

# ACE-52

## Multiservice Network Termination Unit

Extending the reach  
of Ethernet LANs and  
TDM services over  
ATM networks



- Transparent LAN services (TLS) and Circuit Emulation Services (CES) over ATM networks
- STM-1/OC-3c network interface, supporting service data rates of up to 155 Mbps
- LAN/ATM interworking according to RFC 1483/2684 (bridged PDU), with up to 32 virtual circuit connections (VCCs)
- VLAN support according to 802.1p and 802.1Q, including VLAN stacking (Q-in-Q) capabilities, allowing traffic separation and prioritization
- Traffic shaping according to the CBR, VBR, GFR, UBR and UBR+ service classes

ACE-52 is a Customer Located Equipment (CLE) dedicated for provisioning Ethernet (10/100BaseT) and E1/T1 CES interworking services over an ATM network (see *Figure 1*).

Used as a Network Termination Unit (NTU), ACE-52 provides a demarcation point between the provider's network and the customer premises. This enables end-to-end traffic and network management control.

### ATM Capabilities

Using ACE-52, carriers assign each virtual connection (VC) to different service classes, define the QoS parameters and shape the ATM egress traffic accordingly (CES VCCs support only CBR traffic).

By limiting the ATM port egress rate, carriers control the total bandwidth provided to their users.

The following service classes are supported: CBR, VBR, GFR, UBR and UBR+.

ACE-52 allows up to 32 VCCs to be established and used simultaneously.

At the ATM egress, ACE-52 provides two levels of traffic management:

- Shaping per VC
- Rate limiting of the entire traffic coming out of the ATM port.



**data communications**

Innovative Access Solutions

## ACE-52

### Multiservice Network Termination Unit

ACE-52 maps QoS parameters according to the VLAN priority or ToS field. QoS is supported in two modes:

- Mapping to different VCCs (with different traffic descriptors) of the same bridge port according to configured priority
- Mapping to four strict-priority VCC queues according to configuration.

The ATM OAM features reduce operational costs by providing end-to-end traffic manageability and fault localization. OAM functionality complies with ITU-T I.610, and includes:

- AIS/RDI – system indication for local or remote fault conditions. In case these indications are detected in the network interface, ACE-52 sends a trap to alert the management system, and responds accordingly (RDI upon AIS reception)

- Continuity Check (CC) – used for checking service availability. ACE-52 sends a CC cell periodically over a predefined VCC to verify that the link is functional
- Loopback (LB) – used for fault localization. LB cells are sent with a destination address to be looped at any network element that was pre-assigned with loopback point address. ACE-52 also loops back received LB cells.

#### Ethernet Capabilities

ACE-52 has up to two 10/100BaseT ports for the LAN/VLAN connectivity. The Ethernet frame size is up to 1594 bytes to allow special formats, including ISL and stacked VLANs (virtual LANs).

The supported frame types are: untagged, priority-tagged and VLAN-tagged.

VLAN-aware bridging is fully supported, including VLAN ID range (1 to 4094). Up to 128 VLANs can be defined.

Four strict priority queues can be used at the Ethernet egress side for the traffic management. Traffic can be mapped to each of the queues according to VLAN priority. Thus, high priority traffic marked with appropriate VLAN priority is served first upon congestion on the Ethernet port.

ACE-52 provides L2 VPN services. Total traffic separation between customers is achieved by assigning VLAN IDs to virtual connections (VCs). Optionally, different priority levels can be defined within each VPN by mapping VLAN priorities to different VCs with appropriate QoS parameters.

#### CES Capabilities

An optional Circuit Emulation Service (CES) port allows interconnecting PBXs, TDM multiplexers and video conferencing equipment over the ATM network.

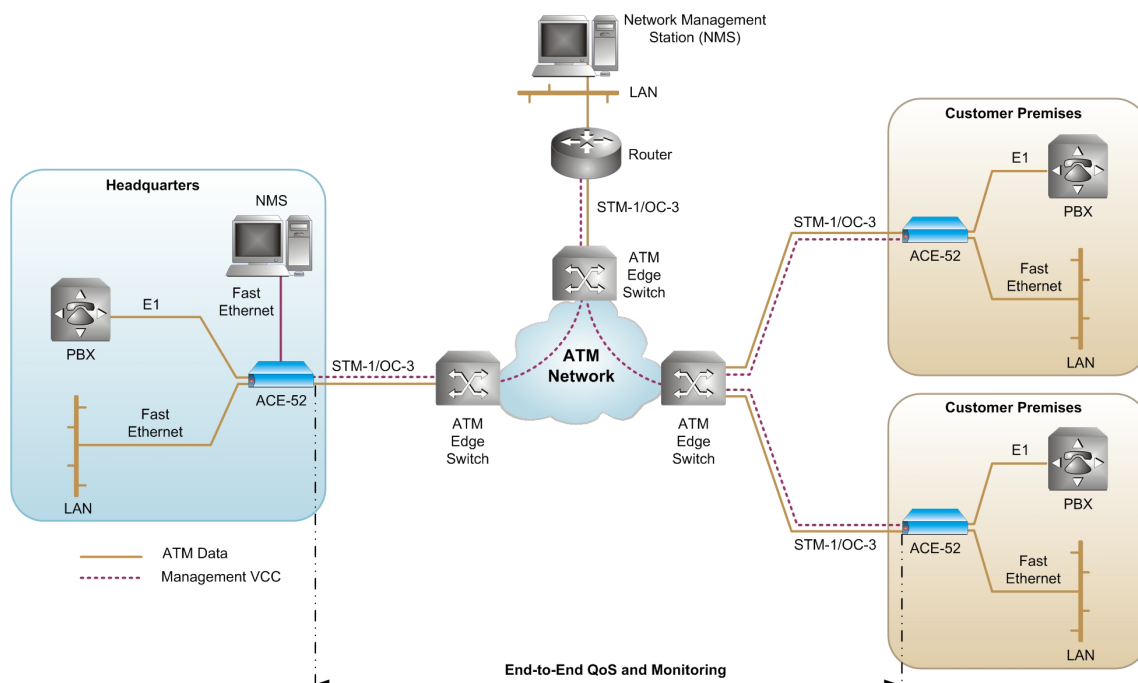


Figure 1. ACE-52 Providing Transparent LAN Services (TLS) over ATM

The E1/T1 CES port supports structured (with or without CAS) and unstructured circuit emulation, as specified in AF-VTOA-0078.00.

The following timing modes are available for the CES port:

- Synchronous (derived from the ATM network)
- Adaptive (for unstructured E1/T1 modes only), as defined in AF-VTOA-0078
- Loopback (derived from the E1/T1 Rx clock).

### SLA Differentiation

Service providers can offer SLA differentiated services to generate revenues from their existing infrastructure. In order to guarantee the SLA, it is important that the service providers have end-to-end control over the QoS.

By defining and monitoring traffic management parameters right from the customer's premises, carriers gain the following advantages:

- Users do not over-utilize their allocated bandwidth
- Better statistical efficiency per link, while using the same backbone equipment
- Complete information on service performance. Access to this information can optionally be opened to users
- Proactive readiness for changes that need to be done on the network, before services run into problems.

### Alarm Forwarding

ACE-52 supports bidirectional alarm forwarding. An alarm detected at either the SDH/SONET or ATM level disables the unit's Ethernet port. Towards the ATM network, ACE-52 sends an SDH/SONET alarm or ATM OAM cells, to notify the remote end about the local Ethernet link disabling.

### Management

ACE-52 can be managed by up to 16 different managers simultaneously, using different ports and applications:

- Locally, by connecting an ASCII terminal to the unit's RS-232 port
- Remotely, over the ATM network using a dedicated VC
- Over bridge, via the unit's Ethernet ports or bridge VCCs connection
- Using RADview-EMS, RAD's CORBA-based network management application via an IP-based connection.

The RADview-EMS network management application monitors, configures, isolates faults and presents network statistics using a graphical, user-friendly display. This PC or Unix-based application alerts in real-time on service availability and faulty network conditions.

Software upgrade and configuration files can be remotely downloaded or uploaded to ACE-52 via TFTP or XMODEM.

### Plug-and-Play

The ACE-52 plug-and-play feature enables device installation without any pre-configuration or on-site setup to minimize truck-roll. When plugged into the network, ACE-52 automatically learns both its own (host) and the NMS (manager) IP addresses. A required configuration is then downloaded to the device from a remote site.

## Specifications

### SDH/SONET INTERFACE

#### Number of Ports

1

#### Data Rate

155 Mbps

#### Framing

STM-1/OC-3C

### Fiber Optic Interface Type

Single mode, multimode, short haul or long haul laser

### Compliance

I.432, G.957 (S 4.1 or L 4.2), G.825 (jitter)

### Fiber Optic Connector

SC or ST

### Wavelength

1310 nm

### Optical Output Power

-8 to -15 dBm (short haul)  
0 to -5 dBm (long haul)

### Optical Input Range

-8 to -28 dBm (short haul)  
-10 to -34 dBm (long haul)

### Typical Range\*

15 km (9.4 miles), short haul  
40 km (25 miles), long haul

**Note:** The SDH/SONET interface types are non-modular ordering options. For more information, refer to the Ordering section.

### 25.6M ATM INTERFACE

#### Number of Ports

1

#### Data Rate

25.6 Mbps

#### Compliance

AF-PHY-0040

#### Block Coding

4B5B

#### Line Rate

32 Mbaud

#### Impedance

100Ω, balanced

#### Connector

RJ-45

### Typical Range\*

100m (328 ft)

**ETHERNET INTERFACE****Number of Ports**

1 or 2 (as ordered)

**Interface Type**

10/100BaseT, half/full duplex, autonegotiation

**Data Rate**

10 Mbps, 100 Mbps

**Compliance**

IEEE 802.3, 802.1p, 802.1Q

**Max. Frame Size**

1594 bytes

**Connector**

RJ-45

**Typical Range\***

100m (328 ft) over UTP Cat. 5 cable

\* The typical range is calculated using common peripheral equipment and environment conditions.

**E1/T1 CES INTERFACE****Number of Ports**

1

**Data Rate**

E1: 2.048 Mbps

T1: 1.544 Mbps

**Framing**

E1: Frame (no CRC-4 MF), CRC-4 MF, Pass-through

T1: ESF, Pass-through

**Compliance**

E1: G.703, G.732, G.823, G.704

T1: G.703, ANSI T1.403, AT&amp;T TR 62411

**Signaling**

E1: CAS, CCS (transparent)

T1: CAS (Bit Robbing), CCS (transparent)

**Line Code**

E1: HDB3

T1: AMI, B8ZS, B7ZS

**Line Impedance**

E1: 120Ω (balanced), 75Ω (unbalanced)

T1: 100Ω (balanced)

**E1 Signal Levels**

Receive: -10 to -32 / 0 to -10 dB

(user-selectable)

Transmit:

 $\pm 3V \pm 10\%$  (balanced) $\pm 2.37V \pm 10\%$  (unbalanced)**T1 Signal Levels**

Receive: 0 to -30 dB

Transmit:

 $\pm 2.75V \pm 10\%$  at 0-655 ft (DSU);

0, -7.5, -15, -22.5 dB (CSU),

(user-selectable)

**Jitter Performance**

E1: Per G.823 standard

T1: Per AT&amp;T TR 62411, G.824 standards

**Capacity**

Up to 8 VCCs, structured

Single VCC per port, unstructured

**Connector**

E1/T1 balanced: RJ-45

E1 unbalanced: RJ-45, via an RJ-45 to BNC adapter cable (supplied)

**TERMINAL CONTROL INTERFACE****Type**

RS-232/V.24 (DTE asynchronous)

**Bit Rate**

9.6, 19.2, 38.4, 57.6 or 115.2 kbps

(user-selectable)

**Connector**

9-pin, D-type, female

**GENERAL****ATM Connections**

Up to 32 connections out of which up to 8 can be used as CES connections

**LED Indicators**

ATM Network (green) –

On: At least one cell received (no HEC error) or transmitted within the last second

Off: Cells were not transmitted nor received within the last second

ATM SYNC (green) –

On: The STM-1/OC-3 port is synchronized (no alarms)

Off: LOS, LOF, LOP, AIS

ETH LINK (green) –

On: Link OK

Off: Link is disconnected

ETH ACT (yellow) –

Blinking: Frame received or sent within the last second

Off: No frame received or sent within the last second

CES SYNC (green) –

On: E1/T1 link is OK

Off in structured mode: AIS, LOS, or LOF detected

Off in unstructured mode: AIS or LOS detected

PWR (green) –

On: Power supply 1/2 is in use and OK

Off: Power supply 1/2 is not in use

Blinking: Power supply is faulty or not connected

**Power**AC: 100–230 VAC ( $\pm 10\%$ ), 47–63 Hz

DC: -48 VDC

**Power Consumption**

15W max

**Physical**

Height: 4.37 cm (1.7 in /1U)

Width: 21.5 cm (8.5 in)

Depth: 30.0 cm (11.8 in)

Weight: 2.1 kg (4.7 lb)

**Environment**

Temperature:

Operating: 0°–50°C (32°–122°F)

Storage: -20°–70°C (-4°–158°F)

Humidity: Up to 90%, non-condensing

Full Ethernet services  
and end-to-end traffic  
management over an  
ATM backbone

## ACE-52

### Multiservice Network Termination Unit

Product Comparison Table

	ACE-52	ACE-201	ACE-201/622
STM-1/OC-3c	✓	✓	
STM-4/OC-12			✓
Gigabit Ethernet		✓	✓
Fast Ethernet	✓		
E1/T1 CES	✓		
Supported VCCs	32	512	256
End-to-end alarm forwarding	✓	✓	
SFPs for ATM fiber optics			✓
Power supply	Single, fixed	Single/dual, fixed	Single/dual, hot-swappable
Physical width	8.5"	17.3"	17.3"

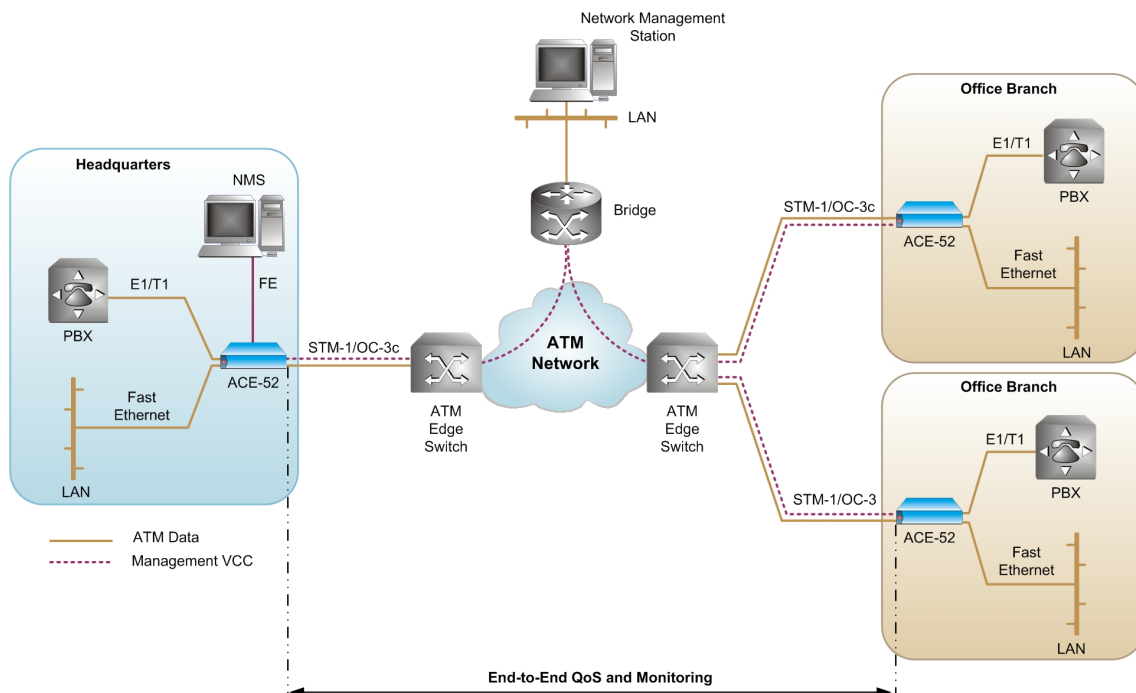


Figure 2. ACE-52 in a Management over Bridge Application

## ACE-52

## Multiservice Network Termination Unit

## Ordering

## ACE-52/#/€/\*/%

Multiservice Network Termination Unit

## Legend

# Power supply type:

**AC** Single 100 to 240 VAC**DC** Single -48 VDC

€ STM-1/OC-3 ATM port (155 Mbps) and connector type:

**SC13L-155** Single mode, 1310 nm short haul laser, S1.1, SC connector**SC13LH-155** Single mode, 1310 nm long haul laser L1.1, SC connector**SC13M-155** Multimode, 1310 nm, SC connector**ST13L-155** Single mode, 1310 nm short haul laser, S1.1, ST connector**ST13LH-155** Single mode, 1310 nm long haul laser, L1.1, SC connector**UTP-25** 25.6 Mbps, electrical RJ-45 connector

\* Ethernet interface:

**ETH** One 10/100BaseT port**2ETH** Two 10/100BaseT ports

% Optional CES port:

**CESE1** Single balanced E1, RJ-45 connector**CESE1-UNBAL** Single unbalanced E1, RJ-45 connector (via adapter cable)**CEST1** Single balanced T1, RJ-45 connector

## SUPPLIED ACCESSORIES

AC power cord or a DC power connection kit (depending on the ordered power supply type)

**CBL-RJ45/2BNC/E1**

Interface adapter for converting a balanced E1 RJ-45 connector to a pair of BNC unbalanced connectors (if unbalanced E1 interface is ordered)

## OPTIONAL ACCESSORIES

**CBL-DB9F-DB9M-STR**

Standard DB-9 to DB-9 control port cable

**RM-35/@**

Hardware kit for mounting one or two ACE-52 units into a 19" rack

## Legend

@ Rack mounting kit type:

**P1** Fitting one unit**P2** Fitting two units**WM-35**

A hardware kit for mounting one ACE-52 unit on a wall

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