



Versatile, resilient, reliable

TNX-210 and TNX-1100 multiservice broadband switches



Are you a service provider (SP) looking for high performance, maximum flexibility, and unparalleled resiliency from your network? Look no further than Marconi's TNX™ multiservice broadband switches. These scalable switches feature a variety of network interfaces and service modules, as well as simultaneous support of Asynchronous Transfer Mode (ATM), Multiprotocol Label Switching (MPLS), and IP. This enables you to offer various revenue-generating services.

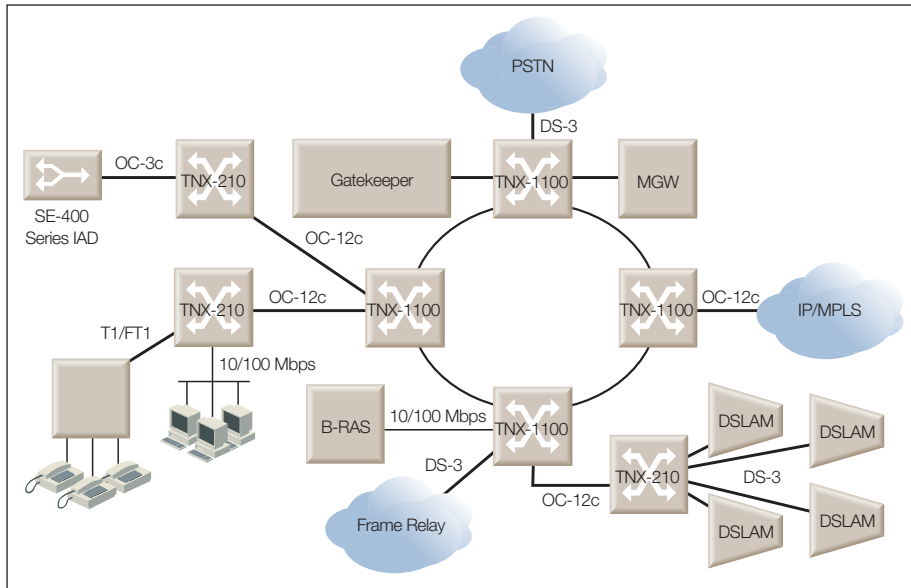
The TNX-210 and TNX-1100 are designed for SP multiservice edge networks. These reliable, scalable switching solutions are ideal for your next-generation network. They can easily support today's networking requirements and scale to meet tomorrow's growth, which means your investment is always protected. And the global availability of these switches enables easy worldwide expansion of your network.

The TNX family combines the high performance and resiliency of high-capacity, non-blocking multiservice switching with the intelligence and scalability of Marconi ForeThought® internetworking software. With small footprints and low costs, these switches are ideal for central offices (COs) and for service extension to customer locations.

The TNX-210 and TNX-1100 also have an extensive line of interfaces — from T1 to OC-48c — which makes these switches the best choice for offering a variety of services from a single switch. In addition, the interfaces support a high degree of density, enabling SPs to leverage their investment in rack space and further maximize profitability.

Key benefits

- Differentiated Quality of Service (QoS) for revenue maximization and achievement of service level agreements (SLAs)
- Switch control processors (SCPs) that scale to match demands for voice, video, and data services
- Unparalleled network resiliency and security delivered by ForeThought's built-in intelligence
- Standards-based design to promote multivendor interoperability



TNX-1100

The TNX-1100 offers the same features and high degree of service and resiliency as the TNX-210, but it adds the following density, scalability, redundancy, and timing options:

- 2.5 Gbps to 10 Gbps scalable switching capacity
- Up to 16 network module slots
- Support for up to 128 discrete ports — up to 32,256 DS-0s via channelized DS-3 and channelized OC-3c network modules
- Support for up to 128,000 virtual connections
- Up to four switch modules with redundant Pentium 266 MHz SCPs with 64 MB DRAM (256 MB RAM optional)
- Optional Pentium 400 MHz SCPs with 256 MB DRAM
- Redundant Stratum 3 or 4 clocks
- Excellent for applications that demand greater performance and bandwidth at the interface level

The TNX-1100's distributed system design and common equipment redundancy enable it to achieve very high system availability at a relatively low price. With its unique distributed switching fabric architecture, the TNX-1100 offers greater resiliency than the TNX-210.

In addition, each 2.5 Gbps switching fabric houses a primary SCP and a standard secondary SCP. The secondary SCP preserves the virtual connections and provides continued switch operation during minor software upgrades, SCP upgrades, or primary SCP failures.

The TNX-1100's timing control module (TCM) supports input and output connections to the building-integrated timing supply (BITS) timing distribution network within a CO. BITS is used in many CO locations to distribute timing reference signals to CO digital equipment. The TCM meets the relevant Telcordia and ANSI synchronization and clock standards, providing hitless switchover to a secondary reference in the event of a primary failure.

For sites where Stratum 3 or 4 performance is required, but BITS is not, the TCM can be configured to derive timing from any of the TNX-1100's network ports.

The TNX-1100 is able to support the performance and throughput requirements of the most demanding network environments.

Meeting network demands

Today's networks face incredible demands — more users, increased speed, integration of legacy technologies, implementation of new technologies, greater service availability — all on a common backbone. Network operators tired of bandwidth band-aids look to Marconi for long-term solutions that are adaptable, scalable, and reliable.

The TNX-210 and TNX-1100 are designed to meet the performance objectives of not only today's multiservice networks, but tomorrow's as well. These switches offer the flexibility and scalability necessary to accommodate future growth — and to protect your investment. With unrivaled reliability and advanced traffic management and shaping, the TNX switches are ideal for supporting efficient, low-cost networks.

The TNX multiservice switches compliment our extensive line of Marconi multiservice concentrators. These switches are built on award-winning Marconi technology, and analysts and editors alike have recognized the TNX family as "the best in the industry."

TNX technology

The TNX family's architecture is based on output-buffered, distributed shared memory switching technology. Common systems components consist of load-sharing power supplies and SCPs. The TNX-1100 adds Stratum 3 or 4 clocks and distributed fans. A failure in any one of these components initiates an automatic switchover to the redundant component. Both switches provide environmental monitoring of temperature and power voltages; the TNX-1100 also monitors fan status.

All field-replaceable components — including power supplies, common equipment modules, SCPs, network modules, and switch fabrics — are hot swappable. Key components can be added or replaced while the system is operating, which maximizes system availability and facilitates system maintenance and repair.

TNX-210

- 2.5 Gbps switching fabric in a modular chassis
- Four network module slots
- Support for up to 32 discrete ports
- Support for up to 16,000 virtual connections
- Support for a variety of interfaces, including ATM, Inverse Multiplexing for ATM (IMA), Frame Relay, Circuit Emulation (CEM), and 10/100 and Gigabit Ethernet
- Redundant AC or DC power supplies
- One switch module with redundant Pentium 266 MHz SCPs with 64 MB DRAM (256 MB RAM optional)
- Optional Pentium 400 MHz SCPs with 256 MB DRAM
- Network Equipment Building System (NEBS) Level 3 certification
- Low profile (less than 5 in. high)
- Fault tolerant
- Excellent for co-locations and multitenant applications

Superior network intelligence

The TNX switches support ForeThought, Marconi's powerful internetworking software. As a mature and reliable operating system for Marconi switches, ForeThought has been deployed in hundreds of networks worldwide. Its performance and scalability are unmatched.

The sophisticated ForeThought software provides connection management features such as

- on-demand smart permanent virtual circuits (SPVCs);
- switched virtual circuits (SVCs) at the user-to-network interface (UNI) and network-to-network interface (NNI) levels; and
- transparent support for IP applications using IP over ATM and LAN Emulation (LANE).

Multiple services and scalability

The TNX multiservice switches offer leading-edge technology, which enables you to provide an extensive assortment of narrowband and broadband services to your customers from a single switching platform. You can start small and readily expand to offer networking services to thousands of customers and locations.

Port densities range from one port for the OC-12c and OC-48c modules to eight ports for the ATM T1/E1 module.

SCPs

The TNX switches offer a scalable selection of processors, from 266 MHz SCPs with 64 MB or 256 MB of DRAM to 400 MHz SCPs with 256 MB of DRAM. In fact, processor performance is linked to the Intel Pentium processor architecture. This ensures that you will always have access to the latest enhancements in processor performance. This is especially critical in an industry that is experiencing network traffic growth of up to 100 percent per year.

By utilizing the power of the Pentium processor, the TNX switches have won third-party awards for fastest calls per second. They have exceeded 1,900 call setups and teardowns per second, per node, in lab tests.

Marconi's commitment to increasing processor performance in tune with the industry's growth rate ensures that the TNX family will provide continuous investment protection for SP networks.

Meeting SLAs

The TNX-210 and TNX-1100 deliver non-blocking, high-performance multiservice switching. They can support the demands of multiservice backbone networks in which effective congestion management and strict control of QoS parameters — such as cell delay variation and cell transfer delay — are required. Independent tests have verified that the TNX multiservice switches are two of the industry's leading performers in these important functions.

The TNX switches incorporate large output buffers and per-VC bandwidth management to ensure that contracted SLAs are met on each connection. Per-VC buffer management effectively isolates users. This prevents each user's service level from being impacted by the traffic behavior of other connections.

Through implementation of Synchronous Optical Network (SONET)/Synchronous Digital Hierarchy (SDH) linear 1+1 automatic protection switching (APS)/multiplex section protection (MSP) and timing protection on the OC-3 network module, the TNX family provides the necessary availability to meet the demands of various SLAs.

The TNX switches support an extensive logging capability for network performance statistics. Line-level statistics, such as line-code violations and framing bit errors, are reported on every interface. ATM-level statistics — including total transmitted, received, and errored calls — are recorded for each ATM port. Additionally, VC-level statistics, such as intentional and unintentional dropped cells, are reported for each active VC.

Call detail statistics are also collected on a per-VC basis. A call record includes a network-unique identifier, call type, call duration, and numerous other connection-related statistics. Call records are recorded locally and are periodically uploaded to a network management station for processing. Because the TNX switches offer a full range of connection-based statistics, you can create numerous billing packages to provide a variety of differentiated services.

To ensure that network bandwidth is allocated fairly and in compliance with the traffic management policies established by the network operator, the TNX switches implement a connection admission control (CAC) algorithm for call admission and a usage parameter control (UPC) algorithm for enforcing traffic contracts.

ForeThought CAC

ForeThought CAC is a sophisticated bandwidth allocation algorithm in which the TNX calculates available network bandwidth per traffic class of service (CoS). The switch uses this calculation to determine whether to accept or reject connection requests.

Bandwidth calculations are made for real-time variable bit rate (rt-VBR), non-real-time VBR (nrt-VBR), and constant bit rate (CBR) traffic types. Connection requests for unspecified bit rate (UBR) traffic are always accepted and are assigned bandwidth on a best-effort basis. CAC is based on an effective bandwidth algorithm designed to maximize the utilization of network resources by taking advantage of the statistical nature of VBR traffic.

To further optimize bandwidth usage, ForeThought CAC supports QoS overbooking. With QoS overbooking, the network operator assigns the percentage by which each traffic class can be oversubscribed. This technique is extremely useful for environments in which applications are bursty and can be oversubscribed to a high degree with minimal impact on network performance.

ForeThought UPC

ForeThought UPC polices virtual path connections (VPCs) and virtual channel connections (VCCs). This ensures compliance with negotiated traffic contracts and prevents "misbehaving" sources from impacting other network users. ForeThought UPC implements standards-based generic cell-rate algorithms (GCRA) to police VPCs and VCCs.

TNX-1100 CEC-Plus clock specifications

	Stratum 3	Stratum 4
Free run accuracy	+4.6 ppm	+20 ppm
Holdover accuracy	+0.05 ppm initial offset; +0.04 ppm drift delay; +0.028 ppm temperature	N/A
Pull-in range	+4.6 ppm	+50 ppm
Synchronization standards	Telcordia TR-TSY-000312, TR-1244, TR-253; ANSI T1.101	Telcordia TR-TSY-000312, TR-1244, TR-253; ANSI T1.101

TNX switch comparison

	TNX-210	TNX-1100
Switching fabric	2.5 Gbps, non-blocking	2.5 to 10 Gbps, non-blocking
Number of ports	2 to 32	2 to 128
Maximum virtual connections	16,000	128,000
Switch transit delay	<10 microseconds	<12 microseconds
Maximum port speed	OC-12c	OC-48c
Dimensions	H: 4.75 in. (12.1 cm); W: 17.5 in. (44.5 cm); D: 18 in. (45.7 cm)*	H: 24.5 in. (62.2 cm); W: 19 in. (48.3 cm); D: 18 in. (45.7 cm)
Weight	24.9 lbs (11.3 kg)	With AC power: 89.7 lbs (41 kg); With DC power: 83.1 lbs (38 kg)
AC power	90–270 VAC (autoranging), 47–63 Hz, 2.2 A, 200 W	120/240 VAC, 50/60 Hz, 12 A, 1 kW
DC power	36–72 VDC, 10 A, 200 W	36–72 VDC, 30 A, 1 kW

* With an optional 70° angle bracket, the TNX-210 can be placed in a 12-in. rack. The resulting dimensions are: H: 16.75 in. (42.55 cm); W: 17.5 in. (44.5 cm); D: 12 in. (30.5 cm).

SPVCs

ForeThought software provides yet another intelligent feature: SPVCs. SPVCs provide faster re-establishment of permanent virtual paths (PVPs). While this offers resiliency for the permanent virtual circuits (PVCs) on the switching side, the SPVC feature extends the same redundancy all the way to the host or any other device connected to the switch. When TNX switches are interconnected using multiple links, the ForeThought software and Pentium-based SCPs reroute traffic if a failure occurs on any link. This network-level resiliency makes the TNX switches exceptionally well-suited for SP networks.

Traffic management and hierarchical shaping

The TNX-210 and TNX-1100 provide the industry's most complete and advanced traffic management features, including the following:

- High-capacity smart buffers (up to 128,000 cells per port)
- Per-VC queuing and hierarchical traffic shaping
- Frame discard
- GCRA traffic policing
- Comprehensive counters, including G.826 SONET statistics
- Configurable buffer thresholds
- Explicit-rate available bit rate (ER-ABR) support

In addition, hierarchical shaping enables the TNX switches to shape traffic at the VC level. This optimizes backbone network utilization and helps you offer high-quality, guaranteed services to your customers.

ForeThought bandwidth management also allows high-priority, delay-sensitive CBR (e.g., real-time video and voice) and VBR traffic to traverse the network without being affected by bursty ABR or UBR data traffic. The TNX-1100 is one of the first switches in the industry to cross the threshold of 2,000,000+ cell buffers.

The combination of large cell buffers and hierarchical shaping enables the TNX switches to efficiently manage traffic flows and bandwidth when connecting to lower-speed devices.

Standards and interoperability

All TNX switches support ATM Forum, IETF, and ITU (CCITT) standards and are NEBS Level 3 certified. They also comply with the following UNI 3.0/3.1/4.0 specifications:

- Signaling
- Private Network–Network Interface (PNNI) signaling and routing, including PNNI peer group leader hierarchy
- Traffic management (UPC policing)
- Network management
 - Interim Local Management Interface (ILMI) Management Information Base (MIB)
 - Simple Network Management Protocol (SNMP) MIB

The TNX switches also support Classical IP (RFC 1577) and LANE 1.0 with Distributed LAN Emulation (DLE) enhancements. More importantly, the TNX family of multiservice switches has been thoroughly field tested to interoperate with other vendors' products and services.

The TNX switches' MPLS implementation is based on the Martini IETF draft. It specifies encapsulation for ATM, Frame Relay, Ethernet, and high-level data link control (HDLC).

Global availability

In the last few years, thousands of Marconi multiservice switches have been installed throughout the world. That's because their industry-leading features and performance are acknowledged worldwide — and not only by Marconi customers. Several independent publications, including *Network Computing*, *Telecommunications*, *Network World*, *Information Week*, and *Internet Week*, have recognized the outstanding capabilities of Marconi multiservice solutions.

The TNX switches have an extensive presence in networks around the globe. In fact, we can ship the TNX to any country in the world. This ensures that Marconi can partner with you at any stage of your business, whether you're just gaining market share or expanding your business to become a global presence. You'll also have the flexibility to standardize on the TNX as your switch of choice in the architecture of your globally deployed network.

Facility and fault management

The TNX switches support an array of fault management features for monitoring and troubleshooting network conditions on the switch as well as on the network:

- Loopback capability to facilitate performance testing of transmission facilities
- Standards-based facility alarms and statistics
 - Monitor facility performance
 - Alert the network management system of degraded and failed conditions
- ATM Layer F4 and F5 operation, administration, and maintenance (OAM) fault management cells
 - F4 OAM cells convey fault and performance information for VPs
 - F5 OAM cells convey fault and performance information for VCs

Applications driving today's networking requirements

Internet applications such as e-commerce and multimedia entertainment are growing at an exponential rate. To support this growth, they demand a reliable, high-performance network infrastructure. The TNX-210 and TNX-1100 are engineered to answer this challenge by supporting a wide range of network interface modules, reliable ForeThought software, and world-class customer support.

The unprecedented growth of the Internet and the need to increase the connection capacity to transport multiservice traffic are accelerating the deployment of digital subscriber lines (DSLs). To accommodate this, the TNX product family offers:

- industry-leading application-specific integrated circuits (ASICs) and advanced traffic management to aggregate DSL access multiplexers (DSLAMs);
- large buffers and an increased connection capacity, which make the TNX switches ideal for DSLAM aggregation; and
- QoS overbooking to help you get a higher return on investment (ROI) by effectively oversubscribing the links between these multiservice switches.

The TNX switches' Ethernet Transparent LAN Services (TLS) run over ATM or MPLS cores. Advanced SLA services include IEEE 802.1p priority of service mapping to PVCs, SPVCs, and MPLS label switched paths (LSPs). Likewise, the TNX switches' support of IEEE 802.1Q is very robust. Virtual LANs (VLANs) can be mapped to ATM or MPLS connections.

In addition, virtual private network (VPN) services can be based on a point-to-point, dedicated Layer 2 (RFC 1483 bridged PVCs) service and/or an MPLS Layer 2 LSP. Soon, the TNX family will also support RFC 1483 routed PVCs.

These combined features enable you to offer multiple services and SLAs to residential and business customers. The TNX family provides the means to sell these differentiated services over a single network while maximizing your profits.

A solution built on economics and technological leadership

The TNX line of switches is cost effective, non-blocking, standards based, high performance, fault tolerant, and field proven.

The TNX-210 provides a small-footprint solution for service extension to customer locations and remote service offices. The TNX-1100 offers a scalable CO solution, enabling rapid expansion of port capacity without service disruption. This modularity allows you to expand your network — and, therefore, your capital investment — in a manner that is consistent with your business growth.

Network modules and interfaces

- ATM
 - T1/E1 with IMA
 - Channelized DS-3/1 with IMA
 - Channelized DS-3/E1 with IMA
 - DS-3/E3
 - OC-3c/STM-1
 - OC-12c/STM-4
 - 155 Mbps SONET/SDH (Category 5 UTP, OC-3c/STM-1 and STM-1e)
 - OC-48c/STM-16 (TNX-1100 only)
- Frame Relay
 - T1/E1 (clear channel and channelized)
 - Channelized DS-3/1/0 (clear channel and channelized with Multilink Frame Relay [FRF.16])
- CEM
 - T1/E1 (clear channel and channelized)
 - Channelized DS-3/1/0 (clear channel and channelized)
 - OC-3c channelized to DS-1/0
- 10/100 and Gigabit Ethernet

Key features

- Scalability up to 128 ports
- 2.5 Gbps to 10 Gbps non-blocking switching capacity
- Complete line of LAN and WAN interfaces
- Port speeds from T1/E1 (N x 64 Kbps) to OC-12c/STM-4 (up to OC-48c for TNX-1100)
- NEBS Level 3 compliance
- Hierarchical traffic shaping
- SONET/SDH APS/MPS on OC-3c/STM-1 network modules
- Inverse ATM multiplexing support via T1/E1 and channelized DS-3/1/E1 IMA modules
- T1/E1 (N x 64 Kbps) CEM for private branch exchange (PBX) connectivity
- Non-service-disrupting software and processor upgrades
- Frame Relay internetworking (FRF.1.1, FRF.2.1, FRF.3, FRF.5, FRF.8, and FRF.16)
- ForeThought network intelligence
 - Smart buffers
 - Per-VC queuing
 - Early packet discard (EPD)
 - Partial packet discard (PPD)
 - ER-ABR support
- ATM Forum standards compliance
 - PNNI 1.0
 - Peer group leader hierarchy (H-PNNI)
 - ATM Inter-Network Interface (AINI)
 - Network Call Correlation Identifier (NCCI)
 - Path and Connection Trace
 - Control Plane Security — only Marconi offers this feature for ATM networks
- Enhanced ATM Forum LANE 1.0
- Virtual UNI
- Per-VC queuing, shaping, and statistics
- >2,000,000 cell buffers (smooth bursty traffic)
- Redundant common equipment (SCPs, TCM [TNX-1100 only], power supplies, and fans)
- Stratum 3 and 4 timing
- Enhanced connection performance
- Hot-swappable components
- <2 microseconds call setup
- 1,250 calls per second (TNX-210 with the Pentium 400 MHz SCP)
- 1,250 calls per second per 2.5 Gbps fabric (TNX-1100 with the Pentium 400 MHz SCP)
- 1+1 SONET APS (OC-3c)
- Connection Modify — permanent and switched connections
- Transit Network Selection (TNS)
- Management plane security per Telcordia GR-815-CORE
- SNMPv3 with Triple Data Encryption Standard (3DES)
- Secure Shell (SSH) v2
- Secure Socket Layer (SSL), Remote Authentication Dial-In User Service (RADIUS), SecurID, and Kerberos
- Closed user groups (CUGs)
- Policed UBR
- Enhanced disaster recovery with patent-pending Marconi Distributed Protection Switching
- G4 link management interface (LMI) support on the channelized DS-3 Frame Relay module

Data summary

ATM features

Output buffers	Maximum of 128,000 cells per port; PPD, EPD, and policing leaky bucket GCRA
Standards compliance	ITU I.361 ATM Layer, UNI 3.0/3.1/4.0, NEBS Level 3
Traffic shaping	CBR, rt-VBR, nrt-VBR, UBR

SCP features

Ethernet interface	IEEE 802.3 compatible, RJ-45 connector
Front panel indicators	Diagnostic indicators, CD and TX/RX data
Safety	UL 1950, CSA 22.2, IEC 950, EN50082-1
Serial interface	DB-9 connector

General

Emissions	FCC Part 15, Class A; CISPR 22, Class A; VCCI Class 1 EMC; IEC 801-2 Level 3, IEC 801-3 Level 2, IEC 801-4 Level 2
Environmental	
ESD susceptibility	IEC 801-2 Level 3
Operating humidity	10% to 90% relative humidity, non-condensing
Operating temperature	23° F to 131° F (-5° C to +55° C), up to 10,000 ft (3,048 m) per Telcordia NEBS GR-63-CORE
Storage humidity	5% to 95% relative humidity, non-condensing
Storage temperature	-40° F to +158° F (-40° C to +70° C), up to 30,000 ft (9,144 m)

TNX-210 ordering information

Multiservice broadband switches

TNX-210/AC*	Base configuration (AC); includes 2.5 Gbps non-blocking ATM switching fabric via one switch module, four network module slots, redundant AC power supplies, and redundant Pentium 266 MHz SCPs with 64 MB DRAM
TNX-210/DC*	Base configuration (DC); includes 2.5 Gbps non-blocking ATM switching fabric via one switch module, four network module slots, redundant DC power supplies, and redundant Pentium 266 MHz SCPs with 64 MB DRAM

Factory-installed hardware upgrades

SCP-TNX-P5400-I**	Redundant Pentium 400 MHz SCPs with 256 MB DRAM (two Pentium 400 MHz SCPs installed in place of Pentium 266 MHz SCPs)
SCP-TNX-P266-HM-I***	Redundant Pentium 266 MHz SCPs with 256 MB DRAM (two Pentium 266 MHz SCPs with 256 MB DRAM installed in place of Pentium 266 MHz SCPs with 64 MB DRAM)

Spares and accessories

SM-210	TNX-210 switch module (SCP not included)
ENCL-210/AC	TNX-210 switch enclosure with 2 AC power supplies
ENCL-210/DC	TNX-210 switch enclosure with 2 DC power supplies
PS-210/AC	TNX-210 AC power supply
PS-210/DC	TNX-210 DC power supply
SCP-P5-400**	Pentium 400 MHz SCP with 256 MB DRAM and 32 MB flash
SCP-P5-266***	Pentium 266 MHz SCP with 64 MB DRAM and 16 MB flash
SCP-P5-200*	Pentium 200 MHz SCP with 64 MB DRAM and 16 MB flash
FT-SW/R	Replacement software media (current version only)

Field hardware upgrades

SCP-P5-200-HM-UPG*	SCP-P5-200 256 MB DRAM upgrade kit; includes 256 MB memory, EPROM, chip puller, and instruction manual
SCP-P5-266-HM-UPG***	SCP-P5-266 256 MB DRAM upgrade kit; includes 256 MB memory, EPROM, chip puller, and instruction manual

* Requires ForeThought 7.0 or greater software or patch to ForeThought 6.2.

** Requires ForeThought 8.0 or greater software or patch to ForeThought 7.0 or 7.1.

*** Requires ForeThought 8.0 or greater software or patch to ForeThought 6.2 or greater.

TNX-1100 ordering information

AC base configurations (must choose DS-1 or E1 timing)[†]

TNX-1100/2.5AC-4	2.5 Gbps switch, Stratum 4 CEC-Plus
TNX-1100/2.5AC-3	2.5 Gbps switch, Stratum 3 CEC-Plus
TNX-1100/5AC-4	5 Gbps switch, Stratum 4 CEC-Plus
TNX-1100/5AC-3	5 Gbps switch, Stratum 3 CEC-Plus
TNX-1100/7.5AC-4	7.5 Gbps switch, Stratum 4 CEC-Plus
TNX-1100/7.5AC-3	7.5 Gbps switch, Stratum 3 CEC-Plus
TNX-1100/10AC-4	10 Gbps switch, Stratum 4 CEC-Plus
TNX-1100/10AC-3	10 Gbps switch, Stratum 3 CEC-Plus

DC base configurations (must choose DS-1 or E1 timing)[†]

TNX-1100/2.5DC-4	2.5 Gbps switch, Stratum 4 CEC-Plus
TNX-1100/2.5DC-3	2.5 Gbps switch, Stratum 3 CEC-Plus
TNX-1100/5DC-4	5 Gbps switch, Stratum 4 CEC-Plus
TNX-1100/5DC-3	5 Gbps switch, Stratum 3 CEC-Plus
TNX-1100/7.5DC-4	7.5 Gbps switch, Stratum 4 CEC-Plus
TNX-1100/7.5DC-3	7.5 Gbps switch, Stratum 3 CEC-Plus
TNX-1100/10DC-4	10 Gbps switch, Stratum 4 CEC-Plus
TNX-1100/10DC-3	10 Gbps switch, Stratum 3 CEC-Plus

Factory-installed hardware upgrades

SCP-TNX400-I**	Redundant Pentium 400 MHz SCPs with 256 MB DRAM (two Pentium 400 MHz SCPs installed in place of Pentium 266 MHz SCPs); requires one SCP-TNX400-I per switch module to be upgraded
SCP-TNX-P266-HM-I*	Redundant Pentium 266 MHz SCPs with 256 MB DRAM (two Pentium 266 MHz SCPs with 256 MB DRAM installed in place of Pentium 266 MHz SCPs with 64 MB DRAM)

Spares and accessories

SM-1100	TNX-1100 switch module (SCPs not included)
SM-1100-B	TNX-1100 high-performance switch module (SCPs not included)
SCP-P5-400**	Pentium 400 MHz SCP with 256 MB DRAM and 32 MB flash
SCP-P5-266*	Pentium 266 MHz SCP with 64 MB DRAM and 16 MB flash
SCP-P5-266-HM*	Pentium 266 MHz SCP with 256 MB DRAM and 16 MB flash
SCP-P5-200*	Pentium 200 MHz SCP with 64 MB DRAM and 16 MB flash
SCP-P5-200-HM*	Pentium 200 MHz SCP with 256 MB DRAM and 16 MB flash
PS-1000AC	TNX-1100 AC power supply
PS-1000/DC-B	TNX-1100 DC power supply
ENCL-1100	TNX-1100 switch enclosure
FAN-1100	TNX-1100 fan tray
CEC-PLUS/CXR ^{††}	CEC-Plus carrier module
TCM/DS1-3 ^{††}	TCM with Stratum 3 DS-1 interface
TCM/DS1-4 ^{††}	TCM with Stratum 4 DS-1 interface
TCM/E1-3 ^{††}	TCM with Stratum 3 E1 interface
TCM/E1-4 ^{††}	TCM with Stratum 4 E1 interface
FT-SW/R	Replacement software media (current version only)
CMT-19	19-in. cable management tray
CMT-23	23-in. cable management tray
RMB23-14UI	23-in. rack-mount brackets (one pair)
KIOSK-23	23-in. Marconi kiosk; includes removable sides and door with bronze-tinted window and lockable handle and two pairs of 23-in. rack-mount brackets
KIOSKPKG-23/AC	23-in. AC power Marconi kiosk package; includes Marconi kiosk, 23-in. cable management tray, two pairs of rack-mount brackets, and extended-length AC power cords
KIOSKPKG-23/DC	23-in. DC power Marconi kiosk package; includes Marconi kiosk; 23-in. cable management tray; two pairs of rack-mount brackets; and power interface with system alarm display, alarm extension cables, and DC power breaker panel interface (BIP) cables

* Requires ForeThought 7.0 or greater software or patch to ForeThought 6.2.

** Requires ForeThought 8.0 or greater software or patch to ForeThought 7.0 or 7.1.

† Includes non-blocking, high-performance ATM switching fabric via 1–4 switch modules, 4–16 network module slots (4 slots per module), redundant power supplies, redundant Pentium 266 MHz SCPs with 64 MB DRAM per switch module, and CEC-Plus management station with redundant TCMs (must choose DS-1 or E1 timing).

†† To order a spare, configured CEC-Plus, order a CEC-Plus/CXR and two TCMs of the same type and Stratum as desired.

TNX-1100 ordering information (continued)

Field hardware upgrades (for customers using the SM-1100-B switch fabrics)

SCP-P5-200-HM-UPG*	SCP-P5-200 256 MB DRAM upgrade kit; includes 256 MB memory, EPROM, chip puller, and instruction manual
SCP-P5-266-HM-UPG*	SCP-P5-266 256 MB DRAM upgrade kit; includes 256 MB memory, EPROM, chip puller, and instruction manual
TNXB-P400/UPG**	TNX-1100 2.5 Gbps switch module upgrade; includes SM-1100-B switch fabric and two Pentium 400 MHz SCPs with 256 MB DRAM
TNXB-P266/UPG*	TNX-1100 2.5 Gbps switch module upgrade; includes SM-1100-B switch fabric and two Pentium 266 MHz SCPs with 64 MB DRAM
TNXB-P266-HM/UPG*	TNX-1100 2.5 Gbps switch module upgrade; includes SM-1100-B switch fabric and two Pentium 266 MHz SCPs with 256 MB DRAM
TNXB-P200/UPG*	TNX-1100 2.5 Gbps switch module upgrade; includes SM-1100-B switch fabric and two Pentium 200 MHz SCPs with 64 MB DRAM
TNXB-P200-HM/UPG*	TNX-1100 2.5 Gbps switch module upgrade; includes SM-1100-B switch fabric and two Pentium 200 MHz SCPs with 256 MB DRAM

Field hardware upgrades for upgrading the SM-1100 to SM-1100-B (all fabrics within a chassis must be of the same type)

TNXB-UPG-P400**	2.5 Gbps switch module upgrade; includes SM-1100-B switch fabric and two Pentium 400 MHz SCPs with 256 MB DRAM; requires one per each 2.5 Gbps capacity; a credit is given for the destruction of the SM-1100 and previous SCPs
TNXB-UPG-P266*	2.5 Gbps switch module upgrade; includes SM-1100-B switch fabric and two Pentium 266 MHz SCPs with 64 MB DRAM; requires one per each 2.5 Gbps capacity; a credit is given for the destruction of the SM-1100 and previous SCPs
TNXB-UPG-P266-HM*	2.5 Gbps switch module upgrade; includes SM-1100-B switch fabric and two Pentium 266 MHz SCPs with 256 MB DRAM; requires one per each 2.5 Gbps capacity; a credit is given for the destruction of the SM-1100 and previous SCPs
TNXB-UPG-P200*	2.5 Gbps switch module upgrade; includes SM-1100-B switch fabric and two Pentium 200 MHz SCPs with 64 MB DRAM; requires one per each 2.5 Gbps capacity; a credit is given for the destruction of the SM-1100 and previous SCPs
TNXB-UPG-P200-HM*	2.5 Gbps switch module upgrade; includes SM-1100-B switch fabric and two Pentium 200 MHz SCPs with 256 MB DRAM; requires one per each 2.5 Gbps capacity; a credit is given for the destruction of the SM-1100 and previous SCPs

* Requires ForeThought 7.0 or greater software or patch to ForeThought 6.2.

** Requires ForeThought 8.0 or greater software or patch to ForeThought 7.0 or 7.1.



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