exist in an inactive state. When a dynamic application program is deactivated and CLOSE macro processing is complete for the dynamic application program, the definition of the dynamic application program is deleted. The dynamic application program is no longer known by VTAM and will not appear in the output of any DISPLAY commands.

- Major nodes:
  - For ID=*ADJCP major node*, its subordinate nodes
  - For ID=*application program major node*, its subordinate applications:

- Conventionally defined application programs
- Model application programs
- Dynamic application programs built from model application program definitions

– For ID=*CDRM major node*, its subordinate CDRMs
– For ID=*CDRSC major node*, its subordinate CDRSCs:
- Conventionally defined CDRSCs
- Model CDRSCs
- Clone CDRSCs built from model CDRSC definitions

– For ID=*channel-attachment major node*, its subordinate links
– For ID=*external communications adapter (XCA) major node*, its subordinate links
– For ID=*hostpu*, its subordinate cross-subarea links
– For ID=*local non-SNA 3270 major node*, its subordinate logical units
– For ID=*local_sna_major_node*:
- Each PU providing local SNA connectivity and its subordinate logical units
- Each PU providing APPN host-to-host connectivity

– For ID=*lugroup major node*, its model LU groups, and their model LUs
– For ID=*model major node*, its subordinate logical units and the physical units to which the logical units are subordinate
– For ID=*NCP major node*, its subordinate links
– For ID=*rapid transport protocol major node* (ISTRTPMN), its dynamic physical units
– For ID=*switched major node*, its subordinate logical units and the physical units to which the logical units are subordinate
– For ID=*transport resource list major node*, its subordinate transport resource list entries (TRLEs).

• Minor nodes:
– For ID=*conventionally defined application program* or ACB *name*:
- For SCOPE=ACT, the established sessions with the application program
- For SCOPE=INACT, the names of logical units waiting for sessions with the application program
- For SCOPE=ALL, the information provided for both ACT and INACT, as described above
- An indication if the application is a VCNS user

– For ID=*model application program*
- An indication that the application program is a model
- A list of dynamic application programs that have been built from this model, or an indication that no dynamic application programs have been built from this model
- An indication if the model application program definition specifies that any dynamic application programs built from the model are to be VCNS users

– For ID=*dynamic application program*
- An indication that the application program is a dynamic application program
- The name of the model application program definition used to build the dynamic application program

- For SCOPE=ACT, the established sessions with the dynamic application program
- For SCOPE=ALL, the established sessions with the dynamic application program
- An indication if the dynamic application program is a VCNS user

– For ID=*CDRSC minor node* (conventionally defined and dynamic):
- For SCOPE=ACT, the established sessions with the cross-domain resource
- For SCOPE=INACT, the names of logical units waiting for sessions with the cross-domain resource
- For SCOPE=ALL, the information provided for both ACT and INACT, as described in the preceding information

– For ID=*model CDRSC minor node*:
- An indication that the CDRSC is a model
- An indication of the current value of the DELETE parameter of the model CDRSC
- For SCOPE=ONLY, an indication if no clone CDRSCs currently exist that were built from this model
- For other values of SCOPE, a list of clone CDRSCs that have been built from this model that meet the SCOPE criteria, or an indication if no clone CDRSCs currently exist that were built from this model that meet the SCOPE criteria

– For ID=*clone CDRSC minor node*:
- An indication that the CDRSC is a clone
- The name of the model CDRSC used to build the clone CDRSC
- An indication of the current value of the DELETE parameter from the model CDRSC used to build this clone CDRSC
- For SCOPE=ACT, the established sessions with the cross-domain resource
- For SCOPE=INACT, the names of logical units waiting for sessions with the cross-domain resource
- For SCOPE=ALL, the information provided for both ACT and INACT, as described previously

– For ID=*host* CDRM *name*, the host's network ID (where applicable), subarea and element addresses, and only the external CDRM session partner and session status for established sessions with the host CDRM

– For ID=*same-network external* CDRM *name*:
- HPR capability, if the same-network external CDRM is active
- For SCOPE=ACT, active cross-domain resources owned by the external CDRM
- For SCOPE=INACT, inactive cross-domain resources owned by the external CDRM
- For SCOPE=ALL, all active or inactive cross-domain resources owned by the external CDRM

– For ID=*cross-network external* CDRM *name*:
- For SCOPE=ACT, active cross-network resources owned by the external CDRM
- For SCOPE=INACT, inactive cross-network resources owned by the external CDRM
- For SCOPE=ALL, all active or inactive cross-network resources owned by the external CDRM

- For ID=*line group*:
  - For SCOPE=ALL, lines and PUs
  - For SCOPE=ACT, all active lines and all active PUs
  - For SCOPE=INACT, all inactive lines, all inactive PUs, and all active lines that have inactive PUs
  - For SCOPE=ONLY, only line group
- For ID=*link*:
  - Its subordinate link stations, or
  - Its subordinate physical units and dependent logical units
- For ID=*physical_unit*:
  - Its subordinate logical units
  - For a PU providing APPN host-to-host connectivity, the name, status, and line control as specified by the TRLE operand on the PU definition statement
  - For a PU supported by a DLUR, the name of the DLUR and the switched major node that defines the PU
  - For a dynamic rapid transport protocol (RTP) PU, the data flow rate and the end-to-end route
  - For an HPR-capable PU in a type 2.1 node, the HPR capability.
- For ID=*transport_resource_list_entry*:
  - Names of the Communications Server z/OS upper-layer protocols (ULPs) using this TRLE
  - For a dynamic TCP TRLE or an exclusively owned TRLE, or a Remote Direct Memory Access (RDMA) network interface card (RNIC) TRLE, only one message with a ULP ID is issued because only one ULP can use each of these TRLEs. For an OSA-Express adapter, one message with a ULP ID is issued for each datapath channel address that a ULP uses. For other TRLEs, more than one ULP ID message can be issued, depending on how many ULPs are using the TRLE.

    Rule: Only one message with a ULP ID is generated for a 10 GbE RoCE Express2 feature, or a 10 GbE RoCE Express feature that operates in a shared RoCE environment.
  - The ULP ID will be the jobname for TCP/IP ULPs, the SNA PU name for ANNC ULPs, and the XCA Major Node name for ATM or EE ULPs.

- Resources in the directory database:
  - The name of the resource
  - The entry type, such as dynamic
  - The resource type, such as network node
  - The owning CP
  - The network node server
  - For an LU resource:
    - The subarea number
    - The required locate message size to retrieve routing information
    - The locate message size used when this LU was last searched
- Generic resource names:
  - Member name
  - Owning CP name

– Whether the resource is currently available to be selected during resolution. NO indicates that the generic resource is on an end node that does not have a CP-CP session with its network node server, and is therefore not selectable. YES indicates that the resource is selectable. DEL indicates that the resource has deleted itself as a generic resource and is not selectable. If you need to fully delete the generic resource from VTAM and the generic resource coupling facility structure, the application's ACB must be closed and the MODIFY GR DELETE command must be issued at every host in the sysplex. See the z/OS Communications Server: SNA Network Implementation Guide for a full description of generic resource deletion procedures.
– APPC value

Examples

Displaying an adjacent CP major node:

```
d net,id=istadjcp,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = ISTADJCP, TYPE = ADJCP MAJOR NODE
IST486I STATUS= ACTIV     ,  DESIRED STATE= ACTIV
IST1100I ADJACENT CONTROL POINTS FROM MAJOR NODE ISTADJCP
IST1102I NODENAME          NODETYPE CONNECTIONS CP CONNECTIONS NATIVE
IST1103I NETB.VN1          VN       0           0              *NA*
IST2157I ALIASRCH = *NA
IST1103I NETA.VN1          VN       1           0              *NA*
IST2157I ALIASRCH = *NA
IST314I END
```

Displaying an application program major node, including model application programs and dynamic application programs built from those models:

```
d net,id=a01appls,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = A01APPLS, TYPE = APPL SEGMENT
IST486I STATUS= ACTIV     , DESIRED STATE= ACTIV
IST360I APPLICATIONS:
IST080I APPL01   CONCT      APPL0102 CONCT      A01MVSNO CONCT
IST080I APPL1    CONCT      APPLA*   CONCT      APPL2    CONCT
IST080I APPLQ?   CONCT      APPL3    CONCT      APPLQ1   ACTIV
IST314I END
```

Displaying a CDRM major node:

```
d net,id=cdrm1a,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = CDRM1A, TYPE = CDRM SEGMENT
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST477I CDRMS:
IST1546I CDRM     STATUS    SUBAREA ELEMENT NETID    SSCPID
IST1547I SSCP1A    ACTIV          1      1  NETA          1
IST1547I SSCPAA    NEVAC         10      1  NETA        N/A
IST1547I SSCP2A    NEVAC          2      1  NETA        N/A
IST1547I SSCPBA    NEVAC         11      1  NETA        N/A
IST1547I SSCPCA    NEVAC         12      1  NETA        N/A
IST1547I SSCP7B    ACTIV          5      1  NETB          7
IST1547I SSCP9C    ACTIV          8      3  NETC          9
IST1500I STATE TRACE = OFF
IST314I END
```

Displaying a CDRSC major node:

```
d net,id=istcdrdy,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = ISTCDRDY, TYPE = CDRSC SEGMENT
IST486I STATUS= ACTIV     , DESIRED STATE= ACTIV
```

```
IST478I CDRSCS:
IST483I C25NVLUC ACTIV----Y, CDRM = ***NA***, NETID = NETA
IST483I B01NVLUC ACTIV----Y, CDRM = ***NA***, NETID = NETA
IST483I A81NVLUC ACTIV----Y, CDRM = ***NA***, NETID = NETA
IST483I A03D207F ACT/S----Y, CDRM = A01N    , NETID = NETA
IST483I A02NVLUC ACT/S----Y, CDRM = A01N    , NETID = NETA
IST483I ECHO02A  ACT/S----Y, CDRM = A01N    , NETID = NETA
IST483I A50NVLUC ACT/S----Y, CDRM = A01N    , NETID = NETA
IST483I A500N    ACT/S----Y, CDRM = A01N    , NETID = NETA
IST483I A02N     ACT/S----Y, CDRM = A01N    , NETID = NETA
IST314I END
```

Displaying a CDRSC major node for a specific network:

```
d net,id=a99cdrsc,netid=netc,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = A99CDRSC, TYPE = CDRSC SEGMENT
IST486I STATUS= ACTIV     , DESIRED STATE= ACTIV
IST478I CDRSCS:
IST483I CECH*    ACTIV     , CDRM = C01M    , NETID = NETC
IST483I CECHO01  ACTIV     , CDRM = C01M    , NETID = NETC
IST483I TPNSC01  ACTIV     , CDRM = C01M    , NETID = NETC
IST483I C01NVLUC ACTIV     , CDRM = C01M    , NETID = NETC
IST483I TSO11    ACTIV     , CDRM = ***NA***, NETID = NETC
IST483I ECHO11   ACTIV     , CDRM = C11M    , NETID = NETC
IST483I C11NVLUC ACTIV     , CDRM = C11M    , NETID = NETC
IST483I TSO255   ACTIV     , CDRM = ***NA***, NETID = NETC
IST483I ECHO255  ACTIV     , CDRM = C255M   , NETID = NETC
IST483I C255NLUC ACTIV     , CDRM = C255M   , NETID = NETC
IST314I END
```

Displaying a local SNA major node:

```
d net,id=a50lsna,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = A50LSNA, TYPE = LCL SNA MAJ NODE
IST486I STATUS= ACTIV     , DESIRED STATE= ACTIV
IST084I NETWORK NODES:
IST089I PUA      TYPE = PU_T2            , ACTIV      ,CUA=0770
IST089I LSNALU1  TYPE = LOGICAL UNIT     , ACTIV
IST089I LSNALU2  TYPE = LOGICAL UNIT     , ACTIV
IST089I LSNALU3  TYPE = LOGICAL UNIT     , ACTIV
IST089I LSNALU4  TYPE = LOGICAL UNIT     , ACTIV
IST314I END
```

Displaying a local SNA major node for each PU providing APPN host-to-host connectivity:

```
d net,id=lsna1a,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = LSNA1A, TYPE = LCL SNA MAJ NODE
IST486I STATUS= ACTIV     , DESIRED STATE= ACTIV
IST084I NETWORK NODES:
IST1316I PU NAME = AHHCPU1   STATUS = NEVAC       TRLE = ML1A2A2
IST1316I PU NAME = AHHCPU2   STATUS = NEVAC       TRLE = ML1A2A3
IST1316I PU NAME = AHHCPU3   STATUS = NEVAC       TRLE = ML1A2A4
IST314I END
```

Displaying the dynamic XCF local SNA major node:

```
d net,id=istlsxcf,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = ISTLSXCF, TYPE = LCL SNA MAJ NODE
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST084I NETWORK RESOURCES:
IST1316I PU NAME = ISTP0001  STATUS = ACTIV--LX-  TRLE = ISTT0001
IST1500I STATE TRACE = OFF
IST314I END
```

Displaying a transport resource list major node:

```
d net,id=trl1a,scope=all
 IST097I DISPLAY ACCEPTED
 IST075I NAME = TRL1A, TYPE = TRL MAJOR NODE
 IST1314I TRLE = TRLE1A    STATUS = NEVAC       CONTROL = MPC
 IST1314I TRLE = TRLE1B    STATUS = NEVAC       CONTROL = MPC
 IST1314I TRLE = TRLE1C    STATUS = NEVAC       CONTROL = MPC
 IST1314I TRLE = TRLE1D    STATUS = NEVAC       CONTROL = MPC
 IST314I END
```

Displaying an active TRL entry:

```
d net,id=trle1a
IST097I DISPLAY ACCEPTED
IST075I NAME = TRLE1A, TYPE = TRLE
IST486I STATUS= ACTIV----E, DESIRED STATE= ACTIV
IST087I TYPE = LEASED             , CONTROL = MPC , HPDT = NO
IST1954I TRL MAJOR NODE = TRL1
IST1715I MPCLEVEL = HPDT       MPCUSAGE = SHARE
IST1221I WRITE DEV = 0508 STATUS = RESET      STATE = ONLINE
IST1221I READ  DEV = 0408 STATUS = RESET      STATE = ONLINE
IST1500I STATE TRACE = OFF
IST314I END
```

Displaying a local non-SNA 3270 major node:

```
d net,id=a01local,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = A01LOCAL, TYPE = LCL 3270 MAJ NODE
IST486I STATUS= ACTIV     , DESIRED STATE= ACTIV
IST355I LOGICAL UNITS:
IST089I A01A741  TYPE = LOGICAL UNIT     , NEVAC      ,CUA=0741
IST089I A01A742  TYPE = LOGICAL UNIT     , NEVAC      ,CUA=0742
IST089I A01A743  TYPE = LOGICAL UNIT     , NEVAC      ,CUA=0743
IST089I A01A744  TYPE = LOGICAL UNIT     , NEVAC      ,CUA=0744
IST089I A01A745  TYPE = LOGICAL UNIT     , NEVAC      ,CUA=0745
IST089I A01A746  TYPE = LOGICAL UNIT     , NEVAC      ,CUA=0746
IST089I A01A747  TYPE = LOGICAL UNIT     , NEVAC      ,CUA=0747
IST089I A01A748  TYPE = LOGICAL UNIT     , NEVAC      ,CUA=0748
IST089I A01A721  TYPE = LOGICAL UNIT     , ACT/S      ,CUA=0721
IST089I A01A722  TYPE = LOGICAL UNIT     , ACTIV      ,CUA=0722
IST089I A01A723  TYPE = LOGICAL UNIT     , ACTIV      ,CUA=0723
IST089I A01A724  TYPE = LOGICAL UNIT     , ACTIV      ,CUA=0724
IST089I A01A725  TYPE = LOGICAL UNIT     , ACTIV      ,CUA=0725
IST089I A01A726  TYPE = LOGICAL UNIT     , NEVAC      ,CUA=0726
IST314I END
```

Displaying an NCP major node:

```
d net,id=a0462zc,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = A0462ZC, TYPE = PU T4/5
IST486I STATUS= ACTIV     , DESIRED STATE= ACTIV
IST247I LOAD/DUMP PROCEDURE STATUS = RESET
IST1656I VTAMTOPO = REPORT, NODE REPORTED - YES
IST484I SUBAREA = 4
IST391I ADJ LINK STATION = 0017-S, LINE = 0017-L, NODE = ISTPUS
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST077I SIO = 50078 CUA = 0017
IST675I VR = 0, TP = 2
IST170I LINES:
IST080I A04B00   NEVAC      A04B01   NEVAC      A04B03   NEVAC
IST080I A04B32   NEVAC      A04B33   NEVAC      A04B35   NEVAC
IST080I A04VXX   NEVAC----T A04S02   NEVAC      A04S34   NEVAC
IST080I A04S04   NEVAC      A04S16   NEVAC      A04S20   NEVAC
```

```
IST080I A04S36   NEVAC      A04S48   NEVAC      A04S52   NEVAC
IST080I A04S128  NEVAC      A04S136  NEVAC      A04PT88  ACTIV
IST080I A04C00   NEVAC      A04C02   NEVAC
IST314I END
```

Displaying the host physical unit:

```
d net,id=istpus,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = ISTPUS, TYPE = PU T4/5
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST596I IRN TRACE = OFF
IST1656I VTAMTOPO = INCLUDE, NODE REPORTED - YES
IST484I SUBAREA = 1
IST925I DYNAMIC PATH DEFINITION PATH1A STATUS = ACTIV
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1500I STATE TRACE = OFF
IST170I LINES:
IST080I 091C-L   ACTIV----I
IST314I END
```

Displaying the rapid transport protocol (RTP) major node:

```
d net,id=istrtpmn,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = ISTRTPMN, TYPE = RTP MAJOR NODE
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST1486I   RTP NAME   STATE             DESTINATION CP     MNPS  TYPE
IST1487I   CNR00004   CONNECTED         NETA.SSCP2A        NO    LULU
IST1487I   CNR00003   CONNECTED         NETA.SSCP2A        NO    RSTP
IST1487I   CNR00002   CONNECTED         NETA.SSCP2A        NO    CPCP
IST1487I   CNR00001   CONNECTED         NETA.SSCP2A        NO    CPCP
IST314I END
```

Displaying a switched major node:

```
d net,id=a04smnc,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = A04SMNC, TYPE = SW SNA MAJ NODE
IST486I STATUS= ACTIV     , DESIRED STATE= ACTIV
IST1656I VTAMTOPO = REPORT, NODE REPORTED - YES
IST084I NETWORK NODES:
IST089I A04P882  TYPE = PU_T2            , ACTIV--L--
IST089I A04P883  TYPE = PU_T2            , ACTIV--L--
IST089I A04D8831 TYPE = LOGICAL UNIT     , ACTIV
IST089I A04D8832 TYPE = LOGICAL UNIT     , ACTIV
IST089I A04D8833 TYPE = LOGICAL UNIT     , ACT/S
IST089I A04D8834 TYPE = LOGICAL UNIT     , ACTIV
IST089I A04D8835 TYPE = LOGICAL UNIT     , ACTIV
IST089I A04D8836 TYPE = LOGICAL UNIT     , ACT/S
IST089I A04D8837 TYPE = LOGICAL UNIT     , ACT/S
IST089I A04P885  TYPE = PU_T2            , ACTIV--L--
IST089I A04P886  TYPE = PU_T2            , ACTIV--L--
IST089I A04D8861 TYPE = LOGICAL UNIT     , ACT/S
IST089I A04D8862 TYPE = LOGICAL UNIT     , ACT/S
IST089I A04D8863 TYPE = LOGICAL UNIT     , ACTIV
IST089I A04D8864 TYPE = LOGICAL UNIT     , ACTIV
IST314I END
```

Displaying a channel-attachment major node:

```
d net,id=ctcbc0t3,scope=all
IST097I DISPLAY  ACCEPTED
IST075I NAME = CTCBC0T3         , TYPE = CA MAJOR NODE
IST486I STATUS= ACTIV     , DESIRED STATE= ACTIV
```

```
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST170I LINES:
IST232I CTCLBC03, ACTIV----E, CUA = BC0
IST314I END
```

Displaying an XCA major node with its subordinate resources:

```
d net,id=xca1a,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = XCA1A, TYPE = XCA MAJOR NODE
IST486I STATUS= ACTIV      , DESIRED STATE= ACTIV
IST1021I MEDIUM=RING,ADAPNO= 1,CUA=0500,SNA SAP= 8
IST1885I SIO = 1234 SLOWDOWN = YES
IST1324I VNNAME =  NETA.CN1           VNGROUP = GP1A2A
IST1105I RESOURCE STATUS TGN CP-CP TG CHARACTERISTICS
IST1106I XCA1A    AC/R    21 NO    902D0000000000000000017100808080
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1656I VTAMTOPO = REPORT, NODE REPORTED - YES
IST170I LINES:
IST232I LN1A2A  , ACTIV
IST232I LN1A7B  , NEVAC
IST232I LN1A9C  , NEVAC
IST232I LN1AAA  , NEVAC
IST232I LN1ABA  , NEVAC
IST232I LN1ACA  , NEVAC
IST232I LN1ADA  , NEVAC
IST232I LN1AEA  , NEVAC
IST314I END
```

Displaying an XCA major node without its subordinate resources:

```
d net,id=x50rbf4a
IST097I DISPLAY ACCEPTED
IST075I NAME = X50RBF4A, TYPE = XCA MAJOR NODE
IST486I STATUS= ACTIV      , DESIRED STATE= ACTIV
IST1021I MEDIUM=RING,ADAPNO= 0,CUA=0BF4,SNA SAP= 4
IST1885I SIO = 1234 SLOWDOWN = YES
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1656I VTAMTOPO = REPORT, NODE REPORTED - YES
IST314I END
```

Displaying an XCA major node that defines a native ATM port:

```
d net,id=xcaosa1a,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = XCAOSA1A, TYPE = XCA MAJOR NODE
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST1557I MEDIUM = ATM, PORT NAME = OSA11
IST1559I ATM ADDRESS                                    TYPE      FORMAT
IST1553I 11111111111111111111111111111111111111100    LOCAL     NSAP
IST1324I VNNAME = NETA.SSCPVN        VNGROUP = GP1A2AC
IST1559I ATM ADDRESS                                    TYPE      FORMAT
IST1553I 21111111111111111111111111111111111111110    GATEWAY   NSAP
IST1105I RESOURCE STATUS TGN CP-CP TG CHARACTERISTICS
IST1106I XCAOSA1A AC/R    21 NO    1075000000000000000014C00808080
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1656I VTAMTOPO = REPORT, NODE REPORTED - YES
IST170I LINES:
IST232I LN1A2A   ACTIV
IST232I LNP1A2A1 ACTIV
IST232I LN1A2AC1 ACTIV
IST314I END
```

Displaying an XCA major node group that defines a transmission group (TG) to a native ATM connection network:

```
d net,id=gp1a2ac,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = GP1A2AC, TYPE = LINE GROUP
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST231I XCA MAJOR NODE = XCAOSA1A
IST1485I DLCADDR SUBFIELDS FOR GP1A2AC
IST1318I 1,C'ATMSVCNETA.SSCPVNEXCLUSIVE'
IST1318I 7,BCD'03000000 40000000 40000000 536000'
IST1318I 8,X'0003'
IST1318I 21,X'00022111 11111111 11111111 11111111 11111111 1110'
IST084I NETWORK RESOURCES:
IST089I LN1A2AC1 TYPE = LINE             , ACTIV
IST314I END
```

Displaying an XCA major node that defines Enterprise Extender:

```
d net,id=xcaip,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = XCAIP, TYPE = XCA MAJOR NODE
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST1679I MEDIUM = HPRIP
IST1685I TCP/IP JOB NAME = ***NA***
IST924I-------------------------------------------------------------
IST1324I VNNAME = IP.VNA             VNGROUP = GPVNA     (LOCAL)
IST1910I LOCAL HOSTNAME NODENAME.NETID.DOMAIN
IST1105I RESOURCE STATUS TGN CP-CP TG CHARACTERISTICS
IST1106I XCAIP    NEV      0 NO    107500000000000000000014C00808080
IST924I -------------------------------------------------------------
IST1324I VNNAME = IP.VNB             VNGROUP = GPVNB     (GLOBAL)
IST1680I LOCAL IP ADDRESS 223.254.254.252
IST1105I RESOURCE STATUS TGN CP-CP TG CHARACTERISTICS
IST1106I XCAIP    NEV      0 NO    127500000000000000000014C00808080
IST924I -------------------------------------------------------------
IST1324I VNNAME = IP.VNC             VNGROUP = GPVNC     (GLOBAL)
IST1910I LOCAL HOSTNAME NODENAME.NETID.REALLYREALLYLONGDOMAIN.COM
IST1105I RESOURCE STATUS TGN CP-CP TG CHARACTERISTICS
IST1106I XCAIP    NEV      0 NO    12B400000000000000000017100808080
IST924I -------------------------------------------------------------
IST1902I GROUP = GPIP1
IST1680I LOCAL IP ADDRESS 223.254.254.254
IST924I -------------------------------------------------------------
IST1902I GROUP = GPIP2
IST1680I LOCAL IP ADDRESS 223.254.254.255
IST924I -------------------------------------------------------------
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1656I VTAMTOPO = REPORT, NODE REPORTED - YES
IST170I LINES:
IST1901I LINES UNDER GROUP: GPVNC
IST232I LNIPC1   NEVAC
IST232I LNIPC2   NEVAC
IST1901I LINES UNDER GROUP: GPVNA
IST232I LNIPA1   NEVAC
IST232I LNIPA2   NEVAC
IST1901I LINES UNDER GROUP: GPVNB
IST232I LNIPB1   NEVAC
IST232I LNIPB2   NEVAC
IST232I LNIPB3   NEVAC
IST1901I LINES UNDER GROUP: GPIP1
IST232I LNIP1    NEVAC
IST232I LNIP2    NEVAC
IST1901I LINES UNDER GROUP: GPIP2
IST232I LNIP21   NEVAC
IST232I LNIP22   NEVAC
IST232I LNIP23   NEVAC
IST314I END
```

Displaying a GROUP associated with an XCA major node that defines Enterprise Extender, where the GROUP definition uses only IPADDR to define the IPv4 connection:

```
d net,id=gpip,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = GPIP, TYPE = LINE GROUP
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST231I XCA MAJOR NODE = XCAIP
IST1680I LOCAL IP ADDRESS 223.254.254.252
IST084I NETWORK RESOURCES:
IST089I LNIP1    TYPE = LINE             , NEVAC
IST089I LNIP2    TYPE = LINE             , NEVAC
IST314I END
```

Displaying a GROUP associated with an XCA major node that defines Enterprise Extender, where the GROUP definition uses HOSTNAME to define the IPv6 connection:

```
d net,id=gpip6v,e
IST097I DISPLAY ACCEPTED
IST075I NAME = GPIP6V, TYPE = LINE GROUP
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST231I XCA MAJOR NODE = XCAIP1
IST1680I LOCAL IP ADDRESS 9::67:1:1
IST1910I LOCAL HOSTNAME VIPA26.SSCP1A.RALEIGH.IBM.COM
IST084I NETWORK RESOURCES:
IST089I LNGV6000 TYPE = LINE             , NEVAC
IST089I LNGV6001 TYPE = LINE             , NEVAC
IST314I END
```

Displaying an adjacent CP (CDRSC minor node):

```
d net,id=neta.sscp2a,idtype=cp,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = NETA.SSCP2A, TYPE = ADJACENT CP
IST1046I SSCP NETA.SSCP2A ALSO EXISTS
IST486I STATUS= ACT/S----Y, DESIRED STATE= ACTIV - TRACE= OFF
IST1447I REGISTRATION TYPE = NO
IST977I MDLTAB=***NA*** ASLTAB=***NA***
IST1333I ADJLIST = ***NA***
IST861I MODETAB=***NA*** USSTAB=***NA*** LOGTAB=***NA***
IST934I DLOGMOD=***NA*** USS LANGTAB=***NA***
IST597I CAPABILITY-PLU ENABLED  ,SLU ENABLED  ,SESSION LIMIT NONE
IST231I CDRSC MAJOR NODE = ISTCDRDY
IST479I CDRM NAME = SSCP1A, VERIFY OWNER = NO
IST1184I CPNAME = NETA.SSCP2A - NETSRVR = ***NA***
IST1044I ALSLIST = ISTAPNPU
IST082I DEVTYPE = INDEPENDENT LU / CDRSC
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST171I ACTIVE SESSIONS = 0000000002, SESSION REQUESTS = 0000000002
IST206I SESSIONS:
IST1081I ADJACENT LINK STATION = P3A21
IST634I NAME     STATUS         SID          SEND RECV VR TP NETID
IST635I SSCP1A   ACTIV/CP-S F6ABEEC38077021A 0002 0001  0  0 NETA
IST635I SSCP1A   ACTIV/CP-P EAABEEC37D76FABF 0001 0002  0  0 NETA
IST314I END
```

Displaying a dependent LU requester:

```
d net,id=nncpa1,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = NETA.NNCPA1, TYPE = ADJACENT CP
IST486I STATUS= ACT/S----Y, DESIRED STATE= ACTIV
IST977I MDLTAB=***NA*** ASLTAB=***NA***
IST861I MODETAB=***NA*** USSTAB=***NA*** LOGTAB=***NA***
IST934I DLOGMOD=CPSVCMG USS LANGTAB=***NA***
```

```
IST597I CAPABILITY-PLU ENABLED  ,SLU ENABLED  ,SESSION LIMIT NONE
IST231I CDRSC MAJOR NODE = ISTCDRDY
IST1044I ALSLIST = ISTAPNPU
IST1131 DEVICE = ILU/CDRSC
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST228I ENCRYPTION = OPT, TYPE = TDES24
IST1563I CKEYNAME = NNCPA1 CKEY = PRIMARY CERTIFY = NO
IST1552I MAC = NONE MACTYPE = NONE
IST171I ACTIVE SESSIONS = 0000000004, SESSION REQUESTS = 0000000004
IST206I SESSIONS:
IST1081I ADJACENT LINK STATION = P3A4956K
IST634I NAME     STATUS         SID          SEND RECV VR TP NETID
IST635I SSCP1A   ACTIV/DL-S E2C5E2E2D6D5000B 001C 0000  0  0 NETA
IST635I SSCP1A   ACTIV/CP-S E2C5E2E2D6D50005 0004 0001  0  0 NETA
IST635I SSCP1A   ACTIV/DL-P EAABEEC3361D945A 0000 0012  0  0 NETA
IST635I SSCP1A   ACTIV/CP-P EAABEEC3361D945B 0001 0005  0  0 NETA
IST1355I PHYSICAL UNITS SUPPORTED BY DLUR NETA.NNCPA1
IST089I AA1PUA   TYPE = PU_T2            , ACTIV
IST089I AA1PUB   TYPE = PU_T2            , ACTIV
IST924I -------------------------------------------------------------
IST075I NAME = NETA.NNCPA1, TYPE = DIRECTORY ENTRY
IST1186I DIRECTORY ENTRY = DYNAMIC NN
IST1184I CPNAME = NETA.NNCPA1 - NETSRVR = ***NA***
IST314I END
```

Displaying an SSCP (CDRM minor node) with virtual-route-based transmission group support:

```
d net,id=neta.sscp2a,idtype=sscp,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = NETA.SSCP2A, TYPE = CDRM
IST1046I CP NETA.SSCP2A ALSO EXISTS
IST486I STATUS= ACTIV     , DESIRED STATE= ACTIV
IST815I AUTOMATIC RECOVERY IS SUPPORTED
IST231I CDRM  MAJOR NODE = CDRM1A
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST476I CDRM TYPE = EXTERNAL
IST637I SUBAREA= 2   ELEMENT= 1 SSCPID = 2
IST675I VR = 0, TP = 0
IST389I PREDEFINITION OF CDRSC = OPT
IST1105I RESOURCE STATUS TGN CP-CP TG CHARACTERISTICS
IST1106I SSCP2A   AC/R   255 YES   982D0000000000000000017100808080
IST636I CDRSCS OWNED BY SSCP2A   -
IST080I L4A3278A ACTIV      L4A3279A ACTIV      L4A3767D ACTIV
IST080I L4A3278B ACTIV      L4A3279B ACTIV      L4A3287B ACTIV
IST080I L4A3767E ACTIV      L4A4956D ACTIV      L4A4956E ACTIV
IST080I L4A4956F ACTIV      NETAPPL1 ACTIV      NETAPPL2 ACTIV
IST080I NETAPPL3 ACTIV      NETAPPL4 ACTIV      APLMDSEC ACTIV
IST080I TSO2     ACTIV
IST314I END
```

Displaying an SSCP (CDRM) and adjacent CP (CDRSC) with the same name from a network node:

```
d net,id=sscp2a,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = NETA.SSCP2A, TYPE = CDRM
IST1046I CP NETA.SSCP2A ALSO EXISTS
IST486I STATUS= NEVAC, DESIRED STATE= INACT - TRACE= OFF
IST815I AUTOMATIC RECOVERY IS SUPPORTED
IST231I CDRM MAJOR NODE = CDRM1A
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST476I CDRM TYPE = EXTERNAL
IST637I SUBAREA= 2   ELEMENT= 1 SSCPID = 2
IST389I PREDEFINITION OF CDRSC = OPT
IST636I CDRSCS OWNED BY SSCP2A   -
IST080I NETAPPL1 PNF/S
```

```
IST924I -------------------------------------------------------------
IST075I NAME = NETA.SSCP2A, TYPE = ADJACENT CP
IST1046I SSCP NETA.SSCP2A ALSO EXISTS
IST486I STATUS= ACT/S----Y, DESIRED STATE= ACTIV - TRACE= OFF
IST1447I REGISTRATION TYPE = NO
IST977I MDLTAB=***NA*** ASLTAB=***NA***
IST1333I ADJLIST = ***NA***
IST861I MODETAB=***NA*** USSTAB=***NA*** LOGTAB=***NA***
IST934I DLOGMOD=***NA*** USS LANGTAB=***NA***
IST597I CAPABILITY-PLU ENABLED  ,SLU ENABLED  ,SESSION LIMIT NONE
IST231I CDRSC MAJOR NODE = ISTCDRDY
IST479I CDRM NAME = SSCP1A, VERIFY OWNER = NO
IST1184I CPNAME = NETA.SSCP2A - NETSRVR = ***NA***
IST1044I ALSLIST = ISTAPNPU
IST082I DEVTYPE = INDEPENDENT LU / CDRSC
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST171I ACTIVE SESSIONS = 0000000002, SESSION REQUESTS = 0000000002
IST206I SESSIONS:
IST1081I ADJACENT LINK STATION = P3A21
IST634I NAME     STATUS         SID          SEND RECV VR TP NETID
IST635I SSCP1A   ACTIV/CP-S F6ABEEC38077021A 0006 0001  0  0 NETA
IST635I SSCP1A   ACTIV/CP-P EAABEEC37D76FABF 0001 0006  0  0 NETA
IST924I -------------------------------------------------------------
IST075I NAME = NETA.SSCP2A, TYPE = DIRECTORY ENTRY
IST1186I DIRECTORY ENTRY = DYNAMIC NN
IST1184I CPNAME = NETA.SSCP2A - NETSRVR = ***NA***
IST314I END
```

Displaying an SSCP (CDRM) and a host CP (application) with the same name:

```
d net,id=neta.sscp1a,idtype=resource,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = NETA.SSCP1A, TYPE = CDRM
IST1046I CP NETA.SSCP1A ALSO EXISTS
IST486I STATUS= ACTIV     , DESIRED STATE= ACTIV
IST815I AUTOMATIC RECOVERY IS SUPPORTED
IST231I CDRM  MAJOR NODE = VTAMSEG
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST476I CDRM TYPE = HOST, GATEWAY CAPABLE
IST637I SUBAREA= 2   ELEMENT= 1 SSCPID = 2
IST388I DYNAMIC CDRSC DEFINITION SUPPORT = YES
IST171I ACTIVE SESSIONS = 0000000000, SESSION REQUESTS = 0000000000
IST172I NO SESSIONS EXIST
IST924I -------------------------------------------------------------
IST075I NAME = NETA.SSCP1A, TYPE = HOST CP
IST1046I SSCP NETA.SSCP1A ALSO EXISTS
IST486I STATUS= ACT/S     , DESIRED STATE= ACTIV
IST977I MDLTAB=***NA*** ASLTAB=***NA***
IST861I MODETAB=***NA*** USSTAB=***NA*** LOGTAB=***NA***
IST934I DLOGMOD=***NA*** USS LANGTAB=***NA***
IST597I CAPABILITY-PLU ENABLED  ,SLU ENABLED  ,SESSION LIMIT NONE
IST231I APPL  MAJOR NODE = VTAMSEG
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST271I JOBNAME = VTAM    , STEPNAME = VTAM    , DSPNAME = 0AAABIST
IST228I ENCRYPTION = NONE, TYPE = DES
IST1563I CKEYNAME = SSCP1A CKEY = PRIMARY CERTIFY = NO
IST1552I MAC = NONE MACTYPE = NONE
IST1050I MAXIMUM COMPRESSION LEVEL - INPUT = 0, OUTPUT = 0
IST171I ACTIVE SESSIONS = 0000000002, SESSION REQUESTS = 0000000000
IST206I SESSIONS:
IST634I NAME     STATUS         SID          SEND RECV VR TP NETID
IST635I SSCP2A   ACTIV/CP-S EAABEEC3F11FF31F 0002 0001       NETA
IST635I SSCP2A   ACTIV/CP-P F6ABEEC3F4203D93 0001 0002       NETA
IST314I END
```

Displaying the host (this command works for any host). This display shows an interchange node:

```
d net,id=vtam
IST097I DISPLAY ACCEPTED
IST075I NAME = VTAM, TYPE = CDRM
IST1046I CP NETA.SSCP1A ALSO EXISTS
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST599I REAL NAME = NETA.SSCP1A
IST815I AUTOMATIC RECOVERY IS SUPPORTED
IST231I CDRM MAJOR NODE = VTAMSEG
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1500I STATE TRACE = OFF
IST2159I XCF GROUP = ISTXCF11 CFS GROUP = ISTCFS11
IST2181I GR STRUCTURE NAME IS ISTGENERIC11
IST2181I MNPS STRUCTURE NAME IS ISTMNPS11
IST476I CDRM TYPE = HOST GATEWAY CAPABLE
IST637I SUBAREA = 1 ELEMENT = 1 SSCPID = 1
IST388I DYNAMIC CDRSC DEFINITION SUPPORT = YES
IST171I ACTIVE SESSIONS = 0000000000, SESSION REQUESTS = 0000000000
IST924I -------------------------------------------------------------
IST075I NAME = NETA.SSCP1A, TYPE = HOST CP
IST1046I SSCP NETA.SSCP1A ALSO EXISTS
IST486I STATUS= ACT/S, DESIRED STATE= ACTIV
IST1447I REGISTRATION TYPE = NO
IST1501I XCF TOKEN = 010000B7000F0001
IST977I MDLTAB=***NA*** ASLTAB=***NA***
IST861I MODETAB=***NA*** USSTAB=***NA*** LOGTAB=***NA***
IST934I DLOGMOD=***NA*** USS LANGTAB=***NA***
IST1632I VPACING = 63
IST597I CAPABILITY-PLU ENABLED  ,SLU ENABLED  ,SESSION LIMIT NONE
IST231I APPL MAJOR NODE = VTAMSEG
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1500I STATE TRACE = OFF
IST271I JOBNAME = VTAM550T, STEPNAME = NET, DSPNAME = ISTEAF13
IST228I ENCRYPTION = NONE, TYPE = DES
IST1563I CKEYNAME = SSCP1A CKEY = PRIMARY CERTIFY = NO
IST1552I MAC = NONE MACTYPE = NONE
IST1050I MAXIMUM COMPRESSION LEVEL - INPUT = 0, OUTPUT = 0
IST1633I ASRCVLM = 1999999
IST1634I DATA SPACE USAGE: CURRENT = 0 MAXIMUM = 272
IST171I ACTIVE SESSIONS = 0000000002, SESSION REQUESTS = 0000000000
IST314I END
```

Displaying a CDRSC (no SSCP, adjacent CP, or host CP was found with this name) from a network node:

```
d net,id=neta.netappl1,idtype=resource,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = NETA.NETAPPL1, TYPE = CDRSC
IST486I STATUS= ACT/S, DESIRED STATE= ACTIV
IST1447I REGISTRATION TYPE = NO
IST977I MDLTAB=***NA*** ASLTAB=***NA***
IST1333I ADJLIST = ***NA***
IST861I MODETAB=***NA*** USSTAB=***NA*** LOGTAB=***NA***
IST934I DLOGMOD=***NA*** USS LANGTAB=***NA***
IST597I CAPABILITY-PLU ENABLED  ,SLU ENABLED  ,SESSION LIMIT NONE
IST231I CDRSC MAJOR NODE = CDRSC1A
IST479I CDRM NAME = SSCP2A, VERIFY OWNER = NO
IST1184I CPNAME = NETA.SSCP2A - NETSRVR = ***NA***
IST1044I ALSLIST = ISTAPNPU
IST082I DEVTYPE = INDEPENDENT LU / CDRSC
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1500I STATE TRACE = OFF
IST228I ENCRYPTION = NONE, TYPE = DES
IST1563I CKEYNAME = NETAPPL1 CKEY = PRIMARY CERTIFY = NO
IST1552I MAC = NONE MACTYPE = NONE
IST171I ACTIVE SESSIONS = 0000000001, SESSION REQUESTS = 0000000000
IST206I SESSIONS:
IST1081I ADJACENT LINK STATION = P3A21
```

```
IST634I NAME     STATUS         SID          SEND RECV VR TP NETID
IST635I APPL1    ACTIV-P    EAABEEC356FA371B 0000 0000  0  0 NETA
IST924I -------------------------------------------------------------
IST075I NAME = NETA.NETAPPL1, TYPE = DIRECTORY ENTRY
IST1186I DIRECTORY ENTRY = DYNAMIC LU
IST1184I CPNAME = NETA.SSCP2A - NETSRVR = ***NA***
IST484I SUBAREA = 2
IST1703I DESIRED LOCATE SIZE = 1K LAST LOCATE SIZE = 16K
IST314I END
```

Displaying directory information for a resource (no SSCP, adjacent CP, host CP, or other resource was found with this name) and the command was issued at a network node or interchange node:

```
d net,id=neta.lu71,idtype=resource,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = NETA.LU71, TYPE = DIRECTORY ENTRY
IST1186I DIRECTORY ENTRY = DYNAMIC LU
IST1184I CPNAME = NETA.NN3 - NETSRVR = ***NA***
IST484I SUBAREA = ****NA****
IST1703I DESIRED LOCATE SIZE = 1K LAST LOCATE SIZE = 16K
IST314I END
```

Displaying only directory information for a resource:

```
d net,id=sscp2a,idtype=directry,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = NETA.SSCP2A, TYPE = DIRECTORY ENTRY
IST1186I DIRECTORY ENTRY = DYNAMIC NN
IST1184I CPNAME = NETA.SSCP2A   - NETSRVR = ***NA***
IST314I END
```

Displaying a conventionally defined application program that is not being monitored for 3270 protocol violations:

```
d net,id=appl1,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = NETA.APPL1, TYPE = APPL
IST486I STATUS= ACT/S, DESIRED STATE= ACTIV - TRACE= OFF
IST1447I REGISTRATION TYPE = CDSERVR
IST977I MDLTAB=***NA*** ASLTAB=***NA***
IST861I MODETAB=***NA*** USSTAB=***NA*** LOGTAB=***NA***
IST934I DLOGMOD=***NA*** USS LANGTAB=***NA***
IST1632I VPACING =  7
IST1938I APPC = YES
IST597I CAPABILITY-PLU ENABLED  ,SLU ENABLED  ,SESSION LIMIT NONE
IST231I APPL MAJOR NODE = APPL1A
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1500I STATE TRACE = OFF
IST271I JOBNAME = ECHO, STEPNAME = ECHO, DSPNAME = IST6D2D6
IST228I ENCRYPTION = OPTIONAL, TYPE = DES
IST1563I CKEYNAME = APPL1 CKEY = PRIMARY CERTIFY = NO
IST1552I MAC = NONE MACTYPE = NONE
IST1050I MAXIMUM COMPRESSION LEVEL - INPUT = 0, OUTPUT = 0
IST1633I ASRCVLM = 2000000
IST1634I DATA SPACE USAGE: CURRENT = 0 MAXIMUM = 0
IST2436I DSMONITR = NO
IST171I ACTIVE SESSIONS = 0000000001, SESSION REQUESTS = 0000000001
IST206I SESSIONS:
IST634I NAME     STATUS         SID          SEND RECV VR TP NETID
IST635I NETAPPL1 ACTIV-S    EAABEEC37D76FAC1 0000 0000  0  0 NETA
IST314I END
```

Displaying an application program that is multinode persistent session (MNPS) capable:

```
d net,id=mappl1,e
 IST097I DISPLAY ACCEPTED
 IST075I NAME = NETA.MAPPL1, TYPE = DYNAMIC APPL
 IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
 IST1447I REGISTRATION TYPE = CDSERVR
 IST1550I MNPS STATE = DISABLED
 IST2062I SNPS FORCED TAKEOVER REQUESTS ARE ACCEPTABLE
 IST1629I MODSRCH = NEVER
 IST977I MDLTAB=***NA*** ASLTAB=***NA***
 IST861I MODETAB=***NA*** USSTAB=***NA*** LOGTAB=***NA***
 IST934I DLOGMOD=***NA*** USS LANGTAB=***NA***
 IST1632I VPACING =  7
 IST1938I APPC = NO
 IST597I CAPABILITY-PLU ENABLED  ,SLU ENABLED  ,SESSION LIMIT NONE
 IST231I APPL MAJOR NODE = APPLANY
 IST1425I DEFINED USING MODEL MAPPL*
 IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
 IST1500I STATE TRACE = OFF
 IST271I JOBNAME = ECHO, STEPNAME = ECHO, DSPNAME = ISTBFA93
 IST228I ENCRYPTION = OPTIONAL , TYPE = DES
 IST1563I CKEYNAME = MAPPL1 CKEY = PRIMARY CERTIFY = NO
 IST1552I MAC = NONE MACTYPE = NONE
 IST1050I MAXIMUM COMPRESSION LEVEL - INPUT = 0, OUTPUT = 0
 IST1633I ASRCVLM = 1000000
 IST1634I DATA SPACE USAGE: CURRENT = 0 MAXIMUM = 0
 IST171I ACTIVE SESSIONS = 0000000000, SESSION REQUESTS = 0000000000
 IST172I NO SESSIONS EXIST
 IST314I END
```

Displaying an application program that is single node persistent session (SNPS) capable and is being monitored for 3270 protocol violations:

```
d net,id=appl1,e
 IST097I DISPLAY ACCEPTED
 IST075I NAME = NETA.APPL1, TYPE = APPL
 IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
 IST1447I REGISTRATION TYPE = CDSERVR
 IST2062I SNPS FORCED TAKEOVER REQUESTS ARE ACCEPTABLE
 IST977I MDLTAB=***NA*** ASLTAB=***NA***
 IST861I MODETAB=***NA*** USSTAB=***NA*** LOGTAB=***NA***
 IST934I DLOGMOD=***NA*** USS LANGTAB=***NA***
 IST1632I VPACING =  7
 IST1938I APPC = NO
 IST597I CAPABILITY-PLU ENABLED  ,SLU ENABLED  ,SESSION LIMIT NONE
 IST231I APPL MAJOR NODE = APPL1A
 IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
 IST1500I STATE TRACE = OFF
 IST271I JOBNAME = ECHO, STEPNAME = ECHO, DSPNAME = IST4915A
 IST228I ENCRYPTION = OPTIONAL , TYPE = DES
 IST1563I CKEYNAME = APPL1 CKEY = PRIMARY CERTIFY = NO
 IST1552I MAC = NONE MACTYPE = NONE
 IST1050I MAXIMUM COMPRESSION LEVEL - INPUT = 0, OUTPUT = 0
 IST1633I ASRCVLM = 1000000
 IST1634I DATA SPACE USAGE: CURRENT = 0 MAXIMUM = 0
 IST2433I DSMONITR = YES, DSCOUNT = 1, DSACTION = (SYSLOG,NONE)
 IST2434I DSTRUST = NONE
 IST171I ACTIVE SESSIONS = 0000000000, SESSION REQUESTS = 0000000000
 IST172I NO SESSIONS EXIST
 IST314I END
```

Displaying a model application program:

```
d net,id=appl*,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = NETA.APPL*, TYPE = MODEL APPL
IST486I STATUS= CONCT, DESIRED STATE= CONCT - TRACE= OFF
IST1447I REGISTRATION TYPE = CDSERVR
```

```
IST977I MDLTAB=***NA*** ASLTAB=***NA***
IST861I MODETAB=***NA*** USSTAB=***NA*** LOGTAB=***NA***
IST934I DLOGMOD=***NA*** USS LANGTAB=***NA***
IST1938I APPC = NO
IST597I CAPABILITY-PLU INHIBITED,SLU INHIBITED,SESSION LIMIT NON
IST231I APPL MAJOR NODE = APPL1A
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST271I JOBNAME = ***NA***, STEPNAME = ***NA***, DSPNAME = ***NA
IST228I ENCRYPTION = OPTIONAL, TYPE = DES
IST1563I CKEYNAME = APPL* CKEY = PRIMARY CERTIFY = NO
IST1552I MAC = NONE MACTYPE = NONE
IST1050I MAXIMUM COMPRESSION LEVEL - INPUT = 0, OUTPUT = 0
IST1424I APPLICATIONS DEFINED USING THIS MODEL:
IST080I APPL1  ACTIV
IST314I END
```

Displaying a multinode persistent session application program from a remote node connected to the MNPS coupling facility structure might result in any of the following output:

```
d net,id=mapplx1,e
IST097I DISPLAY ACCEPTED
IST075I NAME = NETA.MAPPLX1, TYPE = APPL
IST1549I OWNER = NETA.SSCP2A MNPS STATE = DISABLED
IST2062I MNPS FORCED TAKEOVER REQUESTS ARE ACCEPTABLE
IST924I -------------------------------------------------------------
IST075I NAME = NETA.MAPPLX1, TYPE = DIRECTORY ENTRY
IST1186I DIRECTORY ENTRY = REGISTERED LU
IST1184I CPNAME = NETA.SSCP1A - NETSRVR = NETA.SSCPAA
IST314I END
```

```
d net,id=mapplx1,e
IST097I DISPLAY ACCEPTED
IST075I NAME = NETA.MAPPLX1, TYPE = CDRSC
IST486I STATUS= ACT/S----Y, DESIRED STATE= ACTIV
IST1447I REGISTRATION TYPE = NO
IST977I MDLTAB=***NA*** ASLTAB=***NA***
IST1333I ADJLIST = ***NA***
IST861I MODETAB=***NA*** USSTAB=***NA*** LOGTAB=***NA***
IST934I DLOGMOD=***NA*** USS LANGTAB=***NA***
IST597I CAPABILITY-PLU ENABLED  ,SLU ENABLED  ,SESSION LIMIT NONE
IST231I CDRSC MAJOR NODE = ISTCDRDY
IST479I CDRM NAME = SSCPAA, VERIFY OWNER = NO
IST1184I CPNAME = NETA.SSCP2A - NETSRVR = ***NA***
IST082I DEVTYPE = INDEPENDENT LU / CDRSC
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1500I STATE TRACE = OFF
IST228I ENCRYPTION = NONE, TYPE = DES
IST1563I CKEYNAME = MAPPLX1 CKEY = PRIMARY CERTIFY = NO
IST1552I MAC = NONE MACTYPE = NONE
IST171I ACTIVE SESSIONS = 0000000001, SESSION REQUESTS = 0000000000
IST206I SESSIONS:
IST1081I ADJACENT LINK STATION = CNR00005
IST634I NAME     STATUS         SID          SEND RECV VR TP NETID
IST635I APPLAA1  ACTIV-P    EAABEE185A59FD67 0000 0000  0  0 NETA
IST924I -------------------------------------------------------------
IST075I NAME = NETA.MAPPLX1, TYPE = APPL
IST1549I OWNER = NETA.SSCP2A MNPS STATE = ENABLED
IST2062I MNPS FORCED TAKEOVER REQUESTS ARE ACCEPTABLE
IST924I -------------------------------------------------------------
IST075I NAME = NETA.MAPPLX1, TYPE = DIRECTORY ENTRY
IST1186I DIRECTORY ENTRY = DYNAMIC LU
IST1184I CPNAME = NETA.SSCP2A - NETSRVR = ***NA***
IST314I END
```

```
d net,id=mappl1,e
IST097I DISPLAY ACCEPTED
IST075I NAME = NETA.MAPPL1, TYPE = CDRSC
```

```
IST486I STATUS= ACT/S----Y, DESIRED STATE= ACTIV
IST1447I REGISTRATION TYPE = NO
IST977I MDLTAB=***NA*** ASLTAB=***NA***
IST1333I ADJLIST = ***NA***
IST861I MODETAB=***NA*** USSTAB=***NA*** LOGTAB=***NA***
IST934I DLOGMOD=***NA*** USS LANGTAB=***NA***
IST597I CAPABILITY-PLU ENABLED  ,SLU ENABLED  ,SESSION LIMIT NONE
IST231I CDRSC MAJOR NODE = ISTCDRDY
IST479I CDRM NAME = SSCP1A, VERIFY OWNER = NO
IST1184I CPNAME = NETA.SSCP2A - NETSRVR = ***NA***
IST082I DEVTYPE = INDEPENDENT LU / CDRSC
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1500I STATE TRACE = OFF
IST228I ENCRYPTION = NONE, TYPE = DES
IST1563I CKEYNAME = MAPPL1 CKEY = PRIMARY CERTIFY = NO
IST1552I MAC = NONE MACTYPE = NONE
IST171I ACTIVE SESSIONS = 0000000001, SESSION REQUESTS = 0000000000
IST206I SESSIONS:
IST1081I ADJACENT LINK STATION = CNR00003
IST634I NAME     STATUS         SID          SEND RECV VR TP NETID
IST635I APPL1    ACTIV-P    EAABEEC30C061090 0000 0000  0  0 NETA
IST924I -------------------------------------------------------------
IST075I NAME = NETA.MAPPL1, TYPE = APPL
IST1549I OWNER = NETA.SSCP2A MNPS STATE = DISABLED
IST2062I MNPS FORCED TAKEOVER REQUESTS ARE ACCEPTABLE
IST314I END
```

```
d net,id=mapplx1,e
IST097I DISPLAY ACCEPTED
IST075I NAME = NETA.MAPPLX1, TYPE = APPL
IST486I STATUS= CONCT, DESIRED STATE= CONCT
IST1447I REGISTRATION TYPE = CDSERVR
IST1550I MNPS STATE = DEFINED
IST977I MDLTAB=***NA*** ASLTAB=***NA***
IST861I MODETAB=***NA*** USSTAB=***NA*** LOGTAB=***NA***
IST934I DLOGMOD=***NA*** USS LANGTAB=***NA***
IST1632I VPACING =  7
IST1938I APPC = YES
IST597I CAPABILITY-PLU INHIBITED,SLU INHIBITED,SESSION LIMIT NONE
IST231I APPL MAJOR NODE = APPLMG2
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1500I STATE TRACE = OFF
IST271I JOBNAME = ***NA***, STEPNAME = ***NA***, DSPNAME = ***NA***
IST228I ENCRYPTION = OPTIONAL, TYPE = DES
IST1563I CKEYNAME = MAPPLX1 CKEY = PRIMARY CERTIFY = NO
IST1552I MAC = NONE MACTYPE = NONE
IST1050I MAXIMUM COMPRESSION LEVEL - INPUT = 0, OUTPUT = 0
IST1633I ASRCVLM = 1000000
IST1634I DATA SPACE USAGE: CURRENT = ***NA*** MAXIMUM = ***NA***
IST171I ACTIVE SESSIONS = 0000000000, SESSION REQUESTS = 0000000000
IST172I NO SESSIONS EXIST
IST924I -------------------------------------------------------------
IST075I NAME = NETA.MAPPLX1, TYPE = APPL
IST1549I OWNER = NETA.SSCP1A MNPS STATE = DISABLED
IST2062I MNPS FORCED TAKEOVER REQUESTS ARE ACCEPTABLE
IST314I END
```

Displaying a dynamic application program:

```
d net,id=appl1,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = NETA.APPL1, TYPE = DYNAMIC APPL
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV - TRACE= OFF
IST1447I REGISTRATION TYPE = CDSERVR
IST977I MDLTAB=***NA*** ASLTAB=***NA***
IST861I MODETAB=***NA*** USSTAB=***NA*** LOGTAB=***NA***
IST934I DLOGMOD=***NA*** USS LANGTAB=***NA***
IST1632I VPACING =  7
```

```
IST1938I APPC = NO
IST597I CAPABILITY-PLU ENABLED  ,SLU ENABLED  ,SESSION LIMIT NON
IST231I APPL MAJOR NODE = APPL1A
IST1425I DEFINED USING MODEL APPL*
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1500I STATE TRACE = OFF
IST271I JOBNAME = ECHO, STEPNAME = ECHO, DSPNAME = IST75874
IST228I ENCRYPTION = OPTIONAL, TYPE = DES
IST1563I CKEYNAME = APPL1 CKEY = PRIMARY CERTIFY = NO
IST1552I MAC = NONE MACTYPE = NONE
IST1050I MAXIMUM COMPRESSION LEVEL - INPUT = 0, OUTPUT = 0
IST1633I ASRCVLM = 2000000
IST1634I DATA SPACE USAGE: CURRENT = 0 MAXIMUM = 0
IST171I ACTIVE SESSIONS = 0000000000, SESSION REQUESTS = 0000000
IST314I END
```

Displaying the application program representing the network operator:

```
d net,id=istnop
IST097I DISPLAY ACCEPTED
IST075I NAME = NETA.ISTNOP, TYPE = APPL
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV - TRACE= OFF
IST1447I REGISTRATION TYPE = NO
IST977I MDLTAB=***NA*** ASLTAB=***NA***
IST1395I FLDTAB = ISTMSFLD FILTER = ISTMGC10
IST861I MODETAB=***NA*** USSTAB=***NA*** LOGTAB=***NA***
IST934I DLOGMOD=***NA*** USS LANGTAB=***NA***
IST1938I APPC = NO
IST597I CAPABILITY-PLU INHIBITED,SLU INHIBITED,SESSION LIMIT NONE
IST231I APPL MAJOR NODE = VTAMSEG
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST271I JOBNAME = ***NA***, STEPNAME = ***NA***, DSPNAME = ***NA***
IST228I ENCRYPTION = NONE, TYPE = DES
IST1563I CKEYNAME = ISTNOP CKEY = PRIMARY CERTIFY = NO
IST1552I MAC = NONE MACTYPE = NONE
IST1050I MAXIMUM COMPRESSION LEVEL - INPUT = 0, OUTPUT = 0
IST171I ACTIVE SESSIONS = 0000000000, SESSION REQUESTS = 0000000000
IST314I END
```

Displaying a dynamic same-network CDRSC:

```
d net,id=applaa3,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = NETA.APPLAA3, TYPE = CDRSC
IST486I STATUS= ACTIV----Y, DESIRED STATE= ACTIV
IST1447I REGISTRATION TYPE = CDSERVR
IST977I MDLTAB=***NA*** ASLTAB=***NA***
IST1333I ADJLIST = ***NA***
IST861I MODETAB=***NA*** USSTAB=***NA*** LOGTAB=***NA***
IST934I DLOGMOD=***NA*** USS LANGTAB=***NA***
IST597I CAPABILITY-PLU ENABLED  ,SLU ENABLED  ,SESSION LIMIT NONE
IST231I CDRSC MAJOR NODE = ISTCDRDY
IST479I CDRM NAME = ***NA***, VERIFY OWNER = NO
IST1184I CPNAME = NETA.SSCPAA - NETSRVR = ***NA***
IST082I DEVTYPE = CDRSC
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST228I ENCRYPTION = NONE, TYPE = DES
IST1563I CKEYNAME = APPLAA3 CKEY = PRIMARY CERTIFY = NO
IST1552I MAC = NONE MACTYPE = NONE
IST171I ACTIVE SESSIONS = 0000000000, SESSION REQUESTS = 0000000000
IST314I END
```

Displaying a dynamic cross-network CDRSC:

```
d net,id=netb.applb11,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = NETB.APPLB11, TYPE = CDRSC
IST486I STATUS= ACT/S----Y, DESIRED STATE= ACTIV
```

```
IST1447I REGISTRATION TYPE = CDSERVR
IST977I MDLTAB=***NA*** ASLTAB=***NA***
IST1333I ADJLIST = ***NA***
IST861I MODETAB=***NA*** USSTAB=***NA*** LOGTAB=***NA***
IST934I DLOGMOD=***NA*** USS LANGTAB=***NA***
IST597I CAPABILITY-PLU ENABLED  ,SLU ENABLED  ,SESSION LIMIT NONE
IST231I CDRSC MAJOR NODE = ISTCDRDY
IST479I CDRM NAME = SSCP7B, VERIFY OWNER = NO
IST1184I CPNAME = NETB.SSCP7B - NETSRVR = ***NA***
IST082I DEVTYPE = CDRSC
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST228I ENCRYPTION = NONE, TYPE = DES
IST1563I CKEYNAME = APPLB11 CKEY = PRIMARY CERTIFY = NO
IST1552I MAC = NONE MACTYPE = NONE
IST171I ACTIVE SESSIONS = 0000000002, SESSION REQUESTS = 0000000000
IST206I SESSIONS:
IST634I NAME     STATUS         SID          SEND RECV VR TP NETID
IST635I APPL1    ACTIV-S    C2BB19BC74339803 0016 0016  0  0 NETA
IST635I APPL1    ACTIV-P    EAABEEC34604F7E2 0009 000A  0  0 NETA
IST314I END
```

Displaying a predefined CDRSC for a specific network:

```
d net,id=applb11,netid=netb,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = APPLB11, TYPE = CDRSC
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST1447I REGISTRATION TYPE = CDSERVR
IST977I MDLTAB=***NA*** ASLTAB=***NA***
IST1333I ADJLIST = ***NA***
IST861I MODETAB=***NA*** USSTAB=***NA*** LOGTAB=***NA***
IST934I DLOGMOD=***NA*** USS LANGTAB=***NA***
IST597I CAPABILITY-PLU ENABLED  ,SLU ENABLED  ,SESSION LIMIT NONE
IST231I CDRSC MAJOR NODE = CDRSC1A
IST479I CDRM NAME = SSCP7B, VERIFY OWNER = NO
IST082I DEVTYPE = CDRSC
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST228I ENCRYPTION = NONE, TYPE = DES
IST1563I CKEYNAME = APPLB11 CKEY = PRIMARY CERTIFY = NO
IST1552I MAC = NONE MACTYPE = NONE
IST171I ACTIVE SESSIONS = 0000000000, SESSION REQUESTS = 0000000000
IST314I END
```

Displaying a predefined CDRSC without network (no sessions):

```
d net,id=netappl2,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = NETA.NETAPPL2, TYPE = CDRSC
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV - TRACE= OFF
IST1447I REGISTRATION TYPE = NO
IST977I MDLTAB=***NA*** ASLTAB=***NA***
IST1333I ADJLIST = ***NA***
IST861I MODETAB=***NA*** USSTAB=***NA*** LOGTAB=***NA***
IST934I DLOGMOD=***NA*** USS LANGTAB=***NA***
IST597I CAPABILITY-PLU ENABLED  ,SLU ENABLED  ,SESSION LIMIT NONE
IST231I CDRSC MAJOR NODE = CDRSC1A
IST479I CDRM NAME = SSCP2A, VERIFY OWNER = NO
IST082I DEVTYPE = CDRSC
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST171I ACTIVE SESSIONS = 0000000000, SESSION REQUESTS = 0000000000
IST314I END
```

Displaying a model CDRSC:

```
d net,id=applb*,e
IST097I DISPLAY ACCEPTED
IST075I NAME = NETB.APPLB*, TYPE = MODEL CDRSC
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
```

```
IST1447I REGISTRATION TYPE = NO
IST977I MDLTAB=***NA*** ASLTAB=***NA***
IST1333I ADJLIST = ***NA***
IST861I MODETAB=***NA*** USSTAB=***NA*** LOGTAB=***NA***
IST934I DLOGMOD=***NA*** USS LANGTAB=***NA***
IST597I CAPABILITY-PLU ENABLED  ,SLU ENABLED  ,SESSION LIMIT NONE
IST231I CDRSC MAJOR NODE = CDRSC1A
IST2095I MODEL CDRSC DELETE = YES
IST479I CDRM NAME = SSCP7B, VERIFY OWNER = NO
IST082I DEVTYPE = CDRSC
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1500I STATE TRACE = OFF
IST228I ENCRYPTION = NONE , TYPE = DES
IST1563I CKEYNAME = APPLB11 CKEY = PRIMARY CERTIFY = NO
IST1552I MAC = NONE MACTYPE = NONE
IST2088I CDRSCS DEFINED USING THIS MODEL:
IST483I APPLB11  ACTIV     , CDRM = SSCP7B  , NETID = NETB
IST483I APPLB12  ACTIV     , CDRM = SSCP7B  , NETID = NETB
IST314I END
```

Displaying a clone CDRSC:

```
d net,id=applb11
IST097I DISPLAY ACCEPTED
IST075I NAME = NETB.APPLB11, TYPE = CLONE CDRSC
IST486I STATUS= ACT/S, DESIRED STATE= ACTIV
IST1447I REGISTRATION TYPE = NO
IST977I MDLTAB=***NA*** ASLTAB=***NA***
IST1333I ADJLIST = ***NA***
IST861I MODETAB=***NA*** USSTAB=***NA*** LOGTAB=***NA***
IST934I DLOGMOD=***NA*** USS LANGTAB=***NA***
IST597I CAPABILITY-PLU ENABLED  ,SLU ENABLED  ,SESSION LIMIT NONE
IST231I CDRSC MAJOR NODE = CDRSC1A
IST1425I DEFINED USING MODEL NETB.APPLB*
IST2095I MODEL CDRSC DELETE = YES
IST479I CDRM NAME = SSCP7B, VERIFY OWNER = NO
IST082I DEVTYPE = CDRSC
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1500I STATE TRACE = OFF
IST228I ENCRYPTION = NONE , TYPE = DES
IST1563I CKEYNAME = APPLB11 CKEY = PRIMARY CERTIFY = NO
IST1552I MAC = NONE MACTYPE = NONE
IST171I ACTIVE SESSIONS = 0000000001, SESSION REQUESTS = 0000000000
IST314I END
```

Displaying a CDRSC for a TN3270 or TN3270E client:

```
d net,id=tcpm1011,e
IST097I DISPLAY ACCEPTED
IST075I NAME = NETA.TCPM1011, TYPE = CDRSC
IST486I STATUS= ACT/S----Y, DESIRED STATE= ACTIV
IST1447I REGISTRATION TYPE = NO
IST977I MDLTAB=***NA*** ASLTAB=***NA***
IST1333I ADJLIST = ***NA***
IST861I MODETAB=***NA*** USSTAB=***NA*** LOGTAB=***NA***
IST934I DLOGMOD=***NA*** USS LANGTAB=***NA***
IST597I CAPABILITY-PLU ENABLED  ,SLU ENABLED  ,SESSION LIMIT NONE
IST231I CDRSC MAJOR NODE = ISTCDRDY
IST479I CDRM NAME = SSCP1A, VERIFY OWNER = NO
IST1184I CPNAME = NETA.SSCP1A - NETSRVR = ***NA***
IST082I DEVTYPE = CDRSC
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1500I STATE TRACE = OFF
IST228I ENCRYPTION = NONE , TYPE = DES
IST1563I CKEYNAME = TCPM1011 CKEY = PRIMARY CERTIFY = NO
IST1552I MAC = NONE MACTYPE = NONE
IST1727I DNS NAME: VIC127.TCP.RALEIGH.IBM.COM
IST1669I IPADDR..PORT 9.67.113.83..1027
```

```
IST171I ACTIVE SESSIONS = 0000000001, SESSION REQUESTS = 0000000000
IST206I SESSIONS:
IST634I NAME     STATUS         SID          SEND RECV VR TP NETID
IST635I TSO20001 ACTIV-P    F6ABEEC39DE3E239 0008 0010  0  0 NETA
IST314I END
```

Displaying a CDRSC that is associated with an IPv6 TN3270 client:

```
d net,id=tcpm2012,e
IST097I DISPLAY ACCEPTED
IST075I NAME = NETA.TCPM2012, TYPE = CDRSC
IST486I STATUS= ACT/S----Y, DESIRED STATE= ACTIV
IST1447I REGISTRATION TYPE = NO
IST977I MDLTAB=***NA*** ASLTAB=***NA***
IST1333I ADJLIST = ***NA***
IST861I MODETAB=***NA*** USSTAB=***NA*** LOGTAB=***NA***
IST934I DLOGMOD=***NA*** USS LANGTAB=***NA***
IST597I CAPABILITY-PLU ENABLED  ,SLU ENABLED  ,SESSION LIMIT NONE
IST231I CDRSC MAJOR NODE = ISTCDRDY
IST479I CDRM NAME = SSCP1A, VERIFY OWNER = NO
IST1184I CPNAME = NETA.SSCP1A - NETSRVR = ***NA***
IST1131I DEVICE = CDRSC
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1500I STATE TRACE = OFF
IST228I ENCRYPTION = NONE , TYPE = DES
IST1563I CKEYNAME = TCPM2012 CKEY = PRIMARY CERTIFY = NO
IST1552I MAC = NONE MACTYPE = NONE
IST1669I IPADDR..PORT 2001:0DB8::9:67:115:17..1026
IST171I ACTIVE SESSIONS = 0000000001, SESSION REQUESTS = 0000000000
IST206I SESSIONS:
IST634I NAME     STATUS         SID          SEND RECV VR TP NET
IST635I TSO20002 ACTIV-P    F6ABEEC34C26E9F3 0003 000D  0  0 NET
IST314I END
```

Displaying an independent logical unit:

```
d net,id=l3270a,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = L3270A, TYPE = CDRSC
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST599I REAL NAME = ***NA***
IST1447I REGISTRATION TYPE = NO
IST977I MDLTAB=***NA*** ASLTAB=***NA***
IST1333I ADJLIST = ***NA***
IST861I MODETAB=***NA*** USSTAB=***NA*** LOGTAB=***NA***
IST934I DLOGMOD=***NA*** USS LANGTAB=***NA***
IST597I CAPABILITY-PLU ENABLED  ,SLU ENABLED  ,SESSION LIMIT NONE
IST231I CDRSC MAJOR NODE = ISTPDILU
IST1044I ALSLIST = AHHCPU1
IST082I DEVTYPE = INDEPENDENT LU / CDRSC
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1500I STATE TRACE = OFF
IST228I ENCRYPTION = NONE, TYPE = DES
IST1563I CKEYNAME = L3270A CKEY = PRIMARY CERTIFY = NO
IST1552I MAC = NONE MACTYPE = NONE
IST171I ACTIVE SESSIONS = 0000000000, SESSION REQUESTS = 0000000000
IST172I NO SESSIONS EXIST
IST924I -------------------------------------------------------------
IST075I NAME = NETA.L3270A, TYPE = DIRECTORY ENTRY
IST1186I DIRECTORY ENTRY = REGISTERED LU
IST1184I CPNAME = NETA.SSCP2A - NETSRVR = NETA.SSCP1A
IST484I SUBAREA = ****NA****
IST1703I DESIRED LOCATE SIZE = 1K LAST LOCATE SIZE = 1K
IST314I END
```

Displaying the host CDRM:

```
d net,id=a01n,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = NETA.A01N, TYPE = CDRM
IST1046I CP NETA.A01N ALSO EXISTS
IST486I STATUS= ACTIV     , DESIRED STATE= ACTIV
IST815I AUTOMATIC RECOVERY IS SUPPORTED
IST231I CDRM  MAJOR NODE = VTAMSEG
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST476I CDRM TYPE = HOST, GATEWAY CAPABLE
IST637I SUBAREA= 2   ELEMENT= 1 SSCPID = 2
IST388I DYNAMIC CDRSC DEFINITION SUPPORT = YES
IST171I ACTIVE SESSIONS = 0000000000, SESSION REQUESTS = 0000000000
IST172I NO SESSIONS EXIST
IST924I -------------------------------------------------------------
IST075I NAME = NETA.A01N, TYPE = HOST CP
IST1046I SSCP NETA.A01N ALSO EXISTS
IST486I STATUS= ACT/S     , DESIRED STATE= ACTIV
IST977I MDLTAB=***NA*** ASLTAB=***NA***
IST861I MODETAB=***NA*** USSTAB=***NA*** LOGTAB=***NA***
IST934I DLOGMOD=***NA*** USS LANGTAB=***NA***
IST597I CAPABILITY-PLU ENABLED  ,SLU ENABLED  ,SESSION LIMIT NONE
IST231I APPL  MAJOR NODE = VTAMSEG
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST271I JOBNAME = NET41B  , STEPNAME = NET     , DSPNAME = 00000IST
IST1050I MAXIMUM COMPRESSION LEVEL - INPUT = 0, OUTPUT = 0
IST171I ACTIVE SESSIONS = 0000000014, SESSION REQUESTS = 0000000000
IST206I SESSIONS:
IST634I NAME     STATUS         SID          SEND RECV VR TP NETID
IST635I A04P882A ACTIV/CP-S E7F3895623BE5C86 000D 0001  0  0 NETY
IST635I A04P888A ACTIV/CP-S E7F3895623BE5C85 053E 0001  0  0 NETA
IST635I A04P886A ACTIV/CP-S E7F3895623BE5C84 0721 0001  0  0 NETA
IST635I A04P885A ACTIV/CP-S E7F3895623BE5C83 03AE 0001  0  0 NETA
IST635I A04P889A ACTIV/CP-S E7F3895623BE5C82 0727 0001  0  0 NETA
IST635I A04P883A ACTIV/CP-S E7F3895623BE5C81 01C5 0001  0  0 NETZ
IST635I A02N     ACTIV/CP-S E7F3895623BE56A5 1055 0001  0  0 NETA
IST635I A02N     ACTIV/CP-P E7E3F9563F1747D7 0001 1047  0  0 NETA
IST635I A04P882A ACTIV/CP-P F3342BAB9019C2B2 0001 000E  0  0 NETY
IST635I A04P883A ACTIV/CP-P E36D478882B602AB 0001 01C6  0  0 NETZ
IST635I A04P885A ACTIV/CP-P EF0E04F6C768DD2E 0001 03AF  0  0 NETA
IST635I A04P886A ACTIV/CP-P EF0E07F6C768E02F 0001 0722  0  0 NETA
IST635I A04P888A ACTIV/CP-P EF0E09F6C768E230 0001 053F  0  0 NETA
IST635I A04P889A ACTIV/CP-P EF0E08F6C768E131 0001 0728  0  0 NETA
IST314I END
```

Displaying an active, same-network, external CDRM:

```
d net,id=A02n,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = NETA.A02N, TYPE = CDRM
IST1046I CP NETA.A02N ALSO EXISTS
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST815I AUTOMATIC RECOVERY IS SUPPORTED
IST231I CDRM  MAJOR NODE = A01CDRMC
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1500I STATE TRACE = OFF
IST476I CDRM TYPE = EXTERNAL
IST637I SUBAREA= 2   ELEMENT= 1 SSCPID = 2
IST675I VR=0, TP=0
IST389I PREDEFINITION OF CDRSC = OPT
IST1105I RESOURCE STATUS TGN CP-CP TG CHARACTERISTICS
IST1106I A02N     AC/R   255 YES   982D000000000000000017100808080
IST1482I HPR= NO - OVERRIDE = YES - CONNECTION = YES
IST636I CDRSCS OWNED BY A02N     -
IST172I NO CDRSCS EXIST
IST924I -------------------------------------------------------------
IST075I NAME = NETA.A02N, TYPE = ADJACENT CP
IST1046I SSCP NETA.A02N ALSO EXISTS
```

```
IST486I STATUS= ACT/S----Y, DESIRED STATE= ACTIV
IST977I MDLTAB=***NA*** ASLTAB=***NA***
IST861I MODETAB=***NA*** USSTAB=***NA*** LOGTAB=***NA***
IST934I DLOGMOD=***NA*** USS LANGTAB=***NA***
IST597I CAPABILITY-PLU ENABLED  ,SLU ENABLED  ,SESSION LIMIT NONE
IST231I CDRSC MAJOR NODE = ISTCDRDY
IST479I CDRM NAME = A01N    , VERIFY OWNER = NO
IST1044I ALSLIST = ISTAPNPU
IST082I DEVTYPE = INDEPENDENT LU / CDRSC
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST171I ACTIVE SESSIONS = 0000000002, SESSION REQUESTS = 0000000000
IST206I SESSIONS:
IST1081I ADJACENT LINK STATION = A02NETNA
IST634I NAME     STATUS         SID          SEND RECV VR TP NETID
IST635I A01N     ACTIV/CP-S E7E3F9563F1747D7 1055 0001  0  0 NETA
IST635I A01N     ACTIV/CP-P E7F3895623BE56A5 0001 105F  0  0 NETA
IST924I -------------------------------------------------------------
IST075I NAME = NETA.A02N, TYPE = DIRECTORY ENTRY
IST1186I DIRECTORY ENTRY = DYNAMIC NN
IST1184I CPNAME = NETA.A02N     - NETSRVR = ***NA***
IST314I END
```

Displaying a cross-network external CDRM:

```
d net,id=c01n,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = NETC.C01N, TYPE = CDRM
IST486I STATUS= ACTIV     , DESIRED STATE= ACTIV
IST815I AUTOMATIC RECOVERY IS SUPPORTED
IST231I CDRM  MAJOR NODE = A50CDRMC
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST476I CDRM TYPE = EXTERNAL
IST637I SUBAREA= 2   ELEMENT= 1 SSCPID = 2
IST675I VR = 0, TP = 2
IST638I ADJNETSA = 1, ADJNETEL = 1
IST675I VR = 0, TP = 2
IST639I GWN = A0362ZC , ADJNET = NETC
IST640I A500N    ADDR IN ADJNET - SA =         31, EL =    11
IST641I GATEWAY PATH SELECTION LIST -
IST642I  ADJNET     GWN        SUBAREA   ELEM    ADJNETSA  ADJNETEL
IST643I NETC      A0362ZC            3      1           1         1
IST643I NETC                       255      3           1         1
IST898I GWSELECT = YES
IST389I PREDEFINITION OF CDRSC = OPT
IST636I CDRSCS OWNED BY C01N     -
IST080I C01NVLUC ACT/S----Y
IST924I -------------------------------------------------------------
IST075I NAME = NETC.C01N, TYPE = DIRECTORY ENTRY
IST1186I DIRECTORY ENTRY = DYNAMIC EN
IST1184I CPNAME = NETC.C01N     - NETSRVR = NETA.A01N
IST314I END
```

Displaying a peripheral BSC line group:

```
d net,id=a03lbnnb,scope=all
IST097I DISPLAY  ACCEPTED
IST075I NAME = A03LBNNB         , TYPE = LINE GROUP
IST486I STATUS= ACTIV     , DESIRED STATE= ACTIV
IST354I PU T4/5 MAJOR NODE = A0362ZC
IST084I NETWORK NODES:
IST089I A03B00   TYPE = LINE            , NEVAC
IST089I A03C001  TYPE = PU_T2           , NEVAC
IST089I A03C002  TYPE = PU_T2           , NEVAC
IST089I A03B01   TYPE = LINE            , NEVAC
IST089I A03C011  TYPE = PU_T2           , NEVAC
IST089I A03C012  TYPE = PU_T2           , NEVAC
IST089I A03B32   TYPE = LINE            , NEVAC
IST089I A03C321  TYPE = PU_T2           , NEVAC
```

```
IST089I A03C322  TYPE = PU_T2            , NEVAC
IST089I A03B33   TYPE = LINE             , NEVAC
IST089I A03C331  TYPE = PU_T2            , NEVAC
IST089I A03C332  TYPE = PU_T2            , NEVAC
IST314I END
```

Displaying a peripheral SDLC line group:

```
d net,id=a03lbnns,scope=all
IST097I DISPLAY  ACCEPTED
IST075I NAME = A03LBNNS         , TYPE = LINE GROUP
IST486I STATUS= ACTIV      , DESIRED STATE= ACTIV
IST354I PU T4/5 MAJOR NODE = A0362ZC
IST084I NETWORK NODES:
IST089I A03S16   TYPE = LINE             , ACTIV
IST089I A03P161  TYPE = PU_T2            , PREQC
IST089I A03P162  TYPE = PU_T2            , PREQC
IST089I A03P163  TYPE = PU_T2            , PREQC
IST089I A03P164  TYPE = PU_T2            , PREQC
IST089I A03S20   TYPE = LINE             , ACTIV
IST075I NAME = A03LBNNS         , TYPE = LINE GROUP
IST089I A03P201  TYPE = PU_T2            , PREQC
IST089I A03P202  TYPE = PU_T2            , PREQC
IST089I A03P203  TYPE = PU_T2            , PREQC
IST089I A03P204  TYPE = PU_T2            , PREQC
IST089I A03P205  TYPE = PU_T2            , PREQC
IST089I A03P206  TYPE = PU_T2            , PREQC
IST314I END
```

Displaying a peripheral SDLC switched line group:

```
d net,id=grp3a9,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = GRP3A9, TYPE = LINE GROUP
IST486I STATUS= ACTIV      , DESIRED STATE= ACTIV
IST354I PU T4/5 MAJOR NODE = NCP3AB5
IST084I NETWORK NODES:
IST089I LN3A9    TYPE = LINE             , ACTIV
IST089I P3A4956K TYPE = PU_T2            , ACTIV--L--
IST089I L3A4956A TYPE = LOGICAL UNIT     , ACT/S
IST089I LN3A10   TYPE = LINE             , ACTIV
IST089I P3A4956L TYPE = PU_T2            , ACTIV--L--
IST089I L3A4956A TYPE = LOGICAL UNIT     , ACT/S
IST089I LN3A11   TYPE = LINE             , ACTIV
IST089I P3A4956M TYPE = PU_T2            , NEVAC
IST314I END
```

Note: Independent LU L3A4956A is shown under two PUs because it has active sessions through these PUs.

Displaying a peripheral BSC link:

```
d net,id=a03b00,scope=all
IST097I DISPLAY  ACCEPTED
IST075I NAME = A03B00           , TYPE = LINE
IST486I STATUS= NEVAC      , DESIRED STATE= INACT
IST087I TYPE = LEASED             , CONTROL = BSC , HPDT = *NA*
IST134I GROUP = A03LBNNB, MAJOR NODE = A0362ZC
IST650I POLL = 000, NEGPOLL = 010, SESSION(S) = 032
IST084I NETWORK NODES:
IST089I A03C001  TYPE = PU_T2            , NEVAC
IST089I A03T0011 TYPE = LOGICAL UNIT     , NEVAC
IST089I A03T0012 TYPE = LOGICAL UNIT     , NEVAC
IST089I A03T0013 TYPE = LOGICAL UNIT     , NEVAC
IST089I A03T0014 TYPE = LOGICAL UNIT     , NEVAC
IST089I A03T0015 TYPE = LOGICAL UNIT     , NEVAC
IST089I A03T0016 TYPE = LOGICAL UNIT     , NEVAC
```

```
IST089I A03T0017 TYPE = LOGICAL UNIT     , NEVAC
IST089I A03T0018 TYPE = LOGICAL UNIT     , NEVAC
IST089I A03T0019 TYPE = LOGICAL UNIT     , NEVAC
IST089I A03T001A TYPE = LOGICAL UNIT     , NEVAC
IST089I A03T001B TYPE = LOGICAL UNIT     , NEVAC
IST089I A03T001C TYPE = LOGICAL UNIT     , NEVAC
IST089I A03T001D TYPE = LOGICAL UNIT     , NEVAC
IST089I A03T001E TYPE = LOGICAL UNIT     , NEVAC
IST089I A03T001F TYPE = LOGICAL UNIT     , NEVAC
IST089I A03C002  TYPE = PU_T2            , NEVAC
IST089I A03T0021 TYPE = LOGICAL UNIT     , NEVAC
IST089I A03T0022 TYPE = LOGICAL UNIT     , NEVAC
IST089I A03T0023 TYPE = LOGICAL UNIT     , NEVAC
IST089I A03T0024 TYPE = LOGICAL UNIT     , NEVAC
IST089I A03T0025 TYPE = LOGICAL UNIT     , NEVAC
IST089I A03T0026 TYPE = LOGICAL UNIT     , NEVAC
IST089I A03T0027 TYPE = LOGICAL UNIT     , NEVAC
IST089I A03T0028 TYPE = LOGICAL UNIT     , NEVAC
IST089I A03T0029 TYPE = LOGICAL UNIT     , NEVAC
IST089I A03T002A TYPE = LOGICAL UNIT     , NEVAC
IST089I A03T002B TYPE = LOGICAL UNIT     , NEVAC
IST089I A03T002C TYPE = LOGICAL UNIT     , NEVAC
IST089I A03T002D TYPE = LOGICAL UNIT     , NEVAC
IST089I A03T002E TYPE = LOGICAL UNIT     , NEVAC
IST089I A03T002F TYPE = LOGICAL UNIT     , NEVAC
IST314I END
```

Displaying an SDLC link (multidrop INN):

```
d net,id=a04in01,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = A04IN01, TYPE = LINE
IST486I STATUS= ACTIV----E , DESIRED STATE = ACTIV
IST087I TYPE = LEASED             , CONTROL = SDLC, HPDT = *NA*
IST134I GROUP = A04MPRI,  MAJOR NODE = A04N43A
IST084I NETWORK NODES:
IST089I A04P013  TYPE = PU_T2            , NEVAC
IST089I A04L013A TYPE = LOGICAL UNIT     , NEVAC
IST089I A04L013B TYPE = LOGICAL UNIT     , NEVAC
IST089I A04L013C TYPE = LOGICAL UNIT     , NEVAC
IST089I A04L013D TYPE = LOGICAL UNIT     , NEVAC
IST089I A04L013E TYPE = LOGICAL UNIT     , NEVAC
IST089I A04L013F TYPE = LOGICAL UNIT     , NEVAC
IST089I A04L013G TYPE = LOGICAL UNIT     , NEVAC
IST089I A04L013H TYPE = LOGICAL UNIT     , NEVAC
IST089I A04L013I TYPE = LOGICAL UNIT     , NEVAC
IST089I A04L013J TYPE = LOGICAL UNIT     , NEVAC
IST089I A04L013K TYPE = LOGICAL UNIT     , NEVAC
IST089I A04L013L TYPE = LOGICAL UNIT     , NEVAC
IST089I A04L013M TYPE = LOGICAL UNIT     , NEVAC
IST089I A04L013N TYPE = LOGICAL UNIT     , NEVAC
IST089I A04L013O TYPE = LOGICAL UNIT     , NEVAC
IST089I A04I013A TYPE = LOGICAL UNIT     , NEVAC
IST089I A04I013B TYPE = LOGICAL UNIT     , NEVAC
IST089I A04I013C TYPE = LOGICAL UNIT     , NEVAC
IST089I A04I013D TYPE = LOGICAL UNIT     , NEVAC
IST089I A04I013E TYPE = LOGICAL UNIT     , NEVAC
IST396I LNKSTA    STATUS     CTG GTG ADJNODE  ADJSA  NETID  ADJLS
IST397I A04P014   NEVAC        2   2              0
IST397I A04P015   NEVAC        2   2              0
IST397I A04P016   NEVAC        2   2              0
IST397I A04P017   ACTIV----E   2   2 A31N52B     31
IST397I A04P018   ACTIV----E   2   2 A71N43A     71
IST397I A04P019   NEVAC        2   2              0
```

```
IST397I A04P01A   NEVAC        2   2             0
IST397I A04P01B   NEVAC        2   2             0
IST397I A04P01C   NEVAC        2   2             0
IST314I END
```

Displaying a peripheral SDLC link:

```
d net,id=ln3atr10,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = LN3ATR10, TYPE = LINE
IST486I STATUS= ACTIV      , DESIRED STATE= ACTIV
IST087I TYPE = LEASED             , CONTROL = SDLC, HPDT = *NA*
IST1440I USE = NCP, SPARE RESOURCE, CAN BE REDEFINED
IST134I GROUP = GP3ATRP1, MAJOR NODE = NCP3AB7
IST1324I VNNAME =  NETA.VN1           VNGROUP = GP3ATR10
IST1105I RESOURCE STATUS TGN CP-CP TG CHARACTERISTICS
IST1106I LN3ATR10 AC/R    21 NO    907500000000000000000017100808080
IST084I NETWORK NODES:
IST089I P3ATR10  TYPE = PU_T2            , ACTIV
IST314I END
```

Displaying a cross-subarea SDLC switched link:

```
d net,id=a04hdx00,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = A04HDX00, TYPE = LINE
IST486I STATUS= ACTIV      , DESIRED STATE = ACTIV
IST087I TYPE = SWITCHED DIAL-INOUT, CONTROL = SDLC, HPDT = *NA*
IST936I ANSWER MODE = ENABLED
IST134I GROUP = A04SADG1, MAJOR NODE = A04S43A
IST084I NETWORK NODES:
IST089I A31A     TYPE = LINK STATION     , ACTIV
IST314I END
```

Displaying a peripheral SDLC switched link:

```
d net,id=j0004001,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME =J00004001, TYPE = LINE
IST486I STATUS= ACTIV      , DESIRED STATE = ACTIV
IST087I TYPE = SWITCHED DIAL-INOUT, CONTROL = SDLC, HPDT = *NA*
IST936I ANSWER MODE = ENABLED
IST134I GROUP = A04TRLG1, MAJOR NODE = A04S43A
IST1656I VTAMTOPO = REPORT, NODE REPORTED - YES
IST172I NO NETWORK NODES EXIST
IST314I END
```

Displaying an NTRI line in an NCP:

```
d net,id=ln3atr11
IST097I DISPLAY ACCEPTED
IST075I NAME = LN3ATR11, TYPE = LINE
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST087I TYPE = SWITCHED DIAL-INOUT, CONTROL = SDLC, HPDT = *NA*
IST936I ANSWER MODE = ENABLED
IST1440I USE = NCP, DEFINED RESOURCE, CANNOT BE REDEFINED
IST134I GROUP = GP3ATR10, MAJOR NODE = NCP3AB8
IST1500I STATE TRACE = OFF
IST1656I VTAMTOPO = REPORT, NODE REPORTED - NO
IST1657I MAJOR NODE VTAMTOPO = IGNORE
IST314I END
```

Displaying a logical line in an XCA major node:

```
d net,id=ln1a2a
IST097I DISPLAY ACCEPTED
IST075I NAME = LN1A2A, TYPE = LINE
IST486I STATUS= NEVAC, DESIRED STATE= INACT
```

```
IST087I TYPE = SWITCHED DIAL-INOUT, CONTROL = SDLC, HPDT = *NA*
IST936I ANSWER MODE = RESET
IST134I GROUP = GP1A2A, MAJOR NODE = XCA1A
IST1500I STATE TRACE = OFF
IST1656I VTAMTOPO = REPORT, NODE REPORTED - YES
IST1657I MAJOR NODE VTAMTOPO = REPORT
IST314I END
```

Displaying XCF TRLE:

```
d net,id=istt1q2q,e
IST097I DISPLAY ACCEPTED
IST075I NAME = ISTT1Q2Q, TYPE = TRLE
IST1954I TRL MAJOR NODE = ISTTRL
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST087I TYPE = LEASED             , CONTROL = XCF , HPDT = *NA*
IST1715I MPCLEVEL = HPDT       MPCUSAGE = SHARE
IST1717I ULPID = ISTP1Q2Q ULP INTERFACE = *NA*
IST1503I XCF TOKEN = 0200001900120002     STATUS = ACTIVE
IST1502I ADJACENT CP = NETA.SSCP2A
IST1500I STATE TRACE = OFF
IST314I END
```

Displaying TCP TRLE:

```
d net,id=iutx0aa0
IST097I DISPLAY ACCEPTED
IST075I NAME = IUTX0AA0, TYPE = TRLE
IST1954I TRL MAJOR NODE = ISTTRL
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST087I TYPE = LEASED             , CONTROL = TCP , HPDT = *NA*
IST1717I ULPID = TCPCS ULP INTERFACE = *NA*
IST1221I READ  DEV = 0AA0 STATUS = ACTIVE     STATE = N/A
IST1221I WRITE DEV = 0AA1 STATUS = ACTIVE     STATE = N/A
IST1500I STATE TRACE = OFF
IST314I END
```

Displaying a 10 GbE RoCE Express TRLE in a dedicated RoCE environment:

```
d net,id=iut10005
IST097I DISPLAY ACCEPTED
IST075I NAME = IUT10005, TYPE = TRLE
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST087I TYPE = *NA*               , CONTROL = ROCE, HPDT = *NA*
IST1954I TRL MAJOR NODE = ISTTRL
IST2361I SMCR PFID = 0005  PCHID = 0500  PNETID = NETWORK3
IST2362I PORTNUM = 1  RNIC CODE LEVEL = 2.10.4750
IST2389I PFIP = 01000300   GEN = ROCE EXPRESS  SPEED = 10GE
IST924I -------------------------------------------------------------
IST1717I ULPID = TCPIP1 ULP INTERFACE = EZARIUT10005
IST1724I I/O TRACE = OFF  TRACE LENGTH = *NA*
IST1500I STATE TRACE = OFF
IST1866I TRLE = IUT10005   INOPDUMP = ON
IST924I -------------------------------------------------------
IST1717I ULPID = TCPIP2 ULP INTERFACE = EZARIUT10005
IST1724I I/O TRACE = OFF  TRACE LENGTH = *NA*
IST1500I STATE TRACE = OFF
IST1866I TRLE = IUT10005   INOPDUMP = ON
IST314I END
```

Displaying a 10 GbE RoCE Express TRLE in a shared RoCE environment:

```
d net,id=iut10011
IST097I DISPLAY ACCEPTED
IST075I NAME = IUT10011, TYPE = TRLE
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST087I TYPE = *NA*               , CONTROL = ROCE, HPDT = *NA*
IST1954I TRL MAJOR NODE = ISTTRL
```

```
IST2361I SMCR PFID = 0011  PCHID = 0140  PNETID = PNETID1
IST2362I PORTNUM = 1  RNIC CODE LEVEL = **NA**
IST2389I PFIP = 01000300  GEN = ROCE EXPRESS  SPEED = 10GE
IST2417I VFN = 0001
IST924I -------------------------------------------------------------
IST1717I ULPID = TCPIP2 ULP INTERFACE = EZARIUT10011
IST1724I I/O TRACE = OFF  TRACE LENGTH = *NA*
IST1500I STATE TRACE = OFF
IST314I END
```

Displaying a 10 GbE RoCE Express2 TRLE

```
d net,id=iut10014
IST097I DISPLAY ACCEPTED
IST075I NAME = IUT10014, TYPE = TRLE
IST1954I TRL MAJOR NODE = ISTTRL
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST087I TYPE = *NA*               , CONTROL = ROCE, HPDT = *NA*
IST2361I SMCR PFID = 0014  PCHID = 0142  PNETID = PNETID1
IST2362I PORTNUM = 1  RNIC CODE LEVEL = 2.5.31
IST2389I PFIP = 01000300  GEN = ROCE EXPRESS2  SPEED = 10GE
IST2417I VFN = 0014
IST924I -------------------------------------------------------------
IST1717I ULPID = TCPIP2 ULP INTERFACE = EZARIUT10014
IST1724I I/O TRACE = OFF  TRACE LENGTH = *NA*
IST314I END
```

Displaying a switched major node:

```
d net,id=swxca1a,e
IST097I DISPLAY ACCEPTED
IST075I NAME = SWXCA1A, TYPE = SW SNA MAJ NODE
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST1656I VTAMTOPO = REPORT, NODE REPORTED - YES
IST084I NETWORK RESOURCES:
IST089I SW1A2A   TYPE = PU_T2            , CONCT
IST089I SW1A7B   TYPE = PU_T2            , CONCT
IST089I SW1A9C   TYPE = PU_T2            , CONCT
IST089I SW1AAA   TYPE = PU_T2            , CONCT
IST089I SW1ABA   TYPE = PU_T2            , CONCT
IST089I SW1ACA   TYPE = PU_T2            , CONCT
IST089I SW1ADA   TYPE = PU_T2            , CONCT
IST089I SW1AEA   TYPE = PU_T2            , CONCT
IST1500I STATE TRACE = OFF
IST314I END
```

Displaying a switched PU in this switched major node:

```
d net,id=sw1a2a
IST097I DISPLAY ACCEPTED
IST075I NAME = SW1A2A, TYPE = PU_T2
IST486I STATUS= CONCT, DESIRED STATE= CONCT
IST1043I CP NAME = SSCP2A, CP NETID = NETA, DYNAMIC LU = YES
IST1589I XNETALS = YES
IST2238I DISCNT = YES - FINAL USE = NOT FINAL
IST136I SWITCHED SNA MAJOR NODE = SWXCA1A
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1500I STATE TRACE = OFF
IST1656I VTAMTOPO = NOREPORT, NODE REPORTED - YES
IST1657I MAJOR NODE VTAMTOPO = INCLUDE
IST314I END
```

Displaying a cross-subarea SDLC link:

```
d net,id=a04c08,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = A04C08, TYPE = LINE
IST486I STATUS= NEVAC      , DESIRED STATE= INACT
```

```
IST087I TYPE = LEASED            , CONTROL = SDLC, HPDT = *NA*
IST134I GROUP = A04XCA0,  MAJOR NODE = A0462ZC
IST396I LNKSTA    STATUS     CTG GTG ADJNODE  ADJSA  NETID  ADJLS
IST397I A04P08A   NEVAC        1   1              0
IST314I END
```

Displaying a cross-subarea channel link:

```
d net,id=012-l,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = 012-L, TYPE = LINE
IST486I STATUS= ACTIV----I , DESIRED STATE = ACTIV
IST087I TYPE = LEASED            , CONTROL = NCP , HPDT = *NA*
IST134I GROUP = ISTGROUP, MAJOR NODE = A99MPU
IST396I LNKSTA    STATUS     CTG GTG ADJNODE  ADJSA  NETID  ADJLS
IST397I 012-S     ACTIV----I   1   1 A03N43A      3
IST314I END
```

Displaying a cross-subarea channel link station:

```
d net,id=012-s,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = 012-S, TYPE = LINK STATION
IST486I STATUS= ACTIV----I , DESIRED STATE = ACTIV
IST081I LINE NAME = 012-L, LINE GROUP = ISTGROUP, MAJNOD = A99MPU
IST396I LNKSTA    STATUS     CTG GTG ADJNODE  ADJSA  NETID  ADJLS
IST397I 012-S     ACTIV----I   1   1 A03N43A      3
IST610I                           LINE 012-L    - STATUS ACTIV----I
IST314I END
```

Displaying a cross-subarea SDLC link station:

```
d net,id=a03p644,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = A03P644, TYPE = LINK STATION
IST486I STATUS= NEVAC      , DESIRED STATE = INACT
IST081I LINE NAME = A03IN64, LINE GROUP = A03MPRI, MAJNOD = A03N43A
IST396I LNKSTA    STATUS     CTG GTG ADJNODE  ADJSA  NETID  ADJLS
IST397I A03P644   NEVAC        2   2              0
IST610I                           LINE A03IN64  - STATUS NEVAC
IST314I END
```

Displaying a cross-subarea XCA link station with ALLOWACT=YES coded:

```
d net,id=pu1a12,e
IST097I DISPLAY ACCEPTED
IST075I NAME = PU1A12, TYPE = LINK STATION
IST486I STATUS= ACTIV--W-E, DESIRED STATE= ACTIV
IST081I LINE NAME = LN1A12, LINE GROUP = GP1AS, MAJNOD = XCA1A
IST1500I STATE TRACE = OFF
IST1656I VTAMTOPO = REPORT, NODE REPORTED - YES
IST1657I MAJOR NODE VTAMTOPO = REPORT
IST396I LNKSTA   STATUS     CTG GTG  ADJNODE ADJSA    NETID    ADJLS
IST397I PU1A12   ACTIV--W-E   1   1    NCP12    12     NETA   PU121A
IST610I                           LINE LN1A12   - STATUS ACTIV----E
IST314I END
```

Displaying a physical unit:

```
d net,id=a03p011,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = A03P011, TYPE = PU_T2.1
IST486I STATUS= ACTIV      , DESIRED STATE = ACTIV
IST2238I DISCNT = NO - FINAL USE = *NA*
IST081I LINE NAME = A03IN01, LINE GROUP = A03MPRI, MAJNOD = A03N43A
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST355I LOGICAL UNITS:
IST080I A03L011A NEVAC      A03L011B NEVAC      A03L011C NEVAC
```

```
IST080I A03L011D NEVAC      A03L011E NEVAC      A03L011F NEVAC
IST080I A03L011G NEVAC      A03L011H NEVAC      A03L011I NEVAC
IST080I A03L011J NEVAC      A03L011K NEVAC      A03L011L NEVAC
IST080I A03L011M NEVAC      A03L011N NEVAC      A03L011O NEVAC
IST314I END
```

Displaying a physical unit with APPN host-to-host connectivity:

```
d net,id=ahhcpu1
IST097I DISPLAY ACCEPTED
IST075I NAME = AHHCPU1, TYPE = PU_T2.1
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST1043I CP NAME = SSCP2A, CP NETID = NETA, DYNAMIC LU = YES
IST1589I XNETALS = YES
IST2238I DISCNT = YES - FINAL USE = FINAL
IST1105I RESOURCE STATUS TGN CP-CP TG CHARACTERISTICS
IST1106I AHHCPU1  AC/R    21 YES   988D000000000000000014C00808080
IST1482I HPR = RTP - OVERRIDE = N/A - CONNECTION = YES
IST1510I LLERP = REQUIRED - RECEIVED = REQUIRED
IST136I LOCAL SNA MAJOR NODE = LSAHHC1
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1500I STATE TRACE = OFF
IST1314I TRLE = TRLE1A    STATUS = ACTIV       CONTROL = MPC
IST314I END
```

Displaying a physical unit with DLUR support:

```
d net,id=aa1pua,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = AA1PUA, TYPE = PU_T2
IST486I STATUS= ACTIV      , DESIRED STATE= ACTIV
IST1043I CP NAME = ***NA***, CP NETID = NETA, DYNAMIC LU = YES
IST1589I XNETALS = NO
IST2238I DISCNT = YES - FINAL USE = NOT FINAL
IST1354I DLUR NAME = NNCPA1             MAJNODE = SWDLR1A
IST136I SWITCHED SNA MAJOR NODE = SWDLR1A
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST355I LOGICAL UNITS:
IST080I AA1LUA1  ACT/S      AA1LUA2  ACTIV      AA1LUA3  ACTIV
IST080I AA1LUA4  ACTIV
IST314I END
```

Displaying a Rapid Transport Protocol (RTP) physical unit:

```
d net,id=cnr00004
IST097I DISPLAY ACCEPTED
IST075I NAME = CNR00004, TYPE = PU_T2.1
IST486I STATUS= ACTIV--LX-, DESIRED STATE= ACTIV
IST1043I CP NAME = SSCP2A, CP NETID = NETA, DYNAMIC LU = YES
IST1589I XNETALS = YES
IST2238I DISCNT = DELAY - FINAL USE = FINAL
IST1392I DISCNTIM = 00010 DEFINED AT PU FOR DISCONNECT
IST2178I RPNCB ADDRESS = 126FCA18
IST1963I APPNCOS = #INTER - PRIORITY = HIGH
IST1476I TCID X'1239C4D900000014' - REMOTE TCID X'1239D9D700000016'
IST1481I DESTINATION CP NETA.SSCP2A - NCE X'D000000000000000'
IST1587I ORIGIN NCE X'D000000000000000'
IST1966I ACTIVATED AS ACTIVE ON 05/30/03 AT 09:40:30
IST2237I CNR00004 CURRENTLY REPRESENTS A LIMITED RESOURCE
IST1477I ALLOWED DATA FLOW RATE = 355 KBITS/SEC
IST1516I INITIAL DATA FLOW RATE = 1600 KBITS/SEC
IST1841I ACTUAL DATA FLOW RATE = 85 KBITS/SEC
IST1511I MAXIMUM NETWORK LAYER PACKET SIZE = 16410 BYTES
IST1478I NUMBER OF UNACKNOWLEDGED BUFFERS = 0
IST1479I RTP CONNECTION STATE = CONNECTED - MNPS = NO
IST1959I DATA FLOW STATE: NORMAL
IST1855I NUMBER OF SESSIONS USING RTP = 372
IST1697I RTP PACING ALGORITHM = ARB RESPONSIVE MODE
```

```
IST1480I RTP END TO END ROUTE - RSCV PATH
IST1460I TGN  CPNAME             TG TYPE      HPR
IST1461I  21  NETA.SSCP2A        APPN         RTP
IST875I ALSNAME TOWARDS RTP = AHHCPU1
IST1738I ANR LABEL               TP           ER NUMBER
IST1739I 8001000A00000000        *NA*         *NA*
IST231I RTP MAJOR NODE = ISTRTPMN
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1500I STATE TRACE = ON, OPTION = PU
IST314I END
```

Tip: The REMOTE TCID shown on message IST1476I can be used to correlate a local RTP PU name to the RTP PU name used by the remote (VTAM) partner RTP node (shown on the IST1481I message) to represent the same RTP connection. To determine the RTP PU name used by the remote (VTAM) partner RTP node, first issue the above command on the local node and remember the REMOTE TCID value from the IST1476I message. Then issue the DISPLAY RTPS,TCID=tcid command on the remote (VTAM) partner RTP node using the REMOTE TCID value from the prior display.

Displaying a Rapid Transport Protocol (RTP) physical unit with additional diagnostic information:

```
D NET,ID=CNR00004,HPRDIAG=YES
IST097I DISPLAY ACCEPTED
IST075I NAME = CNR00004, TYPE = PU_T2.1
IST486I STATUS= ACTIV--LX-, DESIRED STATE= ACTIV
IST2244I HPRDIAG DISPLAY ISSUED ON 10/14/08 AT 09:42:17
IST1043I CP NAME = SSCP2A - CP NETID = NETA - DYNAMIC LU = YES
IST1589I XNETALS = YES
IST2238I DISCNT = DELAY - FINAL USE = FINAL
IST1392I DISCNTIM = 00010 DEFINED AT PU FOR DISCONNECT
IST231I RTP MAJOR NODE = ISTRTPMN
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1500I STATE TRACE = OFF
IST2178I RPNCB ADDRESS 06639018
IST1963I APPNCOS = #INTER - PRIORITY = HIGH
IST1476I TCID X'246F137A0001000E' - REMOTE TCID X'246F178B0001000E'
IST1481I DESTINATION CP NETA.SSCP2A - NCE X'D000000000000000'
IST1587I ORIGIN NCE X'D000000000000000'
IST1966I ACTIVATED AS ACTIVE ON 10/14/08 AT 09:34:22
IST1479I RTP CONNECTION STATE = CONNECTED - MNPS = NO
IST1959I DATA FLOW STATE = NORMAL
IST1855I NUMBER OF SESSIONS USING RTP = 10
IST1480I RTP END TO END ROUTE - RSCV PATH
IST1460I TGN  CPNAME             TG TYPE      HPR
IST1461I  21  NETA.SSCP2A        APPN         RTP
IST875I ALSNAME TOWARDS RTP = AHHCPU1
IST1738I ANR LABEL               TP           ER NUMBER
IST1739I 8001000A00000000        *NA*         *NA*
IST924I -------------------------------------------------------------
IST1968I ARB INFORMATION:
IST1844I ARB MODE = GREEN
IST1697I RTP PACING ALGORITHM = ARB RESPONSIVE MODE
IST1477I ALLOWED DATA FLOW RATE = 1600 KBITS/SEC
IST1516I INITIAL DATA FLOW RATE = 1600 KBITS/SEC
IST1841I ACTUAL DATA FLOW RATE = 146 KBITS/SEC
IST1969I MAXIMUM ACTUAL DATA FLOW RATE = 164 KBITS/SEC
IST1862I ARB MAXIMUM SEND RATE = 32 MBITS/SEC
IST1846I CURRENT RECEIVER THRESHOLD = 36850 MICROSECONDS
IST1846I MAXIMUM RECEIVER THRESHOLD = 37000 MICROSECONDS
IST1846I MINIMUM RECEIVER THRESHOLD = 17000 MICROSECONDS
IST1970I RATE REDUCTIONS DUE TO RETRANSMISSIONS = 0
IST924I -------------------------------------------------------------
IST1971I TIMER INFORMATION:
```

```
IST1852I LIVENESS TIMER = 180 SECONDS
IST1851I SMOOTHED ROUND TRIP TIME = 9 MILLISECONDS
IST1972I SHORT REQUEST TIMER = 250 MILLISECONDS
IST2229I REFIFO TIMER = 68 MILLISECONDS
IST924I -------------------------------------------------------------
IST1973I OUTBOUND TRANSMISSION INFORMATION:
IST1974I NUMBER OF NLPS SENT = 173104 ( 173K )
IST1975I TOTAL BYTES SENT = 16055969 ( 16M )
IST1849I LARGEST NLP SENT = 140 BYTES
IST1980I SEQUENCE NUMBER = 8265162 (X'007E1DCA')
IST1842I NUMBER OF NLPS RETRANSMITTED = 0
IST2249I NLP RETRANSMIT RATE = 0.0000%
IST1976I BYTES RETRANSMITTED = 0 ( 0K )
IST1478I NUMBER OF UNACKNOWLEDGED BUFFERS = 1
IST1958I NUMBER OF ORPHANED BUFFERS = 0
IST1843I NUMBER OF NLPS ON WAITING-TO-SEND QUEUE = 0
IST1847I NUMBER OF NLPS ON WAITING-FOR-ACKNOWLEDGEMENT QUEUE = 1
IST2268I NUMBER OF BYTES ON WAITING-FOR-ACK QUEUE = 15
IST1977I MAXIMUM NUMBER OF NLPS ON WAITING-FOR-ACK QUEUE = 19
IST2269I MAXIMUM NUMBER OF BYTES ON WAITING-FOR-ACK QUEUE = 879
IST1978I WAITING-FOR-ACK QUEUE MAX REACHED ON 10/14/08 AT 09:34:22
IST2085I NUMBER OF NLPS ON OUTBOUND WORK QUEUE = 0
IST2086I MAXIMUM NUMBER OF NLPS ON OUTBOUND WORK QUEUE = 20
IST2087I OUTBOUND WORK QUEUE MAX REACHED ON 10/14/08 AT 09:34:22
IST1511I MAXIMUM NETWORK LAYER PACKET SIZE = 16410 BYTES
IST924I -------------------------------------------------------------
IST1979I INBOUND TRANSMISSION INFORMATION:
IST2059I NUMBER OF NLPS RECEIVED = 184391 ( 184K )
IST1981I TOTAL BYTES RECEIVED = 16696275 ( 16M )
IST1850I LARGEST NLP RECEIVED = 104 BYTES
IST1980I SEQUENCE NUMBER = 8480224 (X'008165E0')
IST1853I NUMBER OF NLPS ON OUT-OF-SEQUENCE QUEUE = 0
IST2230I MAXIMUM NUMBER OF NLPS ON OUT-OF-SEQUENCE QUEUE = 0
IST1854I NUMBER OF NLPS ON INBOUND SEGMENTS QUEUE = 0
IST1982I NUMBER OF NLPS ON INBOUND WORK QUEUE = 0
IST1983I MAXIMUM NUMBER OF NLPS ON INBOUND WORK QUEUE = 27
IST924I -------------------------------------------------------------
IST1984I PATH SWITCH INFORMATION:
IST2271I PATH SWITCH DELAY = 0
IST1856I LAST PATH SWITCH OCCURRENCE WAS ON 10/14/08 AT 09:34:59
IST1937I PATH SWITCH REASON: INITIATED BY REMOTE PARTNER
IST1985I PATH SWITCHES INITIATED FROM REMOTE RTP = 1
IST1986I PATH SWITCHES INITIATED FROM LOCAL RTP = 0
IST1987I PATH SWITCHES DUE TO LOCAL FAILURE = 0
IST1988I PATH SWITCHES DUE TO LOCAL PSRETRY = 0
IST924I -------------------------------------------------------------
IST1857I BACKPRESSURE REASON COUNTS:
IST1858I PATHSWITCH  SEND QUEUE MAX  STORAGE FAILURE  STALLED PIPE
IST2205I ----------  --------------  ---------------  ------------
IST1859I      0             0                0              0
IST2211I ACK QUEUE MAX
IST2205I -------------
IST2212I      0
IST924I -------------------------------------------------------------
IST2250I ALL DIAGNOSTIC COUNTERS CLEARED ON 10/14/08 AT 09:34:22
IST314I END
```

Displaying a Rapid Transport Protocol (RTP) physical unit with the diagnostic information and clearing the diagnostic counters:

```
D NET,ID=CNR00004,HPRDIAG=YES,CLEAR=ALL
IST097I DISPLAY ACCEPTED
IST075I NAME = CNR00004, TYPE = PU_T2.1
IST486I STATUS= ACTIV--LX-, DESIRED STATE= ACTIV
IST2244I HPRDIAG DISPLAY ISSUED ON 10/14/08 AT 09:43:53
IST1043I CP NAME = SSCP2A - CP NETID = NETA - DYNAMIC LU = YES
IST1589I XNETALS = YES
```

```
IST2238I DISCNT = DELAY - FINAL USE = FINAL
IST1392I DISCNTIM = 00010 DEFINED AT PU FOR DISCONNECT
IST231I RTP MAJOR NODE = ISTRTPMN
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1500I STATE TRACE = OFF
IST2178I RPNCB ADDRESS 06639018
IST1963I APPNCOS = #INTER - PRIORITY = HIGH
IST1476I TCID X'246F137A0001000E' - REMOTE TCID X'246F178B0001000E'
IST1481I DESTINATION CP NETA.SSCP2A - NCE X'D000000000000000'
IST1587I ORIGIN NCE X'D000000000000000'
IST1966I ACTIVATED AS ACTIVE ON 10/14/08 AT 09:34:21
IST1479I RTP CONNECTION STATE = CONNECTED - MNPS = NO
IST1959I DATA FLOW STATE = NORMAL
IST1855I NUMBER OF SESSIONS USING RTP = 10
IST1480I RTP END TO END ROUTE - RSCV PATH
IST1460I TGN  CPNAME             TG TYPE      HPR
IST1461I  21  NETA.SSCP2A        APPN         RTP
IST875I ALSNAME TOWARDS RTP = AHHCPU1
IST1738I ANR LABEL               TP           ER NUMBER
IST1739I 8001000A00000000        *NA*         *NA*
IST924I -------------------------------------------------------------
IST1968I ARB INFORMATION:
IST1844I ARB MODE = GREEN
IST1697I RTP PACING ALGORITHM = ARB RESPONSIVE MODE
IST1477I ALLOWED DATA FLOW RATE = 1600 KBITS/SEC
IST1516I INITIAL DATA FLOW RATE = 1600 KBITS/SEC
IST1841I ACTUAL DATA FLOW RATE = 148 KBITS/SEC
IST1969I MAXIMUM ACTUAL DATA FLOW RATE = 164 KBITS/SEC
IST1862I ARB MAXIMUM SEND RATE = 32 MBITS/SEC
IST1846I CURRENT RECEIVER THRESHOLD = 36850 MICROSECONDS
IST1846I MAXIMUM RECEIVER THRESHOLD = 37000 MICROSECONDS
IST1846I MINIMUM RECEIVER THRESHOLD = 17000 MICROSECONDS
IST1970I RATE REDUCTIONS DUE TO RETRANSMISSIONS = 0
IST924I -------------------------------------------------------------
IST1971I TIMER INFORMATION:
IST1852I LIVENESS TIMER = 180 SECONDS
IST1851I SMOOTHED ROUND TRIP TIME = 9 MILLISECONDS
IST1972I SHORT REQUEST TIMER = 250 MILLISECONDS
IST2229I REFIFO TIMER = 68 MILLISECONDS
IST924I -------------------------------------------------------------
IST1973I OUTBOUND TRANSMISSION INFORMATION:
IST1974I NUMBER OF NLPS SENT = 210394 ( 210K )
IST1975I TOTAL BYTES SENT = 19553353 ( 19M )
IST1849I LARGEST NLP SENT = 140 BYTES
IST1980I SEQUENCE NUMBER = 10044954 (X'0099461A')
IST1842I NUMBER OF NLPS RETRANSMITTED = 0
IST2249I NLP RETRANSMIT RATE = 0.0000%
IST1976I BYTES RETRANSMITTED = 0 ( 0K )
IST1478I NUMBER OF UNACKNOWLEDGED BUFFERS = 1
IST1958I NUMBER OF ORPHANED BUFFERS = 0
IST1843I NUMBER OF NLPS ON WAITING-TO-SEND QUEUE = 0
IST1847I NUMBER OF NLPS ON WAITING-FOR-ACKNOWLEDGEMENT QUEUE = 1
IST2268I NUMBER OF BYTES ON WAITING-FOR-ACK QUEUE = 15
IST1977I MAXIMUM NUMBER OF NLPS ON WAITING-FOR-ACK QUEUE = 19
IST2269I MAXIMUM NUMBER OF BYTES ON WAITING-FOR-ACK QUEUE = 879
IST1978I WAITING-FOR-ACK QUEUE MAX REACHED ON 10/14/08 AT 09:34:21
IST2085I NUMBER OF NLPS ON OUTBOUND WORK QUEUE = 0
IST2086I MAXIMUM NUMBER OF NLPS ON OUTBOUND WORK QUEUE = 20
IST2087I OUTBOUND WORK QUEUE MAX REACHED ON 10/14/08 AT 09:34:21
IST1511I MAXIMUM NETWORK LAYER PACKET SIZE = 16410 BYTES
IST924I -------------------------------------------------------------
IST1979I INBOUND TRANSMISSION INFORMATION:
IST2059I NUMBER OF NLPS RECEIVED = 224100 ( 224K )
IST1981I TOTAL BYTES RECEIVED = 20319156 ( 20M )
IST1850I LARGEST NLP RECEIVED = 104 BYTES
IST1980I SEQUENCE NUMBER = 10306550 (X'009D43F6')
IST1853I NUMBER OF NLPS ON OUT-OF-SEQUENCE QUEUE = 0
```

```
IST2230I MAXIMUM NUMBER OF NLPS ON OUT-OF-SEQUENCE QUEUE = 0
IST1854I NUMBER OF NLPS ON INBOUND SEGMENTS QUEUE = 0
IST1982I NUMBER OF NLPS ON INBOUND WORK QUEUE = 0
IST1983I MAXIMUM NUMBER OF NLPS ON INBOUND WORK QUEUE = 27
IST924I -------------------------------------------------------------
IST1984I PATH SWITCH INFORMATION:
IST2271I PATH SWITCH DELAY = 0
IST1856I LAST PATH SWITCH OCCURRENCE WAS ON 10/14/08 AT 09:34:59
IST1937I PATH SWITCH REASON: INITIATED BY REMOTE PARTNER
IST1985I PATH SWITCHES INITIATED FROM REMOTE RTP = 1
IST1986I PATH SWITCHES INITIATED FROM LOCAL RTP = 0
IST1987I PATH SWITCHES DUE TO LOCAL FAILURE = 0
IST1988I PATH SWITCHES DUE TO LOCAL PSRETRY = 0
IST924I -------------------------------------------------------------
IST1857I BACKPRESSURE REASON COUNTS:
IST1858I PATHSWITCH  SEND QUEUE MAX  STORAGE FAILURE  STALLED PIPE
IST2205I ----------  --------------  ---------------  ------------
IST1859I      0             0                0              0
IST2211I ACK QUEUE MAX
IST2205I -------------
IST2212I      0
IST924I -------------------------------------------------------------
IST2250I ALL DIAGNOSTIC COUNTERS CLEARED ON 10/14/08 AT 09:34:21
IST2248I ALL DIAGNOSTIC COUNTERS CLEARED FOR 1 RTP PIPES
IST314I END
```

Displaying an HPR-capable PU:

```
d net,id=ahhcpu1
IST097I DISPLAY ACCEPTED
IST075I NAME = AHHCPU1, TYPE = PU_T2.1
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST1043I CP NAME = SSCP2A, CP NETID = NETA, DYNAMIC LU = YES
IST1589I XNETALS = YES
IST2238I DISCNT = YES - FINAL USE = NOT FINAL
IST1105I RESOURCE STATUS TGN CP-CP TG CHARACTERISTICS
IST1106I AHHCPU1  AC/R    21 YES   988D000000000000000014C00808080
IST1482I HPR = RTP - OVERRIDE = N/A - CONNECTION = YES
IST1510I LLERP = REQUIRED - RECEIVED = REQUIRED
IST136I LOCAL SNA MAJOR NODE = LSAHHC1
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1500I STATE TRACE = OFF
IST1314I TRLE = TRLE1A    STATUS = ACTIV       CONTROL = MPC
IST314I END
```

Displaying a switched link station:

```
d net,id=swpux2a1,e
IST097I DISPLAY ACCEPTED
IST075I NAME = SWPUX2A1, TYPE = PU_T2.1
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST1043I CP NAME = SSCP2A, CP NETID = NETA, DYNAMIC LU = YES
IST1589I XNETALS = YES
IST2238I DISCNT = DELAY - FINAL USE = NOT FINAL
IST1392I DISCNTIM = 00010 DEFINED AT PU FOR DISCONNECT
IST1105I RESOURCE STATUS TGN CP-CP TG CHARACTERISTICS
IST1106I SWPUX2A1 AC/R    22 YES   982D000000000000000017100808080
IST1482I HPR = NONE - OVERRIDE = N/A - CONNECTION = NO
IST136I SWITCHED SNA MAJOR NODE = SWND3AB8
IST081I LINE NAME = LN3AXN11, LINE GROUP = GP3AXN10, MAJNOD = NCP3AB8
IST1068I PHYSICAL RESOURCE (PHYSRSC) = P3AXN10
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1500I STATE TRACE = OFF
IST1656I VTAMTOPO = NOREPORT, NODE REPORTED - YES
IST1657I MAJOR NODE VTAMTOPO = INCLUDE
IST172I NO LOGICAL UNITS EXIST
IST314I END
```

Displaying a switched PU type 2:

```
d net,id=a04p501,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = A04P501, TYPE = PU_T2
IST486I STATUS= CONCT      , DESIRED STATE = CONCT
IST2238I DISCNT = YES - FINAL USE = NOT FINAL
IST136I SWITCHED SNA MAJOR NODE = A04SG1
IST1934I  IDBLK = 002   IDNUM = 02345
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1656I VTAMTOPO = REPORT, NODE REPORTED - YES
IST1657I MAJOR NODE VTAMTOPO = INCLUDE
IST355I LOGICAL UNITS:
IST080I A04L501A CONCT      A04L501B CONCT      A04L501C CONCT
IST080I A04L501D CONCT      A04L501E CONCT      A04L501F CONCT
IST080I A04L501G CONCT      A04L501H CONCT      A04L501I CONCT
IST080I A04L501J CONCT      A04L501K CONCT      A04L501L CONCT
IST080I A04L501M CONCT      A04L501N CONCT      A04L501O CONCT
IST314I END
```

Displaying a switched PU type 2.1 (LAN capable):

```
D NET,ID=SOE10302,scope=all
IST097I DISPLAY  ACCEPTED
IST075I NAME = SOE10302         , TYPE = PU_T2.1
IST486I STATUS= ACTIV--LX-, DESIRED STATE= ACTIV
IST1058I MODEL LU GROUP = LUGR    , LUSEED =
IST1043I CP NAME = SOE10301, CP NETID = GBSOEL00, DYNAMIC LU = YES
IST1589I XNETALS = YES
IST2238I DISCNT = NO - FINAL USE = *NA*
IST1105I RESOURCE STATUS TGN CP-CP TG CHARACTERISTICS
IST1106I SOE10302 AC/R    21 YES   9875000000000000000014C00808080
IST1482I HPR = NONE - OVERRIDE = N/A - CONNECTION = NO
IST956I PU   SAP=  4 MAC=000524E10156 MAXDATA= 1437
IST1935I RIF = 0AB00011910100210050
IST136I SWITCHED SNA MAJOR NODE = ISTDSWMN
IST081I LINE NAME = L530217D, LINE GROUP = G5302   , MAJNOD = SOE53F02
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1500I STATE TRACE = OFF
IST1656I VTAMTOPO = REPORT  , NODE REPORTED - YES
IST1657I MAJOR NODE VTAMTOPO = REPORT
IST355I LOGICAL UNITS:
IST080I SOE1030I ACTIV---X- SOE1030J ACTIV---X- SOE1030K ACTIV---X-
IST314I END
```

Displaying a switched PU type 2.1 (AS/400):

```
d net,id=a04p882,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = A04P882, TYPE = PU_T2.1
IST486I STATUS= ACTIV--L-- , DESIRED STATE= ACTIV
IST1043I CP NAME = A04P882A, CP NETID = NETY, DYNAMIC LU = YES
IST1589I XNETALS = YES
IST2238I DISCNT = NO - FINAL USE = *NA*
IST1105I RESOURCE STATUS TGN CP-CP TG CHARACTERISTICS
IST1106I A04P882  AC/R    21 YES   802D000000000000000017100000000
IST136I SWITCHED SNA MAJOR NODE = A04SMNC
IST081I LINE NAME = J000401B, LINE GROUP = A04BLG1, MAJNOD = A0462ZC
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST355I LOGICAL UNITS:
IST080I A04I8823 ACT/S      A04I8822 ACT/S      A04P882A ACT/S----Y
IST080I A04I8821 ACT/S
IST314I END
```

Displaying a local SNA physical unit:

```
d net,id=pua,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = PUA, TYPE = PU_T2
IST486I STATUS = ACTIV      , DESIRED STATE= ACTIV
IST2238I DISCNT = YES - FINAL USE = FINAL
IST136I LOCAL    SNA MAJOR NODE = A50LSNA
IST077I SIO = *NA*  CUA = 0770
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST355I LOGICAL UNITS:
IST080I LSNALU1  ACTIV      LSNALU2  ACTIV      LSNALU3  ACTIV
IST080I LSNALU4  ACTIV
IST314I END
```

Displaying a dynamic XCF local SNA physical unit:

```
d net,id=istp0001,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = ISTP0001, TYPE = PU_T2.1
IST486I STATUS= ACTIV--LX-, DESIRED STATE= ACTIV
IST1043I CP NAME = SSCP2A, CP NETID = NETA, DYNAMIC LU = YES
IST1589I XNETALS = YES
IST2238I DISCNT = NO - FINAL USE = *NA*
IST1105I RESOURCE STATUS TGN CP-CP TG CHARACTERISTICS
IST1106I ISTP0001 AC/R    21 YES   988D000000000000000014C0080808
IST1482I HPR = NONE - OVERRIDE = N/A - CONNECTION = NO
IST136I LOCAL SNA MAJOR NODE = ISTLSXCF
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1500I STATE TRACE = OFF
IST1314I TRLE = ISTT0001  STATUS = ACTIV----E  CONTROL = XCF
IST355I LOGICAL UNITS:
IST080I SSCP2A   ACT/S----Y
IST314I END
```

Displaying a dynamic XCF local SNA physical unit, specifying the control point name:

```
d net,id=sscp2a,idtype=xcfcp
IST097I DISPLAY ACCEPTED
IST075I NAME = ISTP0001, TYPE = PU_T2.1
IST486I STATUS= ACTIV--LX-, DESIRED STATE= ACTIV
IST1043I CP NAME = SSCP2A, CP NETID = NETA, DYNAMIC LU = YES
IST1589I XNETALS = YES
IST2238I DISCNT = YES - FINAL USE = NOT FINAL
IST1105I RESOURCE STATUS TGN CP-CP TG CHARACTERISTICS
IST1106I ISTP0001 AC/R    21 YES   988D000000000000000014C00808080
IST1482I HPR = NONE - OVERRIDE = N/A - CONNECTION = NO
IST136I LOCAL SNA MAJOR NODE = ISTLSXCF
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1500I STATE TRACE = OFF
IST1314I TRLE = ISTT0001  STATUS = ACTIV----E  CONTROL = XCF
IST314I END
```

Displaying a logical unit under an NCP:

```
d net,id=a04dxxx1,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = NETA.A04DXXX1, TYPE = LOGICAL UNIT
IST486I STATUS= NEVAC----T , DESIRED STATE= INACT
IST1447I REGISTRATION TYPE = CDSERVR
IST977I MDLTAB=***NA*** ASLTAB=***NA***
IST861I MODETAB=***NA*** USSTAB=***NA*** LOGTAB=***NA***
IST934I DLOGMOD=***NA*** USS LANGTAB=***NA***
IST597I CAPABILITY-PLU INHIBITED,SLU INHIBITED,SESSION LIMIT 00000001
IST081I LINE NAME = A04VXX, LINE GROUP = A04XNPAX, MAJNOD = A0462ZC
IST135I PHYSICAL UNIT = A04NXXX
IST082I DEVTYPE = LU
```

```
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST171I ACTIVE SESSIONS = 0000000000, SESSION REQUESTS = 0000000000
IST172I NO SESSIONS EXIST
IST314I END
```

Displaying a switched logical unit:

```
d net,id=a31d0711,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = A31D0711, TYPE = LOGICAL UNIT
IST486I STATUS= NEVAC      , DESIRED STATE= INACT
IST1447I REGISTRATION TYPE = CDSERVR
IST977I MDLTAB=***NA*** ASLTAB=***NA***
IST861I MODETAB=CRYPTLOG USSTAB=AUSSTAB LOGTAB=INTERP
IST934I DLOGMOD=REQENCRP USS LANGTAB=***NA***
IST597I CAPABILITY-PLU INHIBITED,SLU INHIBITED,SESSION LIMIT 00000001
IST136I SWITCHED SNA MAJOR NODE = SMNDDNN
IST135I PHYSICAL UNIT = A31P021
IST082I DEVTYPE = LU
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1936I LOCADDR = 003
IST171I ACTIVE SESSIONS = 0000000000, SESSION REQUESTS = 0000000000
IST172I NO SESSIONS EXIST
IST314I END
```

Displaying a local SNA logical unit:

```
d net,id=lsnalu1,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = NETA.LSNALU1, TYPE = LOGICAL UNIT
IST486I STATUS= ACTIV      , DESIRED STATE= ACTIV
IST1447I REGISTRATION TYPE = CDSERVR
IST977I MDLTAB=***NA*** ASLTAB=***NA***
IST861I MODETAB=AMODETAB USSTAB=AUSSTAB LOGTAB=***NA***
IST934I DLOGMOD=D4A32782 USS LANGTAB=***NA***
IST597I CAPABILITY-PLU INHIBITED,SLU INHIBITED,SESSION LIMIT 00000001
IST136I LOCAL    SNA MAJOR NODE = A50LSNA
IST135I PHYSICAL UNIT = PUA , CUA = 0770
IST082I DEVTYPE = LU
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1936I LOCADDR = 003
IST171I ACTIVE SESSIONS = 0000000000, SESSION REQUESTS = 0000000000
IST172I NO SESSIONS EXIST
IST314I END
```

Displaying a local non-SNA logical unit:

```
d net,id=a50a721,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = NETA.A50A721, TYPE = LOGICAL UNIT
IST486I STATUS= ACT/S      , DESIRED STATE= ACTIV
IST1447I REGISTRATION TYPE = CDSERVR
IST977I MDLTAB=***NA*** ASLTAB=***NA***
IST861I MODETAB=AMODETAB USSTAB=AUSSTAB LOGTAB=INTERP
IST934I DLOGMOD=M23270I  USS LANGTAB=***NA***
IST597I CAPABILITY-PLU INHIBITED,SLU ENABLED  ,SESSION LIMIT 00000001
IST351I LOCAL 3270 MAJOR NODE = A50LOCAL
IST077I SIO = 00010 CUA = 0721
IST1131I DEVICE = LU
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST171I ACTIVE SESSIONS = 0000000001, SESSION REQUESTS = 0000000001
IST206I SESSIONS:
IST634I NAME     STATUS         SID          SEND RECV VR TP NETID
IST635I ECHOC1C  ACTIV-P    D73BC0750F6AE8F3 0000 0001  0  0 NETC
IST635I ECHO50B  PREALC-P   ECC39EEE2AA3BC6E                 NETA
IST314I END
```

Displaying a native ATM permanent virtual channel (PVC):

```
d net,id=lnp1a2a1,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = LNP1A2A1, TYPE = LINE
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST087I TYPE = LEASED             , CONTROL = SDLC, HPDT = *NA*
IST1554I PVCNAME = PV11211
IST134I GROUP = GPP1A1, MAJOR NODE = XCAOSA1A
IST1500I STATE TRACE = OFF
IST084I NETWORK RESOURCES:
IST089I PP1A2A1  TYPE = PU_T2.1          , ACTIV
IST314I END
```

Displaying a remote node connected through a native ATM PVC:

```
d net,id=pp1a2a1,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = PP1A2A1, TYPE = PU_T2.1
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST1043I CP NAME = SSCP2A, CP NETID = NETA, DYNAMIC LU = YES
IST1589I XNETALS = YES
IST2238I DISCNT = NO - FINAL USE = *NA*
IST1105I RESOURCE STATUS TGN CP-CP TG CHARACTERISTICS
IST1106I PP1A2A1  AC/R    21 YES   182D000000000000000017100808080
IST1482I HPR = RTP - OVERRIDE = N/A - CONNECTION = YES
IST1510I LLERP = REQUIRED - RECEIVED = REQUIRED
IST1555I VPCI/VCI = 010100
IST081I LINE NAME = LNP1A2A1, LINE GROUP = GPP1A1, MAJNOD = XCAOSA1A
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1500I STATE TRACE = OFF
IST172I NO LOGICAL UNITS EXIST
IST314I END
```

Displaying a remote node connected through a native ATM switched virtual channel (SVC):

```
d net,id=sw1a2a,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = SW1A2A, TYPE = PU_T2.1
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST1043I CP NAME = SSCP2A, CP NETID = NETA, DYNAMIC LU = YES
IST1589I XNETALS = YES
IST2238I DISCNT = NO - FINAL USE = *NA*
IST1105I RESOURCE STATUS TGN CP-CP TG CHARACTERISTICS
IST1106I SW1A2A   AC/R    22 YES   182D000000000000000017100808080
IST1482I HPR = RTP - OVERRIDE = N/A - CONNECTION = YES
IST1510I LLERP = REQUIRED - RECEIVED = REQUIRED
IST1559I ATM ADDRESS                                  TYPE      FORMAT
IST1553I 11111111111111111111111111111111111111100    LOCAL     NSAP
IST1553I 21111111111111111111111111111111111111110    REMOTE    NSAP
IST1555I VPCI/VCI = 010200
IST136I SWITCHED SNA MAJOR NODE = SWXCA1A
IST081I LINE NAME = LN1A2A, LINE GROUP = GP1A2A, MAJNOD = XCAOSA1A
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1500I STATE TRACE = OFF
IST1656I VTAMTOPO = NOREPORT, NODE REPORTED - YES
IST1657I MAJOR NODE VTAMTOPO = INCLUDE
IST355I LOGICAL UNITS:
IST080I SW1A2AL  NEVAC
IST314I END
```

Displaying a remote node connected through Enterprise Extender when the connection uses IPv4 addresses without host names:

```
d net,id=sw1a2a,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = SW1A2A, TYPE = PU_T2.1
```

```
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST1043I CP NAME = SSCP2A, CP NETID = NETA, DYNAMIC LU = YES
IST1589I XNETALS = YES
IST2238I DISCNT = NO - FINAL USE = *NA*
IST1105I RESOURCE STATUS TGN CP-CP TG CHARACTERISTICS
IST1106I SW1A2A AC/R 22 YES 182D0000000000000000017100808080
IST1482I HPR = RTP - OVERRIDE = N/A - CONNECTION = YES
IST1510I LLERP = REQUIRED - RECEIVED = REQUIRED
IST1680I LOCAL IP ADDRESS 9.18.100.2
IST1680I REMOTE IP ADDRESS 223.254.254.1
IST2114I LIVTIME:    INITIAL = 10   MAXIMUM =  0   CURRENT = 10
IST136I SWITCHED SNA MAJOR NODE = SWXCA1
IST081I LINE NAME = LN1A2A, LINE GROUP = GP1A2A, MAJNOD = XCAHPR1A
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1500I STATE TRACE = OFF
IST355I LOCAL UNITS:
IST080I SW1A2AL NEVAC
IST314I END
```

Displaying a remote node connected through Enterprise Extender when the connection uses IPv6 addresses:

```
d net,id=sw1a26a,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = SW1A26A, TYPE = PU_T2.1
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST1043I CP NAME = SSCP2A, CP NETID = NETA, DYNAMIC LU = YES
IST1589I XNETALS = YES
IST2238I DISCNT = NO - FINAL USE = *NA*
IST1105I RESOURCE STATUS TGN CP-CP TG CHARACTERISTICS
IST1106I SW1A26A AC/R 22 YES 182D0000000000000000017100808080
IST1482I HPR = RTP - OVERRIDE = N/A - CONNECTION = YES
IST1510I LLERP = REQUIRED - RECEIVED = REQUIRED
IST1680I LOCAL IP ADDRESS 3FFE::9.18.100.2
IST1910I LOCAL HOSTNAME LOCALHOST.DOMAIN.COM
IST1680I REMOTE IP ADDRESS 3FFC:1001:1002:3451:7223:2254:4254:4441
IST1909I REMOTE HOSTNAME REMOTEHOST.DOMAIN.COM
IST2114I LIVTIME:    INITIAL = 10   MAXIMUM =  0   CURRENT = 10
IST136I SWITCHED SNA MAJOR NODE = SWXCA1
IST081I LINE NAME = LN1A26A, LINE GROUP = GP1A26A,MAJNOD = XCAHPR1A
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1500I STATE TRACE = OFF
IST355I LOCAL UNITS:
IST080I SW1A2A6L NEVAC
IST314I END
```

Displaying a remote node connected through Enterprise Extender when the connection uses IPv4 addresses:

```
d net,id=sw1a26b,scope=all
IST097I DISPLAY ACCEPTED
IST075I NAME = SW1A26B, TYPE = PU_T2.1
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST1043I CP NAME = SSCP2A, CP NETID = NETA, DYNAMIC LU = YES
IST1589I XNETALS = YES
IST2238I DISCNT = NO - FINAL USE = *NA*
IST1105I RESOURCE STATUS TGN CP-CP TG CHARACTERISTICS
IST1106I SW1A26B AC/R 22 YES 182D0000000000000000017100808080
IST1482I HPR = RTP - OVERRIDE = N/A - CONNECTION = YES
IST1510I LLERP = REQUIRED - RECEIVED = REQUIRED
IST1680I LOCAL IP ADDRESS 9.18.100.2
IST1910I LOCAL HOSTNAME LOCALHOST2.DOMAIN.COM
IST1680I REMOTE IP ADDRESS 09.26.130.4
IST2114I LIVTIME:    INITIAL = 10   MAXIMUM =  0   CURRENT = 10
IST136I SWITCHED SNA MAJOR NODE = SWXCA1
IST081I LINE NAME = LN1A26B, LINE GROUP = GP1A26B, MAJNOD = XCAHPR1A
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
```

```
IST1500I STATE TRACE = OFF
IST355I LOCAL UNITS:
IST080I SW1A2B6L NEVAC
IST314I END
```

Displaying a dynamic Enterprise Extender PU:

```
d net,id=e2000018
IST097I DISPLAY ACCEPTED
IST075I NAME = E2000018, TYPE = PU_T2.1
IST486I STATUS= ACTIV---X-, DESIRED STATE= ACTIV
IST1043I CP NAME = SSCP2A - CP NETID = NETA - DYNAMIC LU = YES
IST1589I XNETALS = YES
IST2238I DISCNT = NO - FINAL USE = *NA*
IST1105I RESOURCE STATUS TGN CP-CP TG CHARACTERISTICS
IST1106I E2000018 AC/R     5 YES   98750000000000000000017100808080
IST1482I HPR = RTP - OVERRIDE = N/A - CONNECTION = YES
IST1510I LLERP = NOTPREF - RECEIVED = NOTALLOW
IST1680I LOCAL IP ADDRESS 9.67.1.1
IST1910I LOCAL HOSTNAME VIPA14.SSCP1A
IST1680I REMOTE IP ADDRESS 9.67.1.2
IST2114I LIVTIME:    INITIAL =   10   MAXIMUM =    0   CURRENT =   10
IST136I SWITCHED SNA MAJOR NODE = ISTDSWMN
IST081I LINE NAME = LNEE2000, LINE GROUP = GPEE2, MAJNOD = XCAEE2
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1500I STATE TRACE = OFF
IST1656I VTAMTOPO = REPORT, NODE REPORTED - YES
IST1657I MAJOR NODE VTAMTOPO = REPORT
IST314I END
```

Displaying a resource name that is known in several networks:

```
d net,id=*.applb12,max=3
IST097I DISPLAY ACCEPTED
IST075I NAME = NETA.APPLB12, TYPE = APPL
IST486I STATUS= CONCT      , DESIRED STATE= CONCT
IST1447I REGISTRATION TYPE = CDSERVR
IST977I MDLTAB=***NA*** ASLTAB=***NA***
IST861I MODETAB=***NA*** USSTAB=***NA*** LOGTAB=***NA***
IST934I DLOGMOD=***NA*** USS LANGTAB=***NA***
IST1938I APPC = NO
IST597I CAPABILITY-PLU INHIBITED,SLU INHIBITED,SESSION LIMIT NONE
IST231I APPL  MAJOR NODE = APPL1A
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST271I JOBNAME = ***NA***, STEPNAME = ***NA***, DSPNAME = ***NA***
IST228I ENCRYPTION = OPTIONAL, TYPE = DES
IST1563I CKEYNAME = APPLB12 CKEY = PRIMARY CERTIFY = NO
IST1552I MAC = NONE MACTYPE = NONE
IST1050I MAXIMUM COMPRESSION LEVEL - INPUT = 0, OUTPUT = 0
IST171I ACTIVE SESSIONS = 0000000000, SESSION REQUESTS = 0000000000
IST924I -------------------------------------------------------------
IST075I NAME = NETB.APPLB12, TYPE = CDRSC
IST486I STATUS= ACTIV      , DESIRED STATE= ACTIV
IST1447I REGISTRATION TYPE = CDSERVR
IST977I MDLTAB=***NA*** ASLTAB=***NA***
IST861I MODETAB=***NA*** USSTAB=***NA*** LOGTAB=***NA***
IST934I DLOGMOD=***NA*** USS LANGTAB=***NA***
IST1632I VPACING = 7
IST1938I APPC = NO
IST597I CAPABILITY-PLU ENABLED  ,SLU ENABLED  ,SESSION LIMIT NONE
IST231I CDRSC MAJOR NODE = CDRSC1A
IST479I CDRM NAME = SSCP7B  , VERIFY OWNER = NO
IST1131I DEVICE = CDRSC
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST228I ENCRYPTION = NONE, TYPE = DES
IST1563I CKEYNAME = APPLB12 CKEY = PRIMARY CERTIFY = NO
IST1552I MAC = NONE MACTYPE = NONE
IST171I ACTIVE SESSIONS = 0000000000, SESSION REQUESTS = 0000000000
```

```
IST924I -------------------------------------------------------------
IST075I NAME = NETC.APPLB12, TYPE = CDRSC
IST486I STATUS= ACTIV      , DESIRED STATE= ACTIV
IST1447I REGISTRATION TYPE = CDSERVR
IST977I MDLTAB=***NA*** ASLTAB=***NA***
IST861I MODETAB=***NA*** USSTAB=***NA*** LOGTAB=***NA***
IST934I DLOGMOD=***NA*** USS LANGTAB=***NA***
IST597I CAPABILITY-PLU ENABLED  ,SLU ENABLED  ,SESSION LIMIT NONE
IST231I CDRSC MAJOR NODE = CDRSC1A
IST479I CDRM NAME = SSCP9C  , VERIFY OWNER = NO
IST1131I DEVICE = CDRSC
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST228I ENCRYPTION = NONE, TYPE = DES
IST1563I CKEYNAME = APPLB12 CKEY = PRIMARY CERTIFY = NO
IST1552I MAC = NONE MACTYPE = NONE
IST171I ACTIVE SESSIONS = 0000000000, SESSION REQUESTS = 0000000000
IST314I END
```

Displaying a generic resource:

```
d net,id=GRAPPL,idtype=generic
IST097I DISPLAY ACCEPTED
IST075I NAME = GRAPPL, TYPE = GENERIC RESOURCE
IST1359I MEMBER NAME        OWNING CP   SELECTABLE  APPC
IST1360I NETA.NETAPPL1      SSCP2A         YES       NO
IST1360I NETA.APPL1         SSCP1A         NO        NO
IST1360I NETA.APPLAA1       SSCPAA         DEL       NO
IST2210I GR PREFERENCE TABLE ENTRY = **NAMELESS**
IST2202I GREXIT   = YES      WLM      = YES      LOCLU  = YES
IST2204I LOCAPPL  = YES      PASSOLU  = YES
IST1393I GENERIC RESOURCE NAME RESOLUTION EXIT IS ISTEXCGR
IST314I END
```

Displaying an IP address in dotted decimal format when there is only one TN3270 client connected at this IP address:

```
d net,idtype=ipaddr,ID=9.67.113.58
IST097I DISPLAY ACCEPTED
IST075I NAME = NETA.TCPM1001, TYPE = APPL
IST486I STATUS= ACT/S, DESIRED STATE= ACTIV
IST1447I REGISTRATION TYPE = CDSERVR
IST599I REAL NAME = NETA.TCPM1001
IST977I MDLTAB=***NA*** ASLTAB=***NA***
IST861I MODETAB=ISTINCLM USSTAB=***NA*** LOGTAB=***NA***
IST934I DLOGMOD=***NA*** USS LANGTAB=***NA***
IST1632I VPACING =  7
IST1938 APPC = YES
IST597I CAPABILITY-PLU ENABLED  ,SLU ENABLED  ,SESSION LIMIT 00000001
IST231I APPL MAJOR NODE = TCPAPPLS
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1500I STATE TRACE = OFF
IST271I JOBNAME = TCPCS, STEPNAME = TCPCS, DSPNAME = ISTD629B
IST228I ENCRYPTION = OPTIONAL, TYPE = DES
IST1563I CKEYNAME = TCPM1001 CKEY = PRIMARY CERTIFY = NO
IST1552I MAC = NONE MACTYPE = NONE
IST1050I MAXIMUM COMPRESSION LEVEL - INPUT = 0, OUTPUT = 0
IST1633I ASRCVLM = 1000000
IST1634I DATA SPACE USAGE: CURRENT = 0 MAXIMUM = 0
IST1669I IPADDR..PORT 9.67.113.58..1029
IST171I ACTIVE SESSIONS = 0000000001, SESSION REQUESTS = 0000000000
IST314I END
```

Displaying an IP address in colon-hexadecimal format when there is only one TN3270 client connected at this IPv6 address.

```
d net,id=2001:0DB8::9:67:115:17,idtype=ipaddr
IST097I DISPLAY ACCEPTED
IST075I NAME = NETA.TCPM2013, TYPE = DYNAMIC APPL
IST486I STATUS= ACT/S, DESIRED STATE= ACTIV
IST1447I REGISTRATION TYPE = CDSERVR
IST599I REAL NAME = NETA.TCPM2013
IST1629I MODSRCH = NEVER
IST977I MDLTAB=***NA*** ASLTAB=***NA***
IST861I MODETAB=ISTINCLM USSTAB=***NA*** LOGTAB=***NA***
IST934I DLOGMOD=***NA*** USS LANGTAB=***NA***
IST1632I VPACING =  7
IST1938I APPC = YES
IST597I CAPABILITY-PLU ENABLED  ,SLU ENABLED  ,SESSION LIMIT 00000001
IST231I APPL MAJOR NODE = TCPAPPLS
IST1425I DEFINED USING MODEL TCPM*
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1500I STATE TRACE = OFF
IST271I JOBNAME = TCPCS, STEPNAME = TCPCS, DSPNAME = ISTF27CE
IST228I ENCRYPTION = OPTIONAL , TYPE = DES
IST1563I CKEYNAME = TCPM2013 CKEY = PRIMARY CERTIFY = NO
IST1552I MAC = NONE MACTYPE = NONE
IST1050I MAXIMUM COMPRESSION LEVEL - INPUT = 0, OUTPUT = 0
IST1633I ASRCVLM = 1000000
IST1634I DATA SPACE USAGE: CURRENT = 0 MAXIMUM = 0
IST1669I IPADDR..PORT 2001:0DB8::9:67:115:17..1027
IST171I ACTIVE SESSIONS = 0000000001, SESSION REQUESTS = 0000000000
IST314I END
```

Displaying a resource with TN3270 characteristics.

```
d net,id=tcpm2013
IST097I DISPLAY ACCEPTED
IST075I NAME = NETA.TCPM2013, TYPE = DYNAMIC APPL
IST486I STATUS= ACT/S, DESIRED STATE= ACTIV
IST1447I REGISTRATION TYPE = CDSERVR
IST1629I MODSRCH = NEVER
IST977I MDLTAB=***NA*** ASLTAB=***NA***
IST861I MODETAB=ISTINCLM USSTAB=***NA*** LOGTAB=***NA***
IST934I DLOGMOD=***NA*** USS LANGTAB=***NA***
IST1632I VPACING =  7
IST1938I APPC = YES
IST597I CAPABILITY-PLU ENABLED  ,SLU ENABLED  ,SESSION LIMIT 00000001
IST231I APPL MAJOR NODE = TCPAPPLS
IST1425I DEFINED USING MODEL TCPM*
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1500I STATE TRACE = OFF
IST271I JOBNAME = TCPCS, STEPNAME = TCPCS, DSPNAME = ISTF27CE
IST228I ENCRYPTION = OPTIONAL , TYPE = DES
IST1563I CKEYNAME = TCPM2013 CKEY = PRIMARY CERTIFY = NO
IST1552I MAC = NONE MACTYPE = NONE
IST1050I MAXIMUM COMPRESSION LEVEL - INPUT = 0, OUTPUT = 0
IST1633I ASRCVLM = 1000000
IST1634I DATA SPACE USAGE: CURRENT = 0 MAXIMUM = 0
IST1669I IPADDR..PORT 2001:0DB8::9:67:115:17..1027
IST171I ACTIVE SESSIONS = 0000000001, SESSION REQUESTS = 0000000000
IST314I END
```

Displaying an IP address with multiple TN3270 client connections.

```
d net,id=2001:0DB8::9:67:115:17,idtype=ipaddr

IST097I DISPLAY ACCEPTED
IST1912I IP ADDRESS 2001:0DB8::9:67:115:17 102
IST1913I LUNAME            PORT
IST1914I NETA.TCPM2013     1027
IST1914I NETA.TCPM2012     1026
IST314I END
```

Displaying a TSO user ID when the SLU is a Telnet client:

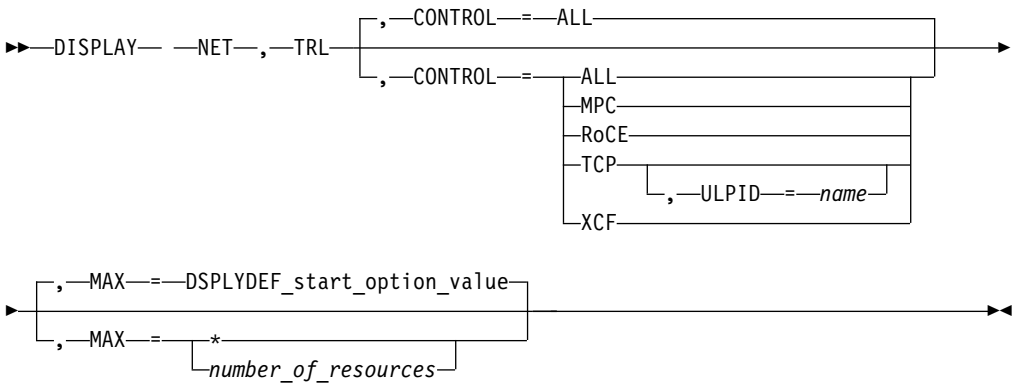
```
d net,tsouser,id=user1
IST097I DISPLAY ACCEPTED
IST075I NAME = USER1, TYPE = TSO USERID
IST486I STATUS= ACTIV, DESIRED STATE= N/A
IST576I TSO TRACE = OFF
IST262I ACBNAME = TSO0003, STATUS = ACT/S
IST262I LUNAME = TCPM1002, STATUS = ACT/S
IST1669I IPADDR..PORT 2001:0DB8::9:67:115:17..1026
IST2203I CHARACTER SET 0065 CODE PAGE 0025
IST314I END
```

Displaying a DLUR CDRSC:

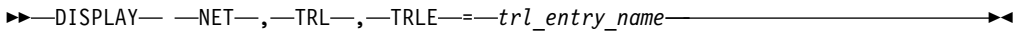
```
d net,id=NNP7
IST075I  NAME = D7NET.NNP7       , TYPE = ADJACENT CP
IST486I  STATUS= ACT/S----Y, DESIRED STATE= ACTIV
IST1402I      SRTIMER = 30           SRCOUNT = 100
IST1447I  REGISTRATION TYPE = NO
IST977I  MDLTAB=***NA*** ASLTAB=***NA***
IST1333I  ADJLIST = ***NA***
IST861I  MODETAB=***NA*** USSTAB=***NA*** LOGTAB=***NA***
IST934I  DLOGMOD=CPSVCMG  USS LANGTAB=***NA***
IST597I  CAPABILITY-PLU ENABLED  ,SLU ENABLED  ,SESSION LIMIT NONE
IST231I  CDRSC    MAJOR NODE = ISTCDRDY
IST1184I  CPNAME = D7NET.NNP7        - NETSRVR = ***NA***
IST1044I  ALSLIST = ISTAPNPU
IST1131I  DEVICE = ILU/CDRSC
IST654I  I/O TRACE = OFF, BUFFER TRACE = OFF
IST1500I  STATE TRACE = OFF
IST171I  ACTIVE SESSIONS = 0000000003, SESSION REQUESTS = 0000000000
IST206I  SESSIONS:
IST1081I  ADJACENT LINK STATION = PBB7N10
IST634I  NAME     STATUS         SID          SEND RECV VR TP NETID
IST635I  CDRMD730 ACTIV/CP-P F8B7DBABF0AB700C 0001 015D  0  0 D7NET
IST1355I  PHYSICAL UNITS SUPPORTED BY DLUR D7NET.NNP7
IST089I  D779AP1  TYPE = PU_T2            , PAPU2
IST924I  ------------------------------------------------------------
IST075I        NAME=D7NET.NNP7       ,TYPE=DIRECTORY ENTRY
IST1186I      DIRECTORY ENTRY = DYNAMIC  NN
IST1184I      CPNAME = D7NET.NNP7           -NETSRVR = ***NNA***
IST1402I       SRTIMER = 30           SRCOUNT = 100
IST134I        END
```

DISPLAY TRL command

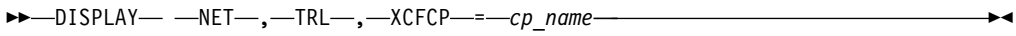
Display the entries in the TRL major nodes:



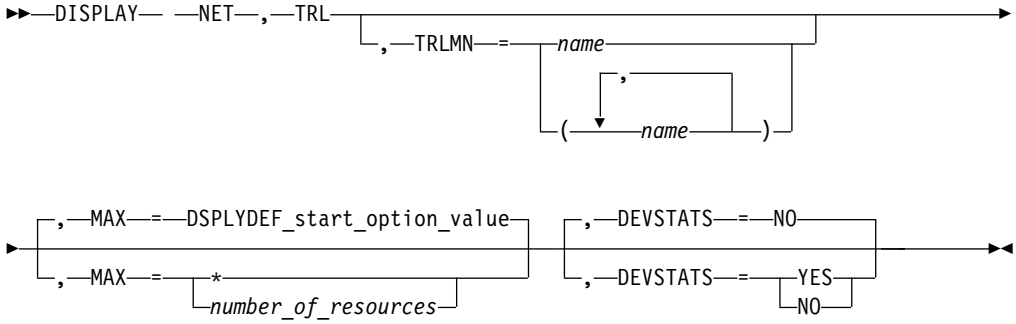
Display information about a specific user-defined TRLE:



Display information about a dynamic XCF TRLE:



Display the entries in one or more specific TRL major nodes:



Abbreviations

Operand	Abbreviation
DISPLAY	D
DEVSTATS=YES	DEVSTATS

Purpose

The DISPLAY TRL (transport resource list) command provides information about the active TRL major nodes or about a single TRLE (transport resource list entry).

Operands

CONTROL
Specifies the type of connections to display.

CONTROL=ALL
Specifies that information is to be displayed about all TRLEs.

CONTROL=MPC
Specifies that information is to be displayed about user-defined TRLEs only.

CONTROL=RoCE
Specifies that information is to be displayed about RDMA over Converged Ethernet (RoCE) TRLEs only.

CONTROL=TCP
Specifies that information is to be displayed about dynamic TCP/IP TRLEs only.

CONTROL=XCF
Specifies that information is to be displayed about dynamic XCF TRLEs only.

DEVSTATS
Specifies whether statistics for RoCE TRLEs should be collected and displayed. This operand is meaningful only when the TRLE operand is also specified, and the value that is specified for the TRLE operand represents a RoCE TRLE; otherwise, the operand is ignored.

DEVSTATS=YES
Specifies that statistics should be collected for the RoCE TRLE.

DEVSTATS=NO
Specifies that statistics should not be collected for the RoCE TRLE. This is the default setting.

MAX
Specifies the maximum number of TRLEs that VTAM displays for this command.

If you specify the MAX operand, do not specify TRLE.

MAX=*
Specifies that the value of the DSPLYMAX start option is used to limit the display output.

MAX=number_of_resources
Specifies the number of TRLEs to display for this command. The valid range is 1 - value of DSPLYMAX. The default is the value specified for the DSPLYDEF start option.

Specifying MAX limits the display output. VTAM searches only for the number of instances that you have specified. When that number is found, VTAM does not search any further. This saves processing time for the command and gives you control over the amount of display output generated by the command. If fewer TRLEs are found than you have specified on MAX, VTAM displays only the TRLEs that are found.

TRLE=trl_entry_name
Specifies the name of the TRLE to be displayed.

TRLMN=trl_major_node_name
Specifies the name of one or more active TRL major nodes to be displayed.

ULPID=name
Specifies the name of a CS z/OS upper-layer protocol (ULP) to be displayed, for example, the TCP/IP procedure name. The ULPID operand is valid only with CONTROL=TCP.

XCFCP=cp_name
Specifies that information is to be displayed about the TRLE representing the connection to another VTAM in the XCF group. The value of *cp_name* is the CP name or SSCP name of the other VTAM.

Resulting display

The resulting display shows:

- The name and status of all TRLEs in the active TRL major nodes if the TRLE operand is not specified.
- The name and status of the TRLE specified on the TRLE operand. If the status is active and the TRLE is not associated with a "RoCE Express" feature, the display also includes the address and operational status of the READ, WRITE, and (OSA-Express and HiperSockets only) DATA subchannels. In addition, the following information may be displayed:

- MPC level and usage (MPC header size, maximum MPC data size, inbound data storage medium)
- Name of the CS z/OS upper-layer protocols (ULPs) using this TRLE
- OSA portname, OSA adapter number, and OSA microcode level
- OSA or HiperSockets channel path id (chpid) type and number
- Peripheral Component Interconnect Express (PCIe) function ID (PFID) for the "RoCE Express" feature
- Microcode level for a 10 GbE RoCE Express feature operating in a dedicated RoCE environment or a 10 GbE RoCE Express2 feature
- Virtual function number (VFN), a 10 GbE RoCE Express feature that operates in a shared RoCE environment, or a 10 GbE RoCE Express2 feature
- Generation level for a "RoCE Express" feature
- Transmission speed for a "RoCE Express" feature
- I/O trace status
- The capability of the connection to perform channel I/O directly to or from communications storage manager (CSM) buffers
- Storage information about the inbound and outbound queues associated with the DATA subchannels

- For a dynamic TCP TRLE, an exclusively owned TRLE, or an RNIC TRLE, only one message with a ULP ID is issued because only one ULP can use each of these TRLEs. For an OSA-Express adapter, one message with a ULP ID is issued for each datapath channel address that a ULP uses. For other TRLEs, more than one ULP ID message can be issued, depending on how many ULPs are using the TRLE.

  Rule: Only one message with a ULP ID is generated for a 10 GbE RoCE Express2 feature, or a 10 GbE RoCE Express feature that operates in a shared RoCE environment.
- The ULP ID will be the jobname for TCP/IP ULPs, the SNA PU name for ANNC ULPs, and the XCA Major Node name for ATM or EE ULPs.
- Message group IST2396I is generated after the base TRL information is displayed when DEVSTATS=YES is specified and the TRLE that is specified on the TRLE operand represents a "RoCE Express" interface. See z/OS Communications Server: SNA Messages for specifics on the statistics reported in the IST2396I message group.

Examples

Displaying all TRL entries:

```
d net,trl
IST097I DISPLAY ACCEPTED
IST350I DISPLAY TYPE = TRL
IST1954I TRL MAJOR NODE = ISTTRL
IST1314I TRLE = ISTT0001  STATUS = ACTIVE----E   CONTROL = XCF
IST1454I 1 TRLE(S) DISPLAYED
IST924I -------------------------------------------------------------
IST1954I TRL MAJOR NODE = TRL1
IST1314I TRLE = TRL1A  STATUS = ACTIVE  CONTROL = MPC
IST1314I TRLE = TRL1B  STATUS = NEVAC   CONTROL = MPC
IST1454I 2 TRLE(S) DISPLAYED
IST924I -------------------------------------------------------------
IST1954I TRL MAJOR NODE = TRL2
```

```
IST1314I TRLE = TRL2A  STATUS = NEVAC   CONTROL = XCF
IST1314I TRLE = TRL2B  STATUS = ACTIVE  CONTROL = XCF
IST1454I 2 TRLE(S) DISPLAYED
IST314I END
```

Displaying two TRL major nodes:

```
d net,trl,trlmn=(trl1,trl2)
IST097I DISPLAY ACCEPTED
IST350I DISPLAY TYPE = TRL
IST1954I TRL MAJOR NODE = TRL1
IST1314I TRLE = TRL1A  STATUS = ACTIVE  CONTROL = MPC
IST1314I TRLE = TRL1B  STATUS = NEVAC   CONTROL = MPC
IST1454I 2 TRLE(S) DISPLAYED
IST924I -------------------------------------------
IST1954I TRL MAJOR NODE = TRL2
IST1314I TRLE = TRL2A  STATUS = NEVAC   CONTROL = XCF
IST1314I TRLE = TRL2B  STATUS = ACTIVE  CONTROL = XCF
IST1454I 2 TRLE(S) DISPLAYED
IST314I END
```

Displaying an active TRL entry:

```
d net,trl,trle=trle1a
IST097I DISPLAY ACCEPTED
IST075I NAME = TOC01N, TYPE = TRLE
IST1954I TRL MAJOR NODE = TRL1
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST087I TYPE = LEASED             , CONTROL = MPC , HPDT = YES
IST1715I MPCLEVEL = HPDT       MPCUSAGE = SHARE
IST1717I ULPID = AHHCPU7 ULP INTERFACE = *NA*
IST1577I HEADER SIZE = 4092 DATA SIZE = 60 STORAGE = ***NA***
IST1221I WRITE DEV = 0CE6 STATUS = ACTIVE     STATE = ONLINE
IST1221I WRITE DEV = 0CE7 STATUS = ACTIVE     STATE = ONLINE
IST1221I WRITE DEV = 0CE8 STATUS = ACTIVE     STATE = ONLINE
IST1221I WRITE DEV = 0CE9 STATUS = ACTIVE     STATE = ONLINE
IST1577I HEADER SIZE = 4092 DATA SIZE = 60 STORAGE = DATASPACE
IST1221I READ  DEV = 0CC6 STATUS = ACTIVE     STATE = ONLINE
IST1221I READ  DEV = 0CC7 STATUS = ACTIVE     STATE = ONLINE
IST1221I READ  DEV = 0CC8 STATUS = ACTIVE     STATE = ONLINE
IST314I END
```

Displaying an active XCF TRL entry:

```
d net,trl,trle=istt1q2q
IST097I DISPLAY ACCEPTED
IST075I NAME = ISTT1Q2Q, TYPE = TRLE
IST1954I TRL MAJOR NODE = ISTTRL
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST087I TYPE = LEASED             , CONTROL = XCF , HPDT = *NA*
IST1715I MPCLEVEL = HPDT       MPCUSAGE = SHARE
IST1717I ULPID = ISTP1Q2Q ULP INTERFACE = *NA*
IST1503I XCF TOKEN = 02000002001B0002     STATUS = ACTIVE
IST1502I ADJACENT CP = NETA.SSCP2A
IST314I END
```

Displaying an active TCP TRL entry:

```
d net,trl,trle=iutx0d20
IST097I DISPLAY ACCEPTED
IST075I NAME = IUTX0D20, TYPE = TRLE
IST1954I TRL MAJOR NODE = ISTTRL
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST087I TYPE = LEASED             , CONTROL = TCP , HPDT = *NA*
IST1717I ULPID = TCPCS2 ULP INTERFACE = *NA*
IST1221I READ  DEV = 0D20 STATUS = ACTIVE     STATE = N/A
IST1221I WRITE DEV = 0D21 STATUS = ACTIVE     STATE = N/A
IST314I END
```

Displaying an inactive TRL entry:

```
d net,trl,trle=trle1c
IST097I DISPLAY ACCEPTED
IST075I NAME = TRLE1C, TYPE = TRLE
IST1954I TRL MAJOR NODE = TRL1
IST486I STATUS= NEVAC, DESIRED STATE= INACT
IST087I TYPE = LEASED             , CONTROL = MPC , HPDT = *NA*
IST1715I MPCLEVEL = NOHPDT     MPCUSAGE = ***N/A***
IST1221I WRITE DEV = 0508 STATUS = RESET      STATE = N/A
IST1221I WRITE DEV = 03F0 STATUS = RESET      STATE = N/A
IST1221I READ  DEV = 0408 STATUS = RESET      STATE = N/A
IST1221I READ  DEV = 02F0 STATUS = RESET      STATE = N/A
IST314I END
```

Displaying an active OSA Express TRL entry:

```
d net,trl,trle=qdio101
IST097I DISPLAY ACCEPTED
IST075I NAME = QDIO101, TYPE = TRLE
IST1954I TRL MAJOR NODE = TRLCS
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST087I TYPE = LEASED             , CONTROL = MPC , HPDT = YES
IST1715I MPCLEVEL = QDIO       MPCUSAGE = SHARE
IST2263I PORTNAME = QDIO4101   PORTNUM =   0   OSA CODE LEVEL = ABCD
IST2337I CHPID TYPE = OSD  CHPID = C1 PNETID = NETWORK3
IST2184I QDIOSYNC = ALLINOUT - SYNCID = QDIO101 - SAVED = NO
IST1577I HEADER SIZE = 4096 DATA SIZE = 0 STORAGE = ***NA***
IST1221I WRITE DEV = 0E29 STATUS = ACTIVE     STATE = ONLINE
IST1577I HEADER SIZE = 4092 DATA SIZE = 0 STORAGE = ***NA***
IST1221I READ  DEV = 0E28 STATUS = ACTIVE     STATE = ONLINE
IST924I -------------------------------------------------------------
IST1221I DATA  DEV = 0E2A STATUS = ACTIVE     STATE = N/A
IST1724I I/O TRACE = OFF  TRACE LENGTH = *NA*
IST1717I ULPID = TCPCS1 ULP INTERFACE = QDIO4101I
IST2310I ACCELERATED ROUTING DISABLED
IST2331I QUEUE   QUEUE     READ             QUEUE
IST2332I ID      TYPE      STORAGE          STATUS
IST2205I ------  --------  ---------------  ----------------------
IST2333I RD/1    PRIMARY   4.0M(64 SBALS)   ACTIVE
IST2333I RD/2    BULKDATA  4.0M(64 SBALS)   ACTIVE
IST2333I RD/3    SYSDIST   4.0M(64 SBALS)   ACTIVE
IST2333I RD/4    EE        4.0M(64 SBALS)   ACTIVE
IST2331I QUEUE   QUEUE     READ
IST2332I ID      TYPE      STORAGE
IST2205I ------  --------  ---------------
IST2333I RD/1    PRIMARY   1.0M(16 SBALS)
IST2333I RD/2    SYSDIST   1.0M(16 SBALS)
IST2305I NUMBER OF DISCARDED INBOUND READ BUFFERS = 0
IST1757I PRIORITY1: UNCONGESTED PRIORITY2: UNCONGESTED
IST1757I PRIORITY3: UNCONGESTED PRIORITY4: UNCONGESTED
IST2190I DEVICEID PARAMETER FOR OSAENTA TRACE COMMAND = 00-05-00-00
IST1801I UNITS OF WORK FOR NCB AT ADDRESS X'15AD0010'
IST1802I P1 CURRENT = 0 AVERAGE = 0 MAXIMUM = 0
IST1802I P2 CURRENT = 0 AVERAGE = 0 MAXIMUM = 0
IST1802I P3 CURRENT = 0 AVERAGE = 0 MAXIMUM = 0
IST1802I P4 CURRENT = 0 AVERAGE = 0 MAXIMUM = 0
IST924I -------------------------------------------------------------
IST1221I TRACE DEV = 0E2B STATUS = ACTIVE     STATE = N/A
IST1724I I/O TRACE = OFF  TRACE LENGTH = *NA*
IST1717I ULPID = TCPCS1 ULP INTERFACE = QDIO6101I
IST2310I ACCELERATED ROUTING DISABLED
IST2331I QUEUE   QUEUE     READ             QUEUE
IST2332I ID      TYPE      STORAGE          STATUS
IST2205I ------  --------  ---------------  ----------------------
IST2333I RD/1    PRIMARY   4.0M(64 SBALS)   ACTIVE
IST2331I QUEUE   QUEUE     READ
IST2332I ID      TYPE      STORAGE
```

```
IST2205I ------  --------  ---------------
IST2333I RD/1    PRIMARY   4.0M(64 SBALS)
IST2305I NUMBER OF DISCARDED INBOUND READ BUFFERS = 0
IST1757I PRIORITY1: UNCONGESTED PRIORITY2: UNCONGESTED
IST1757I PRIORITY3: UNCONGESTED PRIORITY4: UNCONGESTED
IST1801I UNITS OF WORK FOR NCB AT ADDRESS X'15A92010'
IST1802I P1 CURRENT = 0 AVERAGE = 0 MAXIMUM = 0
IST1802I P2 CURRENT = 0 AVERAGE = 0 MAXIMUM = 0
IST1802I P3 CURRENT = 0 AVERAGE = 0 MAXIMUM = 0
IST1802I P4 CURRENT = 0 AVERAGE = 0 MAXIMUM = 0
IST924I -------------------------------------------------------------
IST1221I DATA  DEV = 0E2C STATUS = RESET      STATE = N/A
IST1724I I/O TRACE = OFF  TRACE LENGTH = *NA*
IST314I END
```

Displaying a TRLE dynamically created for HiperSockets:

```
d net,trl,trle=iutiqdio
IST097I DISPLAY ACCEPTED
IST075I NAME = IUTIQDIO, TYPE = TRLE
IST1954I TRL MAJOR NODE = ISTTRL
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST087I TYPE = LEASED             , CONTROL = MPC , HPDT = YES
IST1715I MPCLEVEL = QDIO       MPCUSAGE = SHARE
IST1716I PORTNAME = IUTIQDFE   LINKNUM =   0   OSA CODE LEVEL = *NA*
IST2337I CHPID TYPE = IQD      CHPID = FE PNETID = **NA**
IST2319I IQD NETWORK ID = 07B1
IST1577I HEADER SIZE = 4096 DATA SIZE = 16384 STORAGE = ***NA***
IST1221I WRITE DEV = 0E01 STATUS = ACTIVE     STATE = ONLINE
IST1577I HEADER SIZE = 4092 DATA SIZE = 0 STORAGE = ***NA***
IST1221I READ  DEV = 0E00 STATUS = ACTIVE     STATE = ONLINE
IST924I -------------------------------------------------------------
IST1221I DATA  DEV = 0E02 STATUS = ACTIVE     STATE = N/A
IST1724I I/O TRACE = OFF  TRACE LENGTH = *NA*
IST1717I ULPID = TCPCS1 ULP INTERFACE = IUTIQDIO
IST2310I ACCELERATED ROUTING DISABLED
IST2331I QUEUE   QUEUE     READ
IST2332I ID      TYPE      STORAGE
IST2205I ------  --------  ---------------
IST2333I RD/1    PRIMARY   2.0M(126 SBALS)
IST2331I QUEUE   QUEUE     READ             QUEUE
IST2332I ID      TYPE      STORAGE          STATUS
IST2205I ------  --------  ---------------  ----------------------
IST2333I RD/1    PRIMARY   2.0M(126 SBALS)  ACTIVE
IST2305I NUMBER OF DISCARDED INBOUND READ BUFFERS = 0
IST1757I PRIORITY1: UNCONGESTED PRIORITY2: UNCONGESTED
IST1757I PRIORITY3: UNCONGESTED PRIORITY4: UNCONGESTED
IST1801I UNITS OF WORK FOR NCB AT ADDRESS X'15B18010'
IST1802I P1 CURRENT = 0 AVERAGE = 0 MAXIMUM = 0
IST1802I P2 CURRENT = 0 AVERAGE = 0 MAXIMUM = 0
IST1802I P3 CURRENT = 0 AVERAGE = 0 MAXIMUM = 0
IST1802I P4 CURRENT = 0 AVERAGE = 0 MAXIMUM = 0
IST924I -------------------------------------------------------------
IST1221I DATA  DEV = 0E03 STATUS = RESET      STATE = N/A
IST1724I I/O TRACE = OFF  TRACE LENGTH = *NA*
IST924I -------------------------------------------------------------
IST314I END
```

Displaying a 10 GbE RoCE Express TRLE in a dedicated RoCE environment:

```
d net,trl,trle=iut10005
IST097I DISPLAY ACCEPTED
IST075I NAME = IUT10005, TYPE = TRLE
IST1954I TRL MAJOR NODE = ISTTRL
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST087I TYPE = *NA*               , CONTROL = ROCE, HPDT = *NA*
IST2361I SMCR PFID = 0005  PCHID = 0500  PNETID = NETWORK3
IST2362I PORTNUM = 1  RNIC CODE LEVEL = 2.11.1200
```

```
IST2389I PFIP = 01000300   GEN = ROCE EXPRESS  SPEED = 10GE
IST924I -------------------------------------------------------
IST1717I ULPID = TCPIP1 ULP INTERFACE = EZARIUT10005
IST1724I I/O TRACE = OFF  TRACE LENGTH = *NA*
IST1866I TRLE = IUT10005   INOPDUMP = ON
IST924I -------------------------------------------------------
IST1717I ULPID = TCPIP2 ULP INTERFACE = EZARIUT10005
IST1724I I/O TRACE = OFF  TRACE LENGTH = *NA*
IST1866I TRLE = IUT10005   INOPDUMP = ON
IST314I END
```

Displaying a 10 GbE RoCE Express TRLE in a shared RoCE environment:

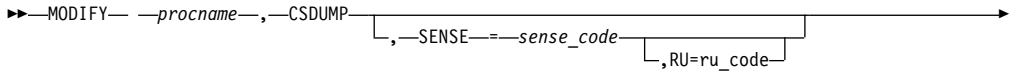
```
d net,trl,trle=iut10011
IST097I DISPLAY ACCEPTED
IST075I NAME = IUT10011, TYPE = TRLE
IST1954I TRL MAJOR NODE = ISTTRL
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST087I TYPE = *NA*               , CONTROL = ROCE, HPDT = *NA*
IST2361I SMCR PFID = 0011  PCHID = 0140  PNETID = PNETID1
IST2362I PORTNUM = 1  RNIC CODE LEVEL = **NA**
IST2389I PFIP = 01000300  GEN = ROCE EXPRESS  SPEED = 10GE
IST2417I VFN = 0001
IST924I -------------------------------------------------------------
IST1717I ULPID = TCPIP2 ULP INTERFACE = EZARIUT10011
IST1724I I/O TRACE = OFF  TRACE LENGTH = *NA*
IST314I END
```

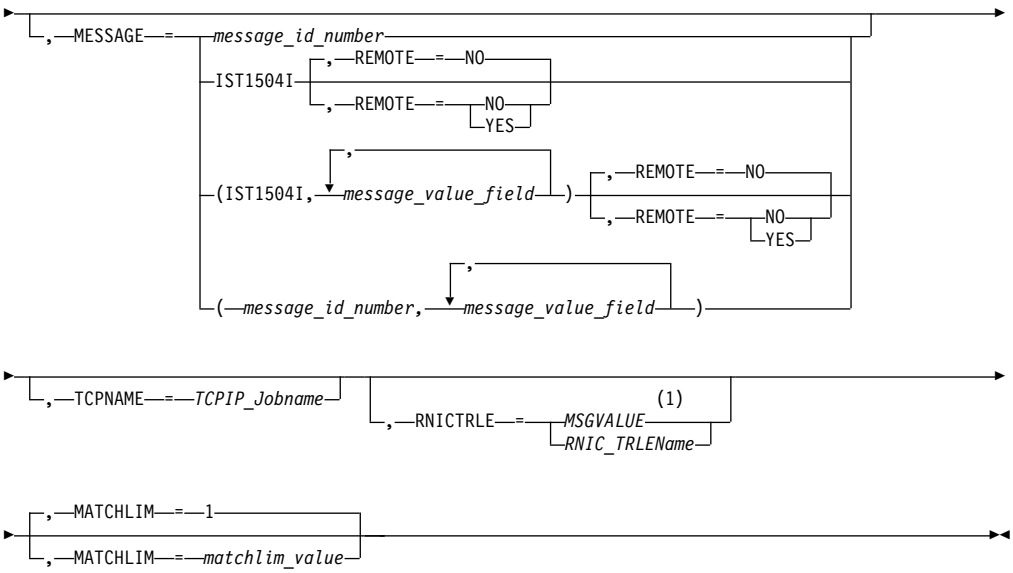
Displaying a 10 GbE RoCE Express2 TRLE

```
d net,id=iut10014
IST097I DISPLAY ACCEPTED
IST075I NAME = IUT10014, TYPE = TRLE
IST1954I TRL MAJOR NODE = ISTTRL
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST087I TYPE = *NA*               , CONTROL = ROCE, HPDT = *NA*
IST2361I SMCR PFID = 0014  PCHID = 0142  PNETID = PNETID1
IST2362I PORTNUM = 1  RNIC CODE LEVEL = 2.5.31
IST2389I PFIP = 01000300  GEN = ROCE EXPRESS2  SPEED = 10GE
IST2417I VFN = 0014
IST924I -------------------------------------------------------------
IST1717I ULPID = TCPIP2 ULP INTERFACE = EZARIUT10014
IST1724I I/O TRACE = OFF  TRACE LENGTH = *NA*
IST314I END
```

MODIFY CSDUMP command

Set the CSDUMP trigger:

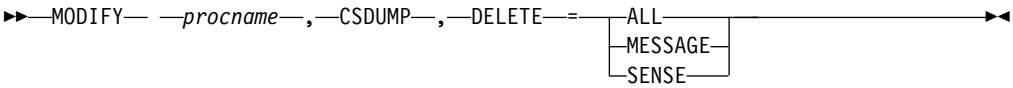




Notes:

1 MSGVALUE is valid only when the MESSAGE operand is used and specifies either message IST2391I or IST2406I.

Remove the CSDUMP trigger:



Abbreviations

Operand	Abbreviation
MODIFY	F

Purpose

Set the CSDUMP trigger:

Use the MODIFY CSDUMP command to perform the following actions:

- Take an immediate dump of the current address space. This is the default action that is performed when the MODIFY CSDUMP command is issued with no other operands. Any existing message or sense code trigger set by the MODIFY CSDUMP command or the CSDUMP start option are not affected by issuing this form of the MODIFY CSDUMP command.
- Set a trigger that invokes a dump of the current address space when a particular sense code is issued. The trigger invokes a dump of the VTAM address space if the current address space is not the VTAM address space.
- Set a trigger that invokes a dump of the current address space and possibly a dump of a remote VTAM address space, when a particular message is issued. The trigger invokes a dump of the VTAM address space if the current address space is not the VTAM address space.

You can set only one sense code and one message trigger simultaneously. You cannot set two different message or sense code triggers at the same time. If you have previously set a message trigger using the MODIFY CSDUMP or the CSDUMP start option, and then you enter a different message trigger, the previous message trigger is overwritten.

Tip: You can use the CSDUMP start option to set either a CSDUMP message trigger or a sense code trigger or both. See z/OS Communications Server: SNA Resource Definition Reference for information about the CSDUMP start option.

Remove the CSDUMP trigger:

Using the MODIFY CSDUMP,DELETE command, the user can delete the triggers set previously.

Operands

procname
The procedure name for the command. If *procname* in the START command was specified as *startname.ident*, where *startname* is the VTAM start procedure and *ident* is the optional identifier, either *startname.ident* or *ident* can be specified for *procname*.

If *procname* in the START command was *startname*, *startname* must be specified for *procname*.

Set the CSDUMP trigger:

MATCHLIM=matchlim_value
Specifies that the CSDUMP trigger is to be disabled after *matchlim_value* matches. The *matchlim_value* is an integer in the range 1-255. The default is 1.

MESSAGE=message_id_number
Specifies the ID number of the message that will trigger a dump. Message numbers must be of the format ISTxxxI, ISTxxxxI, or IVTxxxxI.

Rule: If start option MSGLEVEL=BASE has been specified, or if MSGLVL=BASE has been specified in a USS operator message table, the message displayed on the console is the pre-version 4 message. CSDUMP with a message trigger checks the *message_id_number* before it has been swapped to the base *message_id_number*. Therefore, the *message_id_number* used with the CSDUMP command must be the version 4 message number for CSDUMP to match on the *message_id_number* and take the dump. See z/OS Communications Server: SNA Messages for a list of the base messages and their corresponding version 4 numbers.

MESSAGE=(message_id_number,message_value_field,...)
This parameter specifies the message variable text that can be used to trigger a dump. Instead of just matching on a message number, this allows the trigger to be more specific. If variable text is specified, then a dump will be taken only if the message and variable text match. If a variable text field is left blank, then it is considered a wildcard. See z/OS Communications Server: SNA Messages for more information about message text for VTAM operator messages.

Note: Use an underscore as a substitute for a space in the variable text value of the message operand.

Rules:

1. Each message has the fixed number of message_value_fields. Each message_value_field has the maximum length.
2. The specified number of message_value_fields must be less than or equal to the number of message_value_fields in the specified message.
3. The specified length of the message_value_field must be less than or equal to the maximum length of the specified message_value_field.
4. The leading message_value_field can be skipped using a comma (,) for each message_value_field. The trailing message_value_field is not required.
5. See z/OS Communications Server: SNA Messages to determine the number of message value fields and their maximum lengths.

REMOTE

Specifies whether to request a dump of the remote VTAM when an XCF link that connects the two VTAMs becomes inoperative. This operand can be specified only when MESSAGE=IST1504I is also specified.

REMOTE=NO

A dump of the remote VTAM is not requested when an XCF link becomes inoperative. This is the default behavior.

REMOTE=YES

A dump of the remote VTAM is requested when an XCF link becomes inoperative. The remote VTAM must be z/OS V1R9 or later for the dump to be taken.

RNICTRLE

Specifies that a diagnostic dump of a "RoCE Express" feature needs to be taken under certain conditions. The RNICTRLE operand can be used only with the MESSAGE trigger or as part of an immediate dump.

RNICTRLE=MSGVALUE

MSGVALUE is valid only when the MESSAGE operand is used and specifies either message IST2391I or IST2406I. Specifying the MSGVALUE keyword allows VTAM to collect diagnostic dump information for the "RoCE Express" feature that is identified in these messages.

RNICTRLE=RNIC_TRLEName

The format of *RNIC_TRLEName* must be IUT*yxxxx*, where *xxxx* is the Peripheral Component Interconnect Express (PCIe) function ID (PFID) that identifies the "RoCE Express" feature, and *y* is the port number that is used on the "RoCE Express" interface. The value of *y* can be 1 or 2.

Usage

The "RoCE Express" diagnostic dump is taken in addition to any other dumps that CSDUMP produces. After the "RoCE Express" diagnostic dump is produced, recovery of the "RoCE Express" feature is attempted.

Notes: No "RoCE Express" diagnostic dump is taken in either of the following cases:

- The "RoCE Express" TRLE is not active when CSDUMP produces the dump.
- A specific RNIC_TRLEName is specified for RNICTRLE but the TRLE is not an RDMA over Converged Ethernet (RoCE) TRLE.

Rules:

- When the 10 GbE RoCE Express feature operates in a dedicated RoCE environment, the diagnostic dump deactivates the 10 GbE RoCE Express feature, and causes an inoperative condition for all users.

- When RNICTRLE represents a 10 GbE RoCE Express2 feature, or when it represents a 10 GbE RoCE Express feature operating in a shared RoCE environment, the diagnostic dump only affects the TCP/IP stack that configured the PFID value included in the value of RNIC_TRLEName. Other TCP/IP stacks that use the same feature are not affected.

Guideline: Ensure that multiple "RoCE Express" interfaces are active with the same physical network ID to avoid loss of connections during a CSDUMP operation. For more information, see High availability considerations in z/OS Communications Server: IP Configuration Guide.

RU=ru_code
Specifies the response unit code that will carry the sense code specified. The RU operand can be used only in combination with the SENSE operand. If the RU operand is used, then the dump will be triggered only if the RU and SENSE codes occur together. The RU code must be 2, 4, or 6 characters in length.

See z/OS Communications Server: SNA Data Areas Volume 1 for valid RU codes or *SNA Formats*.

SENSE=sense_code
Specifies the sense code that will trigger a dump. It must be 8 characters in length.

See z/OS Communications Server: IP and SNA Codes for the valid sense codes.

TCPNAME=*TCPIP_Jobname*
Specifies to take a dump of the TCPIP job, along with the current address space. The job name must be 1 - 8 characters in length.

Remove the CSDUMP trigger:

DELETE=ALL
Specifies to delete both the message and the sense triggers.

DELETE=MESSAGE
Specifies to delete the message trigger.

DELETE=SENSE
Specifies to delete the sense trigger.

Examples

Using the default option to take the dump now:

```
f vtam,csdump
 IST097I MODIFY ACCEPTED
 IST223I MODIFY CSDUMP COMMAND COMPLETED
```

Using the default option and tcpname to take the dump of the current address space and the dump of the TCPIP Job now:

```
f vtam,csdump,tcpname=tcpcs
 IST097I MODIFY ACCEPTED
 IST223I MODIFY CSDUMP COMMAND COMPLETED
```

Using the default option, TCPNAME parameter, and RNICTRLE parameter to take an immediate dump of the current address space, the specified TCP/IP address space, and a "RoCE Express" diagnostic dump of the specified "RoCE Express" feature:

```
f vtam,csdump,tcpname=tcpcs,rnictrle=iut10001
  IST097I MODIFY ACCEPTED
  IST223I MODIFY CSDUMP COMMAND COMPLETED
```

Using the message option and RNICTRLE parameter to automatically trigger a dump of the current address space and a "RoCE Express" diagnostic dump the next time when message IST2406I is issued. The diagnostic dump of the "RoCE Express" feature associated with the TRLE name in message IST2406I will be taken.

```
f vtam,csdump,message=ist2406i,rnictrle=msgvalue
  IST097I MODIFY ACCEPTED
  IST223I MODIFY CSDUMP COMMAND COMPLETED
```

Using the message to take the dump:

```
f vtam,csdump,message=ist1386i
 IST097I MODIFY ACCEPTED
 IST223I MODIFY CSDUMP COMMAND COMPLETED
```

Using the message and tcpname to take the dump of the current address space and the dump of the TCPIP Job:

```
f vtam,csdump,message=ist1386i,tcpname=tcpcs
 IST097I MODIFY ACCEPTED
 IST223I MODIFY CSDUMP COMMAND COMPLETED
```

Using the message and the first message_value_field to take the dump:

```
f vtam,csdump,message=(ist169i,react)
IST097I MODIFY ACCEPTED
IST223I MODIFY CSDUMP COMMAND COMPLETED
```

Using the message and the first two message_value_fields:

```
f vtam,csdump,message=(ist169i,react,pua)
 IST097I MODIFY ACCEPTED
 IST223I MODIFY CSDUMP COMMAND COMPLETED
```

Using the message and the second message_value_field to take the dump:

```
f vtam,csdump,message=(ist169i,,pua)
IST097I MODIFY ACCEPTED
IST223I MODIFY CSDUMP COMMAND COMPLETED
```

Using the message and the REMOTE operand to take a dump of this VTAM and of the remote VTAM when an XCF link becomes inoperative:

```
f vtam,csdump,message=ist1504i,remote=yes
IST097I MODIFY ACCEPTED
IST223I MODIFY CSDUMP COMMAND COMPLETED
```

Using the sense code to take the dump:

```
f vtam,csdump,sense=08090000
IST097I MODIFY ACCEPTED
IST223I MODIFY CSDUMP COMMAND COMPLETED
```

Using the sense code and RU code to take the dump:

```
f vtam,csdump,sense=08090000,ru=818641
IST097I MODIFY ACCEPTED
IST223I MODIFY CSDUMP COMMAND COMPLETED
```

Using the sense code, RU code, and matchlim to take the dump 12 times:

```
f vtam,csdump,sense=08090000,ru=818641,matchlim=12
IST097I MODIFY ACCEPTED
IST223I MODIFY CSDUMP COMMAND COMPLETED
```

Using the sense code, RU code, and tcpname to take the dump of the current address space and the dump of the TCPIP Job:

```
f vtam,csdump,sense=08090000,ru=818641,tcpname=tcpcs
IST097I MODIFY ACCEPTED
IST223I MODIFY CSDUMP COMMAND COMPLETED
```

Chapter 9. SNA Network Implementation Guide

Operating VTAM

Resources automatically activated by VTAM

Certain resources are automatically activated by VTAM. Some internally maintained resources are automatically activated when the message "VTAM INITIALIZATION COMPLETE" is issued. These resources can be displayed, but cannot be activated or deactivated by an operator. The following resources are automatically activated:

- VTAMSEG application program major node:
  - VTAM (or name from the CDRM definition statement for this VTAM)
  - ISTATA00
  - ISTNOP
  - ISTPDCLU
  - ISTAPNCP
- VTAMSEG2 application program major node:
  - *?-?* (model application program definition for Telnet server shared ACBs)

  Note: The definition of the model application program for Telnet server shared ACB names cannot be displayed.
- ISTPUS PU (or name from HOSTPU start option) type 5 node
  - ISTGROUP
- ISTPDILU predefined independent LU major node
- ISTADJCP adjacent CP major node
- ISTCDRDY dynamic cross-domain resource major node

  Note: The ISTCDRDY major node can be deactivated and activated by an operator. For further information, see Dynamic definition of independent LUs.
- ISTRTPMN rapid transport protocol major node
- ISTTRL transport resource list major node
- ISTLSXCF local SNA major node

  Note: ISTLSXCF can also be deactivated and activated by the operator.

VTAM dynamically builds and activates transport resource list elements (TRLEs) within the ISTTRL major node for some TCP/IP communication interfaces. All of these TRLEs are created when needed, but cannot be deleted. These dynamic TRLEs are created with the following naming convention:

IUTSAMEH
: This TRLE is created for communication between multiple TCP/IP stacks on the same MVS image, and for communication between TCP/IP and VTAM for Enterprise Extender.

IUTIQDIO
: This TRLE is created for TCP/IP dynamic XCF communications over HiperSockets devices. Up to 10 subchannel addresses are allocated: one READ and one WRITE device, and eight DATAPATH devices.

IUTIQD*xx*
This TRLE is created when TCP/IP activates a HiperSockets interface (defined by using either the DEVICE/LINK statements for IPAQIDIO or the IPv6 INTERFACE statement for IPAQIDIO6) with a CHPID parameter of *xx*. Up to 10 subchannel addresses are allocated: one READ and one WRITE device, and eight DATAPATH devices.

IUTIQ4*xx*
This TRLE is created when TCP/IP activates a HiperSockets interface (defined by using the IPv4 INTERFACE statement for IPAQIDIO) with a CHPID parameter of *xx*. Up to 10 subchannel addresses are allocated: one READ and one WRITE device, and eight DATAPATH devices.

IUTIQX*xx*
This TRLE is created for TCP/IP dynamic Internal Queued Direct I/O extensions (IQDX) function IPv4 communications over HiperSockets devices that are connected to the intraensemble data network (IEDN). The value *xx* is the OSX CHPID number that is associated with this IQDX TRLE. Up to 10 subchannel addresses are allocated: one READ and one WRITE device, and eight DATAPATH devices.

IUTIQ6*xx*
This TRLE is created for TCP/IP dynamic IQDX IPv6 communications over HiperSockets devices that are connected to the intraensemble data network (IEDN). The value *xx* is the OSX CHPID number that is associated with this IQDX TRLE. Up to 10 subchannel addresses are allocated: one READ and one WRITE device, and eight DATAPATH devices.

IUTXT0*xx*
This TRLE is created when TCP/IP activates an MPCIPA INTERFACE with CHPIDTYPE OSX and a CHPID parameter of *xx*. Up to 19 subchannel addresses are allocated: one READ and one WRITE device, and 17 DATAPATH devices.

IUTMT0*xx*
This TRLE is created when TCP/IP activates a dynamically defined OSM interface, where VTAM assigned CHPID *xx* for this communication. Up to 11 subchannel addresses are allocated: one READ and one WRITE device, and nine DATAPATH devices.

IUT*npfid*
This TRLE is created when TCP/IP activates an IPAQENET or IPAQENET6 interface with CHPIDTYPE OSD with Shared Memory Communications - RDMA (SMC-R) specified or taken as the default, and SMC-R is enabled on the system.

- For an IBM 10 GbE RoCE Express TRLE, the *npfid* value is derived from the PORTNUM and PFID values on the SMCR parameter of the GLOBALCONFIG statement in the TCP/IP profile. For example, IUT20018 indicates that the PORTNUM value is 2 and the PFID value is 0018. If PORTNUM is not specified, the default value is 1.
- For an IBM 10 GbE RoCE Express2 TRLE, the *npfid* value is derived from the PFID value on the SMCR parameter of the GLOBALCONFIG statement in the TCP/IP profile and the port number that VTAM learns during activation of the 10 GbE RoCE Express2 feature. The learned port number is used instead of any PORTNUM value specified on the GLOBALCONFIG SMCR statement. For example, IUT20153 indicates that the PFID value is 153 and that the learned port number is 2.

No subchannels are associated with this TRLE.

ISTT*lsrs*

TRLEs of this name are created when VTAM is started with either XCFINIT=YES (the default) or XCFINIT=DEFINE and another VTAM joins the XCF group (ISTXCF).

- *ls* is the two character &SYSCLONE value of the VTAM on the local MVS image
- *rs* is the two character &SYSCLONE value of the VTAM on the partner MVS image.

TCP/IP uses these TRLEs in one of the following situations:

- DYNAMICXCF is specified on the IPCONFIG or IPCONFIG6 statement and device or interface definitions are dynamically created to other VTAMs with XCF connectivity.
- DEVICE/LINK statements of type MPCPTP contain a device name that is the CPNAME or SSCPNAME of another VTAM with XCF connectivity.
- INTERFACE definitions of type MPCPTP6 contain a TRLENAME that is the CPNAME or SSCPNAME of another VTAM with XCF connectivity.

IUT*tdddd*

This TRLE is created when TCP/IP activates a CDLC, CLAW, Hyperchannel, CTC, or LCS device.

- *t* identifies the type of device that is dynamically created:
  - C - TCP/IP CDLC
  - W - TCP/IP CLAW
  - H - TCP/IP Hyperchannel
  - X - TCP/IP CTC
  - L - TCP/IP LCS
- *dddd* identifies the read device address for this device.

Chapter 10. SNA Diagnosis, Volume 2: FFST Dumps and the VIT

Using the VTAM internal trace

Trace options for the VIT

You can specify the OPTION operand in the TRACE start option or in the MODIFY TRACE command. Deactivate the VIT before you attempt to change an option; otherwise, the options that are currently in effect will remain in effect. See Deactivating the VIT for more information about deactivating the VIT.

Table 11 describes the options that you can specify on the OPTION operand. Select one or more of these options to indicate the VTAM functions you want to trace.

Table 11. Trace options of the OPTION operand

Option	Description
API option (for application programming interfaces)	This option helps you determine whether an application program is causing a problem. API entries are written for RPL macros, RPL exit routines, user exit routines, and user posts. Trace data for this option is always automatically recorded in the internal table.
APIOPTS option	This option is a collection of multiple VIT options that includes all the individual VIT options required to diagnose potential application program problems. Specifying the APIOPTS option is equivalent to specifying all the following VIT options: API, MSG, NRM, PIU, PSS, SMS, and SSCP.
APPC	This option helps you determine whether an LU 6.2 application is causing a problem. LU 6.2 entries are written for APPCCMD macro invocations, user posts, and exit scheduling by LU 6.2 code, calls to a security manager for security processing, and message unit transmissions between LU 6.2 components.
APPCOPTS option	This option is a collection of multiple VIT options that includes all the individual VIT options required to diagnose potential LU 6.2 application program problems. Specifying the APPCOPTS option is equivalent to specifying all the following VIT options: API, APPC, MSG, NRM, PIU, PSS, SMS, and SSCP.
CFS option (for coupling facility interfaces)	This option helps you determine problems with the VTAM interface with the MVS coupling facility. CFS entries are written when VTAM issues MVS macros to request services related to the coupling facility.
CIA option (for channel input and output auxiliary)	This option helps you isolate problems related to channel I/O CIA entries. This option presents the remaining trace records from the CIO option.
CIO option (for channel input and output)	This option helps you isolate problems related to channel I/O. CIO entries are written for attentions, error recovery, interruptions, HALT I/O SVC, and START I/O SVC.

Table 11. Trace options of the OPTION operand (continued)

Option	Description
CMIP option (for Common Management Information Protocol Services)	Setting the CMIP option enables the following traces: • Calls from CMIP application programs to the management information base (MIB) application programming interface (API) • Calls to the read-queue exit of the CMIP application program • Topology updates from VTAM resources You can use the CMIP option to help you determine whether there is a problem in VTAM or in a CMIP application program.
CPCPOPTS option	This option is a collection of multiple VIT options that includes all the individual VIT options required to diagnose potential CP-CP session problems. Specifying the CPCPOPTS option is equivalent to specifying all the following VIT options: API, APPC, MSG, NRM, PIU, PSS, SMS, and SSCP.
CSM option (for communications storage manager events)	This option traces the parameter list information that flows across the CSM interface and key internal events (such as pool expansion and contraction) for functions that manipulate buffer states. You can trace and analyze the usage history of a buffer. You can also use the CSM trace when VTAM is not operational. An external trace is generated using the VTAM GTF event ID to write trace records directly to GTF in the same format as those recorded using VIT.
CSMOPTS option	This option is a collection of multiple VIT options that includes all the individual VIT options required to diagnose potential communications storage manager (CSM) problems. Specifying the CSMOPTS option is equivalent to specifying all the following VIT options: API, APPC, CIO, CSM, MSG, NRM, PIU, PSS, SMS, SSCP, and XBUF.
DLUROPTS option	This option is a collection of multiple VIT options that includes all the individual VIT options required to diagnose dependent LU requester (DLUR) problems. Specifying the DLUROPTS option is equivalent to specifying all the following VIT options: API, APPC, HPR, MSG, NRM, PIU, PSS, SMS, and SSCP.
EEOPTS option	This option is a collection of multiple VIT options that includes all the individual VIT options required to diagnose Enterprise Extender (EE) problems. Specifying the EEOPTS option is equivalent to specifying all the following VIT options: CIA, CIO, HPR, MSG, NRM, PIU, PSS, SMS, SSCP, and TCP.
ESC option (for execution sequence control)	This option helps you track, in detail, the flow of requests for a given process.
HPDTOPTS option	This option is a collection of multiple VIT options that includes all the individual VIT options required to diagnose high-performance data transfer (HPDT) problems. Specifying the HPDTOPTS option is equivalent to specifying all the following VIT options: CIA, CIO, HPR, MSG, PIU, PSS, SMS, and SSCP.
HPR option (for High-Performance Routing)	This option helps you isolate problems related to High-Performance Routing.

Table 11. Trace options of the OPTION operand (continued)

Option	Description
HPROPTS option	This option is a collection of multiple VIT options that includes all the individual VIT options required to diagnose High-Performance Routing (HPR) problems. Specifying the HPROPTS option is equivalent to specifying all the following VIT options: API, APPC, CIA, CIO, HPR, MSG, NRM, PIU, PSS, SMS, and SSCP.
LCS option (for local area network (LAN) channel stations)	This option helps you isolate problems that occur when an IBM 3172 Interconnect Nways Controller is activating, deactivating, or transferring data. The LCS option enables tracing of data that VTAM receives from an IBM 3172 Interconnect Nways Controller at four levels: LCSX (channel), LCSP (port or adapter), LCSS (SAP), and LCSL (line).
LCSOPTS options	This option is a collection of multiple VIT options that includes all of the individual VIT options required to diagnose LAN channel station (LCS) problems. Specifying the LCSOPTS option is equivalent to specifying all the following VIT options: CIO, LCS, MSG, NRM, PIU, PSS, SMS, and SSCP.
LOCK option (for locking and unlocking)	This option helps you determine when VTAM modules obtain and release locks.
MSG option (for messages)	Specify this option to accomplish the following tasks: • Correlate other VIT entries with the console messages, even if you lose the console sheet. MSG entries are written for all messages to the VTAM operator. • Match the console log to a surge of activity shown in the VIT. OPER entries are written for all VTAM commands issued at an operator console. Trace data for this option is always automatically recorded in the internal table.
NRM option (for network resource management)	This option helps you follow the services of the network resource management component. These services include the assignment of, references to, and the deletion of certain VTAM resources such as node names, network addresses, and control blocks. NRM entries are written for SRT macros issued by VTAM modules. Trace data for this option is always automatically recorded in the internal table. CIDCTL FIND macro invocations used during the process of sending or receiving data are not traced with CDHF or CDNF trace entries unless they result in a nonzero return code.
PIU option (for path information unit flows)	This option, like the I/O and buffer contents traces, helps you isolate problems to hardware, to the NCP, or to VTAM. Unlike I/O and buffer contents traces, this option causes PIU entries to be written for all PIUs that flow internal and external to VTAM. Trace data for this option is always automatically recorded in the internal table.
PSS option (for process scheduling services)	This option helps you track the flow of requests through VTAM. PSS entries are written for the VTAM macros that invoke and control PSS, scheduling, and dispatching VTAM routines.

Table 11. Trace options of the OPTION operand (continued)

Option	Description
QDIOOPTS options	This option is a collection of multiple VIT options that includes all of the individual VIT options required to diagnose queued direct I/O (QDIO) problems. Specifying the QDIOOPTS option is equivalent to specifying all the following VIT options: CIA, CIO, HPR, MSG, NRM, PIU, PSS, SMS, and SSCP.
SMS option (for storage management services)	This option helps you isolate problems caused by storage shortages. When you specify this option with the SSCP or PSS trace option, it can also help you isolate internal VTAM problems. SMS entries are written when SMS macros are used to request or free fixed-length or variable-length buffers. SMS entries are also written when VTAM expands or attempts to expand a buffer pool.
SSCP option (for system services control point request scheduling and response posting)	This option helps you isolate a VTAM problem to a specific VTAM component or module. SSCP entries are written for the request/response units (RUs) sent between VTAM components. This option also records information for the APPN CP. Trace data for this option is always automatically recorded in the internal table.
STDOPTS option	This option is a collection of multiple VIT options that includes all of the individual VIT options required to diagnose problems related to high CPU, session services, Open/Close ACB, and DLCs such as multipath channel (MPC) and channel-to-channel (CTC). Specifying the STDOPTS option is equivalent to specifying all the following VIT options: API, CIO, MSG, NRM, PIU, PSS and SSCP. STDOPTS is the default trace options. When VTAM is operating in VITCTRL=FULL mode, recording for the events in the STDOPTS VIT option set is also enabled when any other group option set is enabled. Additionally during VTAM start processing with both a CSDUMP and VITCTRL=FULL start option defined, recording for the events in the STDOPTS VIT option is enabled.
TCP option (for use with Enterprise Extender)	This option is used for recording activity related to Enterprise Extender. The trace options record IP address management and timer activity.
TCPOPTS option	This option is a collection of multiple VIT options that includes all of the individual VIT options required to diagnose problems related to TCP/IP. Specifying the TCPOPTS option is equivalent to specifying all the following VIT options: CIA, CIO, MSG, NRM, PIU, PSS, SMS, SSCP, and TCP.
VCNS option (for VCNS application programming interfaces)	This option helps you determine whether a VCNS application is causing a problem. VCNS entries are written for VCNSCMD macro invocations, user posts, exit scheduling by VCNS code, and work element transmissions between VCNS components.
XBUF option (for applications that use the extended buffer list for sending and receiving data)	This option traces the contents of the extended buffer list (XBUFLST). Records are produced to trace these contents from the application-supplied extended buffer list and the internal buffer list that VTAM uses to carry the extended buffer list information. These records store relevant information contained with the extended buffer list, particularly information about CSM usage by VTAM.
XCF option (for VTAM use of the cross-system coupling facility)	Specify this option to track VTAM use of the XCF (cross-system coupling facility) MVS macro interface. Each VTAM use of an XCF macro has a VIT entry.

Table 11. Trace options of the OPTION operand (continued)

Option	Description
XCFOPTS option	This option is a collection of multiple VIT options that includes all of the individual VIT options required to diagnose cross-system coupling facility (XCF) problems. Specifying the XCFOPTS option is equivalent to specifying all the following VIT options: CIA, CIO, HPR, MSG, NRM, PIU, PSS, SMS, SSCP, and XCF.

The VIT always traces the exception conditions listed in Table 12 and all the default VIT options listed under Activating the VIT.

Table 12. Exception conditions always traced by the VIT

Option	Exception conditions traced
APPC	• ACA and ACI entries when following commands are issued: – SEND ERROR – DEALLOC ABNDxxxx – REJECT • ACRC and ACSN entries • Other entries with nonzero return codes (except RPL6RCSC)
CFS	Entries with nonzero return codes
CIO	INOP entry
CMIP option	The following entries, when they have nonzero return codes: • MCO1 and MCO2 • MDEL • MDIS • MQRQ • MQRS • MREG • RQE
LCS	LCSL, LCSP, LCSS, and LCSX entries with nonzero reason codes
NRM	CDHF or CDNF entries with nonzero return codes
SMS	Entries with nonzero return codes and EXPN entries if a buffer pool expansion fails
SSCP	CPI, CPO, and CP2
(No option)	All SNAP entries and some exception entries[1].

Note:

1. The **** (FFST™ and PFFST), ABND, BUFF, COPY, CMER, CME2, INOP, LOST, MMG, and MM2 trace records are not activated by specific VIT options. They are activated as a result of exception conditions.

Table 13 on page 258 and Table 14 on page 259 list the VIT options and the records that they create. For more information, see the list of notes after Table 14 on page 259.

Table 13. VIT options and the records they create (API - LOCK)

VIT options	API	APPC	CFS	CIA	CIO	CMIP	CSM	ESC	HPR	LCS	LOCK
VIT records	AIx IOx RE UEx UP	ACAx ACIx ACPx ACRx ACSN ACUx MUx RACR REML REMQ USx UVx	CFAx CFCx CFDx CFEx CFFC CFLx CFNF CFPx CFRB CFTx CFUS CFVC MNPS	CCR CDSQ C64Q DEVx DRBx ENFx GCEL GCEx HCQx HCRx IDx IOSx IUTx LNKx LSNx MPDx ODPx ODTx PCID PKx PLOQ P64Q QAPL QDIP QSRx RCPI RCPO RPLx RPST RSLK SBAx SIGA SLSx TOKx VHCR XIDx	ADE ATT ERPx HIOx INTx PCIT PCIX RDVX RIOx SIOx	MCO1 MCO2 MDEL MDIS MQRQ MQRS MREG MRGx RQE	ASNx CHGx CNTP CPYx EXPP FIXx FRBx GTBx PAGx	ESC	ARB ARBB ARBR ARPx ARQx ARSx DAPT DRPx HCLK HPRx HPRT NLPx ONLP OOSx RCM RCV REML RSCx RTP RTPx RTSx RVM RXMT	LCSx	LKEX LKSH ULKA UNLK

Table 14. VIT options and the records they create (MSG - XCF)

VIT options	MSG	NRM	PIU	PSS	SMS	SSCP	TCP	VCNS	XBUF	XCF
VIT records	MSGx OPEx QRYL TRNx	BSPx BSSx BSXx CDHx CDNx NIPx PROx RCEx SRTx	DCOx DSCx NRSx PIUx RDSx TSNS 3270 3271	ATSK BTSK DSP DTSK ETSK EXIT IRBx POST QUEx RESM SCHD SRBx VPST VRSM VWAI WAIT XPST	AREL CONT EXPN FBLx FB64 FRES FR64 GBLx GB64 GETS GT64 ORMG POOF QREx RAPx RELS REQx VTAL VTFR	AFSM ALSx AP A2 CCx CIx COx CPI CPO CP2 CPPx CPRx CPWx CRx CSx DBx DLTx ENR GNAx HLSx LDLx MT SPTx TGMx TGVx TOPx TPN2 TPTx TREx TRMx TRRx	IPAD IPGN IPG2 IPG3 IPOG IPO2 IPTC IPTM	CNA CNPx CNRx NSD VCCx VCDQ	XBAx XBIx	XCC2 XCFC XCFJ XCFL XCFM XCFR XCFS XCFX XCJ2 XCL2 XCM2 XCR2 XCS2

Note:

1. The **** (FFST and PFFST), ABND, BUFF, COPY, CMER, CME2, INOP, LOST, MMG, and MM2 trace records are not activated by specific VIT options. They are activated as a result of exception conditions.
2.
   - For CIO record types ATT, ERP, HIO, INT, SIO, with suffix I, X, or T, and INOP, the events are also captured in the NCB (pointed to by NCBCIOMV). The NCB trace table is mapped by NCBCIOAR.
   - For CIA record types INOP, RCPx, RPLx and RPST, the events are also captured in the RUNCB (pointed to by NCBCIOMV).
   - For CIA record type PCIR, the events are also captured in the SRNCB (pointed to by NCBCIOMV).
3. OON and OOX can be generated when the module trace is running.
4. For the IRBx and the SRBx records to be recorded, both the PSS trace option and the PSSTRACE start options must be specified.
5. For APPC record types REMQ and ACSN, the events are also captured in the ISTRAB.
6. Some trace records are generated only when a subtrace is active. These trace records are the HPR option record types ARBB, ARBR, the CIA option record types QAPL, QDIP, QSRx, RSLK, and the SSCP option record types HLSx,

TGVx, TRMx, and TRRx. For more information about subtraces, see z/OS Communications Server: SNA Operation.

Table 15 lists the VIT group options and the individual VIT options that are equivalent for each group option.

Table 15. VIT group options

VIT group option	Equivalent to this set of individual VIT options
APIOPTS	API, MSG, NRM, PIU, PSS, SMS, SSCP
APPCOPTS	API, APPC, MSG, NRM, PIU, PSS, SMS, SSCP
CPCPOPTS	API, APPC, MSG, NRM, PIU, PSS, SMS, SSCP
CSMOPTS	API, APPC, CIO, CSM, MSG, NRM, PIU, PSS, SMS, SSCP, XBUF
DLUROPTS	API, APPC, HPR, MSG, NRM, PIU, PSS, SMS, SSCP
EEOPTS	CIA, CIO, HPR, MSG, NRM, PIU, PSS, SMS, SSCP, TCP
HPDTOPTS	CIA, CIO, HPR, MSG, PIU, PSS, SMS, SSCP
HPROPTS	API, APPC, CIA, CIO, HPR, MSG, NRM, PIU, PSS, SMS, SSCP
LCSOPTS	CIO, LCS, MSG, NRM, PIU, PSS, SMS, SSCP
QDIOOPTS	CIA, CIO, HPR, MSG, NRM, PIU, PSS, SMS, SSCP
STDOPTS	API, CIO, MSG, NRM, PIU, PSS, SSCP
TCPOPTS	CIA, CIO, MSG, NRM, PIU, PSS, SMS, SSCP, TCP
XCFOPTS	CIA, CIO, HPR, MSG, NRM, PIU, PSS, SMS, SSCP, XCF

Appendix. VTAM internal trace (VIT) record descriptions

HCQ entry for invoking a RoCE HCQ operation (Part 1)

Entry: HCQ

VIT option:
CIA

Event: Invocation of a Remote Direct Memory Access (RDMA) over Converged Ethernet (RoCE) HCA Command Queue (HCQ) operation with an IBM 10 GbE RoCE Express2 feature, as part of Shared Memory Communications over Remote Direct Memory Access (SMC-R) processing.

VIT processing module:
ISTITCSH

This trace record is written upon completion of an HCQ operation.

00	01	02	03	04	05	06 07	08 09	0A 0B	0C 0D 0E 0F	10 11 12 13 14 15 16 17	18 19 1A 1B	1C 1D 1E 1F
HCQ				ASID	HCQ STATUS	MODULE ID	RETURN CODE	REASON CODE	OP CODE MODIFIER	PFCTE ADDRESS	HARDWARE HANDLE	RPH ADDRESS

Byte (hex)
Contents

00–03 Record ID: C'HCQ'

04 ID is the primary address space ID (ASID). This field is 0 if the ASID is greater than X'FF'.

05 HCQ operation ending status

06–07 Module identifier of the module that issued the INTRACE command

08–09 Return code

0A–0B Reason code

0C–0F Operation code modifier

10–17 Address of the PFCTE

18–1B Hardware handle

1C–1F Request parameter header (RPH) address

HCQ2 entry for invoking a RoCE HCQ operation (Part 2)

Entry: HCQ2

VIT option:
CIA

Event: Invocation of a Remote Direct Memory Access (RDMA) over Converged Ethernet (RoCE) HCA Command Queue (HCQ) operation with an IBM 10 GbE RoCE Express2 feature, as part of Shared Memory Communications over Remote Direct Memory Access (SMC-R) processing.

VIT processing module:
ISTITCSH

This trace record is a continuation of the HCQ entry.

00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F	10	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F
HCQ2				RETRIES				INPUT MAILBOX COUNT				OUTPUT MAILBOX COUNT				HCQ ELEMENT ADDRESS								0							

Byte (hex)
Contents

00–03 Record ID: C'HCQ2'

04–07 Command retry counter

08–0B Number of input mailboxes

0C–0F Number of output mailboxes

10–17 Address of the HCA Command Queue Element

18–1F 0

HCQ3 entry for invoking a RoCE HCQ operation (Part 3)

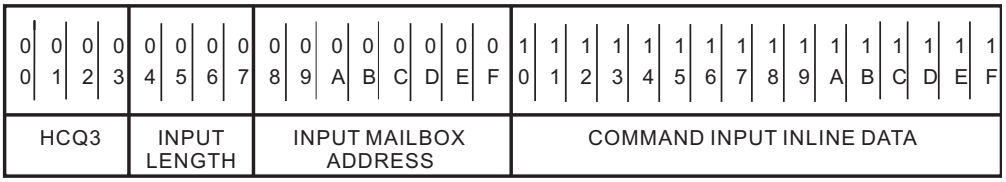
Entry: HCQ3

VIT option:
CIA

Event: Invocation of a Remote Direct Memory Access (RDMA) over Converged Ethernet (RoCE) HCA Command Queue (HCQ) operation with an IBM 10 GbE RoCE Express2 feature, as part of Shared Memory Communications over Remote Direct Memory Access (SMC-R) processing.

VIT processing module:
ISTITCSH

This trace record is a continuation of the HCQ entry.



Byte (hex)
Contents

00–03 Record ID: C'HCQ3'

04–07 Length of command input

08–0F Address of first input mailbox or zero if command input length is 16 or fewer bytes

10–1F The first 16 bytes of command input

HCQ4 entry for invoking a RoCE HCQ operation (Part 4)

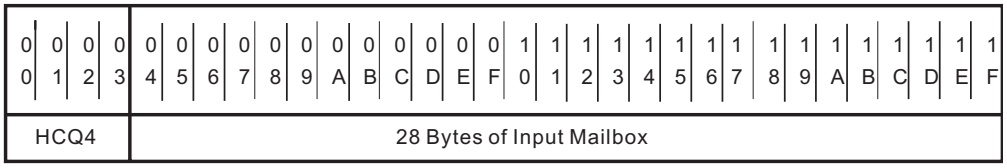
Entry: HCQ4

VIT option:
CIA

Event: Invocation of a Remote Direct Memory Access (RDMA) over Converged Ethernet (RoCE) HCA Command Queue (HCQ) operation with an IBM 10 GbE RoCE Express2 feature, as part of Shared Memory Communications over Remote Direct Memory Access (SMC-R) processing.

VIT processing module:
ISTITCSH

This trace record is a continuation of the HCQ entry, and is generated only when the HCQ operation requires input mailboxes. Multiple HCQ4 entries can be generated, depending on the length of the command input data.



Byte (hex)
Contents

00–03 Record ID: C'HCQ4'

04–1F Command input data

HCQ5 entry for invoking a RoCE HCQ operation (Part 5)

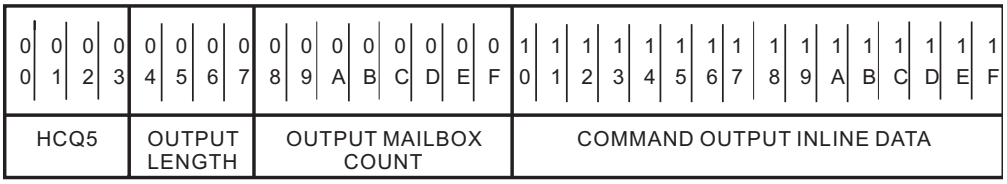
Entry: HCQ5

VIT option:
CIA

Event: Invocation of a Remote Direct Memory Access (RDMA) over Converged Ethernet (RoCE) HCA Command Queue (HCQ) operation with an IBM 10 GbE RoCE Express2 feature, as part of Shared Memory Communications over Remote Direct Memory Access (SMC-R) processing.

VIT processing module:
ISTITCSH

This trace record is a continuation of the HCQ entry.



Byte (hex)
Contents

00–03 Record ID: C'HCQ5'

04–07 Length of command output

08–0F Address of first output mailbox or zero if command output length is 16 or fewer bytes

10–1F The first 16 bytes of command output

HCQ6 entry for invoking a RoCE HCQ operation (Part 6)

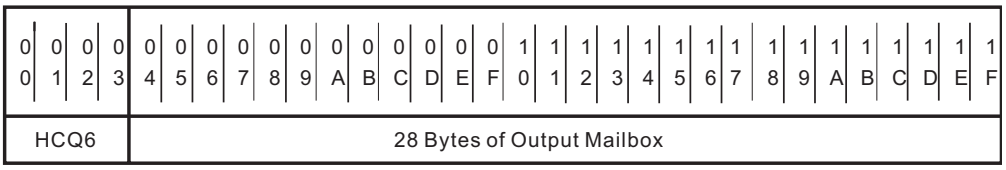
Entry: HCQ6

VIT option:
CIA

Event: Invocation of a Remote Direct Memory Access (RDMA) over Converged Ethernet (RoCE) HCA Command Queue (HCQ) operation with an IBM 10 GbE RoCE Express2 feature, as part of Shared Memory Communications over Remote Direct Memory Access (SMC-R) processing.

VIT processing module:
ISTITCSH

This trace record is a continuation of the HCQ entry, and is generated only when the HCQ operation requires output mailboxes. Multiple HCQ6 entries can be generated, depending on the length of the command output data.



Byte (hex)
Contents

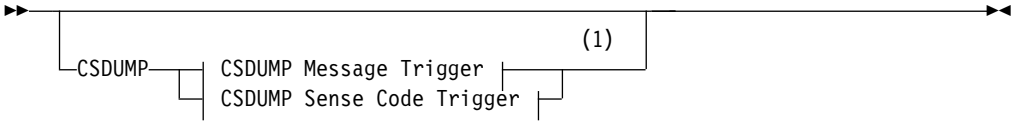
00–03 Record ID: C'HCQ6'

04–1F Command output data

Chapter 11. SNA Resource Definition Reference

VTAM start options

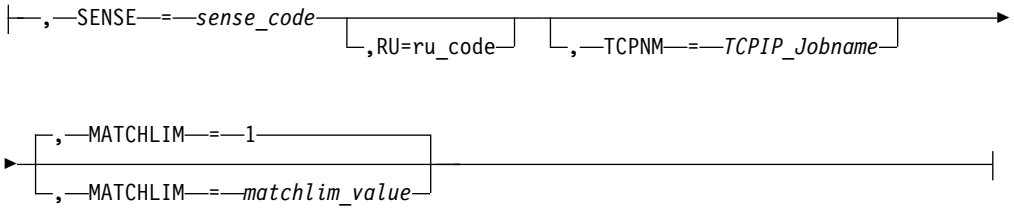
CSDUMP start option



Notes:

1 Specify the CSDUMP start option twice to set both message and sense code triggers.

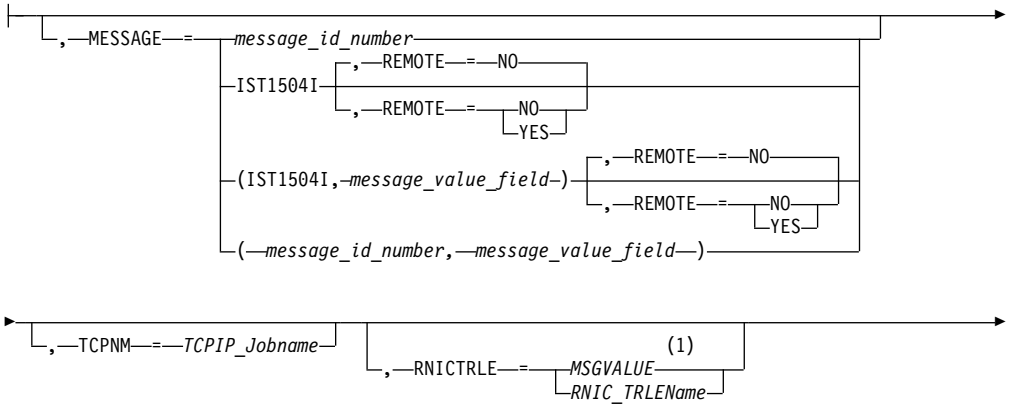
CSDUMP sense code trigger:

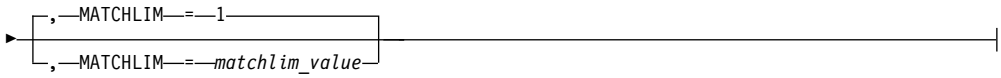


Rules:

1. When an error message is received on any parameter of the CSDUMP start option, the remaining parameters for this CSDUMP start option are ignored. You are required to re-enter the complete CSDUMP start option.
2. When the same parameter is entered multiple times on a CSDUMP sense code trigger, only the last occurrence is accepted.

CSDUMP message trigger:





Notes:

1 MSGVALUE is valid only when the MESSAGE operand is used, and MESSAGE specifies either message IST2391I or IST2406I.

Rules:

- When an error message is received on any parameter of the CSDUMP start option, the remaining parameters for this CSDUMP start option are ignored. You are required to re-enter the complete CSDUMP start option.
- When the same parameter is entered multiple times on a CSDUMP message trigger, only the last occurrence is accepted.

You can use the CSDUMP start option to set up a trigger that invokes a dump of the current address space when a particular sense code or message is issued. You can set only one sense code and one message trigger simultaneously; you cannot set two different message or sense code triggers at the same time. You can change a message trigger or a sense code trigger using the MODIFY CSDUMP command.

Either the MESSAGE operand or the SENSE operand must be specified after the CSDUMP start option or the CSDUMP start option is invalid.

Note: When the VITCTRL start option has a setting of FULL, the following conditions apply:

- When activating a CSDUMP trigger, the VIT option set STDOPTS is enabled.
- The MSG VIT option cannot be disabled when a CSDUMP trigger is active.

MATCHLIM=*matchlim_value*
Specifies that the CSDUMP trigger is to be disabled after the *matchlim_value* value matches the value specified on the message trigger. The *matchlim_value* value is an integer in the range 1-255. The default is 1.

MESSAGE=*message_id_number*
Specifies the ID number of the message that triggers a dump. Message numbers must be in the format IST*xxx*I, IST*xxxx*I, IST*xxx*E, IST*xxxx*E, or IVT*xxxx*I.

Rule: If the start option MSGLEVEL=BASE is specified, or if MSGLVL=BASE is specified in a USS operator message table, then the message displayed on the console is the pre-version 4 VTAM message. If you specify CSDUMP with a message trigger, the message ID number is checked before it is swapped to the base *message_id_number* value. Therefore, the *message_id_number* value used with the CSDUMP command must be the version 4 VTAM message number for CSDUMP to match the *message_id_number* value and take the dump. See z/OS Communications Server: SNA Messages for a list of the base messages and their corresponding version 4 VTAM numbers.

MESSAGE=(*message_id_number*,*message_value_field*,...)
Specifies the message variable text that can be used to trigger a dump. Instead of just matching a message number, this field causes the trigger to be more specific. If variable text is specified, then a dump is taken only when the message and variable text match. If a variable text field is blank, then it is considered to be a wildcard. See z/OS Communications Server: SNA Messages for more information about message text for VTAM operator messages.

Rules:

1. Use an underscore as a substitute for a space in the message text fields that contain variable values. You do not need to pad the end of the variable to fill out the text field; however, in a few rare cases messages can contain text fields (mostly numbers) in which the variable is right justified and does not completely fill the variable length. In these cases, when you are specifying the CSDUMP operand, the *message_value_field* value must be padded to the left with underscores. For example, the first variable in the IST1461I message is a 3-byte field which is right justified. If a 2-byte number is displayed, an underscore must precede the number in the command in order for the dump command to function correctly. See the following example:

   ```
   CSDUMP,MESSAGE=(IST1461I,_21)
   ```

2. Each message has a fixed number of *message_value_field* values. Each *message_value_field* value has a maximum length.
3. The specified number of *message_value_field* values must be less than or equal to the number of *mesage_value_field* values in the specified message.
4. The specified length of the *message_value_field* value must be less than or equal to the maximum length of the specified *message_value_field* value.

Leading *message_value_field* values can be skipped using a comma (,) for each *message_value_field* value. The trailing *message_value_field* values are not required.

See z/OS Communications Server: SNA Messages to determine the number of message value fields and their maximum lengths.

REMOTE

Specifies whether to request a dump of the remote VTAM when an XCF link connecting the two VTAMs becomes inoperative. You can specify this operand only when you specify MESSAGE=IST1504I.

REMOTE=NO

A dump of the remote VTAM is not requested when an XCF link becomes inoperative. This is the default behavior.

REMOTE=YES

A dump of the remote VTAM is requested when an XCF link becomes inoperative. The remote VTAM must be z/OS V1R9 or later for the dump to be taken.

RNICTRLE

Specifies that a diagnostic dump of a "RoCE Express" feature needs to be taken under certain conditions. The RNICTRLE operand can be used only with the MESSAGE trigger.

RNICTRLE=MSGVALUE

MSGVALUE is valid only when the MESSAGE operand is used, and MESSAGE specifies either message IST2391I or IST2406I. Specifying the MSGVALUE keyword allows VTAM to collect diagnostic dump information for the "RoCE Express" feature identified in these messages.

RNICTRLE=RNIC_TRLEName

The format of *RNIC_TRLEName* must be IUT*yxxxx*, where *xxxx* is the Peripheral Component Interconnect Express (PCIe) function ID (PFID) that identifies the "RoCE Express" feature, and *y* is the port number used on the "RoCE Express" interface. The value of *y* can be 1 or 2.

Usage
The "RoCE Express" diagnostic dump is taken in addition to any other dumps that CSDUMP produces. After the "RoCE Express" diagnostic dump is produced, recovery of the "RoCE Express" feature is attempted.

Notes: No "RoCE Express" diagnostic dump is taken in either of the following cases:

- The TRLE is not active when CSDUMP produces the dump.
- A specific TRLE value is coded for RNICTRLE but the TRLE is not an RDMA over Converged Ethernet (RoCE) TRLE.

Rules:

- When the 10 GbE RoCE Express feature operates in a dedicated RoCE environment, the diagnostic dump deactivates the 10 GbE RoCE Express feature, and causes an inoperative condition for all users.
- When RNICTRLE represents a 10 GbE RoCE Express2 feature, or when the 10 GbE RoCE Express feature operates in a shared RoCE environment, the diagnostic dump only affects the TCP/IP stack that configured the PFID value included in the value of RNIC_TRLEName. Other TCP/IP stacks that use the same feature are not affected.

Guideline: Ensure that multiple "RoCE Express" interfaces are active with the same physical network ID to avoid loss of connections during a CSDUMP operation. For more information, see High availability considerations in z/OS Communications Server: IP Configuration Guide.

RU=*ru_code*
Specifies the response unit code that contains the sense code specified. The RU operand can be used only with the SENSE operand. If the RU operand is specified, then the dump is triggered only if the RU and SENSE codes occur together. The RU code must be 2, 4, or 6 characters in length.

See z/OS Communications Server: SNA Data Areas Volume 1 for valid RU codes or see SNA Formats.

SENSE=*sense_code*
Specifies the sense code that will trigger a dump. This value must be 8 characters in length.

See z/OS Communications Server: IP and SNA Codes for valid sense codes.

TCPNM=*TCPIP_Jobname*
Specifies that a dump of the TCPIP job should be taken when the corresponding sense or message trigger occurs. The current address space is also specified. The *TCPIP_Jobname* value must be 1-8 characters in length

Examples:

- Set the message trigger to take the dump:
  ```
  CSDUMP,MESSAGE=IST1386I
  ```
- Set the message trigger to take the dump of the current address space and the dump of the TCPIP job:
  ```
  CSDUMP,MESSAGE=IST1386I,TCPNM=TCPCS
  ```
- Set the message trigger with the message and first *message_value_field* value to take the dump:
  ```
  CSDUMP,MESSAGE=(IST169I,react)
  ```

- Set the message trigger with the message and first two *message_value_field* values to take the dump:

  ```
  CSDUMP,MESSAGE=(IST169I,react,pua)
  ```

- Set the message trigger with the message and first and fifth *message_value_field* values to take the dump:

  ```
  CSDUMP,MESSAGE=(IST252I,rct,,,,pua)
  ```

- Set the sense code trigger to take a dump of the current address space:

  ```
  CSDUMP,SENSE=08090000
  ```

- Set the message trigger and the sense trigger to take a dump:

  ```
  CSDUMP,MESSAGE=(IST169I,react,pua),
  CSDUMP,SENSE=08090000
  ```

- Set the sense code to take a dump of the current address space and a dump of the TCPIP job:

  ```
  CSDUMP,SENSE=08090000,RU=818641,TCPNM=TCPCS
  ```

- Set the message trigger with the message and remote option to take a dump of the current address space and the remote VTAM connected through an XCF link to another VTAM:

  ```
  CSDUMP,MESSAGE=IST1504I,REMOTE=YES
  ```

Chapter 12. SNA Messages

IST2361I SMCR PFID = *pfid* PCHID = *pchid* PNETID = *network_id*

Explanation: VTAM issues this message as part of a message group in response to a DISPLAY ID or DISPLAY TRL command for a TRLE that is associated with an IBM "RoCE Express" interface.

VTAM also issues this message as part of a group of messages generated by the adapter interrupt monitoring function. The first message in the group is IST2419I. See message IST2419I for a complete description.

A complete description of the message group follows the example:

```
IST075I NAME = nodename, TYPE = TRLE
IST1954I TRL MAJOR NODE = trl_major_node_name
IST486I STATUS= current_status, DESIRED STATE= desired_state
IST087I TYPE = *NA* , CONTROL = ROCE , HPDT = *NA*
IST2361I SMCR PFID = pfid  PCHID = pchid  PNETID = network_id
IST2362I PORTNUM = port  RNIC CODE LEVEL = code_level
IST2389I PFIP = pci_path   GEN = generation   SPEED = speed
[IST2417I VFN = virtual_function_number]
IST924I -------------------------------------------
IST1717I ULPID = ulp_id ULP INTERFACE = ulp_interface
IST1724I I/O TRACE = iotrc TRACE LENGTH = length
[IST924I -------------------------------------------]
[IST1717I ULPID = ulp_id ULP INTERFACE = ulp_interface]
[IST1724I I/O TRACE = iotrc TRACE LENGTH = length]
```

IST075I

This message displays the resource name and resource type.

nodename
The name of the resource that was entered on the DISPLAY command.

nodetype
The resource type of the major or minor node. The *nodetype* value is always **TRLE** for this message group.

IST087I

This message displays line information associated with *nodename*.

line_type
The *line_type* value is always ***NA*** for this message group.

line_control
The *line_control* value is always **ROCE** (RDMA over Converged Ethernet) for this message group.

hpdtvalue
The *hpdtvalue* is always ***NA*** for this message group.

IST486I

This message displays status information for *nodename*.

current_status
The current status of the node. See the z/OS Communications Server: IP and SNA Codes for status information.

desired_state
The node state that is desired. See the z/OS Communications Server: IP and SNA Codes for status information. If VTAM cannot determine the desired state, *desiredstate* is ***NA***.

IST1717I

This message is displayed for all TRLEs that are currently being used by at least one Upper-layer Protocol (ULP). A separate IST1717I message is displayed for each ULP that is using the "RoCE Express" TRLE.

ulp_id The name of a z/OS Communications Server ULP that is using the "RoCE Express" TRLE. In this message group, the *ulp_id* value is always the TCP/IP job name.

ulp_interface
The name of the interface associated with the "RoCE Express" TRLE.

IST1724I

This message displays trace information for *nodename*.

iotrc Specifies whether I/O Trace is active for this "RoCE Express" TRLE (ON or OFF).

length Specifies the number of bytes being recorded for I/O Trace for this "RoCE Express" TRLE.

IST1954I

This message displays the TRL major node name.

trl_major_node_name
The name of the TRL major node defining the "RoCE Express" TRLE.

IST2361I

This message provides configuration information for the "RoCE Express" feature associated with *nodename*.

pfid The 2-byte hexadecimal Peripheral Component Interconnect Express (PCIe) function ID for the "RoCE Express" feature associated with *nodename*.

pchid The 2-byte hexadecimal physical channel ID (PCHID) for the "RoCE Express" feature associated with *nodename*.

network_id
The physical network identifier for the "RoCE Express" interface associated with *nodename*.

IST2362I

This message provides configuration and operational information about the "RoCE Express" feature associated with *nodename*.

port A decimal representation of the "RoCE Express" port number associated with *nodename*.

code_level
The processor code level of the "RoCE Express" feature. The code level is in the form **xxxxx.yyyyy.zzzzz** if the 10 GbE RoCE Express feature is operating in a dedicated RoCE environment, or if this is a 10 GbE RoCE Express2 feature.

xxxxx Major version.

yyyyy Minor version.

zzzzz Subminor version.

The code level is **NA** if the 10 GbE RoCE Express feature is operating in a shared RoCE environment.

IST2389I

This message displays additional configuration information for the "RoCE Express" feature associated with *nodename*.

pci_path
The PCI-function internal path (PFIP) value for the "RoCE Express" feature associated with *nodename*.

generation
The generation level of the “RoCE Express” feature. Possible values are:

ROCE EXPRESS
The TRLE represents an IBM 10 GbE RoCE Express feature.

ROCE EXPRESS2
The TRLE represents an IBM 10 GbE RoCE Express2 feature.

speed The throughput speed of the "RoCE Express" feature. The only possible value is 10GE, meaning the "RoCE Express" feature uses 10 gigabit Ethernet ports.

IST2417I

This message displays the virtual function number (VFN) that is associated with *nodename*. This message is displayed only when the "RoCE Express" feature operates in a shared RoCE environment.

virtual_function_number
The VFN value for the "RoCE Express" feature that is associated with *nodename*.

System action: Processing continues.

Operator response: None.

System programmer response: None.

User response: None.

Problem determination: Not applicable.

Source: z/OS Communications Server SNA

Module: Use the modifiable VTAM start option MSGMOD=YES (*f procname,vtamopts,msgmod*=yes or *f procname,msgmod*=yes) to display the issuing module when a message is issued. See z/OS Communications Server: SNA Operation and z/OS Communications Server: SNA Resource Definition Reference for more information about start options.

Routing code: 2

Descriptor code: 5

Automation: This message is not a candidate for automation.

Example:

```
IST097I DISPLAY ACCEPTED
IST075I NAME = IUT2001D, TYPE = TRLE
IST1954I TRL MAJOR NODE = ISTTRL
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST087I TYPE = *NA*              , CONTROL = ROCE, HPDT = *NA*
IST2361I SMCR PFID = 001D  PCHID = 0138  PNETID = NETWORK1
IST2362I PORTNUM = 2 RNIC CODE LEVEL = *NA*
IST2389I PFIP = 08040101   GEN = ROCE EXPRESS   SPEED = 10GE
IST2417I VFN = 0002
IST924I -------------------------------------------------------------
IST1717I ULPID = TCPCS ULP INTERFACE = EZARIUT2001D
IST1724I I/O TRACE = OFF  TRACE LENGTH = *NA*
IST314I END
```

IST2389I **PFIP =** *pci_path* **GEN =** *generation* **SPEED =** *speed*

Explanation: VTAM issues this message as part of a message group in response to a DISPLAY ID or DISPLAY TRL command for a TRLE that is associated with a "RoCE Express" interface.

See message IST2361I for an explanation of the message group.

System action: Processing continues.

Operator response: None.

System programmer response: None.

User response: None.

Problem determination: Not applicable.

Source: z/OS Communications Server SNA

Module: Use the modifiable VTAM start option MSGMOD=YES (*f procname,vtamopts,msgmod*=yes or *f procname,msgmod*=yes) to display the issuing module when a message is issued. See z/OS Communications Server: SNA Operation and z/OS Communications Server: SNA Resource Definition Reference for more information about start options.

Routing code: 2

Descriptor code: 5

Automation: This message is not a candidate for automation.

Example:

```
IST2389I PFIP = 08040101
```

IST2396I RNIC STATISTICS FOR *trlename*

Explanation: VTAM issues this group of messages in response to a DISPLAY TRL,TRLE=*trlename*,DEVSTATS command when *trlename* representsa "RoCE Express" interface.

A complete description of the message group follows:

```
IST2396I RNIC STATISTICS FOR trlename
IST2397I DESCRIPTION OVERFLOW COUNT
IST2398I description overflow count
...
IST314I END
```

Many of the statistics reported using message IST2398I have both a count and an overflow. Both the count and overflow are maintained in unsigned 32-bit variables (unless otherwise indicated). Because an unsigned 32-bit variable can contain only a value up to and including 4294967295 ('FFFFFFFF'X), the variable will wrap through 0 if an increment results in exceeding this value. When such a wrap occurs, the overflow is incremented by 1. Therefore, the total count is determined as follows:

```
Total = (overflow * 4294967296) + count
```

IST2396I

This is the first message in the message group.

trlename
The name of the resource that was specified on the DISPLAY TRL command. Use this value to correlate the "RoCE Express" statistics in this message group with the message group IST2361I output generated by the DISPLAY TRL,TRLE=*trlename* command.

IST2397I

This message is a header message for the statistics displayed with message IST2398I.

IST2398I

This message displays the number of occurrences for the statistic described by *description*. The possible combinations of *overflow*, *count*, and *description* are:

- **INBOUND FRAMES DROPPED** = *overflow count*
  Represents the number of inbound Ethernet frames that were dropped on this "RoCE Express" interface.

  Restriction: This value is always 0 for 10 GbE RoCE Express2 adapters.
- **INBOUND FRAME ERRORS** = *overflow count*
  Represents the number of inbound Ethernet frames that had errors on this "RoCE Express" interface.

  Restriction: This value is always 0 when the 10 GbE RoCE Express adapter operates in a shared RoCE environment.
- **INBOUND RDMA FRAMES** = *overflow count*

| Represents the number of Ethernet frames received on this "RoCE Express" interface.

- **INBOUND RDMA OCTETS** = *overflow count*

| Represents the number of Ethernet octets received on this "RoCE Express" interface.

- **OUTBOUND FRAMES DROPPED** = *overflow count*

  Represents the number of outbound Ethernet frames that were dropped on this "RoCE Express" interface.

| **Restriction:** This value is always 0 for 10 GbE RoCE Express2 adapters.

- **OUTBOUND FRAME ERRORS** = *overflow count*

| Represents the number of outbound Ethernet frames that had errors on this "RoCE Express" interface.

  Restriction: This value is always 0 when the 10 GbE RoCE Express adapter operates in shared RoCE environment.

- **OUTBOUND RDMA FRAMES** = *overflow count*

| Represents the number of Ethernet frames sent on this "RoCE Express" interface.

- **OUTBOUND RDMA OCTETS** = *overflow count*

| Represents the number of Ethernet octets sent on this "RoCE Express" interface.

- **LINK OUTAGE NOTIFICATIONS** = *overflow count*

| Represents the number of times that VTAM was notified of lost connectivity to the "RoCE Express" port.

System action: Processing continues.

Operator response: None.

System programmer response: None.

User response: None.

Problem determination: None.

Source: z/OS Communications Server SNA

Module: Use the modifiable VTAM start option MSGMOD=YES (*f procname,vtamopts,msgmod*=yes or *f procname,msgmod*=yes) to display the issuing module when a message is issued. See z/OS Communications Server: SNA Operation and z/OS Communications Server: SNA Resource Definition Reference for more information about start options.

Routing code: 2

Descriptor code: 5

Automation: Not applicable.

Example: This message group displays statistics for the 10 GbE RoCE Express port 2 on the adapter that operates in a dedicated RoCE environment and is represented by Peripheral Component Interconnect Express (PCIe) function ID (PFID) 001D:

```
IST2396I RNIC STATISTICS FOR IUT2001D
IST2397I DESCRIPTION                       OVERFLOW            COUNT
IST924I ------------------------------------------------------------
IST2398I INBOUND RDMA FRAMES                      1             65535
IST2398I INBOUND RDMA OCTETS                  65535        4294967295
IST2398I INBOUND FRAME ERRORS                     0                 1
IST2398I INBOUND DROPPED FRAMES                   0                 3
IST2398I OUTBOUND RDMA FRAMES                     3        4042322160
IST2398I OUTBOUND RDMA OCTETS                     1        1414812756
IST2398I OUTBOUND FRAME ERRORS                    0                 2
IST2398I OUTBOUND DROPPED FRAMES                  0                 4
IST2398I LINK OUTAGE NOTIFICATIONS                0                 3
IST314I  END
```

IST2419I VIRTUAL INTERRUPT DRIVEN FOR TRLE *trlename*

Explanation: VTAM issues this message as part of a group of messages generated by the adapter interrupt monitoring function. This message group indicates VTAM detected that no interrupt had been generated for the interface associated with *trlename* even though there was data waiting to be processed, and that VTAM then initiated a virtual interrupt to resume activity on the interface. The adapter interrupt monitoring function is enabled using the AIMON start option.

A complete description of the message group follows the example:

```
IST2419I VIRTUAL INTERRUPT DRIVEN FOR TRLE trlename
[ IST1717I ULPID = ulp_id ULP INTERFACE = ulp_interface ]
[ IST2337I CHPID TYPE = chpid_type CHPID = chpid_num PNETID = network_id ]
[ IST2361I SMCR PFID = pfid PCHID = pchid PNETID = network_id ]
IST314I END
```

IST1717I

This message is displayed to identify the upper-layer protocol (ULP) associated with the failing QDIO or iQDIO link.

ulp_id The name of a z/OS Communications Server ULP. In this message group, the *ulp_id* value is always the TCP/IP job name.

IST2337I

This message provides configuration information for the OSA-Express adapter that is associated with *trlename*.

chpid_type
The type of channel path identifier that this TRLE uses:

OSD Channel type for an OSA-Express CHPID that is configured in QDIO mode.

OSM Channel type for an OSA-Express CHPID that is configured for attachment to the intranode management network.

OSX Channel type for an OSA-Express CHPID that is configured for attachment to the intraensemble network.

chpid_mum
The 2-byte hexadecimal virtual channel path identifier (CHPID) for the OSA-Express adapter.

network_id
The physical network identifier for the OSA-Express adapter that is associated with *trlename*.

IST2361I

| This message provides configuration information for the "RoCE Express" feature associated with *trlename*.

| *pfid* The 2-byte hexadecimal Peripheral Component Interconnect Express (PCIe) function ID for the "RoCE
| Express" feature associated with *trlename*.

| *pchid* The 2-byte hexadecimal physical channel ID (PCHID) for the "RoCE Express" feature associated with *trlename*.

network_id
| The physical network identifier for the "RoCE Express" interface associated with *trlename*.

IST2419I

This is the first message in the message group.

trlename
The name of the resource for which VTAM drove a virtual interrupt.

System action: Processing continues.

Operator response: Contact the system programmer.

System programmer response: If this error occurs repeatedly, instruct the operator to issue this command:

```
MODIFY CSDUMP,MESSAGE=IST2419I
```

Issue this command to collect a VTAM dump the next time this message group is displayed. When the diagnostic information is collected, contact IBM Service.

User response: Not applicable.

Problem determination: Not applicable.

Source: z/OS Communications Server SNA

Module: Use the modifiable VTAM start option MSGMOD=YES (*f procname,vtamopts,msgmod*=yes or *f procname,msgmod*=yes) to display the issuing module when a message is issued. See z/OS Communications Server: SNA Operation and z/OS Communications Server: SNA Resource Definition Reference for more information about start options.

Routing code: 2

Descriptor code: 5

Automation: This message is not a good candidate for automation.

Example:

```
IST2419I VIRTUAL INTERRUPT DRIVEN FOR TRLE IUT10010
IST2361I SMCR PFID = 0010  PCHID = 01A0  PNETID = NETID1
IST314I END
```

IST2444I PORTNUM *port_value* **IGNORED FOR SMC-R PFID** *pfid_value*, **ACTIVATION CONTINUES**

Explanation: VTAM issues this message when it attempts to activate an RDMA network interface card (RNIC) interface and the port number configured on the TCP/IP GLOBALCONFIG SMCR statement for this PCIe function ID (PFID) does not match the port number value configured for this PFID in the hardware configuration definition (HCD). The port number configured in the HCD is used and the port number configured on the GLOBALCONFIG statement is ignored.

The IBM 10 GbE RoCE Express2 feature requires that the port number be defined for a given PFID in the HCD, so the PORTNUM operand on a GLOBALCONFIG SMCR statement that defines an IBM 10 GbE RoCE Express2 PFID is not necessary. VTAM learns the port number during RNIC interface activation and provides the real port number to the TCP/IP stack.

In the message text:

port_value
The value specified on the GLOBALCONFIG SMCR statement as the PORTNUM value for PFID *pfid_value*

pfid_value
The value specified as the GLOBALCONFIG SMCR PFID operand

System action: Activation of the RNIC interface continues.

Operator response: Inform the system programmer of the port number mismatch.

System programmer response: Modify the TCP/IP GLOBALCONFIG SMCR statement by removing the PORTNUM value specified for *pfid_value*.

User response: Not applicable.

Problem determination: Not applicable.

Source: z/OS Communications Server SNA

Module: u

Module: Use the modifiable VTAM start option MSGMOD=YES (*f procname,vtamopts,msgmod*=yes or *f procname,msgmod*=yes) to display the issuing module when a message is issued. See z/OS Communications Server: SNA Operation and z/OS Communications Server: SNA Resource Definition Reference for more information about start options.

Routing code: 2

IST2444I

Descriptor code: 5

Automation: This message is a candidate for automation to detect errors that occur during activation of RNIC interfaces.

Example:

```
IST2444I PORTNUM 2 IGNORED FOR SMC-R PFID 0051, ACTIVATION CONTINUES
```

Chapter 13. z/OS SMIC

Communications Server summary of interface

changes

Communications Server IP summary of interface changes

Netstat operator commands (DISPLAY TCPIP,,NETSTAT)

Table 16 lists the new and updated Communications Server IP Netstat operator command DISPLAY TCPIP,,NETSTAT. See General summary of new and changed Communications Server operator commands for the other Communications Server IP operator command entries.

See *z/OS Communications Server: IP System Administrator's Commands* for more detailed information about the Communications Server IP operator commands.

All parameters in the following table are for the DISPLAY TCPIP,,NETSTAT operator command.

Table 16. Summary of new and changed Communications Server Netstat operator commands (DISPLAY TCPIP,,NETSTAT)

Parameters	Release	Description	Reason for change
ACCESS,NETWORK	V2R1	The report displays the setting of the new CACHEALL, CACHEPERMIT, and CACHESAME parameters on the NETACCESS statement.	Improve auditing of NetAccess rules

Table 16. Summary of new and changed Communications Server Netstat operator commands (DISPLAY TCPIP,,NETSTAT) (continued)

Parameters	Release	Description	Reason for change
ALL	V2R1	Added new StartDate and StartTime fields. These fields provide the date and time for the last of one of the following events: • UDP bind • TCP bind • TCP listen • TCP connection establishment	Socket establishment time for Netstat ALL/-A
	V2R1	Displays the names of the routing policy rule and the policy-based routing table used by IP routing for an IPv6 connection.	IPv6 support for policy-based routing
	V2R1	• Displays Shared Memory Communications through Remote Direct Memory Access (SMC-R) information for TCP connections. • Accepts a new SMCID filter to display only the TCP connections associated with a specific SMC-R link group or SMC-R link identifier.	Shared Memory Communications over Remote Direct Memory Access
	V1R13	The output line that begins with the Last Touched field is now displayed after the output lines for the Bytes, Segments, and Dgram In and Out counters	Release update
	V1R13	Report is enhanced to display the following indicators: • An indicator of whether a TCP connection's send data flow is stalled, SendStalled • An indicator of whether a TCP server is experiencing a potential connection flood attack, ConnectionFlood	Expanded Intrusion Detection Services
ALL (continued)	V1R12	Added new fields Ancillary Input Queue and BulkDataIntfName for TCP connections that are using the QDIO inbound workload queueing function.	Performance improvements for streaming bulk data
	V1R12	Displays the new TCP trusted connection flag (TcpTrustedPartner), which indicates that the partner security credentials of a partner within a sysplex or subplex have been retrieved using the SIOCGPARTNERINFO ioctl, or that the SIOCSPARTNERINFO ioctl has been successfully issued or inherited from the listener socket.	Trusted TCP connections

Table 16. Summary of new and changed Communications Server Netstat operator commands (DISPLAY TCPIP,,NETSTAT) (continued)

Parameters	Release	Description	Reason for change
ALLCONN	V2R1	Accepts a new SMCID filter to display only the TCP connections that are associated with a specific SMC-R link group or SMC-R link identifier.	Shared Memory Communications over Remote Direct Memory Access
ARp	V1R13	Displays ARP cache information for an IQDX interface	HiperSockets optimization for intraensemble data networks
CONFIG	V2R1 with APARs OA51949 and PI75199	In the Global Configuration section, the SMCR PORTNUM represents the configured or learned port number used for the PFID.	Communications Server support for RoCE Express2 features
	V2R1	Added the following fields to the TCP CONFIGURATION TABLE section: • TimeWaitInterval • RetransmitAttempt • ConnectTimeOut • ConnectInitInterval • Nagle • KeepAliveProbes • KAProbeInterval • QueuedRTT • FRRThreshold • DefltMaxSndBufSize	Enhanced TCP protocol configuration options and default settings
	V2R1	The QDIOAccel indicator reflects "Yes" or "SD only" when IP Security is operational. IP Security introduces additional reasons that QDIOAccel might run in the "SD only" mode.	QDIO acceleration coexistence with IP filtering
	V2R1	The SELECTIVEACK field is added to the TCP CONFIGURATION TABLE section.	TCP support for selective acknowledgements

Table 16. Summary of new and changed Communications Server Netstat operator commands (DISPLAY TCPIP,,NETSTAT) (continued)

Parameters	Release	Description	Reason for change
CONFIG (continued)	V2R1	This report displays information about the EPHEMERALPORTS parameter on TCPCONFIG and UDPCONFIG.	User control of Ephmeral Port Ranges
	V2R1	This report displays information about the SOURCEVIPAINTERFACE parameter on IPCONFIG.	IPv4 INTERFACE statement for HiperSockets and Static VIPAs
	V2R1	• Displays new SMCR parameter information in the GLOBALCONFIG section. • New SmcrGrpStats field in the Type 119 portion of the SMF parameters section indicates whether SMC-R link group statistics records (SMF subtype 41) are collected. • New SmcrLnkEvent field in the Type 119 portion of the SMF parameters section indicates whether the following SMF records are collected: – SMC-R link start (SMF subtype 42) – SMC-R link end (SMF subtype 43)	Shared Memory Communications over Remote Direct Memory Access
	V1R13	New field AutoIQDX added to the Global Configuration section	HiperSockets optimization for intraensemble data networks
	V1R13	• Displays whether checksum offload is globally enabled for IPv4 or IPv6 OSA-Express QDIO interfaces. • Displays whether segmentation offload is globally enabled for IPv4 or IPv6 OSA-Express QDIO interfaces.	OSA-Express4S QDIO IPv6 checksum and segmentation offload
	V1R13	The IgRedirect field in the IPv6 Configuration Table section of the report is enhanced. A value of Yes can now indicate that Intrusion Detection Services (IDS) policy is in effect to detect and discard ICMP Redirects.	Expanded Intrusion Detection Services

Table 16. Summary of new and changed Communications Server Netstat operator commands (DISPLAY TCPIP,,NETSTAT) (continued)

Parameters	Release	Description	Reason for change
CONFIG (continued)	V1R12	New OSMSecClass field added to the IPv6 Configuration section to display the setting of the OSMSECCLASS parameter from the IPCONFIG6 profile statement.	z/OS Communications Server in an ensemble
	V1R12	Displays the setting of the NOJOIN subparameter from the GLOBALCONFIG SYSPLEXMONITOR profile statement, which indicates whether the TCP/IP stack joins the sysplex group during stack initialization.	Control joining the sysplex XCF group
	V1R12	• The SMF parameters section displays the setting of the new DVIPA and NODVIPA parameters. • The Network Monitor Configuration Information section displays the setting of the new DVIPA and NODVIPA subparameters for the SMFSERVICE parameter.	SMF event records for sysplex events
	V1R12	The Network Monitor Configuration Information section displays the setting of the new CSMAIL, NOCSMAIL, CSSMTP and NOCSSMTP subparameters for the SMFSERVICE parameter.	Management data for CSSMTP
CONN	V2R1	Accepts a new SMCID filter to display only the TCP connections that are associated with a specific SMC-R link group or SMC-R link identifier.	Shared Memory Communications over Remote Direct Memory Access
DEFADDRT	V1R12	New report to display default address selection policy table.	Configurable default address selection policy table
DEvlinks	V2R1 with APARs OA51949 and PI75199	The card generation level and speed information are displayed for RNIC interfaces representing "RoCE Express" features.	Communications Server support for RoCE Express2 features

Table 16. Summary of new and changed Communications Server Netstat operator commands (DISPLAY TCPIP,,NETSTAT) (continued)

Parameters	Release	Description	Reason for change
DEvlinks	V2R1	Displays an IP address of 0.0.0.0 for IPAQENET interfaces that are defined with the TEMPIP parameter.	Enable DHCP clients on OSA Interfaces
	V2R1	• Displays Shared Memory Communications over Remote Direct Memory Access information for OSD interfaces. • Accepts a new SMCID filter to display only the devices that are associated with a specific SMC-R link group or SMC-R link identifier. • Accepts a new SMC modifier to display detailed SMC-R information about active RNIC interfaces and their associated SMC-R links and link groups.	Shared Memory Communications over Remote Direct Memory Access
	V2R1	• This report displays information about IPv4 HiperSockets interfaces that are configured with the INTERFACE statement for IPAQIDIO. • This report displays the datapath address and TRLE name for IPAQIDIO6 interfaces, and IPAQIDIO interfaces defined by the INTERFACE statement. • This report displays information about IPv4 static VIPA interfaces that are configured with the INTERFACE statement for VIRTUAL. • The INTFNAME/-K filter accepts a HiperSockets TRLE name that allows for the display of all interfaces for a HiperSockets TRLE.	IPv4 INTERFACE statement for HiperSockets and Static VIPAs

Table 16. Summary of new and changed Communications Server Netstat operator commands (DISPLAY TCPIP,,NETSTAT) (continued)

Parameters	Release	Description	Reason for change
DEvlinks	V1R13	• Displays whether checksum offload is enabled for an IPAQENET or IPAQENET6 interface. • Displays whether segmentation offload is enabled for an IPAQENET or IPAQENET6 interface.	OSA-Express4S QDIO IPv6 checksum and segmentation offload
	V1R13	Displays information about IQDX interfaces.	HiperSockets optimization for intraensemble data networks
	V1R12	• Added a ChpidType field for IPAQENET and IPAQENET6 interfaces. • Displays information about intraensemble data network and intranode management network interfaces.	z/OS Communications Server in an ensemble
	V1R12	• Moved the InbPerf field from the right column to the left column on a new line. • Added the WorkloadQueueing field to indicate whether inbound workload queueing is enabled for IPAQENET or IPAQENET6 interfaces. This field is only displayed when InbPerf is Dynamic.	Performance improvements for sysplex distributor connection routing
HOme	V2R1	Displays a flag value of I/Internal for IPAQENET interfaces that are defined with the TEMPIP parameter.	Enable DHCP clients on OSA Interfaces
	V2R1	The INTFNAME/-K filter accepts a HiperSockets TRLE name that allows for the display of all interfaces for a HiperSockets TRLE.	IPv4 INTERFACE statement for HiperSockets and Static VIPAs

Table 16. Summary of new and changed Communications Server Netstat operator commands (DISPLAY TCPIP,,NETSTAT) (continued)

Parameters	Release	Description	Reason for change
IDS	V1R13	Report is enhanced to display the following items: • The ICMPv6 scan rule name in the Scan Detection section • Information about new attack types • The number of TCP servers under a potential connection flood attack, ServersInConnFlood • The number of TCP connections whose send data flow is stalled, TCPStalledConns • The percentage of TCP connections whose send data flow is stalled, TCPStalledConnsPct • An indicator of whether a TCP server is experiencing a potential connection flood attack, ConnFlood in the Intrusion Detection Services TCP Port List section • Both IPv4 and IPv6 addresses in the IP address fields	Expanded Intrusion Detection Services
	V1R13	Report is enhanced to display information about new attack types.	Intrusion Detection Services support for Enterprise Extender
ND	V1R13	Displays neighbor cache information for an IQDX interface.	HiperSockets optimization for intraensemble data networks
PORTLIST	V2R1	Displays a new flag to indicate whether the port or the port range is disabled for SMC-R.	Shared Memory Communications over Remote Direct Memory Access
ROUTe	V2R1	When the PR=ALL or PR=prname modifier is used to display a policy-based routing table, IPv6 routes are included in the report.	IPv6 support for policy-based routing
	V1R12	• Support is added for a new modifier, RADV, to display all of the IPv6 routes created based on information received in router advertisement messages. • Default routes learned from IPv6 router advertisements are displayed with a metric of 1 when the router advertisement indicated a preference of high, 2 when the router advertisement indicated a preference of medium, or 3 when the router advertisement indicated a preference of low. In past releases, these routes were always displayed with a metric of 1.	Enhancements to IPv6 router advertisement
SRCIP	V1R12	The report is changed to display JOBNAME entries with a source of PUBLICADDRS.	Configurable default address selection policy table

Table 16. Summary of new and changed Communications Server Netstat operator commands (DISPLAY TCPIP,,NETSTAT) (continued)

Parameters	Release	Description	Reason for change
STATS	V2R1	Displays a new SMCR statistics section. The SMC-R statistics are displayed when no PROTOCOL modifier is specified, or when PROTOCOL=TCP is specified as the modifier value.	Shared Memory Communications over Remote Direct Memory Access
	V2R1	This report displays statistics about the usage of ephemeral ports for both TCP and UDP.	User control of Ephmeral Port Ranges
	V1R13	Report is enhanced to display the following information: • The number of TCP connections whose send data flow is stalled, Current Stalled Connections • The number of TCP servers under a potential connection flood attack, Current Servers in Connection Flood	Expanded Intrusion Detection Services
	V1R12	Added new field, Segments Received on OSA Bulk Queues, which indicates the total number of segments received for all TCP connections using the bulk data ancillary input queue of the QDIO inbound workload queueing function.	Performance improvements for streaming bulk data
TTLS	V2R1	Reports are updated to show four-character cipher code, TLSv1.2 protocol, and new policy attributes	AT-TLS support for TLS v1.2 and related features
VDPT	V1R12	The section of the report containing the Dynamic VIPA Destination Port Table for non-z/OS targets can now show IPv6 non-z/OS distribution targets.	Extend sysplex distributor support for DataPower for IPv6
	V1R12	In the display for a distributed DVIPA, the distribution method is no longer displayed in the Flg field. The distribution method is now displayed in a new DistMethod field. The DistMethod field is not included in the short format display unless the DETAIL parameter is used. The Flg field can now indicate the HotStandby target state, active (V or Active) or backup (K or Backup) depending on whether the Short or Long format display is used. If the new distribution method HotStandby is displayed, a new SrvType field indicates the server type (Preferred or Backup).	Sysplex distributor support for hot-standby server

Table 16. Summary of new and changed Communications Server Netstat operator commands (DISPLAY TCPIP,,NETSTAT) (continued)

Parameters	Release	Description	Reason for change
VIPADCFG	V1R13	The new SAF name field is displayed if the SAF parameter is configured on the VIPARANGE statement.	Improved security granularity for VIPARANGE DVIPAs
	V1R12	The new IPv6 prefix length field is shown if it was configured. If used with DETAIL, a new value ENCAP can be displayed in the routing type (RtgType) field. ENCAP indicates that IPv6 routing encapsulation is used to forward requests.	Extend sysplex distributor support for DataPower for IPv6
	V1R12	In the display for a distributed DVIPA, the distribution method is no longer displayed in the Flg field. The distribution method is now displayed in a new DistMethod field. The DistMethod field is not included in the short format display unless the DETAIL parameter is used. If the new distribution method HotStandby is displayed, a new SrvType field indicates the server type, Preferred or Backup. If the server type is Backup, the Rank of the backup is also displayed. If the distribution method is the new HOTSTANDBY distribution method and the DETAIL parameter is specified, the settings for AUTOSWITCHBACK and HEALTHSWITCH are also displayed.	Sysplex distributor support for hot-standby server
VIPADyn	V2R1	When displaying information about DVIPAs with an origin of VIPARANGE IOCTL, an additional field indicates if the DVIPA was created with affinity.	Affinity for application-instance DIVPAs

NETSTAT TSO commands

Table 17 on page 289 lists the new and updated Communications Server NETSTAT TSO command.

See *z/OS Communications Server: IP System Administrator's Commands* for more detailed information about the Communications Server TSO commands.

Table 17. Summary of new and changed Communications Server NETSTAT TSO commands

Parameter	Release	Description	Reason for change
ALL	V2R1	Added new StartDate and StartTime fields. These fields provide the date and time for the last of one of the following events: • UDP bind time • TCP bind time • TCP listen time • TCP connection establishment time	Socket establishment time for Netstat ALL/-A
	V2R1	Displays the names of the routing policy rule and the policy-based routing table used by IP routing for an IPv6 connection	IPv6 support for policy-based routing
	V2R1	• Displays Shared Memory Communications over Remote Direct Memory Access (SMC-R) information for TCP connections. • Accepts a new SMCLID filter to display only the TCP connections associated with a specific SMC-R link group or SMC-R link identifier.	Shared Memory Communications over Remote Direct Memory Access
	V1R13	The output line that begins with the Last Touched field is now displayed after the output lines for the Bytes, Segments, and Dgram In and Out counters	Release update
	V1R13	Report is enhanced to display the following indicators: • The number of TCP connections whose send data flow is stalled, Current Stalled Connections • The number of TCP servers under a potential connection flood attack, Current Servers in Connection Flood	Expanded Intrusion Detection Services
	V1R12	Added new fields Ancillary Input Queue and BulkDataIntfName for TCP connections that are using the QDIO inbound workload queueing function.	Performance improvements for streaming bulk data
	V1R12	Displays the new TCP trusted connection flag (TcpTrustedPartner), which indicates that the partner security credentials of a partner within a sysplex or subplex have been retrieved using the SIOCGPARTNERINFO ioctl, or that the SIOCSPARTNERINFO ioctl has been successfully issued or inherited from the listener socket.	Trusted TCP connections
ALLCONN	V2R1	Accepts a new SMCID filter to display only the TCP connections associated with a specific SMC-R link group or SMC-R link identifier.	Shared Memory Communications over Remote Direct Memory Access
ARp	V1R13	Displays ARP cache information for an IQDX interface.	HiperSockets optimization for intraensemble data networks

Table 17. Summary of new and changed Communications Server NETSTAT TSO commands (continued)

Parameter	Release	Description	Reason for change
CONFIG	V2R1 with APARs OA51949 and PI75199	In the Global Configuration section, the SMCR PORTNUM represents the configured or learned port number used for the PFID.	Communications Server support for RoCE Express2 features
	V2R1	Added the following fields to the TCP CONFIGURATION TABLE section: • TimeWaitInterval • RetransmitAttempt • ConnectTimeOut • ConnectInitInterval • Nagle • KeepAliveProbes • KAProbeInterval • QueuedRTT • FRRThreshold • DefltMaxSndBufSize	Enhanced TCP protocol configuration options and default settings
	V2R1	• Displays new SMCR parameter information in the GLOBALCONFIG section. • New SmcrGrpStats field in the Type 119 portion of the SMF parameters section indicates whether SMC-R link group statistics records (SMF subtype 41) are collected. • New SmcrLnkEvent field in the Type 119 portion of the SMF parameters section indicates whether the following SMF records are collected: – SMC-R link start (SMF subtype 42) – SMC-R link end (SMF subtype 43)	Shared Memory Communications over Remote Direct Memory Access
	V2R1	The QDIOAccel indicator reflects "Yes" or "SD only" when IP Security is operational. IP Security introduces additional reasons that QDIOAccel might run in the "SD only" mode.	QDIO acceleration coexistence with IP filtering
	V2R1	The SELECTIVEACK field is added to the TCP Configuration Table section.	TCP support for selective acknowledgements

Table 17. Summary of new and changed Communications Server NETSTAT TSO commands (continued)

Parameter	Release	Description	Reason for change
CONFIG (continued)	V2R1	This report displays information about the EPHEMERALPORTS parameter on TCPCONFIG and UDPCONFIG.	User control of Ephmeral Port Ranges
	V2R1	This report displays information about the SOURCEVIPAINTERFACE parameter on IPCONFIG.	IPv4 INTERFACE statement for HiperSockets and Static VIPAs
	V1R13	New field AutoIQDX added to the Global Configuration section.	HiperSockets optimization for intraensemble data networks
	V1R13	• Displays whether checksum offload is globally enabled for IPv4 or IPv6 OSA-Express QDIO interfaces. • Displays whether segmentation offload is globally enabled for IPv4 or IPv6 OSA-Express QDIO interfaces.	OSA-Express4S QDIO IPv6 checksum and segmentation offload
	V1R13	The IgRedirect field in the IPv6 Configuration Table section of the report is enhanced. A value of Yes can now indicate that Intrusion Detection Services (IDS) policy is in effect to detect and discard ICMP Redirects.	Expanded Intrusion Detection Services
	V1R12	New OSMSecClass field added to the IPv6 Configuration section to display the setting of the OSMSECCLASS parameter from the IPCONFIG6 profile statement.	z/OS Communications Server in an ensemble
	V1R12	Displays the setting of the NOJOIN subparameter from the GLOBALCONFIG SYSPLEXMONITOR profile statement, which indicates whether the TCP/IP stack joins the sysplex group during stack initialization.	Control joining the sysplex XCF group
	V1R12	• The SMF parameters section displays the setting of the new DVIPA and NODVIPA parameters. • The Network Monitor Configuration Information section displays the setting of the new DVIPA and NODVIPA subparameters for the SMFSERVICE parameter.	SMF event records for sysplex events
	V1R12	The Network Monitor Configuration Information section displays the setting of the new CSMAIL, NOCSMAIL, CSSMTP and NOCSSMTP subparameters for the SMFSERVICE parameter.	Management data for CSSMTP
CONN	V2R1	Accepts a new SMCID filter to display only the TCP connections associated with a specific SMC-R link group or SMC-R link identifier.	Shared Memory Communications over Remote Direct Memory Access
DEFADDRT	V1R12	New report to display default address selection policy table.	Configurable default address selection policy table
DEvlinks	V2R1 with APARs OA51949 and PI75199	The card generation level and speed information are displayed for RNIC interfaces representing "RoCE Express" features.	Communications Server support for RoCE Express2 features

Table 17. Summary of new and changed Communications Server NETSTAT TSO commands (continued)

Parameter	Release	Description	Reason for change
DEvlinks	V2R1	Displays an IP address of 0.0.0.0 for IPAQENET interfaces that are defined with the TEMPIP parameter.	Enable DHCP clients on OSA Interfaces
	V2R1	• This report displays information about IPv4 HiperSockets interfaces that are configured with the INTERFACE statement for IPAQIDIO. • This report displays information about IPv4 static VIPA interfaces that are configured with the INTERFACE statement for VIRTUAL. • The INTFNAME/-K filter accepts a HiperSockets TRLE name that allows for the display of all interfaces for a HiperSockets TRLE.	IPv4 INTERFACE statement for HiperSockets and Static VIPAs
	V2R1	• Displays Shared Memory Communications over Remote Direct Memory Access (SMC-R) information for OSD interfaces. • Accepts a new SMCID filter to display only the devices that are associated with a specific SMC-R link group or SMC-R link identifier. • Accepts a new SMC modifier to display detailed SMC-R information about active RNIC interfaces and their associated SMC-R links and link groups.	Shared Memory Communications over Remote Direct Memory Access
DEvlinks (continued)	V1R13	Displays information about IQDX interfaces.	HiperSockets optimization for intraensemble data networks
	V1R13	• Displays whether checksum offload is enabled for an IPAQENET or IPAQENET6 interface. • Displays whether segmentation offload is enabled for an IPAQENET or IPAQENET6 interface.	OSA-Express4S QDIO IPv6 checksum and segmentation offload
	V1R12	• Added a ChpidType field for IPAQENET and IPAQENET6 interfaces. • Displays information about intraensemble data network and intranode management network interfaces.	z/OS Communications Server in an ensemble
	V1R12	• Moved the InbPerf field from the right column to the left column on a new line. • Added the WorkloadQueueing field to indicate whether inbound workload queueing is enabled for IPAQENET or IPAQENET6 interfaces. This field is only displayed when InbPerf is Dynamic.	Performance improvements for sysplex distributor connection routing
HOme	V2R1	Displays a flag value of I/Internal for IPAQENET interfaces that are defined with the TEMPIP parameter.	Enable DHCP clients on OSA Interfaces
	V2R1	The INTFNAME/-K filter accepts a HiperSockets TRLE name that allows for the display of all interfaces for a HiperSockets TRLE.	IPv4 INTERFACE statement for HiperSockets and Static VIPAs

Table 17. Summary of new and changed Communications Server NETSTAT TSO commands (continued)

Parameter	Release	Description	Reason for change
IDS	V1R13	Report is enhanced to display the following information: • The ICMPv6 scan rule name in the Scan Detection section • Information about new attack types • The number of TCP servers under a potential connection flood attack, ServersInConnFlood • The number of TCP connections whose send data flow is stalled, TCPStalledConns • The percentage of TCP connections whose send data flow is stalled, TCPStalledConnsPct • An indicator of whether a TCP server is experiencing a potential connection flood attack, ConnFlood in the Intrusion Detection Services TCP Port List section • Both IPv4 and IPv6 addresses in the IP address fields	Expanded Intrusion Detection Services
	V1R13	Report is enhanced to display information about new attack types.	Intrusion Detection Services support for Enterprise Extender
ND	V1R13	Displays Neighbor cache information for an IQDX interface.	HiperSockets optimization for intraensemble data networks
PORTLIST	V2R1	Displays a new flag to indicate whether the port or the port range is disabled for SMC-R.	Shared Memory Communications over Remote Direct Memory Access
ROUTe	V2R1	When the PR=ALL or PR=prname modifier is used to display a policy-based routing table, IPv6 routes are included in the report.	IPv6 support for policy-based routing
	V1R12	• Support is added for a new modifier, RADV, to display all of the IPv6 routes created based on information received in router advertisement messages. • Default routes learned from IPv6 router advertisements are displayed with a metric of 1 when the router advertisement indicated a preference of high, 2 when the router advertisement indicated a preference of medium, or 3 when the router advertisement indicated a preference of low. In past releases, these routes were always displayed with a metric of 1.	Configurable default address selection policy table
SRCIP	V1R12	The report is changed to display JOBNAME entries with a source of PUBLICADDRS.	Configurable default address selection policy table

Table 17. Summary of new and changed Communications Server NETSTAT TSO commands (continued)

Parameter	Release	Description	Reason for change
STATS	V2R1	Displays a new SMCR statistics section. The SMC-R statistics are displayed when no PROTOCOL modifier is specified, or when PROTOCOL=TCP is specified as the modifier value.	Shared Memory Communications over Remote Direct Memory Access
	V2R1	This report displays statistics about the usage of ephemeral ports for both TCP and UDP.	User control of Ephmeral Port Ranges
	V1R13	Report is enhanced to display the following information: • The number of TCP connections whose send data flow is stalled, Current Stalled Connections • The number of TCP servers under a potential connection flood attack, Current Servers in Connection Flood	Expanded Intrusion Detection Services
	V1R12	Added new field, Segments Received on OSA Bulk Queues, which indicates the total number of segments received for all TCP connections using the bulk data ancillary input queue of the QDIO inbound workload queueing function.	Performance improvements for streaming bulk data
TTLS	V2R1	Reports are updated to show four-character cipher code, TLSv1.2 protocol, and new policy attributes	AT-TLS support for TLS v1.2 and related features
VDPT	V1R12	The section of the report containing the Dynamic VIPA Destination Port Table for non-z/OS targets can now show IPv6 non-z/OS distribution targets.	Extend sysplex distributor support for DataPower for IPv6
	V1R12	In the display for a distributed DVIPA, the distribution method is no longer displayed in the Flg field. The distribution method is now displayed in a new DistMethod field. The DistMethod field is not included in the short format display unless the DETAIL parameter is used. The Flg field can now indicate the HotStandby target state, active (V or Active) or backup (K or Backup) depending on whether the Short or Long format display is used. If the new distribution method HotStandby is displayed, a new SrvType field indicates the server type (Preferred or Backup).	Sysplex distributor support for hot-standby server

Table 17. Summary of new and changed Communications Server NETSTAT TSO commands (continued)

Parameter	Release	Description	Reason for change
VIPADCFG	V1R13	The new SAF name field is displayed if the SAF parameter is configured on the VIPARANGE statement.	Improved security granularity for VIPARANGE DVIPAs
	V1R12	The new IPv6 prefix length field is shown if it was configured. If used with DETAIL, a new value ENCAP can be displayed in the routing type (RtgType) field. ENCAP indicates that IPv6 routing encapsulation is used to forward requests.	Extend sysplex distributor support for DataPower for IPv6
	V1R12	In the display for a distributed DVIPA, the distribution method is no longer displayed in the Flg field. The distribution method is now displayed in a new DistMethod field. The DistMethod field is not included in the short format display unless the DETAIL parameter is used. If the new distribution method HotStandby is displayed, a new SrvType field indicates the server type, Preferred or Backup. If the server type is Backup, the Rank of the backup is also displayed. If the distribution method is the new HOTSTANDBY distribution method and the DETAIL parameter is specified, the settings for AUTOSWITCHBACK and HEALTHSWITCH are also displayed.	Sysplex distributor support for hot-standby server
VIPADyn	V2R1	When displaying information about DVIPAs with an origin of VIPARANGE IOCTL, an additional field indicates if the DVIPA was created with affinity.	Affinity for application-instance DIVPAs

Netstat UNIX commands

Table 18 on page 296 lists the new and updated Communications Server z/OS UNIX netstat command. See Summary of new and changed Communications Server z/OS UNIX commands for the other (the non-netstat) z/OS UNIX command entries.

See *z/OS Communications Server: IP System Administrator's Commands* for more detailed information about the z/OS UNIX commands.

All parameters in the following table are for the z/OS UNIX netstat command.

Table 18. Summary of new and changed Communications Server z/OS UNIX netstat commands

Parameter	Release	Description	Reason for change
-A	V2R1	Added new StartDate and StartTime fields. These fields provide the date and time for the last of one of the following events: • UDP bind time • TCP bind time • TCP listen time • TCP connection establishment time	Socket establishment time for Netstat ALL/-A
	V2R1	Displays the names of the routing policy rule and the policy-based routing table used by IP routing for an IPv6 connection	IPv6 support for policy-based routing
	V2R1	• Displays Shared Memory Communications over Remote Direct Memory Access (SMC-R) information for TCP connections. • Accepts a new -U filter to display only the TCP connections associated with a specific SMC-R link group or SMC-R link identifier.	Shared Memory Communications over Remote Direct Memory Access
	V1R13	The output line that begins with the Last Touched field is now displayed after the output lines for the Bytes, Segments, and Dgram In and Out counters	Release update
	V1R13	Report is enhanced to display the following indicators: • An indicator of whether a TCP connection's send data flow is stalled, SendStalled • An indicator of whether a TCP server is experiencing a potential connection flood attack, ConnectionFlood	Expanded Intrusion Detection Services
	V1R12	Added new fields Ancillary Input Queue and BulkDataIntfName for TCP connections that are using the QDIO inbound workload queueing function.	Performance improvements for streaming bulk data
	V1R12	Displays the new TCP trusted connection flag (TcpTrustedPartner), which indicates that the partner security credentials of a partner within a sysplex or subplex have been retrieved using the SIOCGPARTNERINFO ioctl, or that the SIOCSPARTNERINFO ioctl has been successfully issued or inherited from the listener socket.	Trusted TCP connections
-a	V2R1	Accepts a new -U filter to display only the TCP connections associated with a specific SMC-R link group or SMC-R link identifier.	Shared Memory Communications over Remote Direct Memory Access
-c	V2R1	Accepts a new -U filter to display only the TCP connections associated with a specific SMC-R link group or SMC-R link identifier.	Shared Memory Communications over Remote Direct Memory Access
-d	V2R1 with APARs OA51949 and PI75199	The card generation level and speed information are displayed for RNIC interfaces representing "RoCE Express" features.	Communications Server support for RoCE Express2 features

Table 18. Summary of new and changed Communications Server z/OS UNIX netstat commands (continued)

Parameter	Release	Description	Reason for change
-d	V2R1	Displays an IP address of 0.0.0.0 for IPAQENET interfaces that are defined with the TEMPIP parameter.	Enable DHCP clients on OSA Interfaces
	V2R1	• Displays Shared Memory Communications over Remote Direct Memory Access information for OSD interfaces. • Accepts a new -U filter to display only the devices associated with a specific SMC-R link group or SMC-R link identifier. • Accepts a new SMC modifier to display detailed SMC-R information about active RNIC interfaces and their associated SMC-R links and link groups.	Shared Memory Communications over Remote Direct Memory Access
	V2R1	• This report displays information about IPv4 HiperSockets interfaces that are configured with the INTERFACE statement for IPAQIDIO. • This report displays the datapath address and TRLE name for IPAQIDIO6 interfaces, and IPAQIDIO interfaces defined by the INTERFACE statement. • This report displays information about IPv4 static VIPA interfaces that are configured with the INTERFACE statement for VIRTUAL. • The INTFNAME/-K filter accepts a HiperSockets TRLE name that allows for the display of all interfaces for a HiperSockets TRLE.	IPv4 INTERFACE statement for HiperSockets and Static VIPAs
	V1R13	• Displays whether checksum offload is globally enabled for IPv4 or IPv6 OSA-Express QDIO interfaces. • Displays whether segmentation offload is globally enabled for IPv4 or IPv6 OSA-Express QDIO interfaces.	OSA-Express4S QDIO IPv6 checksum and segmentation offload
	V1R13	Displays information about IQDX interfaces	HiperSockets optimization for intraensemble data networks
	V1R12	• Moved the InbPerf field from the right column to the left column on a new line. • Added the WorkloadQueueing field to indicate whether inbound workload queueing is enabled for IPAQENET or IPAQENET6 interfaces. This field is only displayed when InbPerf is Dynamic.	Configurable default address selection policy table
	V1R12	• Added a ChpidType field for IPAQENET and IPAQENET6 interfaces. • Displays information about intraensemble data network and intranode management network interfaces.	z/OS Communications Server in an ensemble

Table 18. Summary of new and changed Communications Server z/OS UNIX netstat commands (continued)

Parameter	Release	Description	Reason for change
-F	V1R13	The new SAF name field is displayed if the SAF parameter is configured on the VIPARANGE statement.	Improved security granularity for VIPARANGE DVIPAs
	V1R12	The new IPv6 prefix length field is shown if it was configured. If used with DETAIL, a new value ENCAP can be displayed in the routing type (RtgType) field. ENCAP indicates that IPv6 routing encapsulation is used to forward requests.	Extend sysplex distributor support for DataPower for IPv6
	V1R12	In the display for a distributed DVIPA, the distribution method is no longer displayed in the Flg field. The distribution method is now displayed in a new DistMethod field. The DistMethod field is not included in the short format display unless the DETAIL parameter is used. If the new distribution method HotStandby is displayed, a new SrvType field indicates the server type, Preferred or Backup. If the server type is Backup, the Rank of the backup is also displayed. If the distribution method is the new HOTSTANDBY distribution method and the DETAIL parameter is specified, the settings for AUTOSWITCHBACK and HEALTHSWITCH are also displayed.	Sysplex distributor support for hot-standby server
-f	V2R1 with APARs OA51949 and PI75199	In the Global Configuration section, the SMCR PORTNUM represents the configured or learned port number used for the PFID.	Communications Server support for RoCE Express2 features

Table 18. Summary of new and changed Communications Server z/OS UNIX netstat commands (continued)

Parameter	Release	Description	Reason for change
-f	V2R1	Added the following fields to the TCP CONFIGURATION TABLE section: • TimeWaitInterval • RetransmitAttempt • ConnectTimeOut • ConnectInitInterval • Nagle • KeepAliveProbes • KAProbeInterval • QueuedRTT • FRRThreshold • DefltMaxSndBufSize	Enhanced TCP protocol configuration options and default settings
	V2R1	• Displays new SMCR parameter information in the GLOBALCONFIG section. • New SmcrGrpStats field in the Type 119 portion of the SMF parameters section indicates whether SMC-R link group statistics records (SMF subtype 41) are collected. • New SmcrLnkEvent field in the Type 119 portion of the SMF parameters section indicates whether the following SMF records are collected: – SMC-R link start (SMF subtype 42) – SMC-R link end (SMF subtype 43)	Shared Memory Communications over Remote Direct Memory Access

Table 18. Summary of new and changed Communications Server z/OS UNIX netstat commands (continued)

Parameter	Release	Description	Reason for change
-f (continued)	V2R1	The QDIOAccel indicator reflects "Yes" or "SD only" when IP Security is operational. IP Security introduces additional reasons that QDIOAccel might run in the "SD only" mode.	QDIO acceleration coexistence with IP filtering
	V2R1	This report displays information about the EPHEMERALPORTS parameter on TCPCONFIG and UDPCONFIG.	User control of Ephmeral Port Ranges
	V2R1	The SELECTIVEACK field is added to the TCP Configuration Table section.	TCP support for selective acknowledgements
	V2R1	This report displays information about the SOURCEVIPAINTERFACE parameter on IPCONFIG.	IPv4 INTERFACE statement for HiperSockets and Static VIPAs
	V1R13	• Displays whether checksum offload is globally enabled for IPv4 or IPv6 OSA-Express QDIO interfaces. • Displays whether segmentation offload is globally enabled for IPv4 or IPv6 OSA-Express QDIO interfaces.	OSA-Express4S QDIO IPv6 checksum and segmentation offload
	V1R13	New field AutoIQDX added to the Global Configuration section.	HiperSockets optimization for intraensemble data networks
	V1R13	The IgRedirect field in the IPv6 Configuration Table section of the report is enhanced. A value of Yes can now indicate that Intrusion Detection Services (IDS) policy is in effect to detect and discard ICMP Redirects.	Expanded Intrusion Detection Services
	V1R12	New OSMSecClass field added to the IPv6 Configuration section to display the setting of the OSMSECCLASS parameter from the IPCONFIG6 profile statement.	z/OS Communications Server in an ensemble
	V1R12	Displays the setting of the NOJOIN subparameter from the GLOBALCONFIG SYSPLEXMONITOR profile statement, which indicates whether the TCP/IP stack joins the sysplex group during stack initialization.	Control joining the sysplex XCF group
	V1R12	• The SMF parameters section displays the setting of the new DVIPA and NODVIPA parameters. • The Network Monitor Configuration Information section displays the setting of the new DVIPA and NODVIPA subparameters for the SMFSERVICE parameter.	SMF event records for sysplex events
	V1R12	The Network Monitor Configuration Information section displays the setting of the new CSMAIL, NOCSMAIL, CSSMTP and NOCSSMTP subparameters for the SMFSERVICE parameter.	Management data for CSSMTP

Table 18. Summary of new and changed Communications Server z/OS UNIX netstat commands (continued)

Parameter	Release	Description	Reason for change
-h	V2R1	Displays a flag value of I/Internal for IPAQENET interfaces that are defined with the TEMPIP parameter.	Enable DHCP clients on OSA Interfaces
	V2R1	The INTFNAME/-K filter accepts a HiperSockets TRLE name that allows for the display of all interfaces for a HiperSockets T-RLE.	IPv4 INTERFACE statement for HiperSockets and Static VIPAs
-J	V1R12	The report is changed to display JOBNAME entries with a source of PUBLICADDRS.	Configurable default address selection policy table
-k	V1R13	Report is enhanced to display the following information: • The ICMPv6 scan rule name in the Scan Detection section • Information about new attack types • The number of TCP servers under a potential connection flood attack, ServersInConnFlood • The number of TCP connections whose send data flow is stalled, TCPStalledConns • The percentage of TCP connections whose send data flow is stalled, TCPStalledConnsPct • An indicator of whether a TCP server is experiencing a potential connection flood attack, ConnFlood in the Intrusion Detection Services TCP Port List section • Both IPv4 and IPv6 addresses in the IP address fields	Expanded Intrusion Detection Services
	V1R13	Report is enhanced to display information about new attack types.	Intrusion Detection Services support for Enterprise Extender
-l	V1R12	New report to display default address selection policy table.	Configurable default address selection policy table
-n	V1R13	Displays neighbor cache information for an IQDX interface.	HiperSockets optimization for intraensemble data networks

Table 18. Summary of new and changed Communications Server z/OS UNIX netstat commands (continued)

Parameter	Release	Description	Reason for change
-O	V1R12	The section of the report containing the Dynamic VIPA Destination Port Table for non-z/OS targets can now show IPv6 non-z/OS distribution targets.	Extend sysplex distributor support for DataPower for IPv6
	V1R12	In the display for a distributed DVIPA, the distribution method is no longer displayed in the Flg field. The distribution method is now displayed in a new DistMethod field. The DistMethod field is not included in the short format display unless the DETAIL parameter is used. The Flg field can now indicate the HotStandby target state, active (V or Active) or backup (K or Backup) depending on whether the Short or Long format display is used. If the new distribution method HotStandby is displayed, a new SrvType field indicates the server type (Preferred or Backup).	Sysplex distributor support for hot-standby server
-o	V2R1	Displays a new flag to indicate whether the port or the port range is disabled for SMC-R.	Shared Memory Communications over Remote Direct Memory Access
-r	V2R1	When the PR=ALL or PR=prname modifier is used to display a policy-based routing table, IPv6 routes are included in the report.	IPv6 support for policy-based routing
	V1R13	Displays ARP cache information for an IQDX interface.	HiperSockets optimization for intraensemble data networks
	V1R12	• Support is added for a new modifier, RADV, to display all of the IPv6 routes created based on information received in router advertisement messages. • Default routes learned from IPv6 router advertisements are displayed with a metric of 1 when the router advertisement indicated a preference of high, 2 when the router advertisement indicated a preference of medium, or 3 when the router advertisement indicated a preference of low. In past releases, these routes were always displayed with a metric of 1.	Enhancements to IPv6 router advertisement

Table 18. Summary of new and changed Communications Server z/OS UNIX netstat commands (continued)

Parameter	Release	Description	Reason for change
-S	V2R1	Displays a new SMCR statistics section. The SMC-R statistics are displayed when no PROTOCOL modifier is specified, or when PROTOCOL=TCP is specified as the modifier value.	Shared Memory Communications over Remote Direct Memory Access
	V2R1	This report displays statistics about the usage of ephemeral ports for both TCP and UDP.	User control of Ephmeral Port Ranges
	V1R13	Report is enhanced to display the following information: • The number of TCP connections whose send data flow is stalled, Current Stalled Connections • The number of TCP servers under a potential connection flood attack, Current Servers in Connection Flood	Expanded Intrusion Detection Services
	V1R12	Added new field, Segments Received on OSA Bulk Queues, which indicates the total number of segments received for all TCP connections using the bulk data ancillary input queue of the QDIO inbound workload queueing function.	Performance improvements for streaming bulk data
-v	V2R1	When displaying information about DVIPAs with an origin of VIPARANGE IOCTL, an additional field indicates if the DVIPA was created with affinity.	Affinity for application-instance DIVPAs
-x	V2R1	Reports are updated to show four-character cipher code, TLSv1.2 protocol, and new policy attributes	AT-TLS support for TLS v1.2 and related features

TCP/IP callable NMI (EZBNMIFR)

Table 19 on page 304 lists the updates to the Communications Server TCP/IP callable NMI.

Table 19. Summary of new Communications Server TCP/IP callable NMI (EZBNMIFR)

Request	Parameter/output	Rel.	Description	Reason for change
GetConnectionDetail	NWMConnLclSMCLinkId	V2R1	New NWMConnLclSMCLinkId field that indicates the local stack link ID for the SMC-R link that this connection traverses.	Shared Memory Communications over Remote Direct Memory Access
	NWMConnRmtSMCLinkId	V2R1	New NWMConnRmtSMCLinkId field that indicates the remote stack link ID for the SMC-R link that this connection traverses.	Shared Memory Communications over Remote Direct Memory Access
	NWMConnSMCRCfg	V2R1	New flag bit NWMConnSMCRCfg is set in the NWMConnFlag01 field to indicate whether the SMCR parameter is configured on the GLOBALCONFIG statement.	Shared Memory Communications over Remote Direct Memory Access
	NWMConnSMCReason	V2R1	New NWMConnSMCReason field that indicates why a connection is not using an SMC-R link.	Shared Memory Communications over Remote Direct Memory Access
	NWMConnSMCStatus	V2R1	New NWMConnSMCStatus field that indicates whether this connection is traversing an SMC-R link.	Shared Memory Communications over Remote Direct Memory Access
	NWMConnTTLSSSLProt	V2R1	New NWMTTLSPROTTLSV1_2 value (X'0303')	AT-TLS support for TLS v1.2 and related features
	NWMConnTTLSSSLNegCiph	V2R1	New NWMTTLSNEGCIPH4X value (X'4X') is added to indicate four-character cipher	AT-TLS support for TLS v1.2 and related features
	NWMConnTTLSSSLNegCiph4	V2R1	New field containing four-character negotiated cipher code	AT-TLS support for TLS v1.2 and related features
	NWMConnStall	V1R13	New bit defined to indicate whether the connection's send data flow is stalled.	Expanded Intrusion Detection Services
	NWMConnAncInputQ flag NWMConnBulkDataIntfName	V1R12	For TCP connections that are using the QDIO inbound workload queueing function, the new flag indicates if a connection is using the bulk-data queue and the field provides the inbound interface name.	Performance improvements for streaming bulk data
	NWMConnTcpTrustedPartner	V1R12	This flag indicates whether the partner security credentials of a partner within a sysplex or subplex have been retrieved using the SIOCGPARTNERINFO ioctl, or that the SIOCSPARTNERINFO ioctl has been successfully issued or inherited from the listener socket.	Trusted TCP connections
GetDVIPAList	NWMDvListFlags	V2R1	A new flag, NWMDVLISTFLAGS_DVRAFFINITY (0x04), is added. The flag means that an application instance DVIPA was created with affinity. Applications are permitted to dynamically create DVIPAs that are within the range defined by a VIPARANGE statement.	Affinity for application-instance DIVPAs
	NWMDvListPrefix	V1R12	This existing field is used to return the configured IPv4 prefix length of an IPv4 DVIPA. It is now also used to return the configured IPv6 prefix length of an IPv6 DVIPA.	Extend sysplex distributor support for DataPower for IPv6

Table 19. Summary of new Communications Server TCP/IP callable NMI (EZBNMIFR) (continued)

Request	Parameter/output	Rel.	Description	Reason for change
GetDVIPAPortDist	NWMDvPortDistGRE	V1R12	This existing field is used to indicate that generic routing encapsulation (GRE) is used to distribute requests to IPv4 non-z/OS targets. It can now also indicate that IPv6 routing encapsulation is used to distribute requests to IPv6 non-z/OS targets.	Extend sysplex distributor support for DataPower for IPv6
	NWMDvPortDistFlags output field	V1R12	New flag added to indicate whether the HotStandby target state is active or backup.	Sysplex distributor support for hot-standby server
	NWMDvPortDistFlags2 output field	V1R12	New flags field containing HotStandby flags that indicate whether the server type is preferred or backup.	Sysplex distributor support for hot-standby server
	NWMDvPortDistMethod output field	V1R12	New NWMDvPortDistMethod_HotStandby value added to field to indicate the new HotStandby distribution method.	Sysplex distributor support for hot-standby server
GetFTPDaemonConfig	SMF119FT_FDCFApplname	V2R1	New SMF119FT_FDCFApplname field contains 8-character FTP server application name from the APPLNAME statement.	Release update
	SMF119FT_FDCFSslv3	V2R1	New field to enable or disable SSLV3	APAR PI28679
	N/A	V2R1	New poll-type request to provide FTP daemon configuration information.	NMI and SMF enhancements for TCP/IP applications
GetGlobalStats	NWMTCPSTCfgEphemDef	V2R1	Contains the number of configured ephemeral ports to be assigned for TCP applications.	User control of Ephmeral Port Ranges
	NWMTCPSTEphemInUse	V2R1	Contains the current number of configured ephemeral ports in use by TCP applications.	User control of Ephmeral Port Ranges
	NWMTCPSTEphemHiWater	V2R1	Contains the highest number of configured ephemeral ports in use by TCP applications at any time.	User control of Ephmeral Port Ranges
	NWMTCPSTEphemExhaust	V2R1	Contains the number of bind() requests that failed because no TCP ephemeral port was available.	User control of Ephmeral Port Ranges
	NWMUDPSTCfgEphemDef	V2R1	Contains the number of configured ephemeral ports to be assigned for UDP applications.	User control of Ephmeral Port Ranges
	NWMUDPSTEphemInUse	V2R1	Contains the current number of configured ephemeral ports in use by UDP applications.	User control of Ephmeral Port Ranges
	NWMUDPSTEphemHiWater	V2R1	Contains the highest number of configured ephemeral ports in use by UDP applications at any time.	User control of Ephmeral Port Ranges
	NWMUDPSTEphemExhaust	V2R1	Contains the number of bind() requests that failed because no UDP ephemeral port was available.	User control of Ephmeral Port Ranges

Table 19. Summary of new Communications Server TCP/IP callable NMI (EZBNMIFR) (continued)

Request	Parameter/output	Rel.	Description	Reason for change
GetGlobalStats (continued)	NWMTCPSTSMCRCfg Existing TCP stats changed: NWMTCPSTCurrEstab NWMTCPSTActiveOpened NWMTCPSTPassiveOpened NWMTCPSTConnClosed NWMTCPSTInSegs NWMTCPSTOutSegs NWMTCPSTOutRsts NWMTCPSTEstabResets NWMTCPSTAcceptCount NWMTCPSTKeepAliveProbes NWMTCPSTKeepAliveDrop NWMTCPSTFinwait2Drops New SMC-R stats: NWMTCPSTSMCRCurrEstabLnks NWMTCPSTSMCRLnkActTimeOut NWMTCPSTSMCRActLnkOpened NWMTCPSTSMCRPasLnkOpened NWMTCPSTSMCRLnksClosed NWMTCPSTSMCRCurrEstab NWMTCPSTSMCRActiveOpened NWMTCPSTSMCRPassiveOpened NWMTCPSTSMCRConnClosed NWMTCPSTSMCRInSegs NWMTCPSTSMCROutSegs NWMTCPSTSMCRInRsts NWMTCPSTSMCROutRsts	V2R1	• New flag bit NWMTCPSTSMCRCfg is set in the NWMTCPSTFlags field to indicate whether the SMCR parameter is configured on the GLOBALCONFIG statement. • When the SMCR parameter is configured on the GLOBALCONFIG statement, the listed TCP counters reflect all TCP connections, including connections over SMC-R links. • The listed SMC-R statistics are added.	Shared Memory Communications over Remote Direct Memory Access
	NWMTCPSTConnFloods	V1R13	New field defined - The number of TCP servers under a potential connection flood attack.	Expanded Intrusion Detection Services
	NWMTCPSTConnStalls	V1R13	New field defined -The number of TCP connections whose send data flow is stalled.	Expanded Intrusion Detection Services
	NWMTCPSTInBulkQSegs	V1R12	For TCP connections that are using the QDIO inbound workload queueing function, this field indicates the number of TCP segments that are received over the BulkData ancillary input queue (AIQ).	Performance improvements for streaming bulk data
	N/A	V1R12	New poll-type request to provide TCP/IP stack global statistics.	Enhancements to TCP/IP callable NMI (EZBNMIFR) - network interface and TCP/IP statistics

Table 19. Summary of new Communications Server TCP/IP callable NMI (EZBNMIFR) (continued)

Request	Parameter/output	Rel.	Description	Reason for change
GetIfs	NWMIfFlags	V2R1	• The NWMIfDefIntf flag bit is set in the NWMIfFlags field for IPv4 IPAQIDIO and VIRTUAL interfaces that are defined by the INTERFACE statement. • The NWMIfBcast flag bit is set in the NWMIfFlags field for IPv4 IPAQIDIO interfaces defined by the INTERFACE statement with the IPBCAST parameter specified.	IPv4 INTERFACE statement for HiperSockets and Static VIPAs
	NWMIfRouteMask	V2R1	The NWMIfRouteMask provides the configured subnet mask for IPv4 IPAQIDIO interfaces defined by the INTERFACE statement.	IPv4 INTERFACE statement for HiperSockets and Static VIPAs
	NWMIfChpID	V2R1	The NWMIfChpID provides the CHPID value for IPv4 IPAQIDIO interfaces defined by the INTERFACE statement.	IPv4 INTERFACE statement for HiperSockets and Static VIPAs
	NWMIfCfgMtu	V2R1	The NWMIfCfgMtu provides the configured MTU value for IPv4 IPAQIDIO interfaces defined by the INTERFACE statement.	IPv4 INTERFACE statement for HiperSockets and Static VIPAs
	NWMIfDatapathNum	V2R1	The NWMIfDatapathNum provides the datapath address for IPv4 IPAQIDIO interfaces defined by the INTERFACE statement, and for IPv6 IPAQIDIO6 interfaces.	IPv4 INTERFACE statement for HiperSockets and Static VIPAs
	NWMIfAssocName	V2R1	The NWMIfAssocName provides the TRLE name for IPv4 IPAQIDIO interfaces defined by the INTERFACE statement, and for IPv6 IPAQIDIO6 interfaces.	IPv4 INTERFACE statement for HiperSockets and Static VIPAs
	NWMIfSrcVipaIntfName	V2R1	The NWMIfSrcVipaIntfName provides the SOURCEVIPAINTERFACE name for IPv4 IPAQIDIO interfaces defined by the INTERFACE statement.	IPv4 INTERFACE statement for HiperSockets and Static VIPAs
	NWMIpadAddr	V2R1	The NWMIpadAddr provides the IP address for IPv4 IPAQIDIO and VIRTUAL interfaces defined by the INTERFACE statement.	IPv4 INTERFACE statement for HiperSockets and Static VIPAs
	NWMIfFlags	V2R1	• The NWMIfSMCRFlg flag bit is set in the NWMIfFlags field for OSD interfaces that have SMCR specified on the INTERFACE statement • The NWMIfPNetIDFlg flag bit is set in the NWMIfFlags field for OSD, OSX and RNIC interfaces to indicate the NWMIfPNetID field contains the Physical network ID.	Shared Memory Communications over Remote Direct Memory Access
	NWMIfType	V2R1	The NWMIfType field can have a new NWMIFTRNIC type for 10 GbE RoCE Express interfaces, which are represented as RNIC interfaces.	Shared Memory Communications over Remote Direct Memory Access
	NWMIfMacAddr	V2R1	The NWMIfMacAddr field contains the VMAC address generated by the VTAM DLC layer for 10 GbE RoCE Express interfaces.	Shared Memory Communications over Remote Direct Memory Access
	NWMIfAssocName	V2R1	The NWMIfAssocName field contains the TRLE name for 10 GbE RoCE Express interfaces.	Shared Memory Communications over Remote Direct Memory Access

Table 19. Summary of new Communications Server TCP/IP callable NMI (EZBNMIFR) (continued)

Request	Parameter/output	Rel.	Description	Reason for change
GetIfs (continued)	NWMIfPFID	V2R1	The new NWMIfPFID field contains the PFID for 10 GbE RoCE Express interfaces.	Shared Memory Communications over Remote Direct Memory Access
	NWMIfGID	V2R1	The new NWMIfGID field contains the GID for 10 GbE RoCE Express interfaces.	Shared Memory Communications over Remote Direct Memory Access
	NWMIfSMCRStatus	V2R1	The new NWMIfSMCRStatus field contains the SMCR status for OSD interfaces.	Shared Memory Communications over Remote Direct Memory Access
	NWMIfPNetID	V2R1	The new NWMIfPNetID field contains the Physical network ID for active OSD, OSX and 10 GbE RoCE Express interfaces.	Shared Memory Communications over Remote Direct Memory Access
	NWMIfFlags2	V2R1	The NWMIfRnicAssoc is set in the NWMIfFlags2 field to indicate that this 10 GbE RoCE Express interface is associated with an OSD interface.	Shared Memory Communications over Remote Direct Memory Access
	NWMIfChksumOffload and NWMIfTcpSegOffload parameters	V1R13	These flags are now valid for IPAQENET6 interfaces.	OSA-Express4S QDIO IPv6 checksum and segmentation offload
	NWMIFTHIPERIQDX	V1R13	New interface type for IQDX (for interface types of either IPAQIQX or IPAQIQX6).	HiperSockets optimization for intraensemble data networks
	NWMIfIQDXFlg	V1R13	For an OSX interface, an indicator if an associated dynamic IQDX interface name field is provided.	HiperSockets optimization for intraensemble data networks
	NWMIfIQDXName	V1R13	For an OSX interface, the associated dynamic IQDX interface name.	HiperSockets optimization for intraensemble data networks
	N/A	V1R12	New poll-type request to provide TCP/IP interface attribute and IP address information.	Enhancements to TCP/IP callable NMI (EZBNMIFR) - network interface and TCP/IP statistics
GetIfStats	NWMIFTHIPERIQDX	V1R13	New interface type for IQDX (for interface types of either IPAQIQX or IPAQIQX6).	HiperSockets optimization for intraensemble data networks
	NWMIfStIQDXFlg	V1R13	For an OSX interface, an indicator if statistics for an associated dynamic IQDX interface exists.	HiperSockets optimization for intraensemble data networks
	NWMIfStInIQDXBytes NWMIfStInIQDXUcastPkts NWMIfStOutIQDXBytes NWMIfStOutIQDXUcastPkts	V1R13	For an OSX interface, statistics for bytes and unicast packets sent and received over the associated dynamic IQDX interface.	HiperSockets optimization for intraensemble data networks
	N/A	V1R12	New poll-type request to provide TCP/IP stack interface counters.	Enhancements to TCP/IP callable NMI (EZBNMIFR) - network interface and TCP/IP statistics
GetIfStatsExtended	NWMIFTHIPERIQDX	V1R13	New interface type for IQDX (for interface types of either IPAQIQDX or IPAQIQDX6)	HiperSockets optimization for intraensemble data networks
	N/A	V1R12	New poll-type request to provide DLC interface counters.	Enhancements to TCP/IP callable NMI (EZBNMIFR) - network interface and TCP/IP statistics
GetProfile	Global configuration section: NMTP_GBCFPFport	V2R1 with APARs OA51949 and PI75199	Global Configuration section: NMTP_GBCPPFport represents the configured or learned port number used for its corresponding NMTP_GBCFPFid.	Communications Server support for RoCE Express2 features

Table 19. Summary of new Communications Server TCP/IP callable NMI (EZBNMIFR) (continued)

Request	Parameter/output	Rel.	Description	Reason for change
GetProfile	NMTP_PIDSEye	V2R1	In the C header file, EZBNMMPC, eyecatcher constant, NMTP_PIDSEYEC has been corrected.	Release update
	NMTP_V6CFDynXcfAddr	V2R1	In the C header file, EZBNMMPC, this IPv6 address field has been redefined from char to struct in6_addr.	Release update
	NMTP_IPA6Addr	V2R1	In the C header file, EZBNMMPC, this IPv6 address field has been redefined from char to struct in6_addr.	Release update
GetProfile (continued)	NMTP_INTFFlags	V2R1	New flag NMTP_INTFTempIP in field NMTP_INTFFlags that indicates the Interface is configured with the TEMPIP parameter.	Enable DHCP clients on OSA Interfaces
	NMTP_TCCFConnectTimeOut NMTP_TCCFConnectInitInterval NMTP_TCCFFRRThreshold NMTP_TCCFKeepAliveProbes NMTP_TCCFKAProbeInterval NMTP_TCCFMaxRetransmit NMTP_TCCFNagle NMTP_TCCFQueuedRTT NMTP_TCCFRetransmitAttempts NMTP_TCCFMaxSndBufSize NMTP_TCCFTimeWaitInterval	V2R1	New fields to indicate the setting of new TCPCONFIG parameters: • CONNECTTIMEOUT • CONNECTINITINTERVAL • FRRTHRESHOLD • KEEPALIVEPROBES • KEEPALIVEPROBEINTERVAL • MAXIMUMRETRANSMITTIME • NAGLE and NONAGLE • QUEUEDRTT • RETRANSMITATTEMPTS • TCPMAXSENDBUFRSIZE • TIMEWAITINTERVAL	Enhanced TCP protocol configuration options and default settings
	NMTP_GBCFFlags NMTP_GBCFPFidCnt NMTP_GBCFFixedMemory NMTP_GBCFTcpKeepMinInt NMTP_GBCFPFs array	V2R1	• The new NMTP_GBCFSMCR flag bit is set in the NMTP_GBCFFlags field to indicate that the SMCR operand was specified on the GLOBALCONFIG statement. • The new NMTP_GBCFPFidCnt field indicates the current number of configured PCI-function ID (PFID) and Port number entries in the NMTP_GBCFPFs array. • The new NMTP_GBCFFixedMemory field specifies the SMCR FIXEDMEMORY value. FIXEDMEMORY is specified in megabyte increments. • The new NMTP_GBCFTcpKeepMinInt field specifies the SMCR TCPKEEPMININTERVAL value. • The new NMTP_GBCFPFs array contains a maximum of 16 PFID and port number paired entries: – NMTP_GBCFPFid is the 2-byte hexadecimal PFID value. – NMTP-GBCFPFport is the 1-byte decimal port number. – NMTP_GBCFPFmtu is a 2-byte decimal maximum transmission unit (MTU) value.	Shared Memory Communications over Remote Direct Memory Access

Table 19. Summary of new Communications Server TCP/IP callable NMI (EZBNMIFR) (continued)

Request	Parameter/output	Rel.	Description	Reason for change
GetProfile (continued)	NMTP_PORTFlags	V2R1	The NMTP_PORTNOSMCR flag bit is set in the NMTP_PORTFlags field to indicate this port or port range is disabled for SMC-R.	Shared Memory Communications over Remote Direct Memory Access
	NMTP_INTFFlags	V2R1	The NMTP_INTFSMCR flag bit is set in the NMTP_INTFFlags field for OSA interfaces that have SMCR specified or that take the SMCR default on the INTERFACE statement.	Shared Memory Communications over Remote Direct Memory Access
	NMTP_MGMTSmf119Types	V2R1	• The new NMTP_MGMT119SmcrGrpStats flag bit is set in the NMTP_MGMTSmf119Type field to indicate that the new SMC-R link group statistics records were requested on the SMFCONFIG profile statement. • The new NMTP_MGMT119SmcrLnkEvent flag bit is set in the NMTP_MGMTSmf119Type field to indicate that the new SMC-R link state start and end records were requested on the SMFCONFIG profile statement.	Shared Memory Communications over Remote Direct Memory Access
	NMTP_V4CFFlags	V2R1	The description of flag NMTP_V4CFQDIOAcc is updated. The restriction of the QDIO Accelerator to sysplex distributor traffic is no longer determined only by whether IP datagram forwarding is enabled.	QDIO acceleration coexistence with IP filtering
	NMTP_TCCFSelectiveACK	V2R1	New flag is added to indicate the setting of TCPCONFIG SELECTIVEACK.	TCP support for selective acknowledgements
	NMTP_NETACache	V2R1	New field is added to indicate the setting of the CACHEALL, CACHEPERMIT, and CACHESAME parameters on the NETACCESS statement.	Improve auditing of NetAccess rules
	NMTP_TCCFEphemPortLow	V2R1	New field is added to indicate the low and high port values for TCP ephemeral ports.	User control of Ephmeral Port Ranges
	NMTP_TCCFEphPortHighNum	V2R1	New fields is added to indicate the low and high port values for TCP ephemeral ports.	User control of Ephmeral Port Ranges
	NMTP_UDCFEphemPortLow	V2R1	New fields is added to indicate the low and high port values for UDP ephemeral ports	User control of Ephmeral Port Ranges
	NMTP_UDCFEphPortHighNum	V2R1	New fields is added to indicate the low and high port values for UDP ephemeral ports	User control of Ephmeral Port Ranges

Table 19. Summary of new Communications Server TCP/IP callable NMI (EZBNMIFR) (continued)

Request	Parameter/output	Rel.	Description	Reason for change
GetProfile (continued)	NMTP_V4CFDynXcfSrcVipaIfNameFlg	V2R1	New flag is added to indicate if the dynamic XCF source VIPA interface name is specified.	IPv4 INTERFACE statement for HiperSockets and Static VIPAs
	NMTP_V4CFDynXcfSrcVipaIfName	V2R1	New field is added to indicate the configured dynamic XCF source VIPA interface name.	IPv4 INTERFACE statement for HiperSockets and Static VIPAs
	NMTP_INTFDefIntf NMTP_INTFFlags	V2R1	The NMTP_INTFDefIntf flag bit is set in the NMTP_INTFFlags field for IPv4 IPAQIDIO and VIRTUAL interfaces that are defined by the INTERFACE statement.	IPv4 INTERFACE statement for HiperSockets and Static VIPAs
	NMTP_INTFIpBcast	V2R1	The NMTP_INTFIpBcast flag bit is set in the NMTP_INTFFlags field for IPv4 IPAQIDIO interfaces that are defined by the INTERFACE statement with the IPBCAST parameter specified.	IPv4 INTERFACE statement for HiperSockets and Static VIPAs
	NMTP_INTFChpID	V2R1	The NMTP_INTFChpID provides the CHPID value for IPv4 IPAQIDIO interfaces that are defined by the INTERFACE statement.	IPv4 INTERFACE statement for HiperSockets and Static VIPAs
	NMTP_INTFIPv4Mask	V2R1	The NMTP_INTFIPv4Mask provides the configured subnet mask for IPv4 IPAQIDIO interfaces that are defined by the INTERFACE statement.	IPv4 INTERFACE statement for HiperSockets and Static VIPAs
	NMTP_INTFMtu	V2R1	The NMTP_INTFMtu provides the configured MTU value for IPv4 IPAQIDIO interfaces that are defined by the INTERFACE statement.	IPv4 INTERFACE statement for HiperSockets and Static VIPAs
	NMTP_INTFIPv4Addr	V2R1	The NMTP_INTFIPv4Addr provides the IP address for IPv4 IPAQIDIO and VIRTUAL interfaces that are defined by the INTERFACE statement.	IPv4 INTERFACE statement for HiperSockets and Static VIPAs
	NMTP_INTFSrcVipaIntfName	V2R1	The NMTP_INTFSrcVipaIntfName provides the SOURCEVIPAINTERFACE name for IPv4 IPAQIDIO interfaces that are defined by the INTERFACE statement.	IPv4 INTERFACE statement for HiperSockets and Static VIPAs
	NMTP_GBCFSegOffload	V1R13	Use of this flag is deprecated. Use NMTP_V4CFSegOffload.	OSA-Express4S QDIO IPv6 checksum and segmentation offload
	NMTP_V4CFChkOffload	V1R13	New flag to indicate setting of IPCONFIG CHECKSUMOFFLOAD.	OSA-Express4S QDIO IPv6 checksum and segmentation offload
	NMTP_V4CFSegOffload	V1R13	New flag to indicate setting of IPCONFIG SEGMENTATIONOFFLOAD.	OSA-Express4S QDIO IPv6 checksum and segmentation offload
	NMTP_V6CFChkOffload	V1R13	New flag to indicate setting of IPCONFIG6 CHECKSUMOFFLOAD.	OSA-Express4S QDIO IPv6 checksum and segmentation offload
	NMTP_V6CFSegOffload	V1R13	New flag to indicate setting of IPCONFIG6 SEGMENTATIONOFFLOAD.	OSA-Express4S QDIO IPv6 checksum and segmentation offload
	NMTP_GBCFAutoIQDX	V1R13	New flags to indicate setting of GLOBALCONFIG AUTOIQDX	HiperSockets optimization for intraensemble data networks

Table 19. Summary of new Communications Server TCP/IP callable NMI (EZBNMIFR) (continued)

Request	Parameter/output	Rel.	Description	Reason for change
GetProfile (continued)	NMTP_DVCFSAFNameSet	V1R13	New flag in field NMTP_DVCFFlags to indicate if the SAF parameter is specified on the VIPARANGE statement.	Improved security granularity for VIPARANGE DVIPAs
	NMTP_DVCFSAFName	V1R13	New field to indicate the name that is specified on the SAF parameter of the VIPARANGE statement.	Improved security granularity for VIPARANGE DVIPAs
	NMTP_PORTJobName	V1R13	This field can now contain a job name consisting of a 1-7 character prefix followed by an asterisk.	Wildcard support for the PORTRANGE statement
	NMTP_INTFChpIDFlg NMTP_INTFChpIDType NMTP_V6CFOSMSecClass	V1R12	• New field that provides the IPSECURITY OSMSECCLASS value from the IPCONFIG6 profile statement. • New flag in field NMTP_INTFFlags that indicates whether an optional CHPID value was specified in field NMTP_INTFChpID. • New field that provides the CHPID type for OSA-Express interfaces defined by the INTERFACE statement.	z/OS Communications Server in an ensemble
	NMTP_INTFDynTypes	V1R12	Updated to return the NMTP_INTFDynTypes field which indicates the dynamic inbound performance types. This field is only set when field NMTP_INTFInbPerfType is set to NMTP_INTFIPDYN and the interface was defined by an INTERFACE statement. The record field is x'80', NMTP_INTFDYNWRKLDQ. If set, DYNAMIC WORKLOADQ is configured.	Performance improvements for sysplex distributor connection routing
	NMTP_DVCFPfxLen NMTP_DDVSTier1Gre	V1R12	• This existing field is used to return the configured IPv4 prefix length of an IPv4 DVIPA. It is now also used to return the configured IPv6 prefix length of an IPv6 DVIPA. • This existing field is used to indicate that generic routing encapsulation (GRE) is used to distribute requests to IPv4 non-z/OS targets. It can now also indicate that IPv6 routing encapsulation is used to distribute requests to IPv6 non-z/OS targets.	Extend sysplex distributor support for DataPower for IPv6
	NMTP_MGMT119DVIPA NMTP_MGMTNMSmfDVIPA	V1R12	• New flag added to the NMTP_MGMTSmf119Types field to indicate whether the new DVIPA SMF 119 records were requested on the SMFCONFIG profile statement. • New flag added to the NMTP_MGMTNetMonSmfRecs field to indicate whether the new DVIPA SMF 119 records were requested on the NETMONITOR profile statement.	SMF event records for sysplex events

Table 19. Summary of new Communications Server TCP/IP callable NMI (EZBNMIFR) (continued)

Request	Parameter/output	Rel.	Description	Reason for change
GetProfile (continued)	NMTP_DDVSDistMethod output field	V1R12	New NMTP_DDVSHotStandby value added to field to indicate the new HotStandby distribution method.	Sysplex distributor support for hot-standby server
	NMTP_DDVSFlags output field	V1R12	New HotStandby flags are added: • NMTP_DDVSSrvTypePreferred is set if the server type is Preferred. • NMTP_DDVSSrvTypeBackup is set if the server type is Backup. • NMTP_DDVSAutoSwitchBack is set if AUTOSWITCHBACK is configured. • NMTP_DDVSHealthSwitch is set if HEALTHSWITCH is configured.	Sysplex distributor support for hot-standby server
	NMTP_DDVSBackupRank output field	V1R12	New field that indicates the rank if this is a HotStandby backup server.	Sysplex distributor support for hot-standby server
	NMTP_DASP section NMTP_PICOSecChanged NMTP_SRCIFlags	V1R12	• This new section provides information from the new DEFADDRTABLE TCP/IP profile statement. • New flag defined for the new DEFADDRTABLE profile statement. • New flag added to this flags field to support the new PUBLICADDRS parameter on the SRCIP TCP/IP profile statement.	Configurable default address selection policy table
	NMTP_MGMTNetMonSmfRecs field	V1R12	New flag bits, NMTP_MGMTNMSmfCSMAIL and NMTP_MGMTNMSmfCSSMTP, added to field NMTP_MGMTNetMonSmfRecs to indicate if CSSMTP SMF 119 records were requested.	Management data for CSSMTP
	New flag NMTP_GBCFSysMonNoJoin added to NMTP_GBCFSysMonOptions field	V1R12	Indicates whether GLOBALCONFIG SYSPLEXMONITOR NOJOIN is configured.	Control joining the sysplex XCF group
GetRnics	Base section: • NWMRnicBGen • NWMRnicBSpeed	V2R1 with APARs OA51949 and PI75199	Base section: • NWMRnicBGen represents the RNIC card generation level (IBM 10 GbE RoCE Express or IBM 10 GbE RoCE Express2) • NWMRnicBSpeed represents the transmission level for the RNIC.	Communications Server support for RoCE Express2 features
GetRnics	N/A	V2R1	New poll-type request to obtain information for SMC-R link groups and the SMC-R links in each group.	Shared Memory Communications over Remote Direct Memory Access
GetSmcLinks	N/A	V2R1	New poll-type request to obtain information for 10 GbE RoCE Express interfaces.	Shared Memory Communications over Remote Direct Memory Access
GetStorageStatistics	NWMStgSMCRCfg New SMC-R storage utilization: NWMStg64SMCRFixedCurrent NWMStg64SMCRFixedMax NWMStg64SMCRFixedLimit NWMStg64SMCRSendCurrent NWMStg64SMCRSendMax NWMStg64SMCRRecvCurrent NWMStg64SMCRRecvMax	V2R1	• New flag bit NWMStgSMCRCfg is set in the NWMStgFlags field to indicate whether the SMCR parameter is configured on the GLOBALCONFIG statement. • The SMC-R storage utilization information is added when the SMCR parameter is configured on the GLOBALCONFIG statement.	Shared Memory Communications over Remote Direct Memory Access
	NWMStg64PrivateCurrent NWMStg64PrivateMax NWMStg64PrivateFree NWMStg64PrivateTrace NWMStg64ComTrace	V1R13	New parameters to return the storage usage information for 64-bit private storage and 64-bit storage used for tracing.	Increased CTRACE and VIT capacity
	NWMStgLPACurrent	V1R12	New parameter to return the storage used for dynamic LPA modules.	Enhancements to the TCP/IP storage display

Table 19. Summary of new Communications Server TCP/IP callable NMI (EZBNMIFR) (continued)

Request	Parameter/output	Rel.	Description	Reason for change
GetTCPListeners	NWMTCPLConnFlood	V1R13	New bit defined to indicate whether the server is under a potential connection flood attack.	Expanded Intrusion Detection Services
GetTnProfile	SMF119TN_TPSSLV3	V2R1	New field to enable or disable SSLV3	APAR PI28679

TCP/IP stack records

Table 20 lists the changes made to the TCP/IP stack SMF type 119 records.

Table 20. Summary of new and changed Communications Server SMF type 119 record - TCP/IP stack records

Record type	Record field	Release	Description	Reason for change
DVIPA status change	N/A	V1R12	New record, subtype 32	SMF event records for sysplex events
DVIPA removed	N/A	V1R12	New record, subtype 33	SMF event records for sysplex events
DVIPA target added	N/A	V1R12	New record, subtype 34	SMF event records for sysplex events
DVIPA target removed	N/A	V1R12	New record, subtype 35	SMF event records for sysplex events
DVIPA target server started	N/A	V1R12	New record, subtype 36	SMF event records for sysplex events
DVIPA target server ended	N/A	V1R12	New record, subtype 37	SMF event records for sysplex events
Interface statistics (subtype 6)	SMF119IS_IFDesc SMF119IS_IFFlags SMF119IS_IFPNetID	V2R1	• The SMF119IS_IFDesc field can have a new SMF119IS_IFLink_RNIC type for 10 GbE RoCE Express interfaces, which are represented as RNIC interfaces. • New SMF119IS_IFFlags field contains information, related to the SMC-R characteristics, if any, for the reported interface. • New SMF119IS_IFPNetID field contains the Physical network ID for active OSD, OSX and RNIC interfaces.	Shared Memory Communications over Remote Direct Memory Access
	SMF119IS_IFLink_IPQIQDX SMF119IS_IFLink_IPQIQX6	V1R13	New interface types IPAQIQDX and IPAQIQDX6	HiperSockets optimization for intraensemble data networks
	SMF119IS_IfIQDXName SMF119IS_IfInIQDXBytes SMF119IS_IfInIQDXUniC SMF119IS_IfOutIQDXBytes SMF119IS_IfOutInIQDXUniC	V1R13	New fields to show the associated dynamic IQDX for an OSX interface and the number of bytes and unicast packets that traversed it.	HiperSockets optimization for intraensemble data networks

Table 20. Summary of new and changed Communications Server SMF type 119 record - TCP/IP stack records (continued)

Record type	Record field	Release	Description	Reason for change
TCP/IP profile record (subtype 4)	Global configuration section NMTP_GBCFPFport	V2R1 with APARs OA51949 and PI75199	Global Configuration section NMTP_GBCPPFport represents the configured or learned port number used for its corresponding NMTP_GBCFPFid.	Communications Server support for RoCE Express2 features
	NMTP_INTFFlags	V2R1	New flag NMTP_INTFTempIP in field NMTP_INTFFlags that indicates the Interface is configured with the TEMPIP parameter.	Enable DHCP clients on OSA Interfaces
	NMTP_TCCFTimeWaitInterval	V2R1	New field that provides the setting of the TCPCONFIG TIMEWAITINTERVAL value.	Enhanced TCP protocol configuration options and default settings
	NMTP_TCCFRetransmitAttempts	V2R1	New field that provides the setting of the TCPCONFIG RETRANSMITATTEMPTS value.	Enhanced TCP protocol configuration options and default settings
	NMTP_TCCFConnectTimeOut	V2R1	New field that provides the setting of the TCPCONFIG CONNECTTIMEOUT value.	Enhanced TCP protocol configuration options and default settings
	NMTP_TCCFConnectInitInterval	V2R1	New field that provides the setting of the TCPCONFIG CONNECTINITINTERVAL value.	Enhanced TCP protocol configuration options and default settings
	NMTP_TCCFNagle	V2R1	New field that provides the setting of the TCPCONFIG NAGLE value.	Enhanced TCP protocol configuration options and default settings
	NMTP_TCCFKeepAliveProbes	V2R1	New field that provides the setting of the TCPCONFIG KEEPALIVEPROBES value.	Enhanced TCP protocol configuration options and default settings
	NMTP_TCCFKAProbeInterval	V2R1	New field that provides the setting of the TCPCONFIG KEEPALIVEPROBEINTERVAL value.	Enhanced TCP protocol configuration options and default settings
	NMTP_TCCFQueuedRTT	V2R1	New field that provides the setting of the TCPCONFIG QUEUEDRTT value.	Enhanced TCP protocol configuration options and default settings
	NMTP_TCCFFRRThreshold	V2R1	New field that provides the setting of the TCPCONFIG FRRTHRESHOLD value.	Enhanced TCP protocol configuration options and default settings
	NMTP_TCCFDefltMaxSndBufSize	V2R1	New field that provides the setting of the TCPCONFIG TCPMAXSENDBUFRSIZE value.	Enhanced TCP protocol configuration options and default settings

Table 20. Summary of new and changed Communications Server SMF type 119 record - TCP/IP stack records (continued)

Record type	Record field	Release	Description	Reason for change
TCP/IP profile record (subtype 4) (continued)	NMTP_TCCFEphemPortBegNum	V2R1	The NMTP_TCCFEphemPortBegNum field contains the beginning port range value for TCP ephemeral ports.	User control of Ephmeral Port Ranges
	NMTP_TCCFEphemPortEndNum	V2R1	The NMTP_TCCFEphemPortEndNum field contains the ending port range value for TCP ephemeral ports.	User control of Ephmeral Port Ranges
	NMTP_UDCFEphemPortBegNum	V2R1	The NMTP_UDCFEphemPortBegNum field contains the beginning port range value for UDP ephemeral ports.	User control of Ephmeral Port Ranges
	NMTP_UDCFEphemPortEndNum	V2R1	The NMTP_UDCFEphemPortEndNumfield contains the ending port range value for UDP ephemeral ports.	User control of Ephmeral Port Ranges
	NMTP_V4CFDynXcfSrcVipaIfNameFlg	V2R1	New flag is added to indicate if the dynamic XCF source VIPA interface name is specified.	IPv4 INTERFACE statement for HiperSockets and Static VIPAs
	NMTP_V4CFDynXcfSrcVipaIfName	V2R1	New field is added to provide the configured dynamic XCF source VIPA interface name	IPv4 INTERFACE statement for HiperSockets and Static VIPAs
	• NMTP_INTFFlags • NMTP_INTFChpID • NMTP_INTFIPv4MaskNMTP_INTFMtu • NMTP_INTFSrcVipaIntfName	V2R1	• The NMTP_INTFDefIntf bit is set in the NMTP_INTFFlags field for IPv4 IPAQIDIO and VIRTUAL interfaces that are defined by the INTERFACE statement. • The NMTP_INTFIpBcast is set in the NMTP_INTFFlags field for IPv4 IPAQIDIO interfaces that are defined by the INTERFACE statement with the IPBCAST parameter specified. • The NMTP_INTFChpID provides the CHPID value for IPv4 IPAQIDIO interfaces that are defined by the INTERFACE statement. • The NMTP_INTFIPv4Mask provides the configured subnet mask for IPv4 IPAQIDIO interfaces that are defined by the INTERFACE statement. • The NMTP_INTFMtu provides the configured MTU value for IPv4 IPAQIDIO interfaces that are defined by the INTERFACE statement. • The NMTP_INTFSrcVipaIntfName provides the SOURCEVIPAINTERFACE name for IPv4 IPAQIDIO interfaces that are defined by the INTERFACE statement.	IPv4 INTERFACE statement for HiperSockets and Static VIPAs

Table 20. Summary of new and changed Communications Server SMF type 119 record - TCP/IP stack records (continued)

Record type	Record field	Release	Description	Reason for change
TCP/IP profile record (subtype 4) (continued)	NMTP_NETACache	V2R1	New field is added to indicate the setting of the CACHEALL, CACHEPERMIT, and CACHESAME parameters on the NETACCESS statement.	Improve auditing of NetAccess rules
	NMTP_TCCFSelectiveACK	V2R1	New flag is added to indicate the setting of SELECTIVEACK/NOSELECTIVEACK.	TCP support for selective acknowledgements
	NMTP_V4CFFlags	V2R1	The description of flag NMTP_V4CFQDIOAcc is updated. The restriction of QDIO Accelerator to sysplex distributor traffic is no longer determined only by whether IP datagram forwarding is enabled.	QDIO acceleration coexistence with IP filtering
	NMTP_GBCFFlags NMTP_GBCFPFidCnt NMTP_GBCFFixedMemory NMTP_GBCFTcpKeepMinInt NMTP_GBCFPFs array	V2R1	• The new NMTP_GBCFSMCR flag bit is set in the NMTP_GBCFFlags field to indicate that the SMCR operand was specified on the GLOBALCONFIG statement. • The new NMTP_GBCFPFidCnt field indicates the current number of configured PCI-function ID (PFID) and Port number entries in the NMTP_GBCFPFs array. • The new NMTP_GBCFFixedMemory field specifies the SMCR FIXEDMEMORY value. FIXEDMEMORY is specified in megabyte increments. • The new NMTP_GBCFTcpKeepMinInt field specifies the SMCR TCPKEEPMININTERVAL value. • The new NMTP_GBCFPFs array contains a maximum of 16 PFID and port number paired entries: – NMTP_GBCFPFid is the 2-byte hexadecimal PFID. – NMTP_GBCFPFport is the 1-byte decimal port number. – NMTP_GBCFPFmtu is a 2-byte maximum transmission unit (MTU) decimal value.	Shared Memory Communications over Remote Direct Memory Access
	NMTP_PORTFlags	V2R1	The NMTP_PORTNOSMCR flag bit is set in the NMTP_PORTFlags field to indicate this port or port range is disabled for SMC-R.	Shared Memory Communications over Remote Direct Memory Access
	NMTP_INTFFlags	V2R1	The NMTP_INTFSMCR flag bit is set in the NMTP_INTFFlags field for OSA interfaces that have SMCR specified or that take the SMCR default on the INTERFACE statement.	Shared Memory Communications over Remote Direct Memory Access
	NMTP_MGMTSmf119Types	V2R1	• The new NMTP_MGMT119SmcrGrpStats flag bit is set in the NMTP_MGMTSmf119Type field to indicate that the new SMC-R link group statistics records were requested on the SMFCONFIG profile statement. • The new NMTP_MGMT119SmcrLnkEvent flag bit is set in the NMTP_MGMTSmf119Type field to indicate that the new SMC-R link state start and end records were requested on the SMFCONFIG profile statement.	Shared Memory Communications over Remote Direct Memory Access

Table 20. Summary of new and changed Communications Server SMF type 119 record - TCP/IP stack records (continued)

Record type	Record field	Release	Description	Reason for change
TCP/IP profile record (subtype 4) (continued)	NMTP_PIDSEye	V2R1	In the C header file, EZBNMMPC, eyecatcher constant, NMTP_PIDSEYEC has been corrected.	Release update
	NMTP_V6CFDynXcfAddr	V2R1	In the C header file, EZBNMMPC, this IPv6 address field has been redefined from char to struct in6_addr.	Release update
	NMTP_IPA6Addr	V2R1	In the C header file, EZBNMMPC, this IPv6 address field has been redefined from char to struct in6_addr.	Release update
	NMTP_GBCFAutoIQDX	V1R13	Subtype 4. New flags to indicate setting of GLOBALCONFIG AUTOIQDX.	HiperSockets optimization for intraensemble data networks
	NMTP_GBCFSegOffload	V1R13	Use of this flag is deprecated. See NMTP_V4CFSegOffload.	OSA-Express4S QDIO IPv6 checksum and segmentation offload
	NMTP_V4CFChkOffload	V1R13	New flag to indicate setting of IPCONFIG CHECKSUMOFFLOAD.	OSA-Express4S QDIO IPv6 checksum and segmentation offload
	NMTP_V4CFSegOffload	V1R13	New flag to indicate setting of IPCONFIG SEGMENTATIONOFFLOAD.	OSA-Express4S QDIO IPv6 checksum and segmentation offload
	NMTP_V6CFChkOffload	V1R13	New flag to indicate setting of IPCONFIG6 CHECKSUMOFFLOAD.	OSA-Express4S QDIO IPv6 checksum and segmentation offload
	NMTP_V6CFSegOffload	V1R13	New flag to indicate setting of IPCONFIG6 SEGMENTATIONOFFLOAD.	OSA-Express4S QDIO IPv6 checksum and segmentation offload
	NMTP_DVCFSAFNameSet	V1R13	New flag in field NMTP_DVCFFlags to indicate if the SAF parameter is specified on the VIPARANGE statement.	Improved security granularity for VIPARANGE DVIPAs
	NMTP_DVCFSAFName	V1R13	New field to indicate the name specified on the SAF parameter of the VIPARANGE statement.	Improved security granularity for VIPARANGE DVIPAs
	NMTP_PORTJobName	V1R13	This field can now contain a job name prefix (1-7 character job name followed by an asterisk) for entries that represent a PORTRANGE profile statement.	Wildcard support for the PORTRANGE statement
	• NMTP_INTFChpIDFlg • NMTP_INTFChpIDType • NMTP_V6CFOSMSecClass	V1R12	• New field that provides the IPSECURITY OSMSECCLASS value from the IPCONFIG6 profile statement. • New flag in field NMTP_INTFFlags that indicates whether an optional CHPID value was specified in field NMTP_INTFChpID. • New field that provides the CHPID type for OSA-Express interfaces defined by the INTERFACE statement.	z/OS Communications Server in an ensemble

Table 20. Summary of new and changed Communications Server SMF type 119 record - TCP/IP stack records (continued)

Record type	Record field	Release	Description	Reason for change
TCP/IP profile record (subtype 4) (continued)	NMTP_DVCFPfxLen	V1R12	This existing field is used to return the configured IPv4 prefix length of an IPv4 DVIPA. It is now also used to return the configured IPv6 prefix length of an IPv6 DVIPA.	Extend sysplex distributor support for DataPower for IPv6
	NMTP_DDVSTier1Gre	V1R12	This existing field is used to indicate that generic routing encapsulation (GRE) is used to distribute requests to IPv4 non-z/OS targets. It can now also indicate that IPv6 routing encapsulation is used to distribute requests to IPv6 non-z/OS targets.	Extend sysplex distributor support for DataPower for IPv6
	NMTP_INTFDynTypes	V1R12	Indicates the dynamic inbound performance types. This field is only set when field NMTP_INTFInbPerfType is set to NMTP_INTFIPDYN and the interface was defined by an INTERFACE statement. The record field is x'80', NMTP_INTFDYNWRKLDQ. If set, DYNAMIC WORKLOADQ is configured.	Performance improvements for sysplex distributor connection routing
	• NMTP_PICOSecChanged • New NMTP_DASP section • NMTP_SRCIFlags	V1R12	• New flag defined for the new DEFADDRTABLE profile statement. • This new section provides information from the new DEFADDRTABLE TCP/IP profile statement. • New flag added to this flags field to support the new PUBLICADDRS parameter on the SRCIP TCP/IP profile statement.	Configurable default address selection policy table
	• NMTP_MGMTNMSMFCSSMTP • NMTP_MGMTNMSMFCSMAIL	V1R12	New flags added to field NMTP_MGMTNetMonSmfRecs to indicate if new CSSMTP SMF 119 records were requested on the NETMONITOR profile statement.	Management data for CSSMTP
	• NMTP_MGMT119DVIPA • NMTP_MGMTNMSmfDVIPA	V1R12	• New flag added to the NMTP_MGMTSmf119Types field to indicate whether the new DVIPA SMF 119 records were requested on the SMFCONFIG profile statement. • New flag added to the NMTP_MGMTNetMonSmfRecs field to indicate whether the new DVIPA SMF 119 records were requested on the NETMONITOR profile statement.	SMF event records for sysplex events
	New flag NMTP_GBCFSysMonNoJoin added to NMTP_GBCFSysMonOptions field	V1R12	Indicates whether GLOBALCONFIG SYSPLEXMONITOR NOJOIN is configured.	Control joining the sysplex XCF group
	For the DVIPA section, NMTP_DDVSDistMethod output field	V1R12	New NMTP_DDVSHotStandby value added to field to indicate the new HotStandby distribution method.	Sysplex distributor support for hot-standby server
	For the DVIPA section, NMTP_DDVSFlags output field	V1R12	New HotStandby flags are added: • NMTP_DDVSSrvTypePreferred is set if the server type is Preferred. • NMTP_DDVSSrvTypeBackup is set if the server type is Backup. • NMTP_DDVSAutoSwitchBack is set if AUTOSWITCHBACK is configured. • NMTP_DDVSHealthSwitch is set if HEALTHSWITCH is configured.	Sysplex distributor support for hot-standby server
	For the DVIPA section, NMTP_DDVSBackupRank output field	V1R12	New field that indicates the rank if this is a HotStandby backup server.	Sysplex distributor support for hot-standby server

Table 20. Summary of new and changed Communications Server SMF type 119 record - TCP/IP stack records (continued)

Record type	Record field	Release	Description	Reason for change
TCP/IP statistics record (subtype 5)	SMF119AP_TSTCEphPortExh	V2R1	SMF119AP_TSTCEphPortExh contains the interval count of number of bind() failures because no TCP ephemeral ports were available.	User control of Ephmeral Port Ranges
	SMF119AP_TSTCEphPortAvail	V2R1	SMF119AP_TSTCEphPortAvail contains the total number of TCP ephemeral ports that are available to use for bind() requests	User control of Ephmeral Port Ranges
	SMF119AP_TSTCEphPortInUse	V2R1	SMF119AP_TSTCEphPortInUse contains the current number of TCP ephemeral ports in use	User control of Ephmeral Port Ranges
	SMF119AP_TSTCEphPortMxUse	V2R1	SMF119AP_TSTCEphPortMxUse contains the maximum number of TCP ephemeral ports used	User control of Ephmeral Port Ranges
	SMF119AP_TSUDEphPortExh	V2R1	SMF119AP_TSUDEphPortExh contains the interval count of number of bind() failures because no UDP ephemeral ports were available.	User control of Ephmeral Port Ranges
	SMF119AP_TSUDEphPortAvail	V2R1	SMF119AP_TSUDEphPortAvail contains the total number of UDP ephemeral ports that are available to use for bind() requests.	User control of Ephmeral Port Ranges
	SMF119AP_TSUDEphPortInUse	V2R1	SMF119AP_TSUDEphPortInUse contains the current number of UDP ephemeral ports in use.	User control of Ephmeral Port Ranges
	SMF119AP_TSUDEphPortMxUse	V2R1	SMF119AP_TSUDEphPortMxUse contains the maximum number of UDP ephemeral ports used	User control of Ephmeral Port Ranges
	Existing TCP stats changed: SMF119AP_TSTCEstab SMF119AP_TSTCOpenConn SMF119AP_TSTCPassConn SMF119AP_TSTCConCls SMF119AP_TSTCInSegs SMF119AP_TSTCOSegs SMF119AP_TSTCReset SMF119AP_TSTCConReset SMF119AP_TSTCOKApr SMF119AP_TSTCDropKA SMF119AP_TSTCDropF2 New SMC-R stats: SMF119AP_TSSMCRCurrEstabLnks SMF119AP_TSSMCRLnkActTimeOut SMF119AP_TSSMCRActLnkOpened SMF119AP_TSSMCRPasLnkOpened SMF119AP_TSSMCRLnksClosed SMF119AP_TSSMCRCurrEstab SMF119AP_TSSMCRActiveOpened SMF119AP_TSSMCRPassiveOpened SMF119AP_TSSMCRConnClosed SMF119AP_TSTSMCRInSegs SMF119AP_TSTSMCROutSegs SMF119AP_TSSMCRInRsts SMF119AP_TSSMCROutRsts New SMC-R storage stats: SMF119AP_TSSTSMCRFixedCurrent SMF119AP_TSSTSMCRFixedMax SMF119AP_TSSTSMCRSendCurrent SMF119AP_TSSTSMCRSendMax SMF119AP_TSSTSMCRRecvCurrent SMF119AP_TSSTSMCRRecvMax	V2R1	• When the SMCR parameter is configured on the GLOBALCONFIG statement, the listed TCP counters reflect all TCP connections, including connections over SMC-R links. • The listed SMC-R stats are added at the end of the TCP statistics section. • The listed SMC-R storage stats are added in the storage statistics section.	Shared Memory Communications over Remote Direct Memory Access

Table 21. Summary of new and changed Communications Server SMF type 119 record - TCP/IP stack records

Record type	Record field	Release	Description	Reason for change
DVIPA status change	N/A	V1R12	New record, subtype 32	SMF event records for sysplex events
DVIPA removed	N/A	V1R12	New record, subtype 33	SMF event records for sysplex events
DVIPA target added	N/A	V1R12	New record, subtype 34	SMF event records for sysplex events
DVIPA target removed	N/A	V1R12	New record, subtype 35	SMF event records for sysplex events
DVIPA target server started	N/A	V1R12	New record, subtype 36	SMF event records for sysplex events
DVIPA target server ended	N/A	V1R12	New record, subtype 37	SMF event records for sysplex events
Interface statistics (subtype 6)	SMF119IS_IFDesc SMF119IS_IFFlags SMF119IS_IFPNetID	V2R1	• The SMF119IS_IFDesc field can have a new SMF119IS_IFLink_RNIC type for 10 GbE RoCE Express interfaces, which are represented as RNIC interfaces. • New SMF119IS_IFFlags field contains information, related to the SMC-R characteristics, if any, for the reported interface. • New SMF119IS_IFPNetID field contains the Physical network ID for active OSD, OSX and RNIC interfaces.	Shared Memory Communications over Remote Direct Memory Access
	SMF119IS_IFLink_IPQIQDX SMF119IS_IFLink_IPQIQX6	V1R13	New interface types IPAQIQDX and IPAQIQDX6	HiperSockets optimization for intraensemble data networks
	SMF119IS_IfIQDXName SMF119IS_IfInIQDXBytes SMF119IS_IfInIQDXUniC SMF119IS_IfOutIQDXBytes SMF119IS_IfOutInIQDXUniC	V1R13	New fields to show the associated dynamic IQDX for an OSX interface and the number of bytes and unicast packets that traversed it.	HiperSockets optimization for intraensemble data networks

Table 21. Summary of new and changed Communications Server SMF type 119 record - TCP/IP stack records (continued)

Record type	Record field	Release	Description	Reason for change
TCP/IP profile record (subtype 4)	NMTP_INTFFlags	V2R1	New flag NMTP_INTFTempIP in field NMTP_INTFFlags that indicates the Interface is configured with the TEMPIP parameter.	Enable DHCP clients on OSA Interfaces
	NMTP_TCCFTimeWaitInterval	V2R1	New field that provides the setting of the TCPCONFIG TIMEWAITINTERVAL value.	Enhanced TCP protocol configuration options and default settings
	NMTP_TCCFRetransmitAttempts	V2R1	New field that provides the setting of the TCPCONFIG RETRANSMITATTEMPTS value.	Enhanced TCP protocol configuration options and default settings
	NMTP_TCCFConnectTimeOut	V2R1	New field that provides the setting of the TCPCONFIG CONNECTTIMEOUT value.	Enhanced TCP protocol configuration options and default settings
	NMTP_TCCFConnectInitInterval	V2R1	New field that provides the setting of the TCPCONFIG CONNECTINITINTERVAL value.	Enhanced TCP protocol configuration options and default settings
	NMTP_TCCFNagle	V2R1	New field that provides the setting of the TCPCONFIG NAGLE value.	Enhanced TCP protocol configuration options and default settings
	NMTP_TCCFKeepAliveProbes	V2R1	New field that provides the setting of the TCPCONFIG KEEPALIVEPROBES value.	Enhanced TCP protocol configuration options and default settings
	NMTP_TCCFKAProbeInterval	V2R1	New field that provides the setting of the TCPCONFIG KEEPALIVEPROBEINTERVAL value.	Enhanced TCP protocol configuration options and default settings
	NMTP_TCCFQueuedRTT	V2R1	New field that provides the setting of the TCPCONFIG QUEUEDRTT value.	Enhanced TCP protocol configuration options and default settings
	NMTP_TCCFFRRThreshold	V2R1	New field that provides the setting of the TCPCONFIG FRRTHRESHOLD value.	Enhanced TCP protocol configuration options and default settings
	NMTP_TCCFDefltMaxSndBufSize	V2R1	New field that provides the setting of the TCPCONFIG TCPMAXSENDBUFRSIZE value.	Enhanced TCP protocol configuration options and default settings

Table 21. Summary of new and changed Communications Server SMF type 119 record - TCP/IP stack records (continued)

Record type	Record field	Release	Description	Reason for change
TCP/IP profile record (subtype 4) (continued)	NMTP_TCCFEphemPortBegNum	V2R1	The NMTP_TCCFEphemPortBegNum field contains the beginning port range value for TCP ephemeral ports.	User control of Ephmeral Port Ranges
	NMTP_TCCFEphemPortEndNum	V2R1	The NMTP_TCCFEphemPortEndNum field contains the ending port range value for TCP ephemeral ports.	User control of Ephmeral Port Ranges
	NMTP_UDCFEphemPortBegNum	V2R1	The NMTP_UDCFEphemPortBegNum field contains the beginning port range value for UDP ephemeral ports.	User control of Ephmeral Port Ranges
	NMTP_UDCFEphemPortEndNum	V2R1	The NMTP_UDCFEphemPortEndNumfield contains the ending port range value for UDP ephemeral ports.	User control of Ephmeral Port Ranges
	NMTP_V4CFDynXcfSrcVipaIfNameFlg	V2R1	New flag is added to indicate if the dynamic XCF source VIPA interface name is specified.	IPv4 INTERFACE statement for HiperSockets and Static VIPAs
	NMTP_V4CFDynXcfSrcVipaIfName	V2R1	New field is added to provide the configured dynamic XCF source VIPA interface name	IPv4 INTERFACE statement for HiperSockets and Static VIPAs
	• NMTP_INTFFlags • NMTP_INTFChpID • NMTP_INTFIPv4MaskNMTP_INTFMtu • NMTP_INTFSrcVipaIntfName	V2R1	• The NMTP_INTFDefIntf bit is set in the NMTP_INTFFlags field for IPv4 IPAQIDIO and VIRTUAL interfaces that are defined by the INTERFACE statement. • The NMTP_INTFIpBcast is set in the NMTP_INTFFlags field for IPv4 IPAQIDIO interfaces that are defined by the INTERFACE statement with the IPBCAST parameter specified. • The NMTP_INTFChpID provides the CHPID value for IPv4 IPAQIDIO interfaces that are defined by the INTERFACE statement. • The NMTP_INTFIPv4Mask provides the configured subnet mask for IPv4 IPAQIDIO interfaces that are defined by the INTERFACE statement. • The NMTP_INTFMtu provides the configured MTU value for IPv4 IPAQIDIO interfaces that are defined by the INTERFACE statement. • The NMTP_INTFSrcVipaIntfName provides the SOURCEVIPAINTERFACE name for IPv4 IPAQIDIO interfaces that are defined by the INTERFACE statement.	IPv4 INTERFACE statement for HiperSockets and Static VIPAs

Table 21. Summary of new and changed Communications Server SMF type 119 record - TCP/IP stack records (continued)

Record type	Record field	Release	Description	Reason for change
TCP/IP profile record (subtype 4) (continued)	NMTP_NETACache	V2R1	New field is added to indicate the setting of the CACHEALL, CACHEPERMIT, and CACHESAME parameters on the NETACCESS statement.	Improve auditing of NetAccess rules
	NMTP_TCCFSelectiveACK	V2R1	New flag is added to indicate the setting of SELECTIVEACK/NOSELECTIVEACK.	TCP support for selective acknowledgements
	NMTP_V4CFFlags	V2R1	The description of flag NMTP_V4CFQDIOAcc is updated. The restriction of QDIO Accelerator to sysplex distributor traffic is no longer determined only by whether IP datagram forwarding is enabled.	QDIO acceleration coexistence with IP filtering
	NMTP_GBCFFlags NMTP_GBCFPFidCnt NMTP_GBCFFixedMemory NMTP_GBCFTcpKeepMinInt NMTP_GBCFPFs array	V2R1	• The new NMTP_GBCFSMCR flag bit is set in the NMTP_GBCFFlags field to indicate that the SMCR operand was specified on the GLOBALCONFIG statement. • The new NMTP_GBCFPFidCnt field indicates the current number of configured PCI-function ID (PFID) and Port number entries in the NMTP_GBCFPFs array. • The new NMTP_GBCFFixedMemory field specifies the SMCR FIXEDMEMORY value. FIXEDMEMORY is specified in megabyte increments. • The new NMTP_GBCFTcpKeepMinInt field specifies the SMCR TCPKEEPMININTERVAL value. • The new NMTP_GBCFPFs array contains a maximum of 16 PFID and port number paired entries: – NMTP_GBCFPFid is the 2-byte hexadecimal PFID. – NMTP_GBCFPFport is the 1-byte decimal port number. – NMTP_GBCFPFmtu is a 2-byte maximum transmission unit (MTU) decimal value.	Shared Memory Communications over Remote Direct Memory Access
	NMTP_PORTFlags	V2R1	The NMTP_PORTNOSMCR flag bit is set in the NMTP_PORTFlags field to indicate this port or port range is disabled for SMC-R.	Shared Memory Communications over Remote Direct Memory Access
	NMTP_INTFFlags	V2R1	The NMTP_INTFSMCR flag bit is set in the NMTP_INTFFlags field for OSA interfaces that have SMCR specified or that take the SMCR default on the INTERFACE statement.	Shared Memory Communications over Remote Direct Memory Access
	NMTP_MGMTSmf119Types	V2R1	• The new NMTP_MGMT119SmcrGrpStats flag bit is set in the NMTP_MGMTSmf119Type field to indicate that the new SMC-R link group statistics records were requested on the SMFCONFIG profile statement. • The new NMTP_MGMT119SmcrLnkEvent flag bit is set in the NMTP_MGMTSmf119Type field to indicate that the new SMC-R link state start and end records were requested on the SMFCONFIG profile statement.	Shared Memory Communications over Remote Direct Memory Access

Table 21. Summary of new and changed Communications Server SMF type 119 record - TCP/IP stack records (continued)

Record type	Record field	Release	Description	Reason for change
TCP/IP profile record (subtype 4) (continued)	NMTP_PIDSEye	V2R1	In the C header file, EZBNMMPC, eyecatcher constant, NMTP_PIDSEYEC has been corrected.	Release update
	NMTP_V6CFDynXcfAddr	V2R1	In the C header file, EZBNMMPC, this IPv6 address field has been redefined from char to struct in6_addr.	Release update
	NMTP_IPA6Addr	V2R1	In the C header file, EZBNMMPC, this IPv6 address field has been redefined from char to struct in6_addr.	Release update
	NMTP_GBCFAutoIQDX	V1R13	Subtype 4. New flags to indicate setting of GLOBALCONFIG AUTOIQDX.	HiperSockets optimization for intraensemble data networks
	NMTP_GBCFSegOffload	V1R13	Use of this flag is deprecated. See NMTP_V4CFSegOffload.	OSA-Express4S QDIO IPv6 checksum and segmentation offload
	NMTP_V4CFChkOffload	V1R13	New flag to indicate setting of IPCONFIG CHECKSUMOFFLOAD.	OSA-Express4S QDIO IPv6 checksum and segmentation offload
	NMTP_V4CFSegOffload	V1R13	New flag to indicate setting of IPCONFIG SEGMENTATIONOFFLOAD.	OSA-Express4S QDIO IPv6 checksum and segmentation offload
	NMTP_V6CFChkOffload	V1R13	New flag to indicate setting of IPCONFIG6 CHECKSUMOFFLOAD.	OSA-Express4S QDIO IPv6 checksum and segmentation offload
	NMTP_V6CFSegOffload	V1R13	New flag to indicate setting of IPCONFIG6 SEGMENTATIONOFFLOAD.	OSA-Express4S QDIO IPv6 checksum and segmentation offload
	NMTP_DVCFSAFNameSet	V1R13	New flag in field NMTP_DVCFFlags to indicate if the SAF parameter is specified on the VIPARANGE statement.	Improved security granularity for VIPARANGE DVIPAs
	NMTP_DVCFSAFName	V1R13	New field to indicate the name specified on the SAF parameter of the VIPARANGE statement.	Improved security granularity for VIPARANGE DVIPAs
	NMTP_PORTJobName	V1R13	This field can now contain a job name prefix (1-7 character job name followed by an asterisk) for entries that represent a PORTRANGE profile statement.	Wildcard support for the PORTRANGE statement
	• NMTP_INTFChpIDFlg • NMTP_INTFChpIDType • NMTP_V6CFOSMSecClass	V1R12	• New field that provides the IPSECURITY OSMSECCLASS value from the IPCONFIG6 profile statement. • New flag in field NMTP_INTFFlags that indicates whether an optional CHPID value was specified in field NMTP_INTFChpID. • New field that provides the CHPID type for OSA-Express interfaces defined by the INTERFACE statement.	z/OS Communications Server in an ensemble

Table 21. Summary of new and changed Communications Server SMF type 119 record - TCP/IP stack records (continued)

Record type	Record field	Release	Description	Reason for change
TCP/IP profile record (subtype 4) (continued)	NMTP_DVCFPfxLen	V1R12	This existing field is used to return the configured IPv4 prefix length of an IPv4 DVIPA. It is now also used to return the configured IPv6 prefix length of an IPv6 DVIPA.	Extend sysplex distributor support for DataPower for IPv6
	NMTP_DDVSTier1Gre	V1R12	This existing field is used to indicate that generic routing encapsulation (GRE) is used to distribute requests to IPv4 non-z/OS targets. It can now also indicate that IPv6 routing encapsulation is used to distribute requests to IPv6 non-z/OS targets.	Extend sysplex distributor support for DataPower for IPv6
	NMTP_INTFDynTypes	V1R12	Indicates the dynamic inbound performance types. This field is only set when field NMTP_INTFInbPerfType is set to NMTP_INTFIPDYN and the interface was defined by an INTERFACE statement. The record field is x'80', NMTP_INTFDYNWRKLDQ. If set, DYNAMIC WORKLOADQ is configured.	Performance improvements for sysplex distributor connection routing
	• NMTP_PICOSecChanged • New NMTP_DASP section • NMTP_SRCIFlags	V1R12	• New flag defined for the new DEFADDRTABLE profile statement. • This new section provides information from the new DEFADDRTABLE TCP/IP profile statement. • New flag added to this flags field to support the new PUBLICADDRS parameter on the SRCIP TCP/IP profile statement.	Configurable default address selection policy table
	• NMTP_MGMTNMSMFCSSMTP • NMTP_MGMTNMSMFCSMAIL	V1R12	New flags added to field NMTP_MGMTNetMonSmfRecs to indicate if new CSSMTP SMF 119 records were requested on the NETMONITOR profile statement.	Management data for CSSMTP
	• NMTP_MGMT119DVIPA • NMTP_MGMTNMSmfDVIPA	V1R12	• New flag added to the NMTP_MGMTSmf119Types field to indicate whether the new DVIPA SMF 119 records were requested on the SMFCONFIG profile statement. • New flag added to the NMTP_MGMTNetMonSmfRecs field to indicate whether the new DVIPA SMF 119 records were requested on the NETMONITOR profile statement.	SMF event records for sysplex events
	New flag NMTP_GBCFSysMonNoJoin added to NMTP_GBCFSysMonOptions field	V1R12	Indicates whether GLOBALCONFIG SYSPLEXMONITOR NOJOIN is configured.	Control joining the sysplex XCF group
	For the DVIPA section, NMTP_DDVSDistMethod output field	V1R12	New NMTP_DDVSHotStandby value added to field to indicate the new HotStandby distribution method.	Sysplex distributor support for hot-standby server
	For the DVIPA section, NMTP_DDVSFlags output field	V1R12	New HotStandby flags are added: • NMTP_DDVSSrvTypePreferred is set if the server type is Preferred. • NMTP_DDVSSrvTypeBackup is set if the server type is Backup. • NMTP_DDVSAutoSwitchBack is set if AUTOSWITCHBACK is configured. • NMTP_DDVSHealthSwitch is set if HEALTHSWITCH is configured.	Sysplex distributor support for hot-standby server
	For the DVIPA section, NMTP_DDVSBackupRank output field	V1R12	New field that indicates the rank if this is a HotStandby backup server.	Sysplex distributor support for hot-standby server

Table 21. Summary of new and changed Communications Server SMF type 119 record - TCP/IP stack records (continued)

Record type	Record field	Release	Description	Reason for change
TCP/IP statistics record (subtype 5)	SMF119AP_TSTCEphPortExh	V2R1	SMF119AP_TSTCEphPortExh contains the interval count of number of bind() failures because no TCP ephemeral ports were available.	User control of Ephmeral Port Ranges
	SMF119AP_TSTCEphPortAvail	V2R1	SMF119AP_TSTCEphPortAvail contains the total number of TCP ephemeral ports that are available to use for bind() requests	User control of Ephmeral Port Ranges
	SMF119AP_TSTCEphPortInUse	V2R1	SMF119AP_TSTCEphPortInUse contains the current number of TCP ephemeral ports in use	User control of Ephmeral Port Ranges
	SMF119AP_TSTCEphPortMxUse	V2R1	SMF119AP_TSTCEphPortMxUse contains the maximum number of TCP ephemeral ports used	User control of Ephmeral Port Ranges
	SMF119AP_TSUDEphPortExh	V2R1	SMF119AP_TSUDEphPortExh contains the interval count of number of bind() failures because no UDP ephemeral ports were available.	User control of Ephmeral Port Ranges
	SMF119AP_TSUDEphPortAvail	V2R1	SMF119AP_TSUDEphPortAvail contains the total number of UDP ephemeral ports that are available to use for bind() requests.	User control of Ephmeral Port Ranges
	SMF119AP_TSUDEphPortInUse	V2R1	SMF119AP_TSUDEphPortInUse contains the current number of UDP ephemeral ports in use.	User control of Ephmeral Port Ranges
	SMF119AP_TSUDEphPortMxUse	V2R1	SMF119AP_TSUDEphPortMxUse contains the maximum number of UDP ephemeral ports used	User control of Ephmeral Port Ranges
	Existing TCP stats changed: SMF119AP_TSTCEstab SMF119AP_TSTCOpenConn SMF119AP_TSTCPassConn SMF119AP_TSTCConCls SMF119AP_TSTCInSegs SMF119AP_TSTCOSegs SMF119AP_TSTCReset SMF119AP_TSTCConReset SMF119AP_TSTCOKApr SMF119AP_TSTCDropKA SMF119AP_TSTCDropF2 New SMC-R stats: SMF119AP_TSSMCRCurrEstabLnks SMF119AP_TSSMCRLnkActTimeOut SMF119AP_TSSMCRActLnkOpened SMF119AP_TSSMCRPasLnkOpened SMF119AP_TSSMCRLnksClosed SMF119AP_TSSMCRCurrEstab SMF119AP_TSSMCRActiveOpened SMF119AP_TSSMCRPassiveOpened SMF119AP_TSSMCRConnClosed SMF119AP_TSTSMCRInSegs SMF119AP_TSTSMCROutSegs SMF119AP_TSSMCRInRsts SMF119AP_TSSMCROutRsts New SMC-R storage stats: SMF119AP_TSSTSMCRFixedCurrent SMF119AP_TSSTSMCRFixedMax SMF119AP_TSSTSMCRSendCurrent SMF119AP_TSSTSMCRSendMax SMF119AP_TSSTSMCRRecvCurrent SMF119AP_TSSTSMCRRecvMax	V2R1	• When the SMCR parameter is configured on the GLOBALCONFIG statement, the listed TCP counters reflect all TCP connections, including connections over SMC-R links. • The listed SMC-R stats are added at the end of the TCP statistics section. • The listed SMC-R storage stats are added in the storage statistics section.	Shared Memory Communications over Remote Direct Memory Access

Table 21. Summary of new and changed Communications Server SMF type 119 record - TCP/IP stack records (continued)

Record type	Record field	Release	Description	Reason for change
RNIC interface statistics record (subtype 44)	• SMF119SM_RSGen • SMF119SM_RSSpeed	V2R1 with APARs OA51949 and PI75199	• SMF119SM_RSGen represents the RNIC card generation level (IBM 10 GbE RoCE Express or IBM 10 GbE RoCE Express2) • SMF119SM_RSSpeed represents the transmission level for the RNIC	Communications Server support for RoCE Express2 features

Communications Server SNA summary of interface changes

Command behavior changes

Table 22 lists the SNA commands that have changed behavior.

For complete information about SNA commands, refer to the *z/OS Communications Server: SNA Operation*.

Table 22. Summary of new and changed Communications Server commands with changed behavior

Command	Release	Description of behavior change	Reason for change
DISPLAY EE	V2R1	IST2346I is added to output that contains information about a remote IP address or a remote host name.	Serviceability Enhancements
DISPLAY EEDIAG	V1R13	When TEST=YES and LIST=SUMMARY are specified together, messages IST2137I and IST2138I now have *NA for the hop count. Previously, IST2137I and IST2138I were displayed with the actual hop count.	Enterprise Extender firewall-friendly connectivity test
DISPLAY ID	V2R1 with APARs OA51949 and PI75199	• If the resource that is being displayed is a RDMA over Converged Ethernet (RoCE) TRLE, message IST2389I contains the "RoCE Express" generation level and the transmission speed. • If the resource that is being displayed is an IBM 10 GbE RoCE Express2 TRLE, IST2362I message always displays the microcode level.	Communications Server support for RoCE Express2 features
	V2R1	If ID=*rnictrle_name* is specified and the 10 GbE RoCE Express feature that *rnictrle_name* represents is operating in a shared RoCE environment, message IST2417I appears in the command output to display the associated virtual function number (VFN).	Shared Memory Communications over RDMA adapter (RoCE) virtualization
	V2R1	If the resource that is being displayed is a RNIC TRLE, a new message group (IST2361I) is generated to display information that is unique to the 10 GbE RoCE Express interface.	Shared Memory Communications over Remote Direct Memory Access
	V2R1	When the ID represents a high performance routing (HPR) physical unit name, IST2395I is issued if the base mode adaptive rate-based (ARB) pacing algorithm is used.	Serviceability Enhancements

Table 22. Summary of new and changed Communications Server commands with changed behavior (continued)

Command	Release	Description of behavior change	Reason for change
DISPLAY ID	V1R13	When ID=*trlename* is specified for an active QDIO TRLE, messages IST2331I, IST2332 and one or more IST2333I are issued. For messages IST2331I, IST2332I, and IST2333I, a new QUEUE STATUS column now shows the current status of each read queue.	Performance improvements for Enterprise Extender traffic
	V1R13	The command is enhanced in the following ways: • Displays information about IQDX TRLEs • Includes the associated interface name on message IST1717I	HiperSockets optimization for intraensemble data networks
	V1R12	When ID=*trlename* is specified for an active QDIO TRLE, messages IST2331I, IST2332 and one or more IST2333I are issued. Previously message IST1918I was issued. Message IST924I is added to separate data device information.	Performance improvements for sysplex distributor connection routing
	V1R12	When ID=*trlename* is specified for an active QDIO TRLE, message IST2337I describing the chpid type and number is issued.	z/OS Communications Server in an ensemble
	V1R12	When the ID represents a high performance routing (HPR) physical unit name or line of the Enterprise Extender XCA major node (MEDIUM=HPRIP), the display output is enhanced to optionally include the additional messages IST2327I, IST2328I, IST2329I, IST2339I, IST2340I, IST2341I and IST2343I.	Enterprise Extender connection health verification
DISPLAY STATS	V2R1	When you specify TYPE=CFS,STRNAME=EZBDVIPA, entries can also be displayed for IPv6 addresses.	Sysplex-Wide Security Associations for IPv6
	V1R13	When TYPE=VTAM is specified, existing message IST1227I displays the VIT size in megabytes. Message IST1227I for the status value 2 displays the VIT size. IST1227I for the status value 163 is retired.	Increased CTRACE and VIT capacity
DISPLAY TOPO	V1R13	When LIST=SUMMARY is specified and APPN routing trees were cleared, new message IST2360I displays the date and time of the last clear operation.	Improved APPN routing resilience
	V1R12	When ID=*cpname*,LIST=ALL is specified, the display output is enhanced to include additional messages.	Enhancements to topology database diagnostics
	V1R12	When ORIG=*orig*,DEST=dest is specified, the display output is enhanced to include additional messages.	Enhancements to topology database diagnostics
	V1R12	When LIST=TDUINFO is specified, the display output is enhanced to include, in addition to information about TDUs received, the following information: • Information about corrupted control vectors. • Information about TDUs sent. In addition, when LIST=TDUINFO,SCOPE=ACTIVITY is specified, the display output is enhanced to include information about RSN updates. Also, when a new FORMAT operand is specified on LIST=TDUINFO, the output is displayed in an expanded format.	Enhancements to topology database diagnostics

Table 22. Summary of new and changed Communications Server commands with changed behavior (continued)

Command	Release	Description of behavior change	Reason for change
DISPLAY TRL	V2R1 with APARs OA51949 and PI75199	• If the TRLE operand specifies a RDMA over Converged Ethernet (RoCE) TRLE, message IST2389I contains the "RoCE Express" generation level and the transmission speed. • If the TRLE operand specifies an IBM 10 GbE RoCE Express2 TRLE, IST2362I message always displays the microcode level.	Communications Server support for RoCE Express2 features
	V2R1	If TRLE=*rnictrle_name* is specified and the 10 GbE RoCE Express feature that *rnictrle_name* represents is operating in a shared RoCE environment, message IST2417I appears in the command output to display the associated virtual function number (VFN).	Shared Memory Communications over RDMA adapter (RoCE) virtualization
	V2R1	When the TRLE operand specifies a RNIC TRLE, a new message group (IST2361I) is generated to display information that is unique to the 10 GbE RoCE Express interface.	Shared Memory Communications over Remote Direct Memory Access
	V1R13	When TRLE=*trlename* is specified for an active QDIO TRLE, messages IST2331I, IST2332 and one or more IST2333I are issued. For messages IST2331I, IST2332I, and IST2333I a new QUEUE STATUS column now shows the current status of each read queue.	Performance improvements for Enterprise Extender traffic
	V1R13	The command is enhanced in the following ways: • Displays information about IQDX TRLEs • Includes the associated interface name on message IST1717I	HiperSockets optimization for intraensemble data networks
	V1R12	When TRLE=*trlename* is specified for an active QDIO TRLE, messages IST2331I, IST2332 and one or more IST2333I are issued. Previously message IST1918I was issued. Message IST924I is added to separate data device information.	Performance improvements for sysplex distributor connection routing
	V1R12	When TRLE=*trlename* is specified for an active QDIO TRLE, message IST2337I describing the chpid type and number is issued.	z/OS Communications Server in an ensemble
DISPLAY VTAMOPTS	V2R1	When FORMAT=CURRENT is specified and the current IPADDR start option value is larger than 17 characters, message IST1904I is displayed instead of IST1189I.	Enterprise Extender IPv6 address configuration
	V2R1	When FORMAT=COMPLETE or FORMAT=MODIFIED is specified, and the IPADDR start option value is currently larger than 17 characters or was larger than 17 characters when VTAM was started, messages IST1905I, IST1906I, IST1907I, and IST1908I are displayed instead of IST1310I.	Enterprise Extender IPv6 address configuration
MODIFY TRACE	V1R13	A SIZE specification that is not specified in the valid range of 4M - 2048M inclusive is rejected. DSPSIZE is rejected.	Increased CTRACE and VIT capacity
MODIFY VTAMOPTS	V2R1	When you specify the new PSRETRY IMMED operand value, activation of a TG or a change in the status of a TG triggers immediate path switch processing of HPR pipes.	HPR PSRETRY Enhancement

VTAM internal trace entries

In V1R13, the VTAM internal trace (VIT) table is relocated to 64-bit common (HCOMMON) storage. As a result, the IPCS subcommand VERBEXIT VTAMMAP functions are changed. VITAL does not support the ALL and ECSA operands and VTVIT does not set the DVIT, DVITC, DVITE, DVITL, and DVITO symbols. See Increased CTRACE and VIT capacity in *z/OS Communications Server: New Function Summary* for more information.

For complete information about VIT entries, refer to *z/OS Communications Server: SNA Diagnosis Vol 2, FFST Dumps and the VIT*.

Table 23 lists the new and changed VIT entries.

Table 23. Summary of new and changed Communications Server VTAM internal trace (VIT) entries

VIT entry	Release	Description	Related support
AFSM	V2R1	**Changed:** VIT record, SMC-R information added.	Shared Memory Communications over Remote Direct Memory Access
CCR and CCR2	V2R1	**New:**VIT records to trace communication channel operations of 10 GbE RoCE Express feature.	Shared Memory Communications over RDMA adapter (RoCE) virtualization
COPY and COP2	V1R13	**Deleted:** COPY and COP2 records are replaced with TOD record.	Increased CTRACE and VIT capacity
C64Q	V2R1	**New:** VIT record for IUTC64QM macro invocations.	Shared Memory Communications over Remote Direct Memory Access
C642	V2R1	**New:** VIT record, a continuation of the C64Q record.	Shared Memory Communications over Remote Direct Memory Access
DRBx	V2R1	**New:** VIT record for RoCE doorbell operations.	Shared Memory Communications over Remote Direct Memory Access
HCQ, HCQ2, HCQ3, HCQ4, HCQ5 and HCQ6	V2R1 with APARs OA51949 and PI75199	**New:** VIT records for 10 GbE RoCE Express2 feature HCQ operations	Communications Server support for RoCE Express2 features
HCR	V2R1	**New:** VIT record for RoCE hardware command operations when the 10 GbE RoCE Express feature operates in a dedicated RoCE environment.	Shared Memory Communications over Remote Direct Memory Access
HCR2	V2R1	**New:** VIT record, a continuation of the HCR record.	Shared Memory Communications over Remote Direct Memory Access
HCR3	V2R1	**New:** VIT record, a continuation of the HCR record.	Shared Memory Communications over Remote Direct Memory Access
HCR4	V2R1	**New:** VIT record, a continuation of the HCR record.	Shared Memory Communications over Remote Direct Memory Access
HCR5	V2R1	**New:** VIT record, a continuation of the HCR record.	Shared Memory Communications over Remote Direct Memory Access
IOSP	V2R1	**New:** VIT record for invocations of z/OS Peripheral Component Interconnect Express (PCIe) services.	Shared Memory Communications over Remote Direct Memory Access
IOS2	V2R1	**New:** VIT record, a continuation of the IOSP record.	Shared Memory Communications over Remote Direct Memory Access
IOS3	V2R1	**New:** VIT record, a continuation of the IOSP record.	Shared Memory Communications over Remote Direct Memory Access

Table 23. Summary of new and changed Communications Server VTAM internal trace (VIT) entries (continued)

VIT entry	Release	Description	Related support
IUTR	V2R1	**New:** A variation of the IUTx VIT record, specifically for IUTIL-R invocations.	Shared Memory Communications over Remote Direct Memory Access
IUTX	V2R1	**Changed:** Added SMC-R information in existing VIT record.	Shared Memory Communications over Remote Direct Memory Access
ODPK	V1R12	**Changed:** Added an indicator of the read queue identifier for inbound packets.	Performance improvements for sysplex distributor connection routing
ODTE	V2R1	**Changed:** Added SMC-R information in existing VIT record.	Shared Memory Communications over Remote Direct Memory Access
PCIR	V2R1	**New:** A variation of the PCIx record, specifically for interrupts of the 10 GbE RoCE Express feature.	Shared Memory Communications over Remote Direct Memory Access
P64Q	V2R1	**New:** VIT record for IUTP64QM macro invocations.	Shared Memory Communications over Remote Direct Memory Access
P642	V2R1	**New:** VIT record, a continuation of the P64Q record.	Shared Memory Communications over Remote Direct Memory Access
QAPL	V1R12	**New:** OSA-Express QDIO or HiperSockets accelerator parameter list.	Performance improvements for sysplex distributor connection routing
QDIP	V1R12	**Changed:** Enabled using the DIO subtrace type under the CIA trace option. You must specify SUBTRACE=DIO,OPT=CIA to enable this trace entry. Previously, this trace entry was enabled under the CIA trace option.	Performance improvements for sysplex distributor connection routing
QSRB	V2R1	**Changed:** Added SMC-R information in existing VIT record.	Shared Memory Communications over Remote Direct Memory Access
	V1R12	**New:** OSA-Express QDIO or HiperSockets Service Request Block (SRB) event.	Performance improvements for sysplex distributor connection routing
QSR2	V1R12	**New:** OSA-Express QDIO or HiperSockets Service Request Block (SRB) event (part 2).	Performance improvements for sysplex distributor connection routing
RAPB	V2R1	**New:** VIT record for RoCE anchor cell operations.	Shared Memory Communications over Remote Direct Memory Access
RAP2	V2R1	**New:** VIT record, a continuation of the RAPB record.	Shared Memory Communications over Remote Direct Memory Access
RCPI	V2R1	**New:** VIT record for RoCE input parameter list information.	Shared Memory Communications over Remote Direct Memory Access
RCPO	V2R1	**New:** VIT record for RoCE output parameter list information.	Shared Memory Communications over Remote Direct Memory Access
RCP2	V2R1	**New:** VIT record, a continuation of the RCPI and RCPO records.	Shared Memory Communications over Remote Direct Memory Access
RCP3	V2R1	**New:** VIT record, a continuation of the RCPO record.	Shared Memory Communications over Remote Direct Memory Access
RPLx	V2R1	**New:** VIT record for RoCE Poll operation completion.	Shared Memory Communications over Remote Direct Memory Access

Table 23. Summary of new and changed Communications Server VTAM internal trace (VIT) entries (continued)

VIT entry	Release	Description	Related support
RPLA	V2R1	**New:** VIT record, a continuation of the RPLx record.	Shared Memory Communications over Remote Direct Memory Access
RPLI	V2R1	**New:** VIT record, a continuation of the RPLA record.	Shared Memory Communications over Remote Direct Memory Access
RPLP	V2R1	**New:** VIT record, a continuation of the RPLx record.	Shared Memory Communications over Remote Direct Memory Access
RPSA	V2R1	**New:** VIT record, a continuation of the RPST record.	Shared Memory Communications over Remote Direct Memory Access
RPSI	V2R1	**New:** VIT record, a continuation of the RPSA record.	Shared Memory Communications over Remote Direct Memory Access
RPSP	V2R1	**New:** VIT record, a continuation of the RPST record.	Shared Memory Communications over Remote Direct Memory Access
RPST	V2R1	**New:** VIT record for RoCE Post operation completion.	Shared Memory Communications over Remote Direct Memory Access
RPS2	V2R1	**New:** VIT record, a continuation of the RPSA record.	Shared Memory Communications over Remote Direct Memory Access
RSLK	V2R1	**New:** VIT record for RoCE shared lock operations.	Shared Memory Communications over Remote Direct Memory Access
SBAL	V1R12	**Changed:** Added direction indicator and write queue priority for outbound packets and added a read queue identifier for inbound packets.	Performance improvements for sysplex distributor connection routing
SLSB	V1R12	**Changed:** Added direction indicator and read queue identifier for inbound packets.	Performance improvements for sysplex distributor connection routing
TOD	V2R1	**Changed:** Added CPU ID information.	Shared Memory Communications over Remote Direct Memory Access
	V1R13	**New:** Time of day snapshot.	Increased CTRACE and VIT capacity
VHCR, VHC2, VHC3, VHC4 and VHC5	V2R1	**New:** VIT records to trace VHCR commands of the 10 GbE RoCE Express feature when the feature operates in a shared RoCE environment.	Shared Memory Communications over RDMA adapter (RoCE) virtualization

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