ACE-2002

Multiservice Access Concentrator/ATM Network Termination Unit

FEATURES

- Multiservice/ATM demarcation device or an enterprise access concentrator
- Offers converged WAN services in a fully ATM-featured product
- Seamless migration of traditional services (LAN, voice) to ATM
- Provides a service platform for router, PBX, LAN, video codec and other corporate device connections
- Offers advanced bandwidth and traffic management capabilities to ensure high utilization of the ATM links while preserving QoS
- Implements ITU-T I.610 OAM standard to provide end-to-end service control
- Supports all ATM service categories: CBR, VBR (rt and nrt), UBR and ABR, UBR^{+}
- High resilience due to ATM uplinks protection and dual hot-swappable power supplies
- Managed either inband or out-of-band
- Managed by RADview-HPOV or other network management applications
- Features a wide variety of ATM UNI modules, including E1/T1, E3/T3 and STM-1/OC-3 modules
- Offers a wide range of non-ATM modules, including LAN (10/100BaseT) and CES (E1/T1, 4xE1/T1, E3/T3)
- Compact, 1U high; suitable for mounting in 19″ racks

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DESCRIPTION

- ACE-2002 is a multiservice access concentrator that can be used as a carrier-owned demarcation device or as a corporate concentrator connected to the public ATM network.
- As a demarcation device, ACE-2002 enables carriers and service providers to define the boundary between their ATM public services and the customer private network. A clear demarcation point at the customer premises increases service reliability, improves network efficiency and ensures end-to-end QoS support.
- ACE-2002 can be used as a demarcation device for native ATM or for legacy services, such as voice or LAN.

APPLICATIONS

- ACE-2002 enables the extension of ATM network facilities up to the customer premises. These facilities include: advanced traffic management (shaping, policing) and full OAM flow support. In addition, the wide range of ATM modules further enhances the flexibility of service offerings.
- When used as an interworking device, ACE-2002 enables smooth migration of legacy equipment such as PBXs and routers to operate over ATM networks. Using multi-port modules and up to three user ports, ACE-2002 can be used as a concentrator for medium to large corporations. The unit enables different types of corporate traffic to pass over public networks in the most efficient way.

TRAFFIC MANAGEMENT

- ACE-2002 operation modes:
  - Monitoring: The unit monitors and gathers statistical information on the user and the network traffic
  - Policing: The unit compares the user traffic with the Service Level Agreement (SLA) parameters. In case the user traffic exceeds the SLA parameters, violating cells can be tagged or discarded.

TRAFFIC SHAPING

- Both user and network operator benefit from shaping bursty traffic. For the user, more traffic can pass through the link at no additional cost. For the operator, shaping enables better statistical efficiency while keeping the same backbone equipment and QoS. Two modes of traffic shaping are supported by ACE-2002: VBR and CBR.

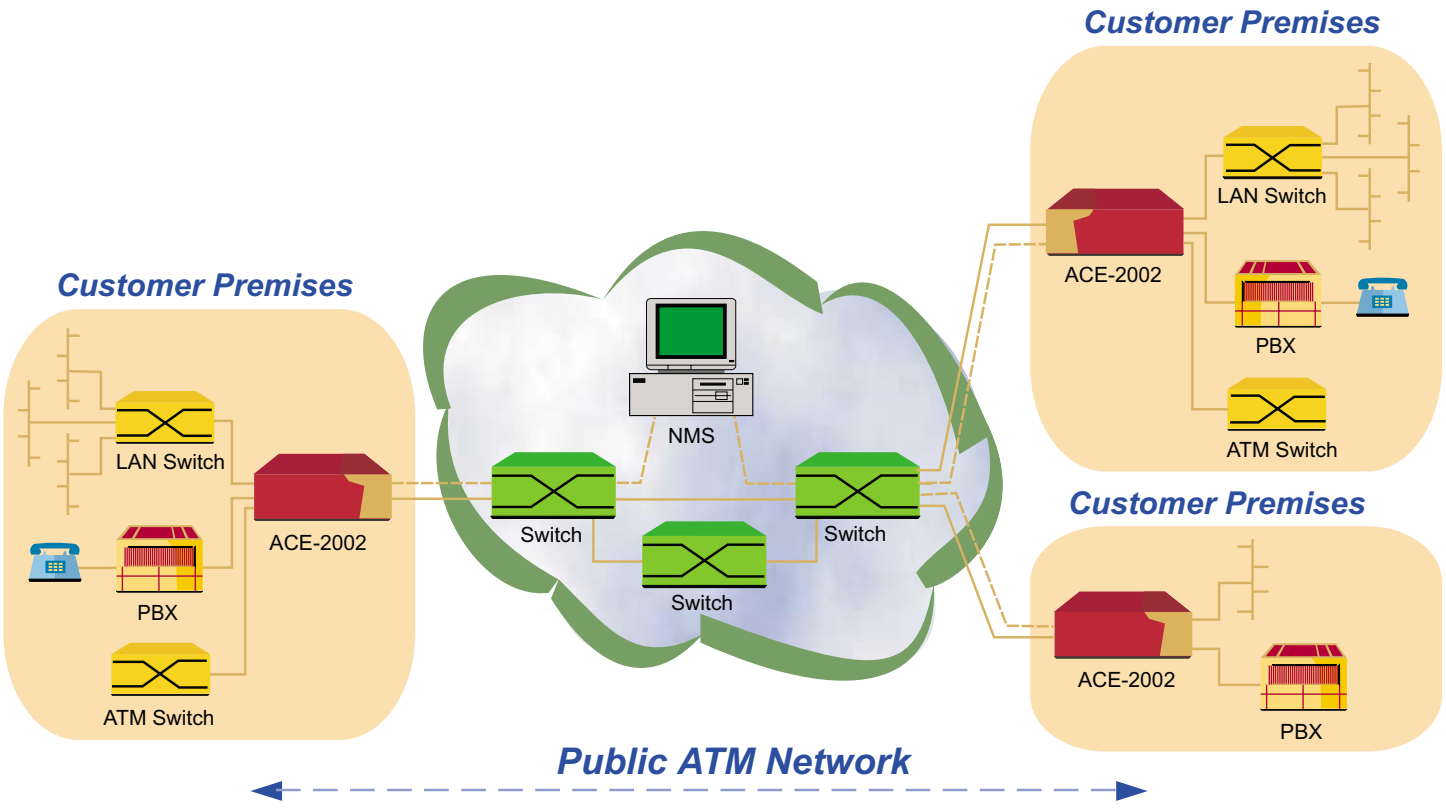

Figure 1. ACE-2002 as a Multiservice Access Concentrator

ACE-2002 Interworking Modules

Module Name	Description	Connector Type
ACE-M/ETH	Ethernet/Fast Ethernet	RJ-45
ACE-M/CES/4E1	4 balanced E1 CES	RJ-45
ACE-M/CES/4E1/CX	4 unbalanced E1 CES	BNC
ACE-M/CES/4T1	4 T1 CES	RJ-45
ACE-M/ETH/CES/E3	Ethernet/Fast Ethernet and one E3 CES	RJ-45 and BNC
ACE-M/ETH/CES/T3	Ethernet/Fast Ethernet and one T3 CES	RJ-45 and BNC

UNI Module

LAN Module

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- VBR (rt and nrt) traffic shaping: This shaping employs dual leaky bucket for each one of its 30 shaped connections. This is an optional mode that must be ordered (requires an additional hardware module). The module has a 148,000-cell buffer.
- CBR traffic shaping: ACE-2002 offers a built-in mechanism that supports up to 950 shaped connections. This mechanism employs an enhanced per-VC queuing mechanism.

In addition, ACE-2002 supports a number of layers of traffic scheduling. The layers are set per VC, per VP, per interface and per user interface.

In VBR and CBR traffic shaping, ACE-2002 schedules the traffic to meet a pre-defined threshold to ensure fair distribution of bandwidth between different conditions, while preserving the individual connection requirements.

IMPROVED RELIABILITY

- ACE-2002 provides improved service reliability and resilience using different built-in mechanisms. The first one, OAM (Operation, Administration and Maintenance) enhances ATM services QoS. It includes alarm surveillance (AIS, RDI), continuity check, performance monitoring and loopback activation.

  The second mechanism is ATM link protection. The third provides hot swapping capability of user and network modules, and the redundant power supplies.

- ACE-2002 OAM support complies with I.610 standard. AIS and RDI (part of standard) are system indicators for faulty conditions in the network.

  In case these indicators are detected in user or network modules, ACE-2002 alerts the network management system.

- Another mechanism to check the service availability is the continuity check. ACE-2002 sends a cell periodically over a predefined VP or VC and verifies that the VP or VC is activated.

ACE-2002 ATM Modules

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

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- Both AIS, RDI and continuity check can be activated on each open VP and VC defined in the ACE-2002 database.
- ACE-2002 monitors the current performance management (PM) characteristics of the ATM network. The monitoring includes end-to-end measurement of QoS parameters, such as error rate and cell loss ratio. ACE-2002 can generate F4/F5 loopback cells (LB) on up to 128 VPs or VCs.
- ACE-2002 supports SDH/SONET mechanisms for fault isolation and system fault alerts – F1-F5. F1-F3 layers enable performance monitoring and fault localization on user and network physical links. F4-F5 layers enable the same functionality on the ATM layer. Using the loopback option, ACE-2002 can measure minimum, maximum and average delay and delay variation. The loopback function can also be used for fault isolation. The loopback cells can be sent with source and destination address and may be looped at any network element that was pre-assigned with a loopback point address.
- In order to improve the product's resilience, ACE-2002 can be connected to the public network from two different modules.
- ACE-2002 includes two protection mechanisms: A uni- and bi-directional ASP 1+1 physical layer protection mechanism that allows the last physical segment from the service exchange to the customer premises to be protected (based on standard transport methods, such as SDH or SONET).
- ACE-2002 supports both NNI and UNI cell headers with full bit range of VPI/VCI fields. ACE-2002 can support up to 1024 connections, VPC and/or VCC. This capability enables using ACE-2002 as a concentrator for large corporate networks or as a junction between two public networks.
- To increase the QoS, ACE-2002 includes VP tunneling. This enables bundling multiple VCCs into a single VPC, while maintaining all the VCC QoS characteristics and OAM (Operation, Administration and Maintenance) capabilities at F4 and F5 layers.
- ACE-2002 supports up to 30 VP tunnels. Each tunnel can be shaped either as a CBR or VBR connection. It can be defined with end-to-end OAM flow and act as a regular VP in the public network.
- To protect the public network from over-subscription and to maximize available network resources, it is beneficial for both user and service provider to agree upon a Service Level Agreement (SLA) contract. To ensure the contract is honored by both sides, ACE-2002 collects information on the various parameters mentioned in the SLA. It also processes the data in real time and converts it into statistical information. The statistics are collected every 15 minutes for 24 hours (or a total of 96 intervals). All detected events are logged and time stamped on a non-volatile memory. The information is collected by management systems in the network. It can be used later for fair billing accounts.
- To send long frames (mainly IP traffic) over ATM networks efficiently, ACE-2002 supports Early Packet Discard (EPD) and Partial Packet Discard (PPD) mechanisms. In case cells are lost or discarded, and are part of a long frame, ACE-2002 can drop the rest of the cells that belong to the same frame. This prevents overload of the network resources by non-valid cells.
- ACE-2002 supports Call Admission Control (CAC), which prevents network congestion by checking the network resources when a request to open a new connection is received. In case the network resources are insufficient, the request for a new connection is rejected.
- ACE-2002 can be managed either locally or remotely using different ports and applications:
  - ACE-2002 can be managed locally by connecting an ASCII terminal to the RS-232 port on the front panel. The same port can be used to connect a dial-up modem so ACE-2002 can be remotely managed. ACE-2002 supports PPP protocol for SNMP management over RS-232.
  - ACE-2002 can be managed locally via a dedicated Ethernet port, located on the front panel.
  - A management workstation located anywhere in the ATM public network can be connected to a remote customer device and perform configuration, monitoring and diagnostics using a dedicated VC.
  - ACE-2002 can be managed by and report to up to 8 different managers simultaneously. This enables viewing the network status from different locations.

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- The RADview-HPOV network management application provides the capability to monitor, configure, fault isolate and present network statistics using a graphical, user-friendly display. This UNIX-based application alerts in real time on service availability and faulty network conditions. The real time clock of the management application is synchronized with all the managed units. This enables determining the real time of events and provides the ability to sort events chronologically. Also, the statistical collection of events can be synchronized so that the 15-minute intervals of statistical information can be sorted in a realistic sequence. The system events and the statistical information are registered in a log file.
  The RADview application can store a complete pre-defined configuration of ACE-2002 to shorten and simplify its field installation. After ACE-2002 is installed, it is possible to remotely download the complete configuration from anywhere in the network.

SPECIFICATIONS

- **ATM Connections**
  1024 connections, 8/12 VPi bits, 16 VCi bits
- **Rate Conversion Buffer**
  Buffer size is 64,000 cells in each direction, per VC weighted fair queues
- **Standards**
  - **ATM Forum**
    UNI 4.0, circuit emulation service 2.0 (at-vtoa-0078), TM 4.0
  - **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, ANSI T1.403, AT&T TR-62411, IETF RFC 1483
- **Control Interfaces**
  - **RS-232/V.24 (DTE)**
    Baud rate: 9600/19,200/38, 400/57, 600/115,200 bps
    Connector: DB-9 DTE
  - **Ethernet Port RJ-45**
    Half-duplex mode
- **Power**
  110W, 100-230 VAC, 47-63 Hz or -36 VDC – -75 VDC
  Supports hot swappable power supply redundancy
- **Physical**
  Height: 4.4 cm / 1.70 in
  Width: 43.2 cm / 17.00 in
  Depth: 35.0 cm / 13.80 in
  Weight: 7.0 kg / 15.50 lb
- **Environment**
  Temperature:
  Operating 0–50°C / 32–122°F
  Storage -20–70°C / -4–158°F
  Humidity: up to 90%, non-condensing

ORDERING

ACE-2002/#/@/&
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)

& Specify **SPR** for traffic shaping option

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

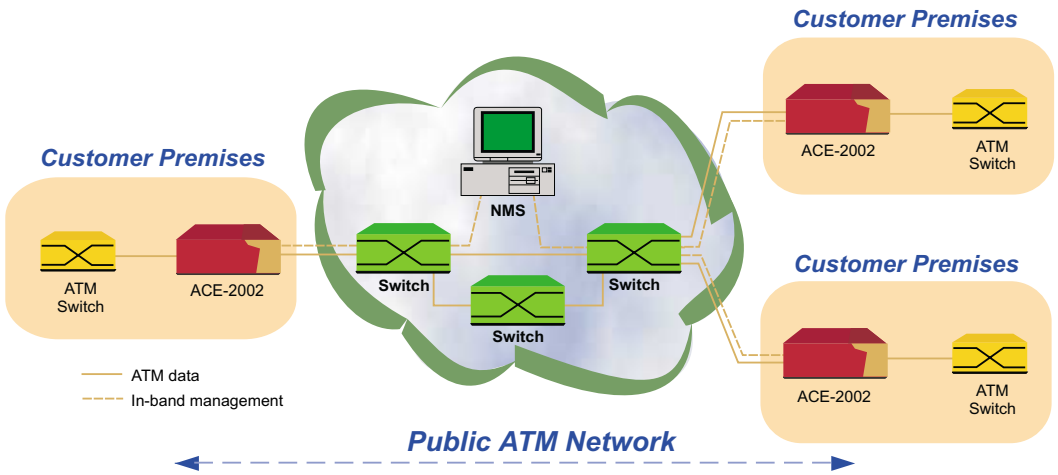

Figure 2. ATM NTU Application

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