

ACE-101

ATM Network Termination Unit / Multiservice Access Concentrator



FEATURES

- Creates a demarcation point between private networks and public ATM networks
- Allows service providers to offer LAN connectivity, data and voice/TDM services over WAN ATM networks
- Traffic management includes fault localization, traffic monitoring and policing
- Offers multiple-class traffic shaping for enhanced ATM uplink utilization
- Provides management and control up to the customer premises
- Implements ITU-T I.610 OAM (Operation, Administration and Maintenance) standard providing end-to-end ATM service control
- Media and rate conversion
- Supports CBR, VBR (rt and nrt) and UBR
- Supports VPC/VCC connections
- UNI (user or network) interfaces supported:
 - 155 Mbps Single Mode Long-Haul and Short-Haul
 - 155 Mbps Single Mode Short-Haul over single fiber (WDM)
 - 155 Mbps Multimode
 - 155 Mbps over UTP and coax
 - E3/T3 over coax and fiber
 - 4 x E1/T1 IMA
 - E1/T1 over coax/UTP
- Interworking interfaces:
 - Ethernet / Fast Ethernet
 - E1/T1 CES
 - 4 x E1/T1 CES
 - E3/T3 CES
 - Frame Forwarding
- Service Level Agreements (SLAs) can be guaranteed by events and statistics collection
- In-band and out-of-band SNMP management and software download
- RADview HPOV Network Management Application (UNIX-based)
- Local or remote control (PPP for SNMP) via the control port (terminal or dial-up)
- Synchronization to the network or user clock
- Redundant network interfaces and power supplies (optional) for improved resilience
- Compact, 1U high suitable for mounting in 19" racks

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DESCRIPTION

- ACE-101 can be used as an ATM NTU (Network Termination Unit) for native ATM or as a multiservice access concentrator (MSAC). Located at the customer premises, it can be controlled by an ATM service provider, or it can be used as part of a corporate ATM-based WAN.
- As an A-NTU, ACE-101 enables a smooth and flexible connectivity between user network and public network. It allows carriers to guarantee the Quality of Service (QoS), by collecting and measuring localized and segment parameters. Thus, detailed performance information and end-to-end network control are provided.
- As a multi-service access concentrator, ACE-101 offers ATM QoS-based WAN services. Traditional services, such as LAN and voice, can be consolidated over statistically multiplexed links, at high rates. The built-in traffic management features contribute to the efficiency and quality of these services.
- ACE-101 has one user interface and two network interfaces. The user interface is used either in native ATM or legacy services, e.g. Ethernet / Fast Ethernet and voice. The network interfaces are connected via one or two ATM links, thus providing protected ATM service.

TRAFFIC MANAGEMENT

- ACE-101 controls the user ingress traffic transmitted to the public ATM network. It monitors or polices (cell tagging or cell discarding) transmitted traffic in order to protect the public ATM network from service agreement violation. Single and dual leaky bucket is used for UPC (Usage Parameter Control) measurements. This mechanism is applied per each open connection (VPC/VCC). Traffic Management also includes the support of AAL5 Partial Packet Discard (PPD), CLP dropping and Early Forward Congestion Identification (EFCI) marking.

TRAFFIC SHAPING

- An optional traffic shaping feature, with up to 148,000 cells buffer, adds to ACE-101 user's traffic assurance. ACE-101 as an A-NTU and MSAC, helps users to better utilize their ATM services.

APPLICATION

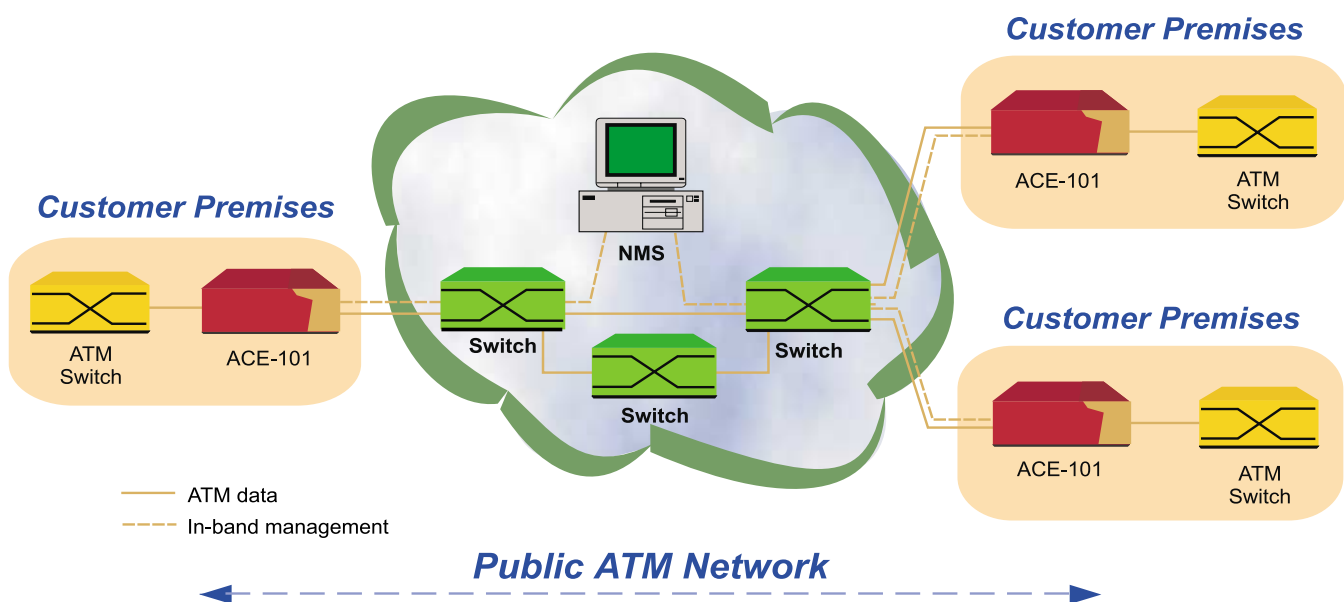


Figure 1. ACE-101 in a Public / Private Application

ACE-101 Interworking Modules

Module Name	Description	Data Rates (Mbps)	Connector Type
ACE-101M/ETH	Ethernet/Fast Ethernet	10/100	RJ-45
ACE-101M/ETH/CES/E1	Ethernet and one balanced E1 CES	10/100	RJ-45s
ACE-101M/ETH/CES/E1/CX	Ethernet and one unbalanced E1 CES	10/100	RJ-45 and BNC
ACE-101M/ETH/CES/T1	Ethernet and one T1 CES	10/100	RJ-45s
ACE-101M/ETH/CES/E3	Ethernet/Fast Ethernet and one E3 CES	10/100	RJ-45 and BNC
ACE-101M/ETH/CES/T3	Ethernet/Fast Ethernet and one T3 CES	10/100	RJ-45 and BNC
ACE-101M/HDLC/HS	HDLC-HSSI	Up to 52	HSSI
ACE-101M/4HDLC/X21	4 HDLC, X21	Up to 8.192	X.21
ACE-101M/4HDLC/V35	4 HDLC, V35	Up to 8.192	V35
ACE-101M/4HDLC/530	4 HDLC, RS530	Up to 8.192	RS530
ACE-101M/CES/4E1	4 balanced E1 CES		RJ-45
ACE-101M/CES/4E1/CX	4 unbalanced E1 CES		BNC
ACE-101M/CES/4T1	4 T1 CES		RJ-45



CES Module



LAN Module



Frame Forwarding Module



UNI Module

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ACE-101 ATM Modules

Module Name	Description	Data Rates (Mbps)	Connector Type	Typical Distance (km/mi)	Wavelength (nm)	Optical Output (dBm)	Sensitivity (dBm)
ACE-101M/E1	E1 UNI	2.048	RJ-45, 8-pin BNC, 75Ω		–	–	-27
ACE-101M/T1	T1 UNI electrical	1.544	RJ-45, 8-pin	–	–	–	-27
ACE-101M/4E1-IMA	Inverse multiplexing 4xE1 for ATM	Up to 4x2.048	RJ-45				-27
ACE-101M/4E1-IMA/CX	Inverse multiplexing 4xE1 for ATM	Up to 4x2.048	BNC				-27
ACE-101M/4T1-IMA	Inverse multiplexing 4xT1 for ATM	Up to 4x1.544	RJ-45				-27
ACE-101M/E3	E3 UNI electrical	34.368	BNC	150m/492 ft	–	–	–
ACE-101M/FC13L/E3	E3 UNI optical	34.368	FC-PC	40/25	1300	-12	-31
ACE-101M/T3	T3 UNI electrical	44.736	BNC	150m/492 ft	–	–	–
ACE-101M/CX/BNC/155	STM-1, electrical	155.52	BNC	150m/492 ft	–	–	–
ACE-101M/UTP/155	STM-1 electrical	155.52	RJ-45	100m/ 328 ft	–	–	–
ACE-101M/FC13L/T3	T3 optical	44.736	FC-PC	40/25	1300	-12	-31
ACE-101M/SC13M/155	STM-1/OC-3 multi-mode	155.52	Duplex SC	2/1.25	1300	-18	-31
ACE-101M/ST13L/155	STM-1/OC-3 single-mode	155.52	ST	40/25	1300	-12	-31
ACE-101M/FC13L/155	STM-1/OC-3 single-mode	155.52	FC-PC	40/25	1300	-12	-31
ACE-101M/SC13L/155	STM-1/OC-3 single-mode	155.52	Duplex SC	40/25	1300	-12	-31
ACE-101M/FC13LH/155	STM-1/OC-3 single-mode, long-haul	155.52	FC-PC	60/38	1300	-2	-34
ACE-101M/FC15LH/155	STM-1/OC-3 single-mode, long-haul	155.52	FC-PC	110/68	1550	-2	-34
ACE-101M/FC/SF1/155	WDM, single fiber, STM-1/OC-3		FC-PC	40/25	Tx 1300 Rx 1550	-12	-29
ACE-101M/FC/SF2/155	WDM, single fiber, STM-1/OC-3		FC-PC	40/25	Tx 1550 Rx 1300	-12	-29
ACE-101M/ST/SF1/155	WDM, single fiber, STM-1/OC-3		ST	40/25	Tx 1300 Rx 1550	-12	-29
ACE-101M/ST/SF2/155	WDM, single fiber, STM-1/OC-3		ST	40/25	Tx 1550 Rx 1300	-12	-29

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- Both customers and ATM service providers enjoy an improved service, since bursty traffic is smoothed. Shaping of VBR to CBR is also possible. This is a significant benefit, especially at low speed ATM links. For the private ATM or legacy services user, traffic shaping allows flexible, yet accurate, traffic adaptation to the required service. ATM service providers benefit from the shaping at the customer premises, as it smoothes ingress traffic. Thus, public network congestion is prevented, while increased network utilization is accomplished.
- ACE-101 supports both single VPC/VCC shaping and group shaping for aggregate shaping.

FAULT LOCALIZATION AND END-TO-END ATM SERVICE MONITORING

- The ATM layer F4/F5 segment or end-to-end OAM protocol is performed between any two ACE-101 units located at the network edges, in compliance with the latest ITU-T I.610 standard. This configuration enables end-to-end measurement of QoS parameters, such as connectivity, delay, error rate and cell loss ratio - all of which describe the Quality of Service supported by the public network. ACE-101 also enables diagnostics and localization of faults throughout the public ATM network.

- ATM NTUs improve service reliability significantly. Fault management capabilities of these units enable the verification of end-to-end ATM connectivity. OAM fault management includes alarm surveillance (AIS, RDI) and continuity checks, supported for all VPCs/VCCs. ACE-101 also monitors Performance Management (PM), by checking whether all the conformant data transmitted to the network has reached its destination with no errors on the way. Performance management is supported for up to 15 bi-directional VPCs/VCCs (or 31 unidirectional VPCs/VCCs). In addition, ACE-101 generates F4/F5 loopback cells (LB) on up to 32 VPCs/VCCs. This enables fault localization and measurements of the ATM network delays, including minimum, maximum, average delay and delay variation. Additionally, loopback cells can be sent with source and destination addresses. These loopback cells may be looped at any network element that was pre-assigned with a loopback point address.
- The PHY layer F1-F3 OAM protocol is also supported by ACE-101, enabling performance monitoring and fault localization on the **user** and **network** physical links.

RATE CONVERSION

- Extracting ATM cells from one interface and sending them over to the other interface performs rate conversion between dissimilar interfaces. A 6000-cell buffer with four levels of priority queues is used to convert between the two interfaces, while preserving the VP/VC traffic characteristics.

CLOCK SYNCHRONIZATION

- In most applications, ACE-101 enables synchronization to one of the following options: network, user or internal clocking. ACE-101 synchronizes the user interface to the recovered network clock. In case of signal loss on the network interface, a local clock is used to generate the data.

SERVICE LEVEL AGREEMENT (SLA) SUPPORT

- SLA support requires elaborate collection of various parameters. ACE-101 processes these parameters in real-time into statistic figures. Statistics gathered by ACE-101 are collected at 15-minute intervals and stored for a period of 24 hours (96 intervals). This includes PHY layer faults, F4/F5 OAM events and traffic statistics. These statistics can be used to analyze the ATM network behavior and detect service degradation or generate billing information.
- ACE-101 maintains an event log file. All detected events are logged and time-stamped in a non-volatile memory that also maintains a list of active alarms.

MANAGEMENT

- ACE-101 supports up to 8 VCCs for in-band management and software download. This enables creation of redundant network management topologies by the public network administrator, as well as management from the user side. In-band communication is implemented according to RFC 1483 (routed PDU).
- ACE-101 allows full configuration and management tasks by using Telnet.

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- The RADview HPOV network management application provides management at all levels: physical and ATM layers, and per VP/VC analysis. It allows the user to activate and efficiently administrate all the functions of the device. The user can configure the polling time and the date and time (default is local) of all the managed ACE-101 devices. In addition, as local time of all ACE-101 units is synchronized, the 15-minute intervals are synchronized to this local time. The status is reported using a detailed user graphical interface, and is registered in the log file. Each device is concurrently monitored by the management application, which receives traps, allows configuration, traffic and fault management, performance monitoring, and loopback test activation per VP/VC or interface.
- In order to ease field installation and management of ACE-101, two features are offered:
 - **Plug & play**, enables operators to install ACE-101 without configuration at the customer premises. Later, via a predefined ATM connection, a configuration file can be downloaded.
 - **Preconfigured**, enables downloading of the configuration file to other devices in the field.

SPECIFICATIONS

- **ATM Connections**
384 VPCs/VCCs depending on configuration
 - **Rate Conversion Buffer**
Buffer size is 6000 cells, with 4 priority levels
- #### STANDARDS
- **ATM Forum**
UNI 3.1, Circuit emulation service 2.0 (at-vtoa-0078), Inverse ATM multiplexing 1.1
 - **ITU-T**
I.610, I.371, I.372, I.432, I.363.1
G.703, G.704, G.706, G.732, G.823, G.957
 - **Control Interface**
Interface: RS-232/V.24 (DTE)
Baud rate: 9600/19200/38400/57600 bps
Connector: RJ-45
 - **Power**
75W, 100-230 VAC, 47-63 Hz or -48 VDC
Supports power supply redundancy
 - **Physical**
Height: 4.4 cm / 1.70 in (1U)
Width: 43.2 cm / 17.00 in
Depth: 35.0 cm / 13.78 in
Weight: 2.8 kg / 6.20 lb
 - **Environment**
Temperature: 0-45°C / 32-110°F
Humidity: up to 90%, non-condensing

ORDERING

ACE-101/#/@/&
ATM Network Termination Unit

Specify power supply type:
AC for 100-250 VAC
48 for -48 VDC

@ Specify **R** for redundant power supply (same as the first power supply unit)

& Specify **SPR** for traffic shaping option

RM-11
Hardware for mounting units in a 19" rack

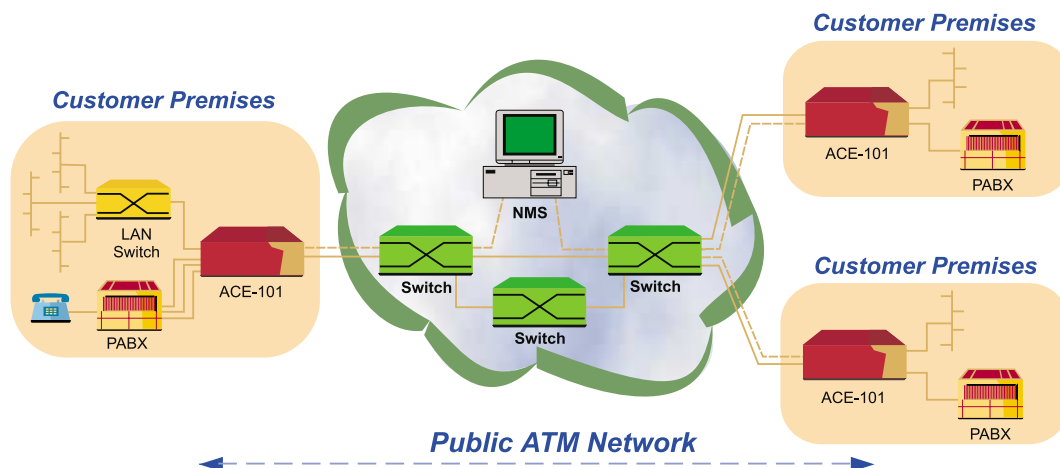


Figure 2. ACE-101 as a Multi-Service Access Concentrator

For Sales and Technical:

Pulse, Inc.
www.pulsewan.com
sales@pulsewan.com

Toll Free (USA)
Tel: 888-785-7393

International:
Tel: 1-561-279-7700