

# ASX<sup>®</sup> 200BX/1000/1200 MULTISERVICE BROADBAND SWITCHES

High Performance, Flexibility, Resiliency



Operators that want non-blocking switching performance paired with maximum flexibility and resiliency need look no further than the Ericsson ASX200BX, ASX1000, and ASX1200. In addition to advanced reliability features, these multiservice broadband switches offer intelligent partitioning, non-service-affecting upgrades, continuous investment protection, and a wide variety of network interfaces and service modules.

The ASX200BX, ASX1000, and ASX1200 are designed for service provider edge and enterprise backbone networks. The ASX200BX provides up to 32 physical ports for connecting clients, servers, or access devices (hubs, routers, LAN switches, or WAN access devices). The ASX1000 and ASX1200 offer up to 128 physical ports for device connections.

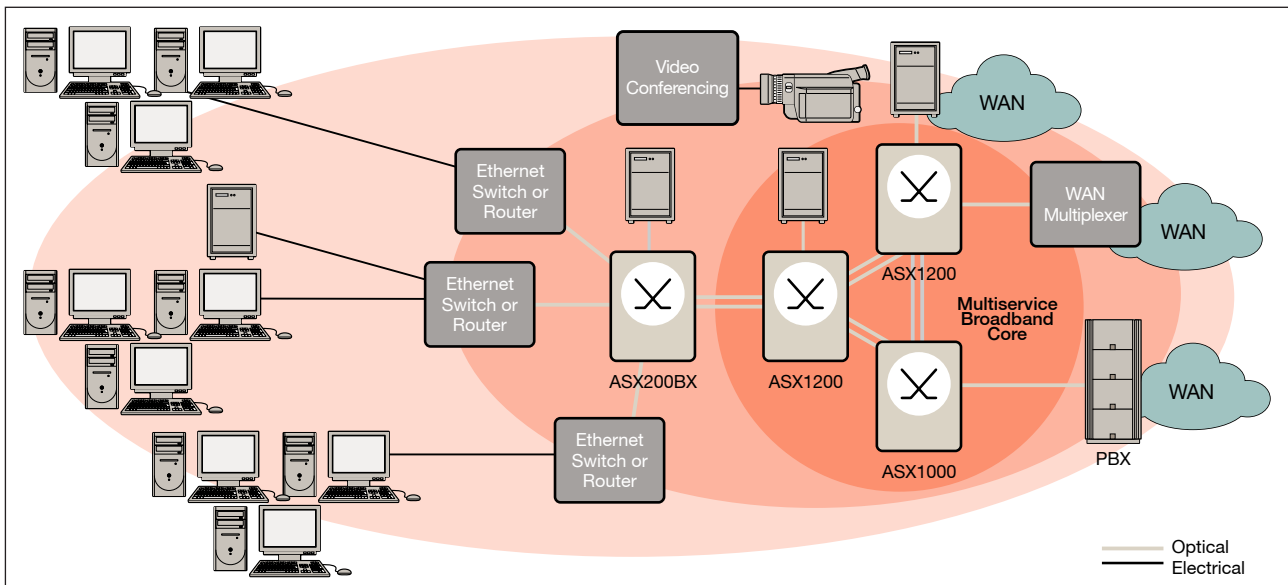
The ASX line offers a wide range of interfaces, from serial to T1/E1 to OC-48c/STM-16, and a variety of intelligent network modules, including Ethernet, 75 bps serial Circuit Emulation (CEM), N x 64

Kbps CEM, and Inverse Multiplexing for ATM (IMA). These switches are the best choice for reliable and resilient multiservice deployments.

The ASX200BX, ASX1000, and ASX1200 switches are built on award-winning technology. Analysts and editors alike have recognized the ASX switches as “the best in the industry.”

## Key benefits

- High-performance, scalable packet switches with common ForeThought<sup>®</sup> software allow for future growth and investment protection from the smallest to largest switch
- Extensive range of network interfaces provides greater flexibility
- Redundant design with no single point of failure offers unrivaled network availability
- ForeThought intelligence and compliance with the latest standards ensures unparalleled network resiliency and security
- Advanced traffic management and hierarchical traffic shaping increase the performance of service provider edge and enterprise backbone networks



Versatile ASX switches in multiservice applications

### Increased performance for service provider and enterprise networks

The ASX200BX, ASX1000, and ASX1200 feature advanced traffic management hardware capabilities that improve performance of both service provider edge and enterprise backbone networks.

With advanced traffic management, service providers have the flexibility to offer multiple levels of services (i.e., for voice, video, or data) to their customers, plus the capability to manage each service level agreement (SLA) down to the virtual circuit (VC) level. As a result, service providers realize optimum bandwidth usage and maximum revenue.

For enterprise customers, the ASX traffic management features significantly enhance backbone performance, enabling each traffic flow to be monitored and managed effectively. In addition, sophisticated ForeThought internetworking software provides advanced connection management features, including the following:

- On-demand smart permanent virtual circuits (SPVCs)
- Switched virtual circuits (SVCs) at the user-to-network interface (UNI) and network-to-network (NNI) levels
- Transparent support for Internet Protocol (IP) applications using IP-over-ATM and LAN Emulation (LANE)

### Capabilities overview

#### Capacity

The ASX200BX has a 2.5 Gbps switching fabric in a modular chassis that supports hot-swappable ATM, Frame Relay, CEM, 10/100 Ethernet, and Gigabit Ethernet modules. It also features redundant, hot-swappable switch control processors (SCPs) and power supplies. In addition, it supports up to 32 discrete ports ranging from serial to T1/E1 to OC-12c/STM-4. When high-density DS-1/E1 or DS-0 terminations are required, the ASX200BX supports a wide range of channelized DS-3 and channelized OC-3/STM-1 network modules.

For higher-density connectivity, the ASX1000 and ASX1200 scale from 2.5 Gbps to 10 Gbps and support up to 128 discrete ports. For applications that demand greater performance and bandwidth at the interface level, the ASX1200 is the perfect choice; it supports interfaces from serial to T1/E1 to OC-48c/STM-16. Designed for growth, the ASX1000 and ASX1200 are world-class multiservice broadband switches that support in-service expansion of port and switching capacity.

The ASX family switch architecture is based on award-winning output-buffered, distributed shared memory switching technology. This design enables the ASX switches to support the performance and throughput demands of the most demanding network environments.

## Reliability and fault tolerance

The ASX family of switches provides fault-tolerant software and highly reliable hardware for mission-critical applications that run over backbone and multiservice network deployments. When ASX switches are interconnected using multiple links, ForeThought software reroutes traffic in the event of a failure on any one of the links. This high-level resiliency makes the ASX switches suitable for service provider edge and enterprise backbone networks.

Redundant, load-sharing power supplies with dual power cords and redundant fans in the ASX switches increase network availability. Power is available in AC or DC options for connection to continual backup uninterruptible power supply (UPS) systems.

The ASX1000 and ASX1200 are intelligently partitioned so that power supplies, network modules, fan trays, SCPs, and switch fabrics can be hot-swapped while the unit is in operation. This minimizes downtime during switch maintenance and network expansions. It also allows operators to upgrade individual “like” components as opposed to upgrading the entire system.

With their unique distributed switching fabric architecture, the ASX1000 and ASX1200 offer additional redundancy. In the event of a switching fabric failure, the remainder of the switch is unaffected and continues to operate. As well, each 2.5 Gbps switching fabric houses a primary SCP and an optional secondary SCP. If the primary SCP fails, the secondary SCP preserves the virtual connections and ensures continued operation of the switch. The switches also provide environmental monitoring of temperature, fan status (ASX1000, ASX1200), and power voltages.

The ASX family also implements Synchronous Optical Network (SONET)/Synchronous Digital Hierarchy (SDH) linear 1+1 automatic protection switching (APS)/multiplex section protection (MSP) and timing protection. As a result, the ASX switches can provide the availability needed to meet the demands of various SLAs.

ForeThought software comes with yet another intelligent feature: SPVCs that offer faster reestablishment of permanent virtual paths (PVPs). While this promotes resilience for the permanent virtual circuits (PVCs) on the switching side, the SPVC group redundancy feature extends the same redundancy all the way to the host or any other device that is connected to the switch.

To accommodate network software and hardware changes, the switches can be upgraded easily — without affecting network services. Switch software can be upgraded to newer versions and implemented without a service interruption. And SCPs, when configured for redundancy, can be upgraded without affecting services. These resiliency features significantly increase operational flexibility, as well as the ability to ensure service delivery to end users.

## Stratum-level synchronization

For jitter-sensitive applications such as real-time voice and video, the ASX1000 and ASX1200 support options for carrier-class network synchronization. The ASX timing control module (TCM) is available in both Stratum 3 and Stratum 4 configurations and meets Telcordia and ANSI synchronization standards.

The TCM can be configured to derive timing from a network transmission facility or from a local timing source connected to the module’s building integrated timing supply (BITS) interface. Hitless switchover from a primary to secondary reference ensures that no traffic is lost during changes in reference clocks.

## Maximum performance

All ASX switches 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
- Generic cell rate algorithm (GCRA) traffic policing
- Comprehensive counters, including G.826 SONET statistics
- Configurable buffer thresholds
- Explicit-rate ABR (ER-ABR) support

The switches also feature hierarchical shaping, which means they can shape traffic at the VC level. This feature optimizes enterprise backbone network utilization and helps service providers offer high-quality, guaranteed services to their customers.

In addition, ForeThought bandwidth management allows high-priority, delay-sensitive constant bit rate (CBR) — i.e., real-time video and voice — and variable bit rate (VBR) traffic to traverse the network unaffected by “bursty” available bit rate (ABR) or unspecified bit rate (UBR) data traffic. The ASX1000 was the first switch to cross the threshold of 2,000,000+ cell buffers per ATM switch, and the ASX1200 continues to support this milestone.

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

Customers often face the challenge of protecting their existing investments while pursuing technological developments so that they can reap maximum benefits. The ASX family of switches uses industry-leading, high-performance SCPs based on the Intel® Pentium® processor architecture. This keeps SCP performance in line with CPU growth while protecting existing investments. Operators seeking even more efficiency can purchase higher-speed, CPU-based SCPs, which more than quadruple connection performance. (Refer to the Multiservice Broadband SCPs Data Sheet for more information about SCP options.)

### Flexibility

The ASX switches support a wide range of network interface modules, including the following:

- T1
- E1
- DS-3
- E3
- Ethernet (10/100, Gigabit Ethernet)
- LANE Services
- Frame Relay
- CEM (N x 64 Kbps)
- 155 Mbps SONET/SDH (Category 5 UTP copper, OC-3c/STM-1, and STM-1e)
- OC-12c/STM-4
- OC-48c/STM-16 (ASX1200)
- T1/E1 IMA
- Channelized DS-3
  - Channelized DS-3/1 ATM/IMA
  - Channelized DS-3/E1 ATM/IMA
  - Channelized DS-3/1/0 Frame Relay
  - Channelized DS-3/1/0/E1 CEM
- Channelized OC-3/DS-1/0/E1 CEM
- Channelized OC-3/DS-1/E1 ATM/IMA
- Serial CEM (DTE/DCE, 75 bps to 19 Mbps; EIA/TIA 232/422/423/449/530/V.35)
- Serial cell-bearing (DTE/DCE, 56 Kbps to 24 Mbps; EIA/TIA 530)

This wide range of interfaces gives the switches unmatched flexibility to meet most network requirements for service provider and enterprise customers. In the service provider space, the switches can be positioned as multiservice switches to offer CEM, Frame Relay, inverse multiplexing, and ATM services to customers. In an enterprise network, these network interface modules can interconnect ATM switches to form the backbone, and they can connect LAN switches and WAN access devices to the backbone.

For more detailed information about these interfaces, see the Multiservice Broadband Network Modules Data Sheet.

### Standards and compliance

All ASX switches support MFA Forum, IETF, and ITU (CCITT) standards. They also comply with the following standards:

- User–Network Interface (UNI) 3.0/3.1/4.0 specifications for signaling
- Private Network–Network Interface (PNNI) signaling and routing, including PNNI peer group leader hierarchy
- Traffic management – usage parameter control (UPC) policing
- Network management – Interim Local Management Interface (ILMI) and Simple Network Management Protocol (SNMP) Management Information Bases (MIBs)

In addition, the ASX switches support Classical IP (CLIP; RFC 1577) and LANE v1.0 with Distributed LAN Emulation (DLE) enhancements. More important, the ASX switches have been thoroughly field tested to interoperate with other vendors' products and services.

### Intelligent broadband network solutions

Because Internet applications such as e-commerce and multimedia entertainment are growing at an exponential rate, they demand a highly reliable and high-performance network infrastructure that supports their growth. The ASX200BX, ASX1000, and ASX1200 switches have been designed and built for broadband solutions, with support for a wide range of network interface modules, reliable ForeThought software, and world-class customer support.

## Simply the best multiservice switches

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

### Key features

- 2.5 to 10 Gbps of non-blocking switching capacity
- Scalable to 128 discrete ports
- Complete line of LAN and WAN interfaces
- Port speeds from T1/E1 to OC-12c/STM-4 (up to OC-48c/STM-16 for ASX1200)
- Hierarchical traffic shaping
- SONET/SDH APS/MSP on OC-3c/STM-1 network modules
- IMA support (via T1/E1 IMA network modules)
- T1/E1 (N x 64 Kbps) CEM for private branch exchange (PBX) connectivity
- Frame relay internetworking (FRF.5 and FRF.8) and Multilink Frame Relay (FRF.16)
- ForeThought network intelligence
- MFA Forum standards compliance
  - PNNI 1.0
  - Peer group leader hierarchy
  - ATM Inter-Network Interface (AINI)
  - Network Call Correlation Identifier (NCCI)
  - Path and Connection Trace
  - Control Plane Security

- Enhanced MFA Forum LANE 1.0
- Virtual UNI
- Per-VC queuing
- Per-VC shaping and statistics
- >2,000,000 cell buffers
- Redundant common equipment
- Stratum 3 and Stratum 4 timing
- Enhanced connection performance
- 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 Distributed Protection Switching
- G4 link management interface (LMI) support on the channelized DS-3 Frame Relay network module

## Data summary

### ASX switch comparison

	<b>ASX200BX</b>	<b>ASX1000</b>	<b>ASX1200</b>
Switching fabric	2.5 Gbps, non-blocking	2.5 Gbps to 10 Gbps, non-blocking	2.5 Gbps to 10 Gbps, non-blocking
Number of ports	2 to 32	2 to 128	2 to 128
Switch transit delay	<10 microseconds	<12 microseconds	<12 microseconds
Dimensions (H x W x D)	4.75 in. x 17.5 in. x 18 in. (12.1 cm x 44.5 cm x 45.7 cm)	24.5 in. x 17.5 in. x 18 in. (62.2 cm x 44.5 cm x 45.7 cm)	24.5 in. x 17.5 in. x 18 in. (62.2 cm x 44.5 cm x 45.7 cm)
Weight	24.9 lbs (11.3 kg)	89.7 lbs (40.7 kg)	89.7 lbs (40.7 kg)
Power (nominal)			
AC power	100–240 VAC (nominal, ±10%), 50/60 Hz, 3 A (maximum), 200 W	100–240 VAC (nominal, ±10%), 50/60 Hz, 20 A (maximum), 1,000 W	100–240 VAC (nominal, ±10%), 50/60 Hz, 20 A (maximum), 1,000 W
DC power	-48/-60 VDC (nominal), 8 A (maximum), 200 W	-48/-60 VDC (nominal), 30 A (maximum), 1,080 W (at -36 VDC, 30 A)	-48/-60 VDC (nominal), 30 A (maximum), 1,080 W (at -36 VDC, 30 A)

### Hardware

Output buffers	Maximum of 128,000 cells per port
Traffic policing	Leaky buck GCRA, CBR, and VBR

## Data summary (continued)

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### ForeThought bandwidth management

- Smart buffers
  - Per-VC queuing
  - Early packet discard (EPD)
  - Partial packet discard (PPD)
  - ER-ABR support
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### Connection performance

Call setup	<2 microseconds
Calls per second	
ASX200BX	Up to 1,120 with the standard 400 MHz SCP; up to 1,525 with the optional 700 MHz SCP
ASX1000	Up to 2,900 with standard 266 MHz SCP (see ASX1200 figures for performance from optional upgrades)
ASX1200	Up to 4,500 with standard 400 MHz SCP; up to 6,100 with optional 700 MHz SCP
Interface	
Ethernet	IEEE 802.3 compatible, RJ-45 connector
Serial	DB-9 connector
Front panel indicators	Diagnostic indicators, CD and Tx/Rx data
Maximum port speed	
ASX200BX, ASX1000	OC-12/STM-4
ASX1200	OC-48c/STM-16

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### Redundancy

Power	Yes (optional or standard, depending on model)
SCP	Yes (optional on all models)
Software	Non-service-affecting upgrades supported

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### General

Electromagnetic compatibility (EMC)	
Emissions	FCC Part 15, Class A; EN55022, Class A; VCCI, Class 1 EMC
Flicker	EN61000-3-3
Harmonics	EN61000-3-2
Immunity	EN55024
Telecom	EN300386
Environmental	
ESD susceptibility	IEC 801-2 Level 3
Operating humidity	10% to 90% relative humidity, non-condensing
Operating temperature	41° F to 104° F (5° C to 40° C), up to 10,000 ft (3,048 m)
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)
Safety	UL/CSA 60950, IEC 60950
Standards compliance	ITU I.361 ATM Layer, UNI 3.0/3.1/4.0

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### CEC-Plus clock specifications (ASX1000, ASX1200 option)

	Stratum 3	Stratum 4
Free accuracy	+4.6 ppm	+20 ppm
Holdover accuracy	+0.05 ppm initial offset +0.04 ppm drift/day +0.028 ppm temperature	N/A
Pull-in rating	-4.6 ppm	+50 ppm

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