# Bulk Statistics Collector for CBX 500 v1.0
# Product Description

## 1.) Overview

The Bulk Statistics Collector for the CBX 500 switch provides bulk collection and storage of ATM usage statistics within a Cascade CBX 500 network. Statistics are collected periodically from the network and made available to the end-user in either a comma-delimited ASCII file or a Sybase database. This data can then be used for a variety of purposes, including historical trend analysis, network design and planning and Customer Network Management (CNM)-based usage reporting. This is shown in Figure 1.

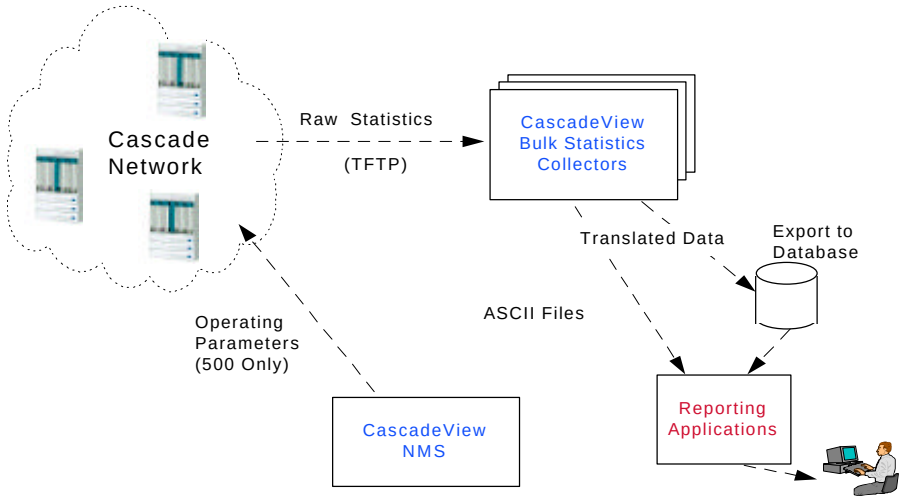


**Figure 1: Bulk Statistics in the Cascade Network**

## 2.) Bulk Statistics Collector v1.0

The Bulk Statistics Collector is responsible for the reception, processing, translation and storage of usage statistics generated by the Cascade CBX 500. In a way that is consistent with the Bulk Statistics Collector for B-STDX/STDX, the data is made available to the user in ASCII comma-delimited file format, or optionally, through a Sybase database.

The Bulk Statistics Collector will provide both measurement period totals and 5-minute peak statistics, where the length of the measurement period and the capability to generate peaks and totals is configured through CascadeView on a per-card basis for each CBX 500 switch in the network:

- 5-minute peak statistics

A 5-minute peak statistic is the maximum value of the statistic as measured during the number of samples determined by the period length, beginning at the start of the measurement period (e.g., from 00:00 to 00:04.99, 00:05 to 00:09.99, 00:10 to 00:14.99, etc).

- Measurement period total

This statistic is an aggregate count from the start to the end of the measurement period. The aggregate statistic is reset to zero at the beginning of each period and is not reported as a running total from one period to the next.

The switch is responsible for calculating the peak and period data directly as the measurement period unfolds. The translated data will be made available to the customer in near real-time at the collector in a format similar to what is provided in the existing Bulk Statistics Collector for B-STDX/STDX; the Bulk Statistics Collector will translate the raw statistics data into a comma-delimited ASCII format as soon as the data arrives at the collector and will optionally bulk-copy the data into a Sybase database. Correlated statistics can then be provided to the end-user by reporting applications or other operations that are not defined within the scope of this document.

The base collection period can be configured on a per-card basis with allowable values of 15, 20, and 30 minutes, 1, 2, 3, 4, 6, 12 and 24 hours, with the default value of 1 hour. Additionally, the capability to record peak and total values can be controlled on a per-card basis on each switch. Thus, for example, the user can configure a CBX 500 switch to report aggregate counts but disable the recording of 5-minute peaks.

**Important**

It is important to note that within a network, switches and cards may have different bulk statistic collection settings.

Collection settings will also affect the number of supported VCs on an IOM. Enabling of peak/total collection capability will limit the number of supported VCs to 6,000 on an IOM with 16 Mbytes of memory.

Per-PVC statistics will be generated by ingress and egress nodes only. All nodes will send per-port statistics, including UNI, B-ICI and Cell Trunk.

## 3.) Product Positioning

The Bulk Statistics Collector is positioned as a distributed network management server. It reduces SNMP (Simple Network Management Protocol) traffic flowing through Cascade CBX 500 switches and traveling over the network. Multiple Bulk Statistics Collectors may reside in the network, each responsible for one or more switches. The Bulk Statistics Collector provides open interfaces and easy access to performance management information by translating statistics into ASCII comma-delimited files or bulk copying the information into Sybase. In terms of standards, the Bulk Statistics Collector uses standards, such as SNMP, wherever possible and pragmatic.

## 4.) Architecture

The Bulk Statistics Collector architecture is based on a distributed and self-contained approach. The architecture achieves distribution through the support for parallel collections.

More than one Bulk Statistics Collector can be configured to simultaneously collect from different switches throughout the network.

The Collector is self-contained in that it is decoupled from CascadeView, HP OpenView, and other Cascade management servers. Sybase is only required if the customer elects to store the translated statistics in a Sybase database.

Bulk statistics collection is defined by a sequence of operations that retrieve, translate and store statistical data that are accumulated on the switch. The CBX 500 switch transfers raw ATM statistics to the collection station where the statistics are stored in the Cascade binary format. The statistics files are subsequently translated into an ASCII comma-delimited format and then optionally stored in a Sybase database. This is shown in Figure 2 and discussed in more detail below.

- Collection of statistics data from the network

  The Bulk Statistics Collector receives statistics from each switch on a schedule that is defined according to the aggregate measurement period configured for each switch. At the end of a measurement period, the switch collects and transfers the statistics via the TFTP (Trivial File Transfer Protocol) protocol to the collector, where the data is stored in a raw statistics file.

  The protocol for data collection is different from the Bulk Statistics Collector for B-STDX/STDX, in which the Bulk Statistics Collector polls each switch in the B-STDX/STDX network to initiate the transfer of statistics data to the collector.

- Translation of statistics data

  Once the data arrives at the collector, a translation application converts the raw statistics into one or more ASCII comma-delimited files, partitioned by the type of data (e.g., trunk statistics are stored in a file separate from circuit statistics). Utilization calculations are also performed as part of the translation process. After translation, the data is optionally bulk-copied into Sybase.

- Archival and reclamation processing

  At midnight each day, the Collector performs a variety of house-keeping operations to reclaim disk space and archive collected statistics:
  - An optional user-defined script or application is executed to allow the user to perform their own Bulk Statistics-related tasks.
  - The day's raw statistics files are time-stamped with the date the files were collected and are then made available for transfer to off-line storage.
  - Archived statistics files that are older than a user-specified number of days are purged in order to reclaim disk space
  - Bulk Statistics entries in the Sybase database that are older than a user-specified number of days are purged in order to reclaim storage space in Sybase.

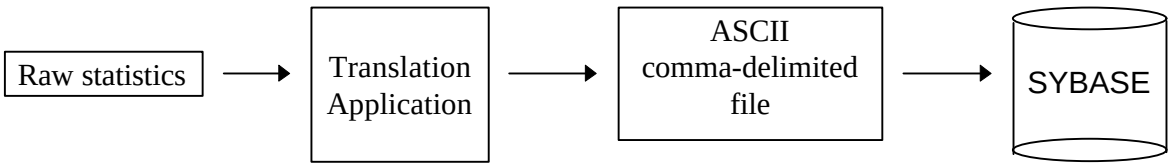


**Figure 2: Bulk Statistics Processing**

5.) Features/Benefits of Bulk Statistics Collector for CBX 500 v1.0

| Features | Description | Benefits |
|---|---|---|
| ***5 Minute Peak*** | The switch measures 5 minute sample periods over a period of time selected by the user (see next feature) and reports the maximum value (peak) of those samples. | Reduces information presented to users by calculating and reporting peak measurements from one or more samples. |
| ***Configurable Aggregate Measurement Period*** | From CascadeView, the user can configure the measurement period for the aggregate total beginning from 15 minutes up to 24 hours for each card in the switch. The default measurement period is one hour. | User flexibility - user controls the granularity of the data and how much load is placed on the network. |
| ***Logical Port Statistics*** | Peak and hourly data is reported for ATM UNI & NNI ports in addition to the trunk & PVC statistics. Also, both ingress and egress counts supported for UNI & NNI on lports. | Allows users to monitor usage across logical ports. |
| ***SVC Call Statistics*** | Call statistics are reported for each UNI port. | Allows users to monitor SVC call history. |
| ***Immediate Translation*** | Raw statistics data is translated immediately into decimal format when received by the Bulk Statistics Collector and then optionally bulk copied into Sybase for archival. | Provides near real-time data for the customer, i.e., more useful for CNM reporting. |
| ***Sybase 11 Support*** | Database table fields use ANSI standard types that are supported fully in Sybase 11 (e.g., numeric). | Use of ANSI standard data types in database tables provides for a more open interface to applications. |
| ***Script to Purge Old Database Entries*** | Users can delete old database entries that are n days old, where n is set by the user. If n is not set, the default is 30 days. | Allows customers to easily "clean up" their database. |
| ***Script to Purge Old Archived Raw Statistics*** | Users can delete old raw statistics file entries that are n days old, where n is set by the user. If n is not set, the default is 30 days. | Allows customers to easily "clean up" their collection station. |
| ***Co-resides with the Bulk Statistics Collector for B-STDX/STDX*** | The Bulk Statistics Collector for CBX 500 can reside on the same server as the Bulk Statistics Collector for B-STDX/STDX. Additionally, ATM statistics can be stored in the same Sybase database that contains B-STDX/STDX statistics. | Reduces capital equipment costs, shares Sybase database. |

6.) Statistics

This section lists the sets of statistics that are collected for ATM Cell Trunks, ATM Permanent Virtual Circuits and ATM UNI/NNI ports logical ports.

ATM Cell Trunk and UNI Logical Port Statistics

Table 1 presents the set of statistics that are reported for ATM Cell Trunks and UNI/NNI Logical Ports.

**Table 1: ATM Cell Trunk and UNI/NNI Statistics**

| **Identifier Object** | **Definition** |
|---|---|
| ifIndex | The unique interface identifier. |
| ifOperStatus | The current operational status of the interface. The value of this object will be enabled(1) when the circuit is operational and disabled (2) when the circuit is disabled. |
| ifSpeed | The interface's configured bandwidth in bits per second. |
| lportPrivateNet | If non-zero, this field indicates the private network that this logical port belongs to. If zero, this port has access to the entire public portion of the network. |
| lportCustomerID | A decimal number that identifies the customer that owns this logical port; this field is used for Virtual Private Networking. |
| lportFeeder | Indicates if this port is a feeder for one or more virtual UNI ports. Not reported for SVC statistics. |
| lportSlotId | The slot number on which this logical port is configured. |
| lportPportId | The physical port number on which this logical port is configured. |
| lportFlowControl | Indicates the state of a Flow Control (NRTS) daughter card for this port (if present on the card). This object will have the following values: 1 if the Flow Control daughter card is present and enabled, 2 if the Flow Control daughter card is present but disabled, 3 if the Flow Control card is not present.<br>If the Flow Control daughter card is not present, the values of InFcRMCells and InFcRMCellsPeak should be ignored.<br>Note that this value is not reported for lport SVC statistics. |
| **Total/Peak Object** | **Definition** |
| InUsrOamCLP01Cells | The total number of received User and OAM CLP 0+1 cells during the measurement period. |
| InUsrOamCLP01CellsPeak | 5-minute peak value for the above counter |
| InErrorUsrOamCLP01Cells | For OC3/DS3/T1, this is a count of the number of cells received during the measurement period with incorrectable HEC errors.<br>For OC12, this is a count of the number of cells received with correctable HEC errors. |
| InErrorUsrOamCLP01CellsPeak | 5-minute peak value for the above counter |
| InFcRMCells | The total number of RM cells received by the Flow Control (NRTS) processor for this port; this count is valid only for logical ports for which a Flow Control daughter card is enabled. |

| | |
|---|---|
| InFcRMCellsPeak | 5-minute peak value for the above counter |
| OutUsrOamCLP01Cells | The total number of transmitted User and OAM CLP 0+1 cells. |
| OutUsrOamCLP01CellsPeak | 5-minute peak value for the above counter |
| OutDroppedUsrOamCLP01Cells | The total number of dropped User and OAM CLP 0+1 cells. |
| OutDroppedUsrOamCLP01CellsPeak | 5-minute peak value for the above counter |
| **Utilization Object** | **Definition** |
| Ingress Utilization | Logical port utilization on inbound side (from the CPE or network) |
| Ingress Peak Utilization | Logical port utilization during the reported peak period |
| Egress Utilization | Logical port utilization of the outbound side during the reported period (to the CPE or network) |
| Egress Peak Utilization | Logical port utilization on outbound side during the reported peak period |

ATM UNI Logical Port SVC Call Statistics

Table 2 presents the SVC Call statistics reported for UNI Logical Ports.

**Table 2: ATM UNI SVC Statistics**

| Total/Peak Object | Definition |
|---|---|
| lportSigStatus | Indicates the state of SVC signalling on the port. This object will have the value of enabled (1) if signalling is enabled, and disabled (2) if signalling is disabled. |
| PtPtOrigActiveMin | Point-to-Point Active - Min (Originating)<br><br>The 'low-water mark' of simultaneous active Point-to-Point SVCs originating on this port. |
| PtPtTermActiveMin | Point-to-Point Active - Min (Terminating)<br><br>The 'low-water mark' of simultaneous active Point-to-Point SVCs terminating on this port. |
| PtPtOrigActiveMax | Point-to-Point Active - Max (Originating)<br><br>The 'high-water mark' of simultaneous active Point-to-Point SVCs originating on this port. |
| PtPtTermActiveMax | Point-to-Point Active - Max (Terminating)<br><br>The 'high -water mark' of simultaneous active Point-to-Point SVCs terminating on this port. |
| PtPtOrigAttempts | Point-to-Point Attempts (Originating)<br><br>The number of Point-to-Point SVC connection attempts originating on this port (as measured by the number of SETUP PDUs received from the CPE). |
| PtPtTermAttempts | Point-to-Point Attempts (Terminating)<br><br>The number of Point-to-Point SVC connection attempts terminating on this port (as measured by the number of SETUP PDUs received from the network). |
| PtPtNetworkRej | Point-to-Point Rejects - Network<br><br>The number of Point-to-Point SVC connection attempts, originating on this port, which were rejected for any reason other than remote user reject. |
| PtPtOrigUserRej | Point-to-Point Rejects - User (Originating)<br><br>The number of Point-to-Point SVC connection attempts, originating on this port, which were rejected by the remote user. |
| PtPtTermUserRej | Point-to-Point Rejects - User (Terminating)<br><br>The number of Point-to-Point SVC connection attempts, terminating on this port, which were rejected by the local user. |
| PtPtOrigFailures | Point-to-Point Failures (Originating )<br><br>The number of Point-to-Point SVC connections, originating on this port, which failed after the connection went active (i.e., for any reason other than the user explicitely dropping the connection). |
| PtPtTermFailures | Point-to-Point Failures (Terminating)<br><br>The number of Point-to-Point SVC connections, terminating on this port, which failed after the connection went active (i.e., for any reason other than the remote user explicitely dropping the connection). |

| | |
|---|---|
| PtMPtOrigActiveConnMin | Point-to-Multipoint Active - Min (Originating)<br><br>The 'low-water mark' of simultaneous active Point-to-Multipoint SVC legs originating on this port. |
| PtMPtTermActiveConnMin | Point-to-Multipoint Active - Min (Terminating)<br><br>The 'low-water mark' of simultaneous active Point-to-Multipoint SVC legs terminating on this port. |
| PtMPtOrigActiveConnMax | Point-to-Multipoint Active - Max (Originating)<br><br>The 'high-water mark' of simultaneous active Point-to-Multipoint SVC legs originating on this port. |
| PtMPtTermActiveConnMax | Point-to-Multipoint Active - Max (Terminating)<br><br>The 'high -water mark' of simultaneous active Point-to-Multipoint SVC legs terminating on this port. |
| PtMPtOrigActivePartiesMin | Point-to-Multipoint Active Parties - Min (Originating)<br><br>The 'low-water mark' of simultaneous active Point-to-Multipoint SVC parties originating on this port. |
| PtMPtTermActivePartiesMin | Point-to-Multipoint Active Parties - Min (Terminating)<br><br>The 'low-water mark' of simultaneous active Point-to-Multipoint SVC parties terminating on this port. |
| PtMPtOrigActivePartiesMax | Point-to-Multipoint Active Parties - Max (Originating)<br><br>The 'high-water mark' of simultaneous active Point-to-Multipoint SVC parties originating on this port. |
| PtMPtTermActivePartiesMax | Point-to-Multipoint Active Parties - Max (Terminating)<br><br>The 'high -water mark' of simultaneous active Point-to-Multipoint SVC parties terminating on this port. |
| PtMPtOrigConnAttempts | Point-to-Multipoint Attempts (Originating)<br><br>The number of Point-to-Multipoint SVC connection SETUP attempts originating on this port. |
| PtMPtOrigPartyAttempts | Point-to-Multipoint Party Attempts (Originating)<br><br>The number of Point-to-Multipoint SVC connection ADD PARTY attempts originating on this port. |
| PtMPtTermConnAttempts | Point-to-Multipoint Attempts (Terminating)<br><br>The number of Point-to-Multipoint SVC connection SETUP attempts received from the network and terminating on this port. |
| PtMPtTermPartyAttempts | Point-to-Multipoint Party Attempts (Terminating)<br><br>The number of Point-to-Multipoint SVC connection ADD PARTY attempts received from the network and terminating on this port. |
| PtMPtOrigNetworkConnRej | Point-to-Multipoint Rejects - Network<br><br>The number of Point-to-Multipoint SVC connection SETUP attempts, originating on this port, which were rejected for any reason <u>other than</u> remote user reject. |

| | |
|---|---|
| PtMPtOrigNetworkPartyRej | Point-to-Multipoint Party Rejects - Network<br><br>The number of Point-to-Multipoint SVC connection ADD PARTY attempts, originating on this port, which were rejected for any reason other than remote user reject. |
| PtMPtOrigRemUserConnRej | Point-to-Multipoint Rejects - Remote User (Originating)<br><br>The number of Point-to-Multipoint SVC connection SETUP attempts, originating on this port, which were rejected by the remote user. |
| PtMPtOrigRemUserPartyRej | Point-to-Multipoint Party Rejects - Remote User (Originating)<br><br>The number of Point-to-Multipoint SVC connection ADD PARTY attempts, originating on this port, which were rejected by the remote user. |
| PtMPtTermUserConnRej | Point-to-Multipoint Rejects - Local User (Terminating)<br><br>The number of Point-to-Multipoint SVC connection SETUP attempts, terminating on this port, which were rejected by the local user. |
| PtMPtTermUserPartyRej | Point-to-Multipoint Party Rejects -Local User (Terminating)<br><br>The number of Point-to-Multipoint SVC connection ADD PARTY attempts, terminating on this port, which were rejected by the local user. |
| PtMPtOrigConnFailures | Point-to-Multipoint Failures (Originating)<br><br>The number of Point-to-Multipoint SVC connections, originating on this port, which failed after the connection went active. This count includes only the legs resultant from initial SETUP requests. |
| PtMPtOrigPartyFailures | Point-to-Multipoint Party Failures (Originating)<br><br>The number of parties dropped from originating Point-to-Multipoint SVC connections which failed after the connection went active. |
| PtMPtTermConnFailures | Point-to-Multipoint Failures (Terminating)<br><br>The number of Point-to-Multipoint SVC connections, terminating on this port, which failed after the connection went active. This count includes only the legs resultant from initial SETUP requests. |
| PtMPtTermPartyFailures | Point-to-Multipoint Party Failures (Terminating)<br><br>The number of parties dropped from terminating Point-to-Multipoint SVC connections which failed after the connection went active. |

## ATM Permanent Virtual Circuit Statistics

Table 4 presents the ATM PVC statistics that are collected.

**Table 4: ATM PVC Statistics**

| Identifier Object | Definition |
|---|---|
| cktSrcIfIndex | The interface number of the logical port that the circuit is subscribed |
| cktAtmVPI | The circuit's VPI |
| cktAtmVCI | The circuit's VCI |
| cktPrivateNet | If non-zero, this field indicates the private network that this trunk belongs to. If zero, this trunk has access to the entire public portion of the network. |
| cktCustomerID | A decimal number that identifies the customer that owns this trunk; this field is used for Virtual Private Networking. |
| cktOperStatus | The operational status of the circuit at the time that the statistics were gathered. The value of this object will be enabled(1) when the circuit is operational and disabled (2) when the circuit is disabled. |
| cktFlowControl | Indicates if this circuit is routed through the Flow Control daughter card on this IOM. The value of the object will be 0 if the circuit is not on the Flow Control card, and 1 if it is. The corresponding flow control counts are valid only when the value of this object is 1. |
| cktAtmUserPlane | Indicates if the circuit is a point-to-point or a point-to-multipoint circuit. The value of the object will be 1 if this is a point-to-point circuit and 2 if it is a point-to-multipoint circuit. |
| cktATMQos | The quality of service (QOS) for the ingress direction of the circuit. |
| cktATMRQos | The quality of service (QOS) for the egress direction of the circuit. |

| Statistics | Definition |
|---|---|
| InPassedUsrOamCLP0Cells | The total number of received User and OAM CLP 0 cells that passed UPC screening during the measurement period. |
| InPassedUsrOamCLP0Peak | 5-minute peak value for the above counter |
| InPassedUsrOamCLP1Cells | The total number of received User and OAM CLP 1 cells that passed UPC screening during the measurement period. |
| InPassedUsrOamCLP1CellsPeak | 5-minute peak value for the above counter |
| InDroppedUsrOamCLP0Cells | The total number of User and OAM CLP 0 cells that were received and dropped by UPC during the measurement period. |
| InDroppedUsrOamCLP0CellsPeak | 5-minute peak value for the above counter |
| InDroppedUsrOamCLP1Cells | The total number of User and OAM CLP 1 cells that were received and dropped by UPC during the measurement period. |
| InDroppedUsrOamCLP1CellsPeak | 5-minute peak value for the above counter |
| InTaggedUsrOamCells | The total number of received and tagged User and OAM cells during the measurement period. |
| InTaggedUsrOamCellsPeak | 5-minute peak value for the above counter |
| OutUsrCLP0Cells | The total number of User CLP 0 cells that were transmitted during the measurement period. |
| OutUsrCLP0CellsPeak | 5-minute peak value for the above counter |
| OutUsrCLP1Cells | The total number of User CLP 1 cells that were transmitted during the measurement period. |
| OutUsrCLP1CellsPeak | 5-minute peak value for the above counter |
| OutOamCLP0Cells | The total number of OAM CLP 0 cells that were transmitted during the measurement period. |
| OutOamCLP0CellsPeak | 5-minute peak value for the above counter |
| OutOamCLP1Cells | The total number of OAM CLP 1 cells that were transmitted during the measurement period. |
| OutOamCLP1CellsPeak | 5-minute peak value for the above counter |
| OutDropFcUsrOamCLP0Cells | The total number of CLP 0 cells (user and OAM) received from the switching fabric and discarded by the Flow Control (NRTS) card, if this circuit passes through the Flow Control daughter card. |
| OutDropFcUsrOamCLP0CellsPeak | 5-minute peak value for the above counter |
| OutDropFcUsrOamCLP1Cells | The total number of CLP 1 cells (user and OAM) received from the swithching fabric and discarded by the Flow Control (NRTS) card, if this circuit passes through the Flow Control daughter card. |
| OutDropFcUsrOamCLP1CellsPeak | 5-minute peak value for the above counter |

7.) Hardware/Software Requirements

For the Bulk Statistics Collector:

- Sun SPARC or UltraSPARC workstation/server running Solaris 2.4 or higher; recommended minimum requirements are a Sun SPARC 20 or UltraSPARC 2.
- Sybase 11 or later (if statistics are to be stored in Sybase)
- 128 MB RAM minimum
- 2.1 GB of hard disk space minimum
- 1/4-inch cartridge (QIC) tape drive

Note: The disk space required to store collected statistics varies by network size.

Cascade Switch Software: CBX 500 v2.0 or later

Note: Bulk Statistics for the B-STDX 8000/9000 and STDX 6000 are supported by the Bulk Statistics Collector for B-STDX/STDX.

8.) Availability/Pricing/Packaging

Note: the Bulk Statistics Collector for CBX 500 will be packaged as part of the 70020 product code (Bulk Statistics Collector for B-STDX/STDX v2.5). Software maintenance contract customers will receive the software at no charge.

- Suggested List Price: $7,500; licensed per machine (workstation or server) without any restrictions as to the number of clients using its services
- Product Code: 70020
- Availability: Q2 1997

Additional Information

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