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

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.
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.
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)

Order ACE-52 from Cutter Networks

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www.bestdatasource.com
**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.

**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 (±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

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**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&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)

**Jitter Performance**
E1: Per G.823 standard
T1: Per AT&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)

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**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

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**Full Ethernet services and end-to-end traffic management over an ATM backbone**
## ACE-52
Multiservice Network Termination Unit

### Product Comparison Table

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

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

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## 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