

ForeRunnerLE™ 155

ATM Workgroup Switch



Industry-leading Scalability and Reliability for Networks that Last

The *ForeRunnerLE* 155 ATM Workgroup Switch (*ForeRunnerLE* 155) revolutionizes the workgroup ATM market by combining state-of-the-art design with a high degree of integration. The *ForeRunnerLE* 155 eliminates price as an issue when comparing the advantages of ATM with other high speed workgroup solutions.

The *ForeRunnerLE* 155 emphasizes useability and provides increased performance over other ATM and non-ATM solutions. Easy to set up, use, and maintain, the *ForeRunnerLE* 155 is "plug-n-play" with LANE services (LES, BUS, LECS) pre-installed and ready to go – right out of the box.

The *ForeRunnerLE* 155's QoS capabilities enable a broad range of workgroup applications not available from other LAN technologies including high resolution video conferencing, high-performance groupware, video-on-demand, and computer telephony integration.

And, as a member of the *ForeRunner* family, the *ForeRunnerLE* 155 leverages FORE's award-winning ASX switch architecture, *ForeThought* Internetworking Software and *ForeView* network management.

ATM Functionality at Superior Price/Performance

The *ForeRunnerLE* 155 features an improved 2.5 Gbps non-blocking switching fabric and an integrated CPU to reduce cost and increase reliability. The *ForeRunnerLE* 155 provides a minimum of 12 ports of 155 Mbps SONET/SDH. An additional four 155 Mbps ports (UTP5 or MMF) or one 622 Mbps port (MMF) can be added to the base 12-port configuration.

The *ForeRunnerLE* 155 also provides key networking features including: User Network Interface (UNI 3.0/3.1); multicast and broadcast support; *ForeThought* Bandwidth Management including four priority levels, large, dynamically allocated output buffers, Per-VC queuing, and Early and Partial Packet Discard.

The Added Intelligence - ForeThought Internetworking Software

ForeThought Internetworking Software is an integrated suite of intelligent software components that works together with *ForeRunner* ATM switches, *ForeRunner* ATM adapters, ES-3810/ES-3850 Ethernet switches and *PowerHub* LAN access switches to deliver high-performance, transparent ATM internetworking. FORE has over 35 *ForeThought* Partners today, including Hewlett-Packard and

Key Features

- ATM at Fast Ethernet prices
- Plug-n-Play operation
- Support for voice, video and data
- 2.5 Gbps non-blocking architecture
- 12- to 16-port SONET/SDH configurations
- 155 Mbps and 622 Mbps LAN interfaces
- Copper, multimode fiber, and single mode fiber interfaces
- LAN Emulation and Classical IP support
- WinSock 2.0 and XTI application support
- ATM Forum standards compliance

Microsoft Corporation.

ForeThought software provides standards-based ATM internetwork functions: switched virtual circuits (SVCs), LAN Emulation, Classical IP-over-ATM, and virtual workgroups, as well as value-added features such as LANE services redundancy, dynamic routing information with *ForeThought* PNNI, and IP multicast.

Standards Compliance

The *ForeRunnerLE* 155 supports ATM Forum, IETF and ITU (CCITT) standards. It complies with the UNI 3.0/3.1 specification for signaling, addressing (OSI NSAP), traffic management (UPC Policing) and network management (ILMI and SNMP MIBs).

The *ForeRunnerLE* 155 also supports Classical IP (RFC 1577) and Ethernet/Token Ring LAN Emulation specifications including support for large message transfer units (MTU).

Through FORE's "FOREcerTIFIED" program, *ForeThought* has been thoroughly tested to interoperate with more than 30 other vendors' ATM products and services.

Network Management via ForeView

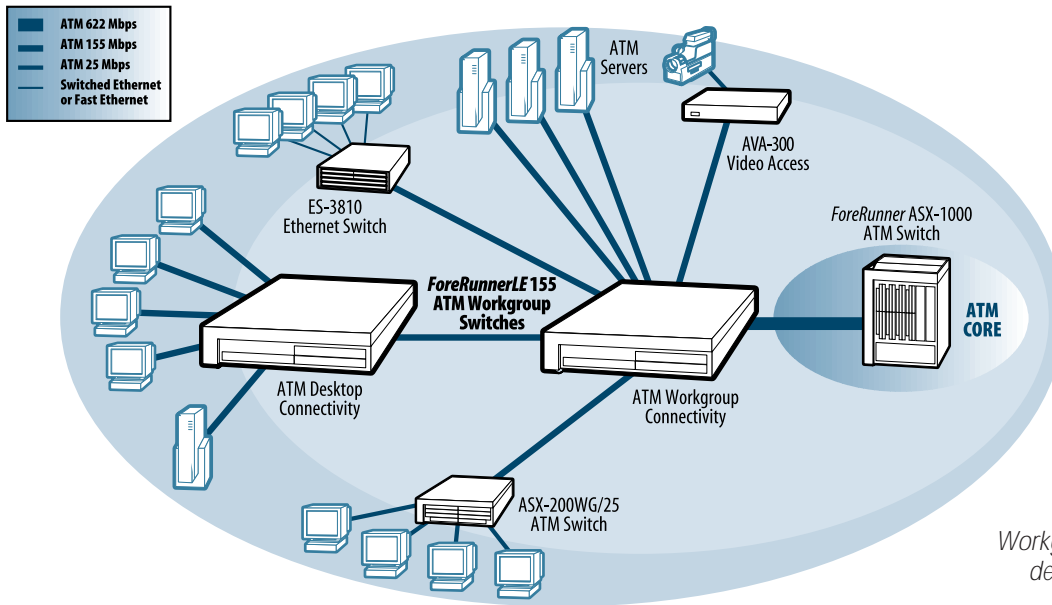
The integral CPU continually monitors information about the switch and its ATM connections including bandwidth utilization and error statistics. This information is communicated via standard SNMP to the *ForeView* software.

ForeView network management software is used to create and reconfigure virtual workgroups, monitor network links and devices, perform inventory management, and provide a detailed view of each *ForeRunner* ATM switch and *ForeRunner* ATM adapter.

ForeView software is compatible with the most popular management systems including HP OpenView, SunNet Manager, and NetView/6000. In addition, a more cost-effective stand-alone version of *ForeView* is available for Windows NT-compatible PCs and select UNIX platforms.

ForeRunnerLE 155 ATM Interface Specifications

Specification	OC-3c/STM-1 155 Mbps SONET/SDH	STS-3c/STM-1 155 Mbps SONET/SDH	OC-12c/STM-4c 622 Mbps SONET/SDH
Data Rate	155.52 Mbps	155.52 Mbps	622.08 Mbps
Output Buffer	32,768 cells	32,768 cells	32,768 cells
Media	Multimode fiber or single mode intermediate reach fiber	Category 5 UTP	Multimode fiber or single mode intermediate reach fiber
Connectors	SC	RJ-45	SC
Line Encoding	Non-return to zero (NRZ)	Non-return to zero (NRZ)	Non-return to zero (NRZ)
Framing	STS-3c/STM-1	STS-3c/STM-1	STS-12c/STM-4c
Power Budget (for distance calculations)	Multimode Fiber: Transmit power: -14 to -20 dBm, Receiver sensitivity: -14 to -30 dBm, Path attenuation: 0 to 10 dBm Single Mode, Intermediate Reach Fiber: Transmit power: -8 to -15 dBm, Receiver sensitivity: -8 to -28 dBm, path attenuation: 0 to 13 dBm	Nominal Distance: 100 m	Multimode Fiber: Transmit power: -14 to -20 dBm, Receiver sensitivity: -14 to -26 dBm, Path attenuation: 0 to 6 dBm Single Mode, Intermediate Reach Fiber: Transmit power: -8 to -15 dBm, Receiver sensitivity: -8 to -28 dBm, path attenuation: 0 to 13 dBm
Loopbacks	Transmit and receive	Transmit and receive	Transmit and receive
Standards Compliance	ATM Forum STS-3c UNI v3.1; ITU-T I.432; ANSI T1E1.2/93-020, T1S1/92-185; ITU-T G.957; Bellcore TR-NWT-000253	ATM Forum STS-3c UNI v3.1; ITU-T I.432; ANSI T1E1.2/93-020, T1S1/92-185	ATM Forum STS-12c UNI v3.1, ATM Forum 95-0128-February 1995; ITU-T I.432; ANSI T1E1.2/93-020, T1S1/92-185, ITU-T G.957; Bellcore TR-NWT-000253
Statistics/Alarms	Loss of Signal (LOS), Loss of Frame (LOF), Loss of Pointer (LOP), Far End Block Errors (FEBE), Alarm Indication Signal (AIS), Far End Receive Failure (FERF), Yellow Alarm, Bit Interleaved Parity errors (BIP), Header Check Sequence errors (HCS)		



The ForeRunnerLE 155 ATM Workgroup Switch provides ATM desktop [workstations, server] connectivity, as well as ATM workgroup [workstation, server, LAN Access, other ATM switches] connectivity.

Systems Software Technical Specifications

ForeThought Internetworking Software:

- Switched virtual circuits (SVCs); permanent virtual circuits (PVCs); smart permanent virtual circuits (SPVCs); unicast, multicast and broadcast
- 4 levels of cell priority: CBR-rt, VBR-rt and -nrt, ABR-ER/EFCI [hardware] and UBR
- ATM Forum UNI 3.0/3.1 compliance
- ATM Forum, PNNI 1.0, ForeThought PNNI, and IISP for interswitch connections
- LAN Emulation 1.0 (Ethernet and Token Ring)
- Distributed LAN emulation for large, resilient networks
- Large MTU support: up to 18,190 bytes
- IP-over-ATM; Classical IP (RFC 1577)

ForeView Network Management Software:

- Point-and-click operation
- Automatic discovery and mapping of ForeRunner ATM networks
- Integration into existing network management platforms
- Simple Network Management Protocol (SNMP v1)
- HP OpenView, SunNet Manager, IBM NetView/6000; standalone Windows NT

Hardware

ForeThought Bandwidth Management:

- Smart Buffers
- 131,072 cells of output buffer
- 4 levels of cell priority: CBR/VBR-rt; VBR-nrt; ABR-ER/EFCI [hardware]; UBR

- Traffic Policing: UPC, single & dual leaky bucket support
- Per-VC queuing
- Early Packet Discard (EPD),
- Partial Packet Discard (PPD)
- Policing Packet Discard

General

Switching Fabric:

2.5 Gbps, non-blocking

Number of Ports:

12 to 16

Switch Transit Delay:

<10 microseconds

Control Processor:

i960

Connection Set Up Time:

<10 milliseconds

Calls:

100 calls per second

Serial Interface:

DB-9 connector

Front Panel Indicators:

Received data and carrier detect LED/port, hardware and software status indicators

Power:

85-132 VAC to 170-264 VAC at 47-63 Hz/1.7 amps

Dimensions:

H: 2.95 in (7.49 cm), W: 17.5 in (44.45 cm),

D: 11.82 in (30.02 cm)

Weight:

14.3 lbs. (6.5 kg)

ForeRunnerLE™ 155

ATM Workgroup Switch

Emissions:

FCC Part 68, Sub-part 15, Class A;
CISPR 22, Class A; EMC IEC 801-3,
Level 2 and IEC 80 1-4. Level2;
VCCI, Class 1

Safety:

UL 1950: CSA 22.2; EC 950;
EN50082-1; EVDE Safety

Operating Temperature:

0° to 40° C up to 10,000 ft

Operating Humidity:

10 to 90% relative humidity, non-condensing

Storage Temperature:

-30° to +70° C up to 30,000 ft

Storage Humidity:

5% to 95% relative humidity, non-condensing

Ordering Information

Model #	Description
ForeRunnerLE 155 ATM Workgroup Switch with:	
1014100000	12 ports UTP5 copper
1014101000	16 ports UTP5 copper
1014102000	14 ports UTP5 and 2 ports multimode fiber
1014103000	12 ports UTP5 and 4 ports multimode fiber
1014104000	12 ports UTP5 and 1 port OC-12c/STM-4c multimode fiber
1014152000	12 ports UTP5 copper, 2 ports multimode fiber, and 2 ports singlemode fiber
1014154000	12 ports UTP5 copper, and 1 port OC-12c/STM-4c single mode fiber
1014200000	12 ports multimode fiber
1014203000	16 ports multimode fiber
1014204000	12 ports multimode fiber and 1 port OC-12c/STM-4c multimode fiber
1014252000	14 ports multimode fiber and, 2 ports singlemode fiber
1014154000	12 ports multimode fiber and 1 port OC-12c/STM-4c singlemode fiber

ForeThought Software Options:

1010100100	ForeThought LANE Services license
1010100200	ForeThought PNNI license
1010100300	ForeThought Classical IP license

Kits:

1010200000	Rack and stack mount kit
1010101000	4-port UTP5 copper Product Expansion Module (PEM) kit
1010102000	2-port UTP5 copper and 2-port 155 Mbps multimode fiber PEM kit
1010103000	4-port multimode fiber PEM kit
1010104000	1-port OC-12c/STM-4c multimode fiber PEM kit
1010152000	2 ports multimode fiber, and 2 ports singlemode fiber PEM kit
1014154000	1 port OC-12c/STM-4c singlemode fiber PEM kit

ForeRunner ATM Adapters:

ForeRunnerLE 155	Family of 155 Mbps PCI bus adapters for desktop and workgroup server environments.
ForeRunner 200E	Family of 155 Mbps adapters for desktop and server environments.



FORE Systems

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