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IBM CICS Business Event Publisher for MQSeries creates WebSphere MQ messages based on events in CICS applications

Overview

CICS® Business Event Publisher for MQSeries® , V1.2 (CICS BEP V1.2) enables extension and re-use of existing CICS applications, through events, to drive new business processes and utilize new technology. You can do this quickly and without changes to existing applications.

It generates user-defined WebSphere® MQ messages as a side effect when certain EXEC CICS commands are executed by an application, or when VSAM, DB2® or IMS™ data is modified. This message generation is transparent to the application program, which remains unchanged when CICS BEP V1.2 is used.

Rules control the generation of the WebSphere MQ messages, defined using a Microsoft™ Windows™-based GUI. The user can select criteria to determine which events are published and also to determine the content of the resulting messages. The destination queue name and queue manager name for the message can either be statically defined in the rule, or dynamically created based on user-specified criteria when the message is created.

CICS BEP V1.2 allows for multiple application related events to be monitored and detected. They are:

- A record written/read/ updated/deleted/unlock on a CICS/VSAM file

- A record insert/updated/deleted on a DB2 or IMS/DB record

- A Temporary Storage Queue or Transient Data Queue written/read/deleted

- One program linking to another

- An Interval Control start

Benefits:

- External logging or notification of CICS application activity

- Better, faster, and safer way to extend the use of existing CICS applications (no application code changes)

- Users can integrate existing CICS applications into new business applications or exploit new technology

- Easier e-business exploitation from new "push" message technology

- Process automation due to immediate action and removal of potentially error-prone manual operations

CICS BEP V1.2 can be looked at as a WebSphere MQ message generator. At this time, the support is outbound ("push"). Inbound MQ messages are not supported.

Key prerequisites

- A supported level of CICS TS for z/OS® or OS/390®
- A supported level of WebSphere MQ for z/OS or MQSeries for OS/390
- A Workstation running Windows NT™, Windows 2000, or Windows XP
- TCP/IP on host and workstation machines

Planned availability date

May 28, 2004

Description

CICS BEP V1.2 enables a rapid extension of existing applications running in CICS Transaction Server V1.3, V2.2, and V2.3.

CICS BEP rules can match, for example, VSAM file updates occurring in a CICS region, DB2 database updates, or IMS database updates, and so notify another application of a change to a record.

Components of CICS BEP reside in several places:

- A message server running in a z/OS address space, communicating with CICS Business Event Publisher event source connectors and WebSphere MQ queue managers

- A dataspace server running in a z/OS address space, containing cached user-generated rules and persistent information used by message servers and event source connectors

- A CICS event source connector running in a CICS TS region

- A DB2 or IMS event source connector running in a z/OS address space

- Inside the IMS region, CICS BEP runs at the DFSFLGX0 Log exit

- A rules database used to control the publishing of events and the contents of published messages

- A GUI (workstation administration client) running on a Windows-based workstation used to create and maintain rules to control the creation of messages

The message server

The CICS BEP message server is responsible for the MQPUT operation to send the generated message to the required queue. The message server supports the use of multiple subtasks for processing multiple units of work in parallel. A very high level of performance results. MQPUT operations can be within or outside of a unit of work as specified by the rule being processed.

For CICS events, in the former case, the CICS BEP unit of work is not that used by CICS, but is coordinated with the current CICS unit of work. This means that updates to CICS Recoverable Resources and the MQPUT will either both succeed or both fail.

For DB2 and IMS, events are processed asynchronously, after the actual DB2 or IMS unit of work has completed. If a rule specifies that a message is to participate in the unit of work, the message will not be hardened on the queue unless the unit of work being processed is successfully committed.

The message server also contains a TCP/IP listener subtask used for communication between the message server and the CICS BEP workstation administration client, for example uploading new rules created on the workstation administration client to the message server rules file.

The dataspace server

The CICS BEP dataspace server offers virtual storage for semipersistent information used by message servers and event source connectors. Message servers and event source connectors can be stopped and started without losing valuable state information, such as cached rules and CICS transaction pattern knowledge.

The CICS event source connector

Inside the CICS region, CICS BEP supplies various exit programs executed as CICS Global User Exit modules. A CICS application program issues EXEC CICS commands to utilize CICS facilities. While executing these commands, CICS executes user-supplied modules at various stages of processing. These modules are invoked at global user exit (GLUE) points and are called exit modules. Several Exit modules are offered.

Exit modules:

- Scan the rules database for a rule matching the event's properties

- Use a matched rule to generate the contents of a WebSphere MQ message

- Use a matched rule to determine the destination message queue and queue manager

- Give the resulting message to the message server so that it may be written to the message queue

- Ensures that transactional activity occurring in the CICS BEP message server and the CICS region are coordinated

All updates to CICS Recoverable Resources and the CICS BEP MQPUTs must be committed or neither succeed. In effect, but not physically, the scope of the CICS unit of work extends into the CICS BEP message server if so specified by the rule being processed. The CICS BEP CICS connector is accessed from within the CICS region through the CICS BEP GLUE modules. The CICS application is unaware of this additional function (although a rule can choose to send an EIBRESP or EIBRESP2 return code on a failure).

These operations are transparent to the application program that issued the EXEC CICS command.

CICS BEP generates WebSphere MQ messages as a side effect to various EXEC CICS commands, providing a valuable extension to an existing application without that application having to change.

The DB2 event source connector

The DB2 event source connector uses the DB2 Instrumentation Facility Interface (IFI) to quickly and efficiently read the DB2 recovery log. As it reads log records, it compares the contents of the certain types of log records to rules in the CICS BEP rules database cached in the dataspace server. If a rule matching the update reflected in a log record is found, a message is created using the rule's message layout specification. The resulting message is passed to the message server to be written to the WebSphere MQ destination queue as specified by the rule.

By evaluating DB2 events through the IFI, the DB2 event source connector's processing takes place outside of the DB2 process, accomplishing its task with no performance impact to the application making the DB2 update request. Unit of work boundaries are enforced (when the matching rule states the message should be published only if the unit of work successfully completes) by employing various MQPUT options that allow a message to be rolled back if the log shows that the unit of work did not complete successfully.

These operations are transparent to the application program that issued the DB2 request.

CICS BEP generates WebSphere MQ messages as a side effect to various DB2 requests that modify DB2 databases, providing a valuable extension to an existing application without that application having to change.

The IMS event source connector and DFSFLGX0 Log Exit

The IMS event source connector uses the IMS asynchronous data capture feature to quickly and efficiently monitor IMS logger activity. As log records are written, the CICS Business Event Publisher DFSFLGX0 Log Exit captures IMS asynchronous change data log records and passes them to the CICS Business Event Publisher IMS/DB event source connector. The event source connector compares the contents of the log records to rules in the CICS Business Event Publisher rules database cached in the dataspace server. If a rule matching the update reflected in the log record is found, a message is created using the rule message layout specification. The resulting message is passed to the message server to be written to the WebSphere MQ destination queue as specified by the rule.

The only change required to IMS/DB resources is the addition of an EXIT= parameter to DBDGEN or SEGM statements for databases to be monitored by CICS Business Event Publisher. This message generation is transparent to the application program, so these remain unchanged when Business Event Publisher is used.

By evaluating IMS events in this manner, most of the event source connector's processing takes place outside of the IMS region itself, accomplishing its task with almost no performance impact to the application making the IMS update request. Unit of work boundaries are enforced (when the matching rule states the message should be published only if the unit of work successfully completes) by employing various MQPUT options that allow a message to be rolled back if the unit of work does not complete successfully.

These operations are transparent to the application program that issued the IMS request.

CICS BEP generates WebSphere MQ messages as a side effect to various IMS requests to modify IMS databases, providing a valuable extension to an existing application without that application having to change.

The rules database

The rules are generated on a workstation and sent to the CICS BEP message server using TCP/IP communications. Although physically stored in a VSAM file, these rules are ultimately cached in a dataspace owned by the dataspace server for efficient access and persistence across message server and connector restarts. Functions are provided to refresh the cache.

Rules contain information such as:

- A VTAM® APPLID for a CICS region
- A CICS Transaction ID
- A user ID
- The resource type and name (such as a VSAM file name, DB2 table name, or IMS/DB physical database name)
- The WebSphere MQ destination queue name and queue manager name
- Selection criteria used to determine if an event should be published
- Specifications for building the message

Rules are scanned and applied by the CICS Business Event Publisher event source connectors to the events they monitor to determine whether or not the events should result in a message being published, as well as what data a published message contains.

More than one rule can be matched by a single event processed by an event source connector, so multiple WebSphere MQ messages can be generated as a side effect to the actual EXEC CICS command, DB2 request, or IMS request.

If the application request (EXEC CICS command, DB2 request, or IMS request) matches on many CICS Business Event Publisher rules, several WebSphere messages can be produced. A novel feature of CICS Business Event Publisher is that, if these messages are placed on the same WebSphere MQ queue, the messages can be concatenated (along with additional control information) into one large message for enhanced performance.

The workstation administration client

The CICS Business Event Publisher workstation administration client is a Windows-based GUI used to create and maintain rules. After rules are created, they are uploaded to the message server to be stored in the rules file. Rules can subsequently be downloaded to a workstation, modified, and uploaded to the message server again. Rules provide the link between the CICS Business Event Publisher event source connectors and the message server.

The workstation administration client can be configured so that sensitive information is not left on the workstation after the information has been uploaded to the message server. In addition to avoiding a single point of failure for storage of rules, this avoids a potential security exposure.

The workstation administration client contains a powerful facility for the generation of rules and the manipulation of the contents of WebSphere MQ messages generated by the rules. A utility is provided to import a COBOL copybook into the CICS Business Event Publisher environment so selection criteria and message creation can be on the basis of named items. In the unlikely event that the selection and creation facilities provided by the workstation administration client are inadequate, a rule exit program written by the user can be used to augment these facilities.

Accessibility by people with disabilities

Section 508 of the U.S. Rehabilitation Act: The following features support use by people with disabilities:

- Operation by keyboard alone
- Optional font enlargement and high-contrast display settings
- Tested with screen readers and screen magnifiers for use by people with visual impairment
- Suitable for people with hearing impairment

Softcopy .pdf documentation is shipped with the product. The .pdf documentation supports optional font enlargement, high-contrast display settings, and may be operated by the keyboard alone. Alternative text is not provided for screen-reader users, however, fully accessible softcopy documentation, with alternative text for diagrams, will be made available on request.

Value Unit-based pricing

Value Unit-based pricing will help align the prices of these products to the principle of the PSLC pricing curve, which provides for a lower price per MSU (millions of service units per hour) for larger capacities.

There is also a price benefit when you grow their capacity. Additional capacity will be based on the number of Value Units (MSUs) you have already installed; for example, additional capacity will not be priced starting at the base with a higher price per unit but on the capacity already installed.

Note that Value Units of a given product cannot be exchanged, interchanged, or aggregated with Value Units of another product.

IBM International Program License Agreement (IPLA) and Subscription and Support considerations

IPLA licenses can be transferred from one machine to another within, but not limited to an enterprise. The customer may aggregate the capacity for all the processors the product is operated on to achieve a more economic price. This will result in a single Proof of Entitlement. It is the customer's responsibility to manage the distribution of Value Units within the limits of the entitlement of the product license.

Subscription and support must cover the same capacity as the product license entitlement. Subscription and support will be available in the country in which the agreement is made.

Product positioning

CICS BEP meets a growing CICS customer demand for a tool to allow rapid integration and extension of mainframe applications and associated data.

CICS BEP V1.2 interprets CICS application events without the need for application changes. It is an attractively priced tool with a Windows-based GUI to control the selection of events that generate messages, determination of the attributes and data to be used and specification of the queue destination and processing.

CICS BEP is for all CICS Transaction Server for z/OS customers. It is particularly important to CICS TS customers who want to extend the use of existing applications to improve their business processes or exploit new technology.

CICS BEP is a WebSphere MQ message generator. The support is outbound (push), not inbound. It is not a message broker.

However, by its ability to generate messages when certain EXEC CICS commands are executed or when associated resources are updated, CICS BEP provides some new opportunities for application extension. It is a strong point of CICS BEP V1.2 that these existing applications are not altered.

CICS BEP can use:

- **Event notification:**
  - A new customer added to a profile list
  - Old customers dropped
  - New orders
  - New purchases
  - New sales
  - Past due notification dates

- **Threshold notification:**
  - Stock level falls below or exceeds a certain value
  - Message sent to notify that action needs to be taken or cause action to happen via electronic supplier notification

Error notification: To generate a message when an application error occurs.

CICS BEP can be used for:

- **Activity audits:**
  - See who uses what files and fields, when they are used, from what location, and by which programs

  - Help generate test plans and in design of new system (what is important in the legacy system and should be included in the new system or what is never used)

  - Help model the data access patterns

- **Batch operations replacement**

  Traditionally, many activities are deferred until the files are taken offline and processed in batch. For example, generate customer letters and e-mails or post other files. With CICS BEP, the changed information can be fed real-time to an asynchronous process where the same batch activities can be done in near real-time. Timeliness is improved without affecting online response time.

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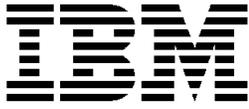
Education support

For additional information on available courses, visit

http://www-3.ibm.com/services/learning

The appropriate curriculum will include the enhancements described in this announcement.

Call IBM Education and Training at 800-IBM-TEACH (426-8322) for catalogs, schedules, and enrollments.

Offering information

Product information is available via the Offering Information Web site

http://www.ibm.com/common/ssi

Publications

The only hardcopy documentation delivered with CICS® BEP will be the Program Directory. After planned availability, user documentation will be available softcopy to download in PDF format from the IBM Publications Center Web site. Customers who want hardcopy of the documentation can print copies from the PDF files.

Publication	Form number
User Guide	GC34-6295
Getting Started	GC34-6296
Program Directory	GI10-2564

Technical information

Hardware requirements: CICS BEP runs on any S/390® or IBM @server zSeries® machine on which the applicable operating system and software runs.

The Rules Database administration tool requires any machine capable of running the applicable operating system.

Software requirements: CICS BEP requires:

- CICS Transaction Server for OS/390® or z/OS® running on the appropriate operating system

- WebSphere® MQ for z/OS V5.3, or later

- A Workstation running Windows NT™, Windows™ 2000, or Windows XP

- TCP/IP on host and workstation machines supports:

  − CICS Transaction Server for OS/390, V1.3 (5655-147)

  − CICS Transaction Server for z/OS, V2.2, or later (5697-E93)

  − DB2 Universal Database® Server for OS/390 V6.1 (5645-DB2®)

  − DB2 Universal Database Server for OS/390 V7.1 (5675-DB2)

  − DB2 Universal Database for z/OS, V8.1 (5625-DB2)

  − IMS™ Database Manager V7 (5655-B01)

  − IMS Database Manager V8 (5655-C56)

The Rules Database administration tool runs as a VisualBasic application; the required software is provided in the operating system. TCP/IP communication support is needed between the host and workstation machines.

Planning information

Packaging: CICS Business Event Publisher for MQSeries®, V1.2 is delivered in a package containing:

- IBM International Program License Agreement (IPLA) in multilanguage booklet (Z125-3301)

- License Information for CICS Business Event Publisher (GC34-6298) in multiple languages

- Proof of Entitlement (PoE)

- Program Directory for CICS Business Event Publisher for MQSeries, V1.2 (GI10-2564)

- 3480 1/2-inch tape cartridge containing a CBPDO or other Customized Offering delivery of the product

The Rules Database administration tool is included in the product installed on the mainframe, and is then downloaded to the workstation where it is installed by InstallShield.

Security, auditability, and control

CICS BEP for MQSeries, V1.2 uses the security and auditability features of the OS/390 or z/OS operating system under which it is operating. The customer is responsible for evaluation, selection, and implementation of security features, administrative procedures, and appropriate controls in application systems and communication facilities.

Ordering information

CICS BEP for MQSeries, V1.2 is licensed under the IBM IPLA. It has a single charge unit, based on Value Units.

CICS BEP V1.2 replaces CICS BEP V1.1, which will no longer be available after the availability of CICS Business Event Publisher V1.2.

Value Unit exhibit VUE007

	MSUs minimum	MSUs maximum	Value Units/MSU
Base	1	3	1
Tier A	4	45	0.45
Tier B	46	175	0.36
Tier C	176	315	0.27
Tier D	316	+	0.2

Value Units for non MSU-based S/390 processors:

Hardware	Value Units/machine
MP3000 H30	6
MP3000 H50	8
MP3000 H70	12
ESL Models	2

Ordering example: The total number of Value Units is calculated according to the following example.

If the customer has installed 1,500 MSUs, the applicable Value Units would be:

Translation from MSUs to Value Units

	MSUs	*	Value Units/MSU	=	Value Units
Base	3	*	1.00	=	3.00
Tier A	42	*	.45	=	18.90
Tier B	130	*	.36	=	46.80
Tier C	140	*	.27	=	37.80
Tier D	1,185	*	.20	=	237.00
Total	1,500				343.50

When calculating the total number of Value Units, the sum is to be rounded up to the next integer.

Example: In the above ordering example, for the product running on a machine with 1,500 MSUs requiring 344 Value Units, order quantity 344.

Ordering z/OS through the Internet

ShopzSeries provides an easy way to plan and order your z/OS ServerPac or CBPDO. It will analyze your current installation, determine the correct product migration, and present your new configuration based on z/OS. Additional products can also be added to your order (including determination of whether all product requisites are satisfied). ShopzSeries is available in the U.S. and several countries in Europe. In countries where ShopzSeries is not available yet, contact your IBM representative (or Business Partner) to handle your order via the traditional IBM ordering process. For more details and availability, visit the ShopzSeries Web site at

> **http://www14.software.ibm.com/webapp/ ShopzSeries/ShopzSeries.jsp**

The products in this announcement have one charge unit: Value Units.

Value Units for IBM 9672 processors will be based upon the full capacity of these systems. This is applicable to all S/390-based systems measured on MSU capacity. Information on MSU capacities can be found in the System/370™, System/390®, and zSeries Machine Exhibit, Z125-3901.

Value Units for zSeries will be based upon full MSU capacity as defined in the Machine Exhibits.

A tool will be available that provides support for transforming the MSU-based capacities of S/390 systems to new Value Units by calculating the applicable number of Value Units for a given number of MSUs.

Basic license: To order, specify the program number, feature number 9001 for asset registration, and the one-time charge (OTC) feature number. Also specify the feature number of the desired distribution medium. To suppress shipment of media, select the license-only option in CFSW.

Description	Program number	OTC feature number
CICS Business Event Publisher	5655-J99	
Entitlement Entity MMID		S00XMK6

Note: The products in this announcement are available with IBM Software On Off Capacity on Demand (OOCoD).

For additional information on OOCoD, refer to Software Announcement 203-202, dated August 12, 2003.

Subscription and support

To receive voice technical support via telephone during normal business hours, and upgrades at no additional charge, subscription and support must be ordered. The capacity of subscription and support (Value Units) must be the same as the capacity ordered for the product licenses.

To order, specify the support program number (in this case, 5655-J97) and feature number 9001 for asset registration. Subscription and support for these products via a separately purchased offering under the terms of the IBM International Agreement for Acquisition of Support (IAAS). This offering:

- Includes and extends the support services provided in the base support to include technical support via telephone during normal business hours.

- Entitles customers to product upgrades at no additional charge. Note that the customer is not entitled for new products.

Once subscription and support is ordered, the charges will renew automatically annually unless cancelled by the customer.

Description	Program number	ASC[1] feature number
CICS Business Event Publisher Subscription and Support	5655-J97	
Entitlement Entity MMID		S00XMKF

[1]   Annual support charge

On/Off Capacity on Demand

Description	Feature number
Entitlement Entity MMID	S00XMK6

Customized offerings

Product media is shipped only via Customized Offerings (for example, CBPDO, ServerPac, Systempac®). Non-customized items (CDs, diskettes, source media, media kits) will continue to be shipped via the stand-alone product.

Terms and conditions

Agreement: IBM IPLA. Proofs of Entitlement are required for all authorized use.

These products are licensed under the IPLA, the associated Agreement for Acquisition of Support, and the Addendum for Support Z125-6435, which provides for support with ongoing access to releases and versions of the program. These programs have a one-time license charge for use of the program and an annual renewable charge for the enhanced support that includes telephone assistance (voice support for defects during normal business hours) as well as access to updates, releases, and versions of the program as long as support is in effect. S/390 and zSeries IBM Operational Support Services — SoftwareXcel is an option for those customers who desire added services.

Limited warranty applies: Yes

Warranty: This program has warranty for a minimum of one year from acquisition from IBM or authorized IBM Business Partner. The warranty provided to the customer, for at least one year from acquisition, is access to databases (read Web sites) for program information and FAQs, including any known fixes to defects, which the customer can download or obtain otherwise and install at leisure.

Program support: Enhanced Support, called Subscription and Support, includes telephone assistance (voice support for defects during normal business hours) as well as access to updates, releases, and versions of the program as long as support is in effect. The customer will be notified of discontinuance of support with 12 months′ notice.

Money-back guarantee: If for any reason you are dissatisfied with the program, return it within 30 days from the invoice date to the party (either IBM or its reseller) from whom you acquired it for a refund. This applies only to your first acquisition of the program.

Copy and use on home/portable computer: No

Volume orders (IVO): No

Passport Advantage® applies: No

Software maintenance applies: No

For operating system software, the revised IBM Operational Support Services — SoftwareXcel offering will provide support for those operating systems and associated products that are not available with the newly announced Software Maintenance offering. This will ensure total support coverage for your enterprise needs, including IBM and selected non-IBM products. For complete lists of products supported under both the current and revised SoftwareXcel offering, visit

http://www.ibm.com/services/sl/products

For additional information on the revised IBM Operational Support Services, refer to Services Announcement 601-023, dated July 10, 2001.

IBM operational support services — SoftwareXcel: Yes

AIX® /UNIX® upgrade protection applies: No

Entitled upgrade for current AIX/UNIX upgrade protection licensees: No

iSeries™ Software Subscription applies: No

Variable charges apply: No

Educational allowance available: Yes, 15% education allowance applies to qualified education institution customers.

Sub-capacity charges terms and conditions

IBM @server zSeries software charges at less than full machine capacity for eligible tools apply when z/OS is running in z/Architecture™ (64-bit) mode on a zSeries 900, no other MVS™-based operating system is licensed to that server and the required information is provided by the customer in accordance with the applicable terms.

Sub-capacity charges for an eligible tool are based on the z/OS product-defined capacity. To obtain charges at less than full machine capacity for eligible tools, the customer is required to:

- Determine the MSUs needed for each machine on which the tools will run. Only machines on which the customer has implemented sub-capacity Workstation License Charges (WLC) according to the above terms and conditions are eligible for charges at less than full machine capacity for the tools.

- Use the product-defined capacity for z/OS (as specified on the Sub-Capacity Reports submitted to IBM for sub-capacity WLC) as the sub-capacity (MSUs) for each tool.

- Submit any additional MSUs and/or Value Units required for each product along with the current entitlement in Value Units for each product.

Sub-capacity charges for tools

To be eligible for sub-capacity charges for tools, the machine on which the tools are running must be eligible for WLC sub-capacity charges terms and conditions. The customer must have signed the Attachment for zSeries Workload License Charges-Pre-ILM, Z125-6516, and submitted at least one Sub-Capacity Report to IBM as defined in the attachment.

With sub-capacity charges, the charge for an eligible tool is based on the z/OS product-defined capacity. To obtain charges at less than full machine capacity for each eligible tool for each machine, the customer should:

- Determine the MSUs needed for the machine on which the tools will run. In a data sharing environment, determine the aggregate MSUs needed on the machine where the tools run. Use the product-defined capacity (MSUs) for z/OS (as specified on the Sub-Capacity Reports submitted to IBM for sub-capacity WLC) as the sub-capacity (MSUs) for each tool.

- Submit any additional MSUs and/or Value Units required for each product along with the current entitlement in Value Units for each product.

- If the use of sub-capacity pricing terms for tools results in a reduced requirement for Value Units, thus freeing up entitlements, customers can reallocate the entitlement difference by distributing the Value Units across a larger or different set of systems, or reserve them for future growth. There will be no refunds for these freed up Value Units. Subscription and Support volumes and entitlements for existing contracts will continue to be at the same levels as the acquired licenses.

Management of the Value Unit entitlements continues to be a customer responsibility. If one of the following occur on a machine to which tools are licensed, the customer must determine if additional Value Units and Subscription and Support need to be ordered for those tools to cover the increase:

- The z/OS defined capacity is increased.

- The requirements for WLC sub-capacity charges are no longer met.

On/off Capacity on Demand

To be eligible for On/Off Capacity on Demand pricing, customers must be enabled for temporary capacity on the corresponding hardware, and the required contract — Z125-6611, Attachment for Customer Initiated Upgrade and IBM @server On/Off Capacity on Demand — Software — must be signed prior to use.

Prices

This product is priced as CICS Business Event Publisher V1.1. Refer to Software Announcement 203-030, dated February 4, 2003.

IBM Global Financing

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