Corporate Network Systems Using Seamless LAN-WAN Technology

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ABSTRACT: In corporate networking, the need for a “seamless network” to flawlessly connect WANs and LANs among offices is increasing. Hitachi, Ltd. has established a new concept for seamless corporate telecommunication network systems and provides ATM, WAN and LAN products, as well as associated services, based on this concept. As a hub node for ATM switches, the AN1000 has been designed with the aim of producing an effective and seamless intercorporate communication network.

INTRODUCTION
THE corporate telecommunication network is evolving with the increasing expansion of the Internet and intranets alike. The base of LAN/WAN seamless networks is expanding, such that the number of LAN-based offices is growing and, for the WAN lines connecting offices, carriers are providing services such as ISDN (integrated services digital network), high-speed digital lines, frame-relay, and ATM (asynchronous transfer mode).

This article will give an overview of Hitachi, Ltd.’s network concept system. With this network, Hitachi is aiming to provide a solution to user’s needs. Hitachi has also developed the AN1000 switching node, a device which uses ATM, as the core technology of the LAN/WAN seamless network.

NEW NETWORK CONCEPT
Hitachi has established a new network concept which is aimed at providing a seamless network solution to support a user-friendly information space. Hitachi’s network products allow the user to construct an open and seamless network in a corporate telecommunication system environment on the basis of the major technologies shown in Fig. 1. Specifically, the following products and services are provided:

Fig. 1—The Basis of the Major Technology of Hitachi’s New Network Concept.
• Connectivity: Provides network products, which are based on new technologies, secures interconnectivity with network products developed by other manufacturers, and provides a network service to connect with the Internet and intranets seamlessly.
• Management and security: Enhances the operation, management and security of each product, and provides integrated management for networks and systems.
• Network system integration: Provides services based on the extensive experience and knowledge of the network system engineers, and provides an optimum system integration in multi-vendor environments.

**NETWORK PRODUCTS**

**Open Network Products**

Initially, host star-topology networks were used as business-application systems, centralized networks found use as voice systems in corporations, while digital lines were used as WAN lines for effective integration of data and speech data. These systems were all introduced to cut costs. More recently, a greater

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**Fig. 2—Example of Network System.**

**Fig. 3—External View of the AU100.**
use of information system LANs has been initiated to improve the efficiency in non-manufacturing operations. In addition, the integration of business-application LANs with R&D, and the incorporation of a voice system is progressing steadily as interest in the Internet and intranets rapidly takes hold. To anticipate such market changes in the future, Hitachi has reinforced its product lineup to prepare for an optimum corporate network, and provided a network solution to meet each specific need. Fig. 2 shows an example of the configuration of major network product groups. The main features of each product are as follows:

(1) AN series ATM switches

The AN series ATM switches implement highly reliable multimedia communications by using ATM Forum-compliant congestion control and proprietary common buffer-based switches.

The AS100 is an ATM server which allows the operator to use legacy applications in the ATM network. It supports ATM Forum-compliant LAN emulation and IETF (Internet Engineering Task Force)-compliant “IP over ATM.”

(2) AU series ATM access units

Fig. 3 shows an external view of the AU100. The AU series ATM access units convert existing interfaces into an ATM interface and helps integrate the existing resources, such as PBX (private branch exchange) voice networks and TDM (time division multiplexer) networks, into ATM according to the class of service for each medium.

(3) HS series LAN switches

Fig. 4 shows an external view of the HS150. The HS series LAN switch implements a high-speed Ethernet†1 environment, and also allows an uplink connection with ATM. This switch reads a selected data destination and switches only the relevant ports to improve the transmission efficiency. It also supports the virtual LAN function to improve the security and operability, and constructs a flexible intra-office LAN. This series was developed at Hitachi Computer Products (America), Inc.

(4) NP series routers

The NP series multi-protocol routers implement different sizes of internet-working. The backbone router, the NP200, and the NP150 are both used to encrypt transmission data for secure networks in small- and medium-sized networks.

By using these groups of major products, the user can build an optimum network that satisfies their needs. Hitachi is continuing to enhance the functions of each product. The following is an overview of the AN1000.

AN1000

Fig. 5 shows an external view of the AN1000. The AN1000 is the top of the range model in Hitachi’s AN series of ATM switches. It is the largest ATM switch available for corporate use, and uses a scalable architecture so that the switching capacity can be extended from 2.5 Gbit/s to 20 Gbit/s (field-upgradable).

This AN1000 switch uses a common buffer scheme that is tolerant to large bursts of traffic. Even if traffic is concentrated at one port, the number of cells discarded can be minimized because the entire buffer supports all traffic. A common buffer which is able to handle up to 256,000 cells can be installed.†1,†2 The processor is a multi-protocol processor which allows the user to extend the supported protocol and throughput. The switching device supports permanent virtual connections (PVCs) and switched virtual connections (SVCs). As an ATM user-network interface, it supports ATM Forum’s UNI4.0 (user network interface) signalling as well as UNI3.0 and UNI3.1. An optimum signaling method can be selected according to the operation configuration and equipment connected.

The major specifications and characteristics of the AN1000 are as follows:

(1) Abundant line interfaces

The AN1000 supports a wide variety of line interfaces including the 622 Mbit/s and 155 Mbit/s ultra high-speed ATM interfaces, and the 6.3 Mbit/s and 1.5 Mbit/s high-speed digital line services. The user can optimize the network configuration according to the LAN and WAN network configuration.

(2) Effective accommodation of legacy applications

The AN1000 incorporates the LAN emulation function (which allows the legacy LAN applications to be used as they are) on the ATM platform and the
client-server function “IP over ATM,” which implements IP (Internet protocol) communication on the ATM platform. In addition, the CLAD (cell assemble and disassemble) function, which converts the data from existing equipment having no ATM interface into ATM cells, allows efficient transmission by accommodating PBXs and TDMs in an integrated manner.

(3) Transmission suitable for each media characteristic and traffic characteristic

The AN1000 supports traffic classes of CBR (constant bit rate), VBR (variable bit rate), UBR (unspecified bit rate), and ABR (available bit rate). It also supports traffic control of 8-level priority class control (delay priority, discarding level and sublevel control are also available) and per-VC (virtual connection) shaping to allow optimum transmission depending on the media characteristics. The AN1000 also implements a dynamic routing protocol. The incorporation of P-NNI (private network-to-network interface) Phase 1 into the AN1000 makes automatic alternate routing possible if traffic becomes too concentrated as a result of failure.

(4) High reliability and operability

One advantage of the AN1000, is that if an interface module fails, it can be replaced while the AN1000 is still in operation. The reliability can be improved by duplicating the main part of the AN1000. It is provided with an SNMP (simple network management protocol)-compliant network management function, which enables the operator to use detailed data based on the proprietary extension MIB, in addition to standard MIB-II (Management Information Base II) and ATM-MIB. The management function can also control operations through the use of the integrated network management platform.

CONCLUSIONS

This article describes new network products, in particular the ATM switching node “AN1000,” which has been developed based on the corporate communication network system concept constructed in order to realize an open and seamless network. Furthermore, by using a scalable architecture which allows the switching capacity to be extended from 2.5 Gbit/s to 20 Gbit/s, the AN1000 implements a seamless corporate telecommunication network of LANs and WANs.

We are continuously making efforts to develop new network products to satisfy the users’ needs.

REFERENCES


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