Premier S/390 Gateway for SNA and IP Access

IBM 3746 Nways Multiprotocol Controller Models 900 and 950

Highlights

Premier gateway to the S/390 server for native TCP/IP, APPN/HPR and SNA subarea networks

Flexible intranet and Internet connectivity for access to new e-business applications

High network availability—ideal in a S/390 Parallel Sysplex environment

ESCON and parallel channel adapters for S/390 server access, with MPC+ support for improved performance in APPN/HPR and IP environments

Flexible TN3270E server support for IP access to SNA applications

Nondisruptive migration path for evolving user requirements

Multiple high-speed connectivity options for both LAN and WAN, including 155-Mbps ATM, 100-Mbps Ethernet, T3/E3 speeds and Primary Rate ISDN

As the Year 2000 approaches, many companies will see an increase in traffic volumes due to application testing, the bringing forward of Year 2000 transactions and increased consumer demand. In addition, there will be a requirement for additional connectivity.

Because of these Year 2000 impacts, companies will be looking for increased capacity and performance from their S/390® and their networks during 1999. However, they will also require a stable, dependable and reliable environment, and in some cases they will have an infrastructure freeze. For these reasons, upgrading and enhancing installed equipment is the optimum solution. The 3746 controller platform will be one of your most important assets to handle the Year 2000 increased traffic needs.

From SNA to APPN/HPR and IP

The 3746 Nways® Multiprotocol Controller has proven to be a dependable and reliable gateway to the S/390 server. IBM has increased its capacity, connectivity and performance over the years, while reducing the cost per port. IBM has announced new functions that show the 3746 as a highly scalable device that enables you to increase connectivity significantly without the need to purchase additional 3746 footprints. The 1999 announcements continue to enhance the product, protecting your investment, and demonstrate that the 3746 is truly the premier gateway to the S/390 server.



IBM 3746 Nways Multiprotocol Controller

The 3746 controllers are designed to meet your data center gateway needs. Link the S/390 server to both the enterprise intranet and the external Internet with high-speed, native IP support. Take advantage of Advanced Peer-to-Peer Networking® (APPN®) and High Performance Routing (HPR) for predictable high-performance networks, along with full availability of host-based Systems Network Architecture (SNA) applications. Connect to public or private frame-relay networks to transport multiple protocols over frame relay for cost-savings. Even add ISDN PRI for unbeatable, but affordable, flexibility.

Powerful networking solutions

The 3746 controllers are a high-performance solution for supporting distributed multiprotocol networks. They're designed to provide high connectivity and high throughput as APPN/HPR and IP routing nodes. The Model 950 operates in standalone mode, without the need for a Network Control Program (NCP), whereas the Model 900 attaches to a 3745 Communication Controller, enabling the transport of SNA subarea traffic as well as supporting all the advanced functions of the Model 950.

Investment protection

IBM continues to improve the performance of the 3746 and add new functions. Recent additions include significant increases in connectivity on the ESCON® channel processors and token-ring processors. New functions are available to balance workload over frame- relay and token-ring connections. The increased connectivity and connection balancing features apply to both NCP and APPN/HPR environments.

New facilities are available to enrich the IP and APPN/HPR protocol support. In addition, the network management functions of the 3746 are enhanced, especially in APPN/HPR environments.

Many of the recent announcements apply to the Type 3 processors of the 3746. Built with improved technology, these processors improve performance and connectivity by up to 100%.

In addition, enhancements to the Multiaccess Enclosure (MAE) increase by more than three times the number of supported TN3270E sessions (up to 15 000). The MAE, with its PowerPC technology and common code support, not only increases the breadth of connectivity but also makes important functions such as TN3270E Server, Network Dispatcher and Enterprise Extender available to all adapters of the 3746.

IP routing

The 3746 controllers provide native support for many IP routing functions. This allows dynamic routing of IP traffic over token-ring, Ethernet, Fast Ethernet, Fiber Distributed Data Interface (FDDI) and asynchronous transfer mode (ATM) local area networks (LANs), as well as ESCON and parallel channels, frame-relay, High-Speed Serial Interface (HSSI), and Point-to-Point Protocol (PPP) links. As IP routers, the 3746 controllers can connect multiple networks, positioning the 3746 as a key gateway into the corporate intranet. The following protocols are provided to support intranet operation:

- Open Shortest Path First (OSPF). This is now supported by the ESCON Processor Type 3 on the base 3746 as well as on the ESCON and parallel channel adapters of the MAE. OSPF is already available on all the LAN, WAN and ATM adapters of the 3746, including the MAE.
- Routing Information Protocol (RIP) Version 2. This is available over all adapters of the 3746, including the MAE.
- Border Gateway Protocol (BGP).

3746 adapters route the IP packets either port-to-port within the adapter, or adapter-to-adapter. IP traffic can share the same adapter with SNA and APPN/HPR data. The IP function operates without NCP support.

Bandwidth Reservation System

For WAN traffic, the Bandwidth Reservation System (BRS) function allows a percentage of the bandwidth to be reserved for different applications, such as IP or APPN.

TN3270E Server

Flexible TN3270E server support for IP access to SNA applications with an innovative approach to the TN3270E server allows the function to be centralized or distributed across either an IP or APPN backbone. The number of TN3270E sessions supported is increased from 4000 to 15 000—an increase of over three times. TN3270E server support is provided by the MAE and is supported for all adapters of the 3746. To enable the increased TN3270E session support, additional memory is required on the MAE (up to 512 MB).

New TN3270E enhancements include multiple LU pools, IP address to LU Name mapping and Dynamic Definition of Dependent LUs, for more efficient management and operation of the network.

Network Dispatcher
The Network Dispatcher function provides a powerful solution for clustering Web servers. It allows multiple S/390 servers to be viewed from the network as a single system image and provides load-balancing among different IP servers.

Enterprise Extender
Enterprise Extender is a simple set of extensions to APPN/HPR technology allowing the integration of SNA Class of Service (CoS) into IP backbones and preserving the SNA CoS by mapping its priority to UDP port numbers. Enterprise Extender technology can also reduce demands on data-center routing platforms. It provides a cost-effective solution by seamlessly routing packets through the network protocol edges, eliminating the need for protocol translation and the store-and-forward mechanisms associated with transport layer functions.

Enterprise Extender technology uses HPR to carry SNA applications across an IP backbone, allowing users to exploit SNA's CoS benefits. Systems employing a Parallel Sysplex configuration will see improved performance with this technology. Enterprise Extender enhances the availability features such as multinode persistent sessions (MNPS) for SNA clients using an IP infrastructure.

The combination of Enterprise Extender and TN3270E server provides a powerful solution for IP backbone networks. Enterprise Extender enables remote sessions from a remote TN3270E server to be carried over IP backbone networks.

Multi-Path Channel Extended (MPC+)
MPC+ support provides TCP/IP support over both the MAE ESCON and parallel channels. In addition, MPC+ supports the User Datagram Protocol (UDP) on the MAE ESCON channel. UDP is provided for communications between DATABASE2™ (DB2®) on OS/390® Version 2 Release 4 and SAP R/3 application servers. MPC+ allows a channel to carry a combination of TCP/IP, UDP and APPN/HPR traffic. Other UNIX® System Services socket applications using UDP, such as Network File System (NFS) and data circuit-terminating equipment (DCE), can also take advantage of UDP services over the MAE ESCON and parallel channels.

IP Passthrough
The new IP Passthrough capability is now available over the ESCON and the parallel channel adapters of the MAE, which will assist with the migration of 3172s in the data center.

Virtual Router Redundancy Protocol (VRRP)
VRRP provides a reliable solution for accessing TCP/IP hosts across a LAN. VRRP allows an IP router to act in standby mode and automatically take over another router's function should it fail. The 2216 Nways Multiaccess Connector also supports VRRP.

Virtual Private Networking (VPN)
The Layer 2 Tunneling Protocol (L2TP) provides a standards-based method for tunneling PPP across an IP backbone, creating a multiprotocol virtual private network that allows private addresses, IP, IPX and AppleTalk communication. L2TP is supported over IP or UDP.

The IP Security (IPSec) functions provide the ability to transport traffic over unsecured networks–such as the Internet–through an IP tunnel. This can reduce network costs by eliminating the reliance upon expensive leased lines between sites.

Extensive APPN/HPR support
The most important characteristics of an APPN network are its dynamic capabilities. The APPN architecture allows devices to connect and disconnect as required, without predefinition, and sessions are established according to the current state of the network. APPN, with its HPR extensions, can reroute around failures in the network without disruption.

Migration from SNA subarea to APPN/HPR will provide greater performance, availability and flexibility while reducing overall network costs. The 3746 provides the following APPN/HPR benefits:

- Reduced system definition and network administration.
- Adaptability based on changes in the configuration workload.
- Nondisruptive data transfer rerouting around failed network components for 100% network availability.
- Automatic Network Routing (ANR) for efficient routing between nodes to reduce the amount of processing required in intermediate nodes.
- Adaptive Rate Base (ARB) congestion control for maximum line use. ARB monitors the data rates between HPR endpoints and regulates the traffic entering the network for significant performance improvements. ARB also eliminates network congestion and minimizes packet retransmissions.
- Interoperability with SNA subarea networks and applications.
- Network management for high availability environments. Many S/390 installations are implementing the S/390 Parallel Sysplex®, which uses APPN/HPR to achieve 100% availability and workload balancing among S/390 servers.
- Centralized end-to-end network management and control.

The 3746 offers full-function APPN/HPR support and can operate either as a regional concentrator for APPN and SNA traffic or as a powerful routing node interfacing to S/390 servers.

On the 3746, HPR support is available over ESCON and parallel channels, token-ring, Ethernet, Fast Ethernet, FDDI, and ATM LANs, frame-relay, ATM, X.25, and SDLC WAN links.

APPN Network Node
The 3746 controllers provide APPN network node services. As a network node, the 3746 automatically registers the topology of the network and updates this topology whenever it changes. The 3746 uses its dynamic knowledge of the network to automatically locate any resource and compute possible routes within the network.

Session Services Extensions (SSE)
SSE provides support for connecting to an APPN border node, splitting very large APPN networks and restricting exchanges of topology information while preserving APPN directory searches. The SSE function also enables the 3746 Network Node to act as a server for an attached VTAM® S/390 end node. SSE is now available on both the MAE and the 3746 base NNP.

Extended Border Node (EBN)
EBN allows large APPN networks to be subdivided into smaller networks or subnetworks. It also provides the ability to connect to other APPN networks with different network IDs. This enables large subarea SNI configurations to migrate smoothly to APPN/HPR. EBN support is available only through adapters on the MAE.

Dependent logical unit requester (DLUR)
DLUR allows sessions from dependent LUs (LU0, LU1, LU2, LU3, LU6 or LU6.2) connected to devices such as the 3746 and 3174 controllers, or the IBM 2210, 2212 or 2216, or the PS/2, to be carried natively using an optimum route over an APPN/HPR network.

The dependent LUs (DLUs) must reside on or be owned by an APPN node providing the DLUR function. The DLUR node requests the dependent logical unit server (DLUS) of a VTAM® network to provide the system services control point (SSCP) services for its dependent LUs.

To establish dependent LU sessions, traditional SSCP-PU and SSCP-LU traffic flows through two LU 6.2 sessions between the DLUR node and the DLUS node. However, the LU-LU application session is always carried natively through the network, giving the user the benefit of APPN/HPR transport and performance.

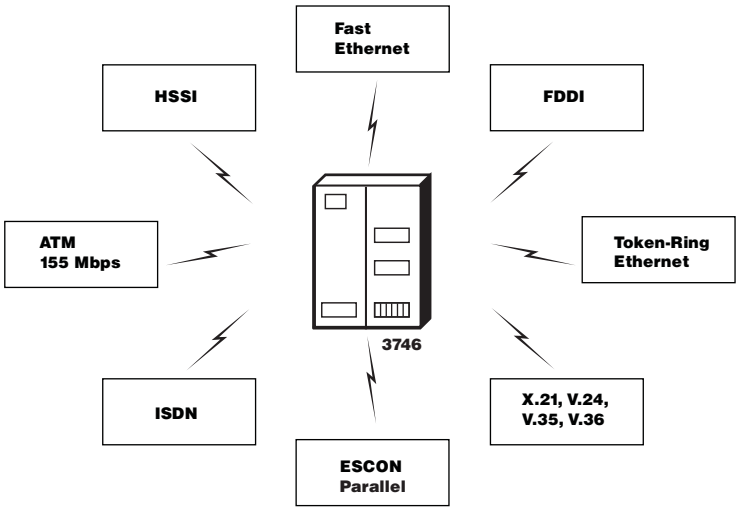
HPR MLTG and ATM functions
HPR Multilink Transmission Group (MLTG) is supported over SDLC, frame- relay, and X.25 links, and token-ring and Ethernet LANs. MLTG enables the 3746 to use a variable bandwidth on a single logical transmission group (TG) composed of multiple physical links or LANs. MLTG can be used where single or multiple sessions require more bandwidth than a single physical link or LAN can provide.

The ATM adapters in the 3746 MAE allow APPN/HPR traffic to flow natively over an ATM virtual channel (VC). Both switched and permanent connections are supported.

Multiaccess Enclosure

The Multiaccess Enclosure (MAE) is available for both the 3746 Model 900 and Model 950.

The high-speed MAE uses PowerPC technology with a direct connection to the connectivity switch of the 3746 controller. This high-speed direct connection provides an impressive balance of price, performance and connectivity support for a broad range of high-speed LANs and WANs for improved IP traffic routing. The directly connected MAE integrates the control points of the 3746 NNP and the MAE into a single IP router image, easing configuration, management, maintenance and network operations. SNA and APPN/HPR traffic between the MAE adapters and the base 3746 adapters is carried over internal token-ring connections.



3746 Multiaccess Enclosure

If you have the earlier version of the MAE, a free field upgrade is available to allow direct connection to the 3746 connectivity switch for IP traffic. The hardware connection between the MAE and the 3746 requires a processor slot in the 3746. The direct connection improves performance for IP traffic routed between MAE adapters and base 3746 adapters.

The MAE supports traffic protocols including TCP/IP, APPN/HPR, and SNA/DLUR. Supported WAN protocols include ATM, SDLC, PPP, frame relay, X.25 and ISDN. With eight adapter slots and up to eight ports per adapter, the MAE offers high WAN port density for cost-effective traffic concentration.

ATM multimode fiber (MMF) and single-mode fiber (SMF) adapters improve performance while holding down costs. For improved performance in the APPN, Data Link Switching (DLSw), and TN3270E environments, MAE memory options of 128 MB, 256 MB and 512 MB are now available.

The TN3270E server function provides an additional solution for transporting SNA traffic over an IP backbone. The TN3270E MAE server supports both APPN/HPR and subarea connectivity to the S/390 server, offering a flexible approach to 3270 access.

In addition to the TN3270E server function, the MAE provides other enhanced functions such as the Network Dispatcher, Enterprise Extender and DLSw. These functions are available to all the adapters of 3746, including those in the 3746 base.

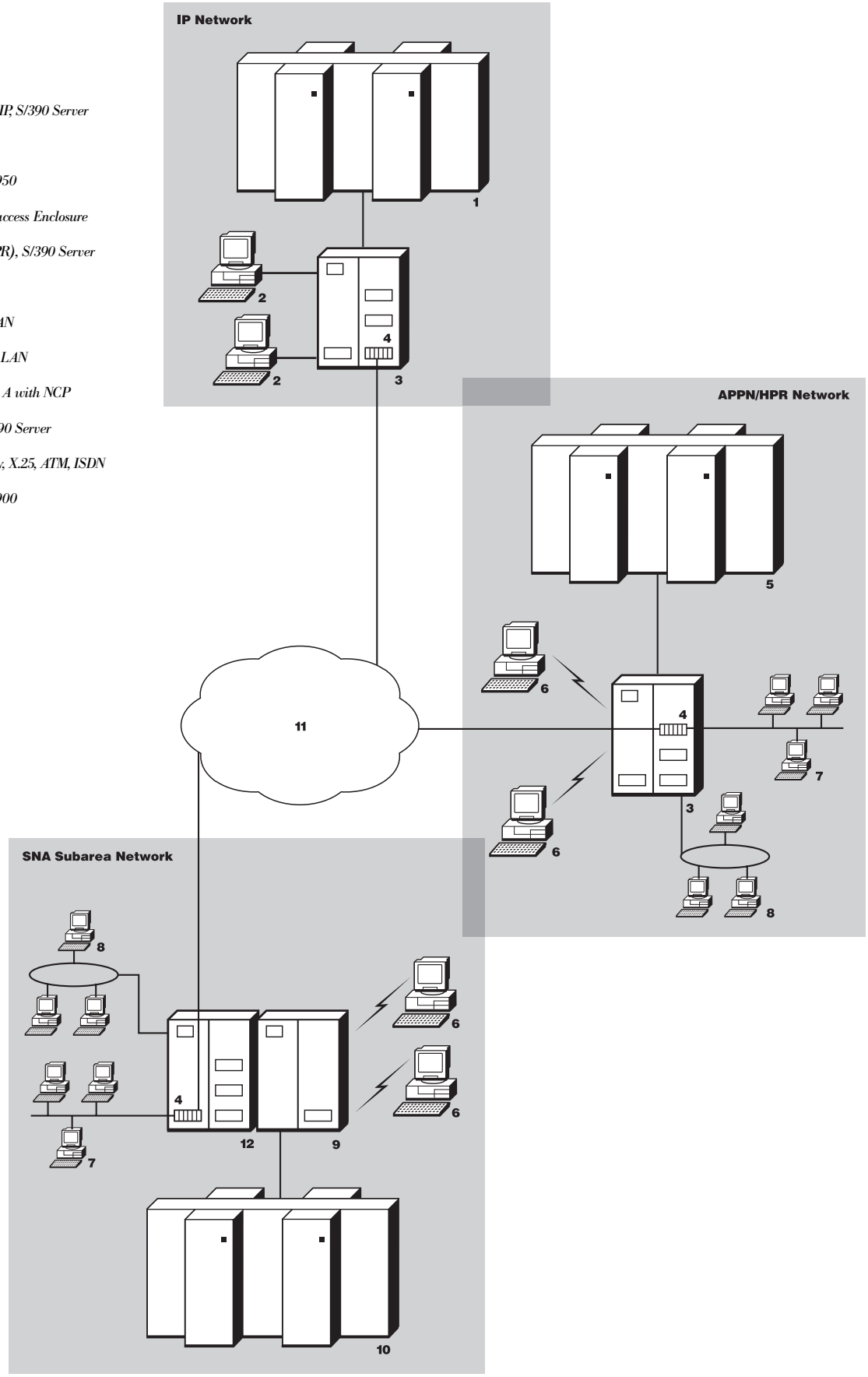
MAE connectivity options

The following network/channel connectivity options are available:

- ATM, MMF, and SMF adapters running at 155 Mbps and operating with SONET OC-3 framing provide support for ATM Forum-compliant LAN Emulation client and Classical IP routing; native HPR support allows APPN/HPR traffic to flow over an ATM VC.
- ESCON Channel Adapter for access to up to 32 servers for LSA, or up to 16 servers for LCS or MPC+. ESCON Multiple Image Facility (EMIF) support is also provided to enable attachment to multiple S/390 logical partitions.
- Parallel Channel Adapter to support byte or block multiplexor channel connectivity to the S/390. Supported channel protocols are LSA, LCS and MPC+. Up to four channel adapters (Parallel or ESCON) can be installed in the MAE.
- Ethernet: 2-port Ethernet Adapter compliant with Ethernet 2.0 IEEE 802.3 and ISO 8802-3.
- Fast Ethernet: 1-port Fast Ethernet Adapter operating at either 10 or 100 Mbps; compliant with IEEE 802.3 and 802.3U.
- Token-ring: 2-port Token-Ring Adapter operating at 4 Mbps or 16 Mbps with automatic sensing of ring speed; compliant with IEEE 802.5 and ISO 8802-5.
- FDDI: 1-port adapter operating at 100 Mbps as either a Dual-Attach Station (DAS) or a Single-Attach Station (SAS) using multimode fiber (MMF) SC media connector; compliant with ISO 9314-1, ISO 9314-2, ISO IEC 9314-3 and FDDI station management revision 7.3.
- ISDN PRI: 1-port adapter operating at either 1.544 Mbps or 2.048 Mbps, supporting 23 and 30 B-channels, respectively; ISDN support can be used for dial backup with the MAE lines' dial-on-demand switched facility. Frame relay and PPP framing are supported.
- ISDN PRI 4-port adapters offer attachments to ISDN primary rate lines; optional 4-port daughter cards can be added to the base adapter, bringing the total to eight ports.
- Channelized E1/T1/J1 support: allows the MAE ISDN primary rate adapters to be configured for channelized T1/E1/J1 operation. It supports frame relay and PPP framing.

  Note: Channelized E1/T1/J1 and ISDN PRI support are mutually exclusive.
- HSSI: 1-port adapter compliant with ANSI/EIA/TIA 612 and ANSI/EIA/TIA 613 speeds up to 52 Mbps.
- V.35/V.36 WAN interface: 6-port V.35 or V.36 adapter; supports line speeds of 9.6 kbps to 2.048 Mbps for modem clocking, and line speeds of 9.6 kbps to 460.8 kbps and 1.544 Mbps and 2.048 Mbps for direct attachment on leased lines.
- X.21 WAN interface: 8-port X.21 adapter supports line speeds of 9.6 kbps to 2.048 Mbps for modem clocking, and line speeds of 9.6 kbps to 460.8 kbps and 1.544 Mbps and 2.048 Mbps for direct attachment on leased lines.
- V.24/EIA 232: 8-port V.24/EIA 232 WAN adapter supports line speeds of 9.6 kbps to 64 kbps with modem attachment or direct attachment.

1. *MVS TCP/IP, S/390 Server*
2. *PPP*
3. *IBM 3746-950*
4. *3746 Multiaccess Enclosure*
5. *VTAM (HPR), S/390 Server*
6. *SDLC*
7. *Ethernet LAN*
8. *Token-ring LAN*
9. *3745 Model A with NCP*
10. *VTAM, S/390 Server*
11. *Frame relay, X.25, ATM, ISDN*
12. *IBM 3746-900*



3746 Nways Controller connectivity

A wide range of adapters

The Type 3 processors provide 3746 adapters with high-end functions at a midrange price. Type 1 and Type 2 processors are field-upgradable to Type 3 processors to enable higher connectivity and increased performance. Increases in throughput are dependent on traffic patterns and protocols used. The Type 1 and 2 processors have been withdrawn.

The following features on the base 3746 controllers can be installed with or without the MAE:

- Communication line adapters

  The communication line adapter consists of one Communication Line Processor (CLP) Type 2 or 3 and any combination of up to four Line Interface Couplers (LICs), Type 11, 12 or 16. Communication line adapters support SDLC, PPP, X.25 and frame-relay lines using two types of LICs. LIC11 supports low-to-medium-speed lines (600 bps to 256 kbps) and LIC12 supports higher speed lines (56 kbps to 2.048 Mbps). The CLPs connect up to four LICs (in any combination) and provide automatic backup capability between adjacent CLPs.

  The CLP Type 3 (CLP3) supports up to 3000 PUs (1000 PUs over SDLC lines and 2000 PUs over frame relay, X.25 or ISDN). For PUs supported by the 3746 Network Node, up to 12000 APPN/DLU LU-LU sessions can be supported. Each CLP3 supports up to 2000 frame-relay Data-Link Connection Identifiers (DLCIs). Any number of IP stations can be attached to the CLP through PPP and frame-relay links. In configurations with all the CLPs carrying only NCP traffic, each CLP3 supports up to 3000 PUs (instead of 2000).

  The CLP3 supports up to three times the connectivity of the CLP2 with up to 100% improvement in throughput. There is no limit to the number of HPR/ANR sessions that can be routed through the CLP.

  Frame-relay BAN connection balancing is now available on the 3746 to balance the connections and workload among multiple CLP3, therefore increasing throughput. This is available on the same or over multiple 3746s.

- ESCON adapters

  The ESCON adapter consists of one ESCON Channel Processor (ESCP) Type 1, 2 or 3, and one ESCON Channel Coupler (ESCC) Coupler Type 1 or 2. The ESCON Coupler Type 1 can be upgraded to ESCC Type 2 for higher throughput. The ESCON Channel Coupler Type 1 or 2 carries the interface to the ESCON MMF duplex optical-fiber channel cable. ESCON Channel Couplers support the standard ESCON fiber distance of 3 km (1.86 mi.).

  ESCON channel adapters allow communication with IBM S/390 servers. The ESCON architecture provides flexibility in the design of S/390 channel connections.

  3746 Models 900 and 950 equipped with ESCON channel adapters meet the high-availability, high-performance requirements set of Parallel Sysplex processors. The 3746 has the unique capability of sharing the adapter with all protocols available in the machine, including SNA subarea, APPN intermediate session routing (APPN/ISR), HPR, TCP/IP and UDP.

  The ESCON Type 3 (ESCP3) processor provides channel data link control (CDLC) and now supports 32 logical connections to VTAMs and TCP/IPs running in S/390 partitions—a 100% increase in connections to the S/390 over the ESCON Type 2 processor. This increased number of channel connections enables you to connect to more partitions of S/390 servers, which is very important in the S/390 Parallel Sysplex environment. In addition, compared to the ESCON Type 2 processor, up to 70% increase in throughput can be realized. The ESCP3 can carry up to 14000 APPN/DLU sessions.

- Token-ring adapters

  Token-ring adapters have two parts: the Token-Ring Processor Type 3 (TRP3), which provides IEEE 802.2 LLC, and the Token-Ring Interface Coupler Type 3 (TIC3), which handles the medium access control (MAC).

  The Token-Ring Processor Type 3 now supports up to 3000 active PUs—a 50% increase from the 2000 PUs supported on the Token-Ring Processor Type 2. This enables a greater number of end users to be connected to each token ring. For PUs controlled by the Network Node, up to 14000 APPN/DLU sessions can be supported.

  Compared with TRP Type 2 processors, Type 3 processors provide up to 80% increase in throughput. There is no limit to the number of HPR/ANR sessions that can be routed through the CLP.

  Token-ring connection balancing is now available on the 3746 to ensure that you are balancing the PU connections and workload among multiple token-ring processors, therefore increasing throughput. This is available on the same or over multiple 3746s.

3746 Models 900 and 950: box connectivity

With box connectivity improvements and the power of the Service Processor Type 3, the 3746 Models 900 and 950 can support any combination of 240 SDLC, frame-relay, X.25 or PPP lines.

Installing the Controller Bus Service Processor Type 3 concurrently with the Network Node Processor (NNP) Type 3 will increase the number of APPN ISR and APPN/DLUR sessions supported at a box level from 15000 to 30000. Out of these 30000 sessions, up to 15000 sessions can be established by the NNP Type 3 acting as the Network Node server of attached PUs (such as PU2s, APPN end nodes, or LEN nodes). The remaining sessions are established by other Network Node servers (such as the IBM 2210, 2212, 2216, CS/2, Network Utility or the MAE). In addition, the total number of HPR/ANR sessions is unlimited.

The base 3746 controller supports up to 16 processors. The MAE processor supports up to eight adapters.

Frame-relay support
The 3746 offers frame-relay support based on RFC 1490 for BAN and Boundary Network Node (BNN). The frame-relay Boundary Access Node (BAN) connection function provides connection balancing on the Communication Line Processor Type 3. This allows you to balance the PU connections and workload among multiple processors on the same or multiple 3746s, thus increasing throughput.

As a frame-relay terminating point, the 3746 supports a variety of frame-relay devices, such as the 2216 Nways Multiaccess Connector and 3174 Controllers, which can be directly connected through leased lines or through a public or private frame-relay network.

Frame-relay congestion management implemented by the 3746 Models 900 and 950 is based on Committed Information Rate (CIR), complying with ITU-T X.36. The 3746 recognizes congestion buildup through frame headers sent from the network and then reduces its transmission rate. Both models of the 3746 support the Frame Relay Frame Handler function.

In conjunction with CIR, BRS on frame-relay links can reserve a percentage of the bandwidth for individual protocols, for example APPN and IP flowing through the same virtual circuit (VC).

Using frame relay with the 3746 gives you a single multiprotocol transport network that allows native routing of IP, SNA and APPN/ HPR over the same WAN connection. And you can use the same WAN link for multiple protocols, reducing bandwidth consumption and network administration and management costs.

Increased availability
The 3746 controllers provide backup and redundant functions that increase availability of the products, including:

- Redundant power supply with automatic, nondisruptive takeover
- DC-distributed power for adapters and couplers
- Communication line adapters with automatic backup
- Duplicate token-ring port addresses
- Hot-pluggable adapters for concurrent upgrades and maintenance
- Dual NNPs

System management
The Service Processor is connected directly to the 3746 Models 900 and 950 and provides a single user interface to perform 3746 operator and service functions. The Service Processor can be used to:

- Perform maintenance on the 3746 Models 900 and 950 and operate the 3746 Network Node and IP Router
- Load the microcode of the 3746 Models 900 and 950
- Store the 3746 Models 900 and 950 configuration data files
- Report box errors as alerts to Tivoli® Management Environment 10 (TME 10), or NetView/390 and send error codes to the IBM Remote Support Facility (RSF)
- Display information about the Network Node Processor (NNP) utilization such as CPU load and memory utilization.

Controller Configuration and Management (CCM) is a utility tool resident in the NNP that is accessed through the Service Processor. CCM allows you to perform the following operations:

- Configure the 3746 Models 900 and 950 and all their resources. The APING function allows validity checking of configuration data.
- Manage 3746 Models 900 and 950 Network Node resources and perform functions such as port and station activation and deactivation.
- Display information about 3746 Models 900 and 950 Network Node resources, for example, the current and local network topology.
- The new remote configuration option allows an AIX® workstation to access the 3746 to upload/download CCM configurations. The AIX operator can modify the ASCII CCM files and verify them. Remote activation is also possible.
- The total number of active PUs and LU sessions under NNP control can be displayed by the CCM operator.

Additional or remote consoles can access the Service Processor using the platform-independent Java™ console support. The only requirement is for a Web browser with Java 1.1 enabled.
This provides the same functions as the previous Distributed Console Access Facility (DCAF) console support.

It is also possible to access the 3746 IP Router using Telnet from any IP station for configuration and management.

Several host network management programs work with the 3746. For example TME 10 or NetView/390 with its SNATAM function supports the following capabilities:

- APPN/HPR networking topology display, including the local topology of the 3746 network.
- 3746 Models 900 and 950 alert reports.
- Operator commands such as activation and deactivation of the 3746 network node resources, including those that are triggered by alerts.
- NetView Performance Monitor (NPM) reports 3746 Models 900 and 950 configuration and traffic activity data for the resources used in APPN/HPR and DLUR traffic. It includes processor load and storage usage for all 3746 adapters and counters reporting for token-ring couplers, WAN lines, frame-relay DLCIs and stations. This performance monitoring can be used for capacity planning in the 3746 Models 900 and 950.
- Management commands for the NNP network node and APPN/HPR resources controlled by the NNP can now be issued from NetView using RUNCMD commands.
- The SNMP agent of the 3746 IP router supports the standard MIBs, including the MIB for ESCON. This allows the 3746 IP router to be managed from NetView for AIX or other SNMP management platforms. NetView for AIX—in conjunction with the enhanced Router and Bridge Manager, a component of the IBM Nways Manager product—supports:
  - IP alerts from the 3746
  - IP router topology display, including 3746 controllers
  - IP traffic counters

Cost savings

Bandwidth and administration are the most costly aspects of today's networks. APPN/HPR and IP networking using 3746 controllers will help reduce these costs by reducing the number of WAN connections that result from the consolidation of IP, SNA or APPN/HPR routing over the same media. Installing the MAE will also significantly lower your cost per port. The 3746 does not require multiple-platform support skills.

Thanks to dynamic definition and total network self-discovery, the rigors and expenses of network administration can be reduced. As you migrate your network to the 3746-950, you will eliminate the need for an NCP due to the support of APPN/HPR. Decreased software expenses and increased performance make the IBM 3746 the right choice for any enterprise networking application.

Choosing the 3746 Nways Controller

When you choose the 3746 Nways Controller, you enable your network to evolve at your pace, satisfying both your current and future requirements. Combining the benefits of APPN/HPR, IP, frame relay, ISDN, Fast Ethernet and ATM, the 3746 helps you build a manageable, reliable platform of choice for data-center access.

The Type 3 processors provide cost-effective enhancements. The improved technology combines increased connectivity with up to a 100% improvement in performance and connectivity, all at a midrange price. All of the new functions delivered in 1999 are available as a new Licensed Internal Code option of the 3746, except for the increased session capacity, which requires additional memory on the Multiaccess Enclosure (MAE). You can take advantage of these new functions through existing 3746 hardware and install the Licensed Internal Code (3746 and MAE Extended Functions 4) when it is available.

Year 2000 ready

The 3746 Nways Multiprotocol Controller is Year 2000 ready when used in accordance with its associated documentation and is capable of correctly processing, and receiving data within and between the 20th and 21st centuries, provided that all other hardware, software, and/or firmware used with the product properly exchange accurate data with it.

To be Year 2000 ready, the installed 3745 and 3746 Models 900 and 950 require a minimum level of Licensed Internal Code. More information on these requirements is available at *www.ibm.com/year2000/* (select **Product readiness**, enter the 7-digit product number plus model number, select **Hardware**, and then select **Search**).

Features	*Benefits*
A single platform that consolidates IP, SNA and APPN/HPR routing over the same media	Cost savings, reduced network administration, advantages of each native protocol.
Migration to APPN/HPR	High availability and performance, full availability of host-based SNA applications, high connectivity and throughput, reduced costs.
Multiaccess Enclosure (MAE)	High-speed connectivity with an excellent balance of price and performance for ATM, ISDN PRI, ESCON, token ring, Ethernet, Fast Ethernet, and FDDI. Memory upgradability for demanding environments.
IP routing	Connects multiple networks, gateway to corporate intranet.
ESCON adapters	Connection with S/390 servers for investment protection.
Redundant power supply, hot-pluggable adapters and dual NNP	High availability.
Systems management with NetView/390 or Tivoli NetView	Cost and time savings.

IBM 3746 Nways Multiprotocol Controller Models 900 and 950 at a glance

Physical specifications	**Line Connection Box (Base or Expansion)**	**3746 with Controller Expansion***	**Controller Expansion (stand-alone)**
Width	450 mm (18 in.)	1560 mm (61.4 in.)	810 mm (32 in.)
Depth	220 mm (9 in.)	750 mm (29.5 in.)	750 mm (29.5 in.)
Height	130 mm (5.1 in.)	1775 mm (70 in.)	1775 mm (70 in.)
Weight	10 kg (22 lb)	632 kg (1393 lb)	242 kg (533.5 lb)

Operating environment

Class B Extended
Operating temperature: 10° to 38°C (50° to 100°F)
Relative humidity: 8% to 80%
Maximum wet-bulb temperature: 23°C (73°F)

	3746 with Controller Expansion	**Controller Expansion (stand-alone)**
Noise level:	7.5 dB	5.7 dB
Maximum heat output:	2.7 kW (9.3 kBTU/hr)	1.35 kW (4.65 kBTU/hr)
Maximum exhaust capacity:	24 m^3/min	6 m^3/min
Maximum electrical power:	3.6 kVA	1.8 kVA
Starting current:	256 A for 10 ms	
Leakage current:	Does not exceed 3.5 mA rms	

Power requirements

- The IBM 3746 and the Controller Expansion are powered through separate power cords, with the following characteristics:
  - Single phase
  - Frequency 50 or 60 Hz
  - Voltage 200-240 V
- The Line Connection Box (Base or Expansion) is powered from the 3746 by the LIC11 interface cable.
- The 3746 Model 900 is always attached to an IBM 3745 Communication Controller Model A.
- For details of the physical specification and the power requirements of both these products, see the following documents:
  - *IBM 3745 Communication Controller Model A, IBM 3746 Expansion Unit Model 900 and Model 950 Migration and Planning Guide,* GA33-0457
  - *IBM 3745 Communication Controller Model A, IBM 3746 Nways Multiprotocol Controller Models 900 and 950 Physical Planning Guide,* GA27-4238 (available in August 1999)

**Applies to the IBM 3746 at maximum configuration with one ac power supply*

3746 Features

Feature Code	Description
3001	*Multiaccess Enclosure with Direct Attachment* This feature provides an MAE with direct hardware connection to the 3746 high-speed switch for IP traffic. SNA and APPN/HPR traffic is supported using internal token-ring connectivity.
3251	*4-port ISDN PRI/Channelized (T1/J1) Daughter Card* 4-port daughter card attachment to FC 3297 that extends ISDN or Channelized capacity from four to eight ports.
3252	*4-port ISDN PRI/Channelized (E1) Daughter Card* 4-port daughter card attachment to FC 3298 to extend ISDN or Channelized capacity from four to eight ports.
3280	*2-port Token-Ring: LIC280* Maximum of six adapters. Each provides two attachments to token-ring LANs.
3281	*2-port Ethernet: LIC281* Maximum of six adapters. Each provides two attachments to Ethernet LANs. It supports the use of either 10BASE-T or 10BASE2 cable.
3282	*8-port EIA 232-E/V.24 Adapter: LIC282* Maximum of eight adapters. Each provides eight discrete attachments to EIA 232-E/V.24 WANs using a fanout cable (FC 3701). Supports line speeds of 9.6 to 64 kbps. Provides support for both modem and direct-attach.
3283	*1-port ISDN PRI/Channelized (T1/J1) Adapter: LIC283* Maximum of four adapters. Each provides one attachment to an ISDN PRI service at T1/J1 speeds. Alternatively provides support for Channelized T1/J1 up to 1.544 Mbps. It provides twenty-three 64-kbps B-channels for data and one 64-kbps D-channel for signaling.
3286	*1-port FDDI Adapter: LIC286* Maximum of eight adapters. Each provides one FDDI attachment on multimode fiber (MMF).
3287	*1-port ESCON Channel Adapter: LIC287* Maximum of 4 adapters, in combination with parallel channel adapters. Each attaches to an ESCON Director (for 3746 access to one or multiple local or remote S/390 servers) or directly to a S/390 server. Supports APPN/HPR, TCP/IP and UDP over MPC+ (with up to 16 VTAM and/or TCP/IP instances), SNA and APPN over LSA (with up to 32 VTAM instances) or IP over LCS (with up to 16 TCP/IP instances), or a combination. Also supports EMIF.
3288	*1-port Fast Ethernet Adapter: LIC288* Maximum of eight adapters. Each provides one 10-Mbps or one 100-Mbps Fast Ethernet attachment using an RJ-45 connector.
3289	*1-port HSSI Adapter: LIC289* Maximum of eight adapters. Each provides one High-Speed Serial Interface attachment with 15.25-m (50-ft) cable and 50-pin connector for attachment to DCE device operating at speeds up to 52 Mbps.
3290	*6-port V.32/V.36 Adapter: LIC290* Maximum of eight adapters. Each provides six attachments to ITU-T V.35 or V.36 WANs using a fanout cable. Supports line speeds of 9.6 kbps to 2.048 Mbps. Provides support for both modem and direct-attach.

3746 Features (continued)

3291	*8-port X.21 Adapter: LIC291* Maximum of eight adapters. Each provides attachment to ITU-T X.21 WANs using a fanout cable. Provides for receiving clocking (modem-attached) at line speeds from 9.6 kbps to 2.048 Mbps. Support for providing clocking (directly attached) at speeds from 9.6 kbps to 460.8 kbps as well as 1.544 Mbps and 2.048 Mbps.
3292	*1-port ISDN PRI/Channelized (E1) Adapter: LIC292* Maximum of four adapters. Each provides one attachment to a ISDN PRI service at E1 speeds. This provides thirty 64-kbps B-channels for data and one 64-kbps D-channel for signaling. It can also provide support for channelized E1 at speeds up to 2.048 Mbps.
3294	*1-port ATM Multimode Fiber Adapter: LIC294* Maximum of two adapters. Enhanced ATM adapter offering increased throughput, especially at small packet sizes.
3295	*1-port ATM Single-Mode Fiber Adapter: LIC295* Maximum of two adapters. Enhanced ATM adapter offering increased throughput, especially at small packet sizes.
3297	*4-port ISDN PRI/Channelized (T1/J1) Adapter* Maximum of one adapter. Provides connections to four ISDN Primary Rate Services at T1/J1 speeds. Each port connects to a T1/J1 line running at 1.544 Mbps, and can be configured to support an ISDN primary link, or T1/J1 channelized operation.
3298	*4-port ISDN PRI/Channelized (E1) Adapter* Maximum of one adapter. Provides connections to four ISDN Primary Rate Services at E1 speeds. Each port connects to an E1 line running at 2.048 Mbps, and can be configured to support an ISDN primary link, or E1 channelized operation.
3299	1-port Parallel Channel Adapter (LIC299) Maximum of 4 adapters, in combination with ESCON channel adapters. Each provides one attachment to a S/390 or S/370™ server, using a parallel I/O channel interface (OEMI). Supports APPN/HPR and TCP/IP over MPC+ (to VTAM and/or TCP/IP instances). SNA and APPN over LSA (to VTAM instances) and IP over LCS (to TCP/IP instances). Operates in byte or block multiplex mode. Data transfer uses Direct-Coupled Interlock (DCI) or data streaming.
3500	*MAE Second AC power supply* Provides backup power supply for the MAE. A single power supply can provide power for a fully configured unit.
3521	*Multiaccess Enclosure: 128 MB Memory Card* Provides 128-MB DIMM, for a total memory of 256 MB, when two such cards are installed.
3522	*Multiaccess Enclosure: 256 MB Memory Card* Provides a 256-MB DIMM, for a total memory of 512 MB, when two such cards are installed.
3720	*Upstream bus and tag cable for the Parallel Channel Adapter*
3721	*Downstream bus and tag cables for the Parallel Channel Adapter*
5000	*3746 Dual AC Power Input* Provides a backup AC power supply for the 3746 Model 900 or 950. In case of power failure, the second power supply automatically takes over without disrupting network operations.

3746 Features (continued)	
5002	*Controller Expansion Second AC Distribution* Provides a second power strip in the controller expansion (FC 5023).
5015	*Expansion Enclosure 1* The Expansion Enclosure has 6 processor slots in the front and twelve coupler slots in the rear. This feature increases the capacity of the 3746 Model 900 or 950 to 10 processors and 21 couplers.
5016	*Expansion Enclosure 2* The Expansion Enclosure has 6 processor slots in the front and 12 coupler slots in the rear. This feature increases the capacity of the 3746 Model 900 or 950 to 16 processors and 33 couplers.
5023	*Controller Expansion* This feature is an extension of the 3745 Models 17A, 21A, 31A, 41A, 61A and 3746 Models 900 and 950. It can be installed as a stand-alone unit and is used to house the Network Node Processor, Service Processor and MAE.
5024	*Side Covers* This feature provides side covers for the Controller Expansion. It is required for a stand-alone Controller Expansion, or Controller Expansion attached to a 3745 Model 17A.
5027	*Network Node Processor Memory Expansion* 64-MB memory expansion allowing the NNP (FC 5022) to support more than 3000 PUs or more than 9000 APPN and DLUR LU-LU sessions.
5030	*X.25 Support* X.25 Support allows the CLP to perform X.25 DLC and Data Packet functions over permanent virtual channels (PVCs) and switched virtual channels (SVCs). In the 3746 Model 900, the X.25 support feature supports SNA Qualified Logical Link Control (QLLC) for NCP subarea and peripheral traffic, without the need for NCP packet switching interface (NPSI) in the 3745 to which the 3746 Model 900 is attached.
5033	*IP Routing* This feature is required to operate the 3746 Model 900 or 950 as an IP router. It supports the IP function of the processors and the IP management functions of the NNP.
5037	*Network Node Processor Type 2 Memory Expansion* 64-MB memory expansion allowing the NNP Type 2 (FC 5122) to support more than 3000 PUs or more than 9000 APPN/DLUR LU-LU sessions.
5047	*Network Node Processor Type 3 Memory Expansion* Basic memory size of the NNP Type 3 (FC 5423) can be upgraded from 128 MB to 160 MB. This 32-MB memory increment allows the DLUR of the NNP Type 3 to support up to 40 000 SSCP-LU (control) sessions, instead of 30 000 SSCP-LU sessions when the NNP Type 3 is equipped with 128 MB memory.
5049	*Network Node Processor Upgrade to NNP Type 3* Upgrades an installed Network Node Processor (FC 5022) or NNP Type 2 (FC 5122) to an NNP Type 3 (FC 5423) and takes advantage of its improved performance and connectivity.

3746 Features (continued)	
5050	*Service Processor Upgrade to Type 3* Provides the upgrade from any version of the Service Processor Type 1 (FC 5020 or FC 5021) to a Service Processor Type 3 (Pentium® II 350-MHz processor with 96 MB memory, 3.2-GB disk, and CD-ROM drive).
5053	*Service Processor Type 3* Provides a Pentium II 350-MHz processor with 96 MB memory, 3.2-GB disk and CD-ROM drive. Includes a service processor access unit (8228 based), monitor, keyboard, mouse and modem.
5123	*CBSP3 Upgrade* Provides the upgrade from the Controller Bus Service Processor (CBSP) or CBSP Type 2 to a CBSP Type 3. CBSP Type 2 or Type 3 is required for 3746 IP router and APPN/HPR Network Node operations. CBSP Type 3 is required to support more than 15000 LU-LU sessions (up to 30000) or more than 5000 IP routes (up to 7500) or more than 5000 autonomous systems external routes (up to 7500) in an OSPF environment. New 3746s are automatically provided with a CBSP Type 3.
5202	*Line Connection Box Expansion (LCBE)* The LCBE is an optional feature. It is connected to the LCBB, which is part of LIC11. The LCBE can house up to 15 ARCs and connects to the LCBB with a 350-mm (13.8-in.) cable.
5203	*Communication Line Processor Type 3 (CLP3)* CLP3 supports 4 LICs and provides the DLC for frame-relay, SDLC and PPP links, and frame-relay, and X.25 network connections.
5210	*Line Interface Coupler Type 11 (LIC11)* LIC11 consists of the LIC itself, plus the line connection base box (LCBB), which connects to the LIC11. Up to 15 active remote connectors (ARCs) can be plugged into the LCBB. The LCBB can be housed in the 3746-900, the 3746-950, the Controller Expansion or a standard 19-inch rack. X.21 switched operation is supported by NCP-controlled lines for attachment to an ISDN-BRI (basic rate interface) terminal adapter.
5212	*Line Interface Coupler 12 (LIC12)* LIC12 supports leased-line operation at speeds from 56 kbps up to 2.048 Mbps. LIC12 has one port which, depending on the external cable used, provides either a V.35 or an X.21 interface. X.21 switched operation is supported by NCP-controlled lines for attachment of an ISDN PRI terminal adapter.
5423	*Network Node Processor Type 3* The 128-MB base memory enables faster network restart times. It can be expanded from 128 MB to 160 MB (FC 5047) to support more SSCP-LU (control) sessions.

3746 Features (continued)	
5502	*ESCON Channel Coupler Type 2 (ESCC2)* The ESCC2 contains the interface to the ESCON MMF, duplex optical-fiber channel cable. There is one ESCC2 per ESCON channel processor.
5523	*ESCON Channel Processor Type 3 (ESCP3)* The ESCP3 supports up to 32 logical connections to S/390 server partitions running VTAM or TCP/IP. For traffic routed by the 3746 Models 900 and 950 NNP, supports up to 14 000 APPN/DLUR LU-LU sessions.
5601	*Token-ring Interface Coupler Type 3 (TIC3)* One or two TIC3s can be connected to each token-ring processor. The TIC3 handles the MAC.
5602	*Controller Bus Coupler* Required for connecting the 3746-900 to the second CCU of a 3745 Model 41A or 61A. Requires a token-ring processor.
5623	*Token-Ring Processor Type 3 (TRP3)* The TRP3 supports up to 3000 PUs controlled by NCP or NNP. For traffic controlled by the 3746 NNP, the TRP3 supports up to 14 000 APPN/DLUR LU-LU sessions.
5713	*Multiaccess Enclosure Token-Ring Kit* Provides token-ring connectivity inside the 3746 for non-IP traffic (APPN/HPR, NCP) between the Multiaccess Enclosure (#3001) adapters and adapters in the base 3746.
5802	*3746 Extended Function 2* Licensed Internal Code that provides Session Services Extension (SSE) and Enhanced Topology Garbage Collection functions on the 3746 base adapters.
5806	*Multiaccess Enclosure TN3270E server* Provides a TN3270 gateway function for TN3270 clients downstream from an SNA/VTAM S/390.
5810	*3746 and Multiaccess Enclosure Extended Functions 4* Provides new microcode features for enhanced SNA (NCP), APPN/HPR and IP function, as well as consolidating earlier FC5800, 5801, 5804, 5805 and 5807 functions.
5811	*Upgrade from Extended Functions to 3746 and MAE Extended Functions 4* Provides the ability to upgrade any combination of FC 5800, 5801, 5804, 5805 and 5807 features to the 3746 and MAE Extended Functions 4 (FC 5810). Requires at least FC 5800 or FC 5804 in the installed 3746.
64xx, 65xx, 66xx	*Active Remote Connector (ARC)* ARCs are electronic cards housed in the line connection boxes (LCBs). The cable and connector carry the necessary physical and electrical interface to connect to a DCE (modem) or DTE.

For more information

To find out more about the IBM 3746 Nways Multiprotocol Controller Models 900 and 950, the 3746 Model 900 Network Node, and other high-performance IBM communication and networking products, contact your IBM representative or call IBM Direct at 1 800 IBM CALL (1 800 426 2255). You can also access the IBM Networking Home Page at: *www.networking.ibm.com*

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IBM Corporation
Department TYCA
PO Box 12195
Research Triangle Park NC 27709
U.S.A.

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