

## SYNCHRONY®

ST-1000 AND ST-20

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*Full Featured Voice/Data  
Backbone and Regional  
Nodes Incorporating  
Frame Switching and  
Routing Support*



**TimePlex Group**

*Networking Your World*



# SYNCHRONY

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Multiservice platform

Quality of Service guarantees

VPN resource partitioning

Application deployment flexibility

Hybrid frame relay and circuit switching

ATM access up to OC-3

Intelligent voice switching and  
compression

Billing statistics

Integral LAN and legacy internetworking

LINK/2+<sup>®</sup> interworking

SNMP-based management

Flexible redundancy

Scalability

Fully Year 2000 Compliant



### Multiservice Platform

SYNCHRONY® ST products put network service providers back in control of the balance between minimized costs and optimized performance. The products, which include the ST-1000 and ST-20, provide the opportunity to compete effectively while increasing responsiveness to customer and user demands and their differing Quality of Service needs.

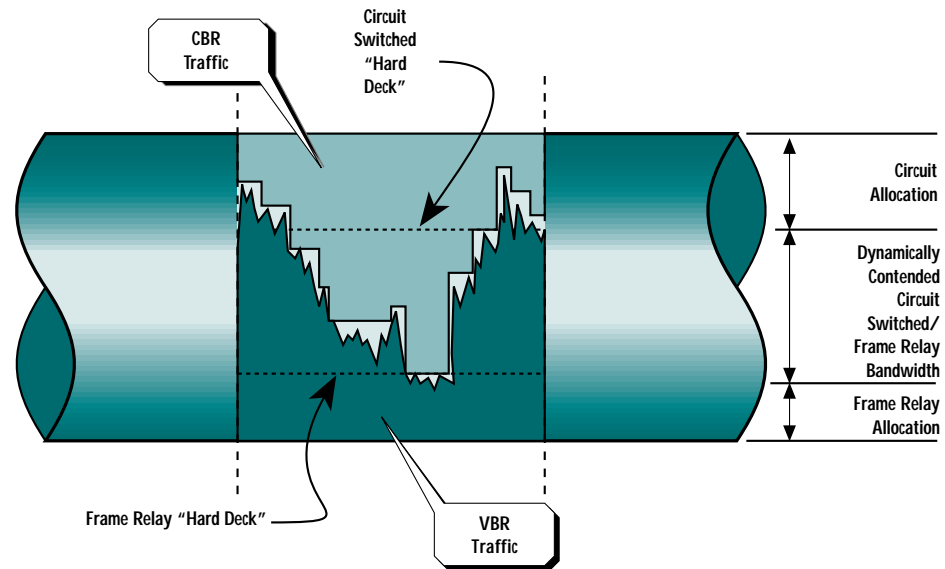
ST products permit the best networking technology to be deployed for each application. No compromise is necessary when selecting a circuit, frame, or cell transport technique. Spare bandwidth is dynamically allocated to both bursty traffic, as well as contending voice, video, or other constant bit rate traffic, to ensure maximum effectiveness of the available resources.

Each of your users or customers can establish service level agreements, with maximum performance achievable for LAN-derived traffic, while the time-critical network demands of voice and legacy data are assured. ATM migration is reduced to the tactical decision level, being accomplished through module insertion where ATM service is available.

Multiple service offerings extend from voice, video, image and data through full LAN capability including routing, bridging and strong SNA functionality including support for DLSw, LLC2 conversion and Source Route Translation.

Intelligent voice handling and switching capabilities include support of DPNSS, Q.Sig and Q.931 call switching and standard DTMF. Compression options are soft-configurable, per circuit and include ADPCM, ATC (Adaptive Transform Coding), CELP (Code Excited Linear Prediction), and the low delay, award winning E-CELP (Enhanced CELP) that provides packetized voice services with compression rates as low as 4.8 kbps.





**Figure 1**  
Dynamic Bandwidth Allocation

### EXPRESS SWITCHING® Technology – Quality of Service Guarantees

EXPRESS SWITCHING, pioneered by TimePlex, provides the ideal solution for merging constant bit rate (CBR) traffic and variable bit rate (VBR) traffic onto one transmission facility. Examples of CBR traffic include voice and delay-sensitive data such as video and SNA traffic. LAN traffic is an example of bursty, delay-insensitive VBR data. The ability to merge these two types of traffic is accomplished while maintaining the appropriate Quality of Service for each flow and ensuring the exceptionally high reliability required for mission-critical applications.

Figure 1 illustrates the unique implementation of dynamic bandwidth allocation used to combine the frame traffic (VBR) and the circuit switched traffic (CBR). As channel connection requirements within the network change, the boundary between transport technology types automatically shifts.

Control parameters enable minimum acceptable bandwidth to be determined for each traffic type. Known as 'hard decks', they ensure that the service level agreement can be satisfied, and permit customers to subscribe to different grades of service.



Any bandwidth remaining within the undesignated portion is dynamically allocated to CBR or VBR traffic as loading varies, depending on priorities defined and configured by the network manager.

Frame traffic can be permitted to burst through the CBR hard-deck, if no traffic is present, to ensure maximum bandwidth utilization.

#### VPN Resource Partitioning

Resource partitioning is a pre-requisite for the delivery of tailored service to multiple customers, and should embrace both bandwidth and service intelligence resources. ST products were designed for this role, so partitioning capability is inherent in the networking elements. Network management 'communities' build on the partition capability to control the resource within individual partitions.

#### Application Deployment Flexibility

A key attribute of ST products is their separation of I/O and server capabilities. This enables service providers to determine where best applications, such as voice compression, voice call processing, frame switching, X.50 and LINK/2+<sup>®</sup> support should reside in their network.

Maximum performance and bandwidth efficiency are obtained by installing application server modules nearest to the point of I/O delivery. Because application server modules can be located anywhere in ST networks, ST systems can deliver the same services with increased resource utilization and reduced cost. It is now possible to balance bandwidth costs against capital expenditure, without losing the ability to respond to new customer demands.

SYNCHRONY ST products can fulfill demands for new services *instantly* and *at any location*, by switching traffic to the nearest available application server module, *anywhere in the network*. Cost can then be engineered out of the solution, at the convenience of the service provider, by physically re-locating or provisioning new application server modules.

Responding quickly to new demands enhances customer satisfaction. Using ST systems, the service provider can inexpensively add new capabilities to a location to support new users and applications.

#### ATM Access

Tariffed wide area ATM services are now available, and can be incorporated into a SYNCHRONY integrated access solution through the use of the ATM- Independent Cell Processor (ICP) or SYNCHRONY Cell Exchange products (CX-1500 and CX-1540).



The ATM-ICP transports LAN and Frame Relay traffic over an ATM service, or over SONET or SDH facility at speeds to 155 Mbps. The ATM-ICP supports international interface options including E-1, E-3, OC-3, OC-1, JT2 (Japan), and STM-1.

The Cell Exchange products provide a scalable multi-access solution for WAN connectivity to ATM services for the ST-1000 and ST-20. They offer the ideal solution for service providers who support voice and data connectivity, billing and Quality of Service over ATM.

#### Voice Capabilities

ST products have been designed to interface with many different voice systems, providing a broad spectrum of voice services and integral fax handling.

The signaling information from a PBX is interpreted to determine the called destination. To maximize bandwidth efficiency, the bandwidth is only allocated for the duration of the call. On-net switching permits the optimum call path and compression rate to be established. "Edge Switching" devices switch compressed voice to its final destination based on the called number, avoiding voice degradation normally caused by tandem hops in other systems.

By combining bandwidth contention and call switching with voice compression, ST systems provision efficient voice networks with either TDM or packetized voice.

#### Billing Statistics

Billing records are provided on a call by call basis. In addition to standard call detail records (CDRs), billing statistics are also provided for Frame Relay, trunk utilization and Quality of Service variables as well as other network management and maintenance features.

#### Data Networking

ST products provide full frame relay switching functions including standard addressing, congestion management and frame relay access. Throughput is scalable from 8,000 frames per second to 100,000 frames per second.

Frames are segmented and pipe-lined to ensure low latency. Proactive congestion avoidance mechanisms are implemented within the network elements on a per Virtual Circuit (VC) basis. Individual buffers are also allocated per VC to support prioritization. Maximum performance and efficiency is achieved by reassembling a frame at the destination.

Although most data applications are transported by frame relay, ST systems also let you circuit switch traffic. This ability provides a safe migration route from leased line or TDM infrastructures, and a guaranteed means of delivering data applications that are very time-sensitive or have high utilization.



### LAN Internetworking

SYNCHRONY ST-1000 systems can be configured with routing processors that enable LAN internetworking traffic to be efficiently routed with voice traffic over finite wide area bandwidth.

The router/bridge media options include Ethernet, Token Ring and FDDI.

IP, IPX, AppleTalk, DECnet, OSI and XNS are supported. Routing protocols supported include OSPF, EGP, RTMP/ZIP, IP RIP, IPX RIP, XNS RIP, DECnet IV (level 1&2) and ES-IS/IS-IS.

Bridging capabilities provide transport for SNA, NetBios and other non-routable protocols.

Frame relay switching provides the core transport. Traffic can be prioritized by protocol, address, application and user to deliver delay-sensitive protocols and support business-critical applications with the appropriate Quality of Service.

In addition to this fully integrated capability, ST-1000 can be used to enhance performance of existing multi-protocol LAN internetworks, by providing a deterministic connection-oriented frame switched core to improve service level consistency.

SDLC and other legacy protocols are switched by frame relay and need not be encapsulated in IP, removing unnecessary overhead and keeping the traffic visible. As a result, SDLC and other legacy protocols receive priority over less time-critical LAN traffic at each intermediate switch point. This provides a more predictable level of service and the maintenance of legacy applications' performance within an integrated LAN/legacy environment.

### Flexible and Cost Efficient Interconnectivity

TimePlex internetworking solutions emphasize support for integrated LAN and time-critical legacy traffic, and the efficient utilization of wide area resources which provide industry standard interoperability and simplify network management.

Traffic prioritization is maintained at each switch point across the internetwork, with performance improved and multiple encapsulation avoided through the use of frame relay switching.

Performance of IPX, SNA and NetBIOS wide area networking is significantly improved by reducing unnecessary broadcast traffic with Remote RIP and Remote SAP for IPX networks, SNA spoofing and NetBIOS name caching.



[ The ST-1000 and ST-20 ]

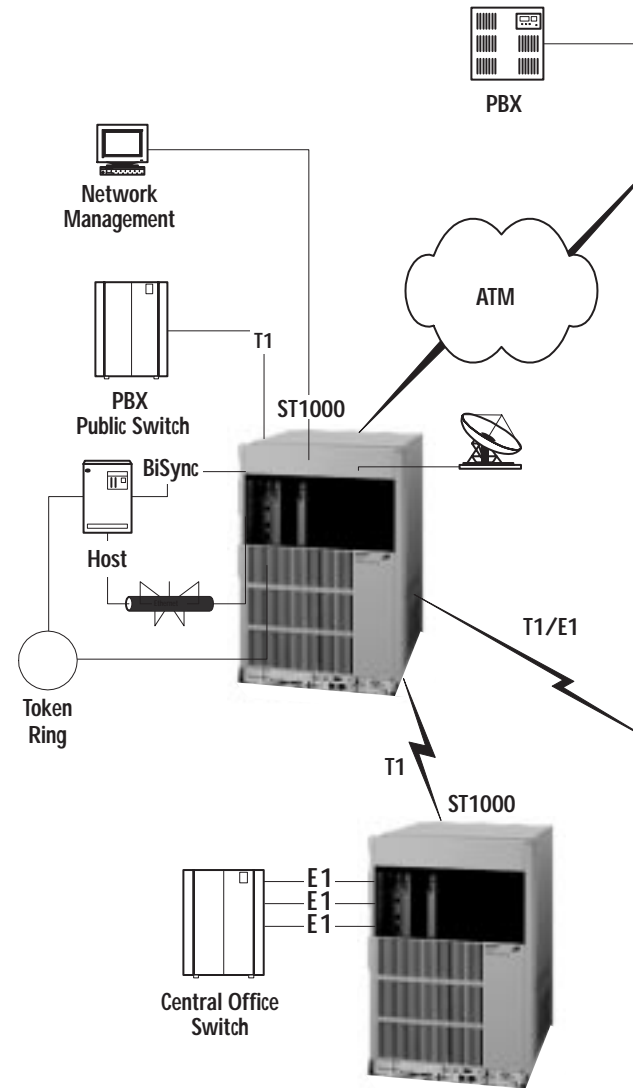
Supported services include ISDN, SMDS and ATM network access, public frame relay access, and private frame relay switching.

Interoperability is assured through strict support for key RFCs and standards like Frame Relay LMI and Annex D; frame relay encapsulation; and Data Link Switching (DLSw), the IBM-compatible standard for transport of SNA and NetBIOS over TCP/IP networks.

**Flexible Redundancy**

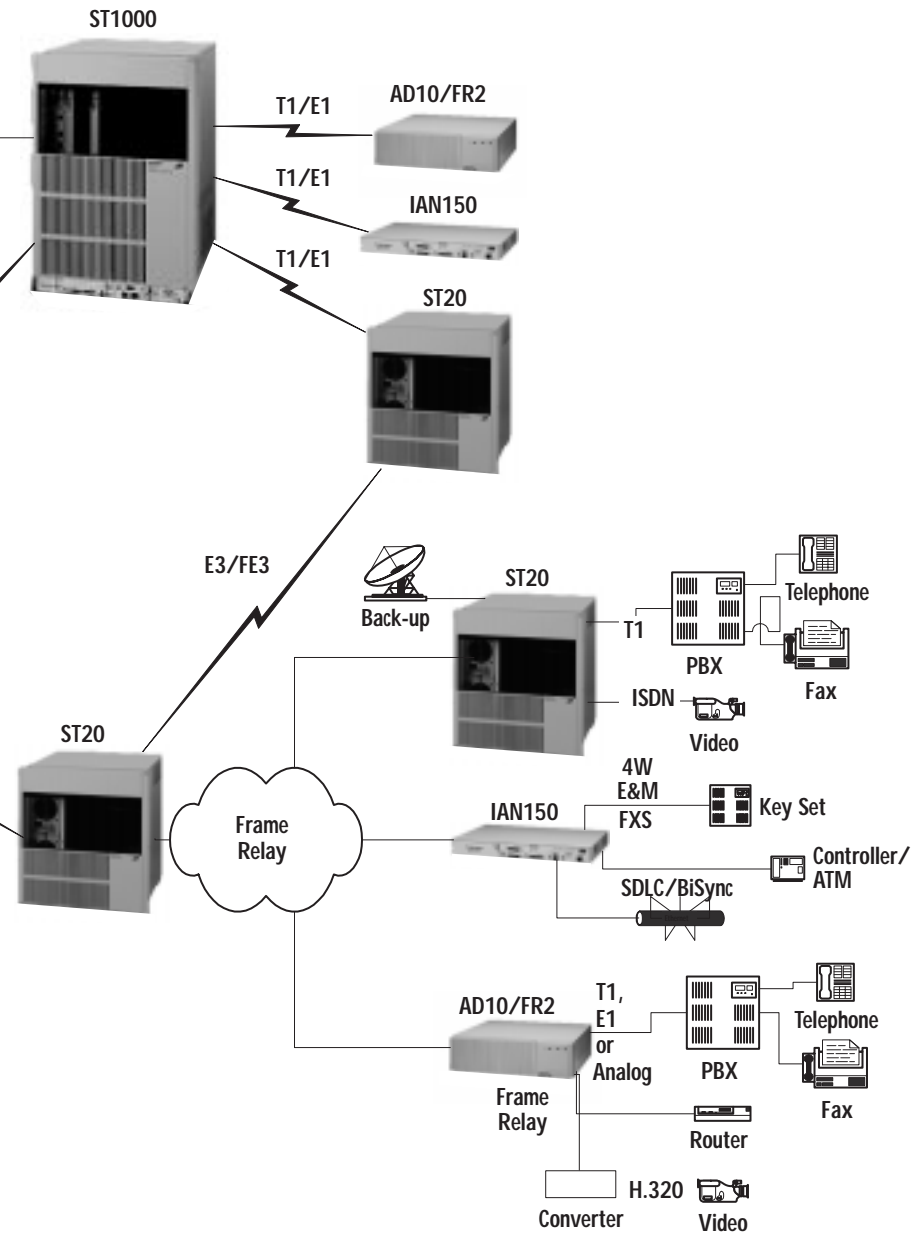
High availability is supported by module and power supply redundancy options. Key components and interface modules are protected by 1:1 redundancy. Resource pools can be protected at minimum cost by a 1:N redundancy scheme, which can be enhanced to 1:1 if desired. Power supplies are configured 1:N redundant.

ST systems were designed to provide resilient networking, without any dependence on external centralized management stations. This is achieved through distributed networking intelligence, with each network element dynamically maintaining a complete network map through frame relay inter-nodal communications. Network topology discovery and routing tables are fully automatic to reduce cost of ownership and maintain traffic flows in an evolving and dynamic real world network environment.





[ The ST-1000 and ST-20 ]



**Standards-Based Management**

Overall management of an ST network is simplified by a host of remote control and management features including downline loading of software, Flash EPROM, upload/download of configuration parameter files and full SNMP GET/SET support for all configurable parameters. ST systems are managed from the TimePlex SYNCHRONY Network Management System (SNMS), a fully featured network management application designed to run under HP OpenView.

**Scalability**

ST product options include the ST-1000 and ST-20. The ST-1000 hybrid frame/circuit switch is the most fully integrated ST product. It can accept all module types, and is designed to deliver maximum flexibility and the broadest range of access options or to create the network backbone. The ST-20 is designed for flexibility either as a regional node in large networks or as a central site for low capacity networks.

**Figure 2**  
Typical SYNCHRONY voice, video and data application



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### Applications

SYNCHRONY ST systems are used by carriers and service providers to integrate multiple traffic types over a range of wide area services, including ATM (see Figure 2). Voice, video, LAN traffic and serial legacy data are efficiently delivered to customers with multiple qualities of service options, with regional, national or international points of presence.

High availability node and network architectures satisfy the demands of a mission-critical core or access network. Traffic prioritization options sustain delay-sensitive, mission-critical legacy applications while integrating voice and LAN internetworking traffic.

Digital PBX networks can be designed with the ST products delivering tandem switch functionality. This provides optimum routing and eliminates the requirement for multiple compressions and decompressions that previously constrained the most cost-effective choice of compression algorithm. The use of distributed signaling servers ensures resilience as well as increased bandwidth efficiency.

Government, carriers and service providers, law enforcement agencies, financial services, and private commerce are among the organizations around the world who have chosen powerful SYNCHRONY ST systems to support their operations with a dependable, controllable and flexible communication solution.

### SYNCHRONY ST SYSTEM DESCRIPTION

#### Express Switching Architecture

Multiple Quality of Service support  
Dynamic bandwidth allocation  
Circuit and frame switching  
Prioritized ATM access

#### Wide Area Support

E-1, E-3, T-1, FE-1, FT-1, JT2,  
HSSI, OC-1, OC-3, STM-1

LAPB, HDLC, PPP

X.25 access, DDN, frame  
relay access/switching, SMDS  
and ATM

ISDN leased line backup, on  
demand or overflow

X.50

Data compression (frame relay,  
HDLC, PPP)

#### SYNCHRONY Branch Access

**AD-10:** CBR and VBR data,  
Sync and async data, compressed  
analog voice.

**AD-10/FR2:** VBR data,  
compressed analog and digital  
voice, frame relay encapsulation  
with call routing.

**AD-7:** 6 port data access unit  
for sync and async data.

**AD-3:** 2 port data access unit  
for sync and async data.

**IAN-150:** Intelligent Voice  
FRAD with G.729 support.

#### Full Connectivity and Control

Full routing and bridging  
capability

Ethernet, Token Ring and  
FDDI support

LINK/2+ protocol interpretation  
for SYNCHRONY-ST channel  
termination and 'virtual'  
LINK/2+ node networking

#### Voice Handling

Intelligent voice switching

PABX signaling (CAS, Q.Sig,  
DPNSS and Q.931)

Bandwidth contention

Voice Compression (CELP,  
ATC, and ADPCM)

Voice over Frame Relay  
(E-CELP and Q.729)

#### Comprehensive Multi-Protocol Routing (ST-1000/ER-5 only)

IP, Xerox XNS, Novell IPX,  
DECnet IV, AppleTalk II,  
OSI CLNP

OSPF, EGP, RTMP/ZIP, IP RIP,  
IPX RIP, XNS RIP, DECnet IV  
(level 1&2), ES-IS/IS-IS

Remote IPX RIP and Remote  
IPX SAP reduce network over-  
head on low speed serial links by  
eliminating repetitive broadcasts

Protocol priority queuing

#### Standards-Based Intelligent Bridging

IEEE: Transparent (802.1d),  
Source Routing, Source Routing  
Transparent (SRT)

Translation Bridging

#### Special IBM Features

LLC2 Local Acknowledgement

NetBIOS caching

Data Link Switching (DLSw)

LAN Network Manager  
proxy support

#### Legacy Handling Options

FRF3, X.25 (switching),  
X.3/X.28/X.29, SDLC/QLLC2,  
BSC 3270, Burroughs  
Poll/Select

#### Comprehensive Network Security

Enhanced access control filtering

PX SAP filtering

#### Standards – Compliant Management

SNMP support

Optional HP OpenView-based  
SNMS

TELNET User and Server access

Remote download of system  
software and configuration  
parameters

#### Capacity

15 universal slots per  
ST-1000 shelf

Up to 60 slots per  
ST-1000 node

Single and high density  
interfaces

100,000 frames per second

1.9 Gbps VBR bus capacity

160 Mbps CBR bus capacity

#### Power

AC Input: auto-selectable for  
90-120 or 200-265 VAC

Frequency: 47-63 Hz

DC Input: 40 to 60 VDC

#### TimePlex Group Forum Membership

IPNSS

ATM Forum

Frame Relay Forum

*Specifications subject to  
change without notice.*



**TimePlex Group**  
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