



data communications

UNIQUE ACCESS SOLUTIONS

Simplified ATM Access

ACE Product Family



ACE

- Demarcation for ATM public networks
- End-to-end management of ATM-based services
- Interworking services over public ATM networks
- Optimization for different user rates
- Flexibility and variety of interfaces

ATM-Based Provisioning of Multiple Services

For several years now, ATM has been the backbone of choice for many of the world's leading carriers. ATM is very flexible, supporting a wide range of legacy and next generation services required by customers. It is a multiservice, high speed, scalable technology that is capable of delivering services with different transfer characteristics. It can simultaneously transport voice, data and video traffic using advanced switching techniques. ATM's intrinsic Quality of Service (QoS) and network management capabilities provide reliability and service level agreement (SLA) differentiation. These attributes make ATM the best course for carriers looking for a dependable and scalable solution for transporting multiple services such as data, video and voice.

Intelligent Demarcation: Customer-Located Equipment (CLE)

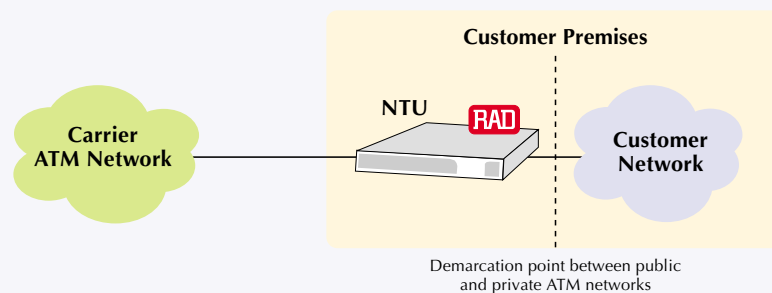
ATM's inherent advantages are further enhanced when extended to the customer premises. By deploying a relatively inexpensive, easily enabled demarcation device or network termination unit (NTU) to manage, control, police and shape ATM traffic entering and exiting the public network, carriers can consolidate services over the ATM network infrastructure to maintain QoS commitments to all their customers end-to-end across the public network. This same intelligent customer-located equipment (CLE) can also support simple interworking for other services, such as LAN, E1/T1 CES and Frame Relay.



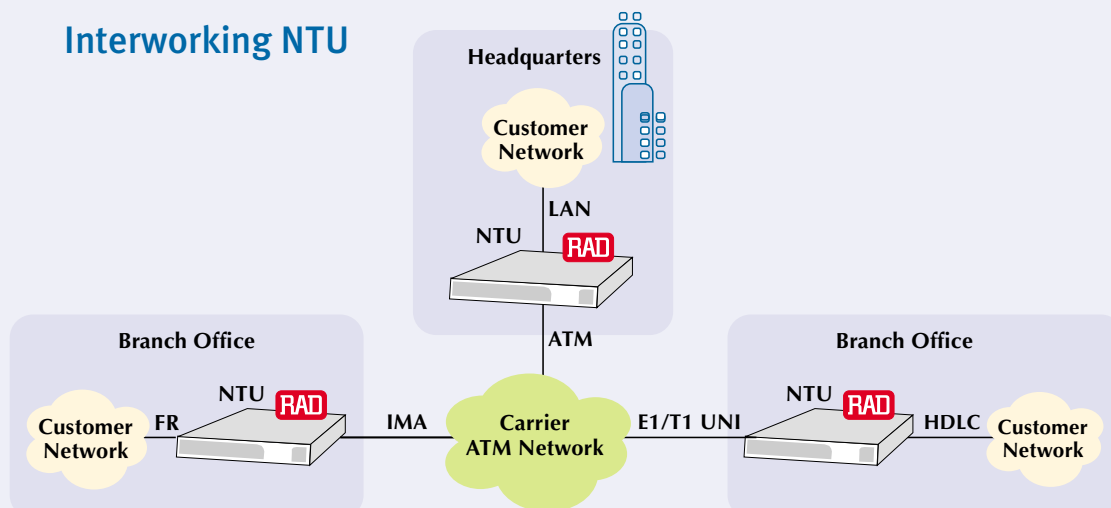
Benefits of CLE to Carriers and Their ATM Customers

- Extends Quality of Service (QoS) to the customer premises
- Helps meet service level agreements (SLAs)
- Improves diagnostics and system performance monitoring
- Increases service flexibility and reliability
- Improves utilization of ATM uplink (shaping)
- Strong network management capabilities reduce operating costs
- Fault isolation enhances reliability

Extending ATM Services to the Customer Premises



Interworking NTU



Multiservice Customer Premises Equipment and Network

RAD's ACE™ product family of network termination units and ATM access concentrators performs three main functions. They serve as carrier-class, customer-located, intelligent demarcation devices between the end user's private network and the public network; as interworking units between traditional services and IP over ATM transport; and as network junction units (NJU) between separate ATM backbone networks.

The plug-and-play ACE products offer advanced management capabilities, including fault localization, delay measurement and performance monitoring. Traffic shaping and spacing improve statistical efficiency. ACE devices implement ITU-T I.610 OAM (operation, administration and management) flows, providing end-to-end QoS.

ACE-2002

Multiservice Access
Concentrator and ATM NTU



ACE-2002™ is a fully modular multiservice access concentrator that can be used as a carrier-owned demarcation device or as a corporate concentrator connected to the public ATM network.

- 4-slot ATM network termination unit with one or two ATM UNI uplinks and up to three user ports
- Consolidates data and voice traffic
- Supports all ATM traffic categories and performs sophisticated traffic policing, scheduling and shaping
- Optional redundant network interfaces and power supplies
- Traffic management, including fault localization and traffic monitoring

Junction Units



ACE-202

Dedicated Multiservice
Access Concentrator



ACE-202™ 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.

- 4-slot ATM network termination unit with two built-in and two plug-in modules
- Consolidates data and voice traffic
- Supports various ATM traffic categories and performs sophisticated traffic policing and scheduling
- Traffic management, including fault localization and traffic monitoring

ACE-101

ATM NTU and Multiservice
Access Concentrator



The ACE-101™ ATM network termination unit and multiservice access concentrator can be used as a demarcation point between private and public ATM networks. It allows service providers to offer LAN connectivity and data, voice and HDLC services.

- One user interface and two network interfaces
- Optional redundant network interfaces and power supplies
- Consolidates data and voice traffic for A-NTU and I-NTU services
- Traffic management, including fault localization and traffic monitoring, policing and shaping

ACE-50

ATM-Aware NTU



The ACE-50™ ATM-aware NTU provides a manageable demarcation point between private and public ATM networks, enabling ATM service providers to extend their control over high speed access lines.

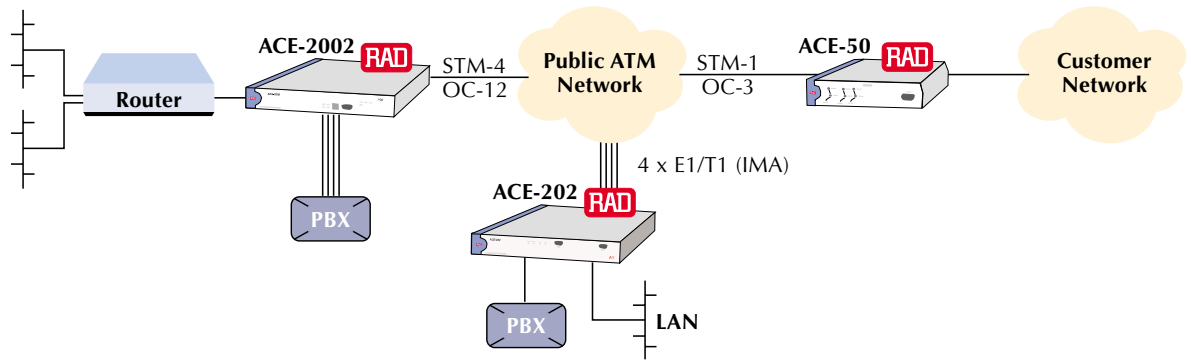
- 2-port ATM UNI (network and user) interface
- In-band management over dedicated ATM virtual channel
- Collects and processes statistics, such as performance and error detection from the physical layer (SDH/SONET), and QoS measurement from the ATM layer

Full Carrier Control, Low Operating Expenses

Multiservice Consolidation

Large enterprises are increasingly installing ATM switches in corporate backbones to accommodate their vast amounts of voice and data transmissions. RAD's ACE products provide a complete solution for enterprise networks, as they support a combination of high speed LAN, ATM and circuit emulation with a flexible combination of rates and interfaces.

In the configuration below, the ACE-2002 unit at company headquarters concentrates voice and data traffic. The ACE-50 NTU defines a manageable demarcation point between the public ATM network and the ATM device in the private network. The inverse multiplexing over ATM (IMA) module of the ACE-101 or ACE-202 allows access rates of $n \times E1/T1$.

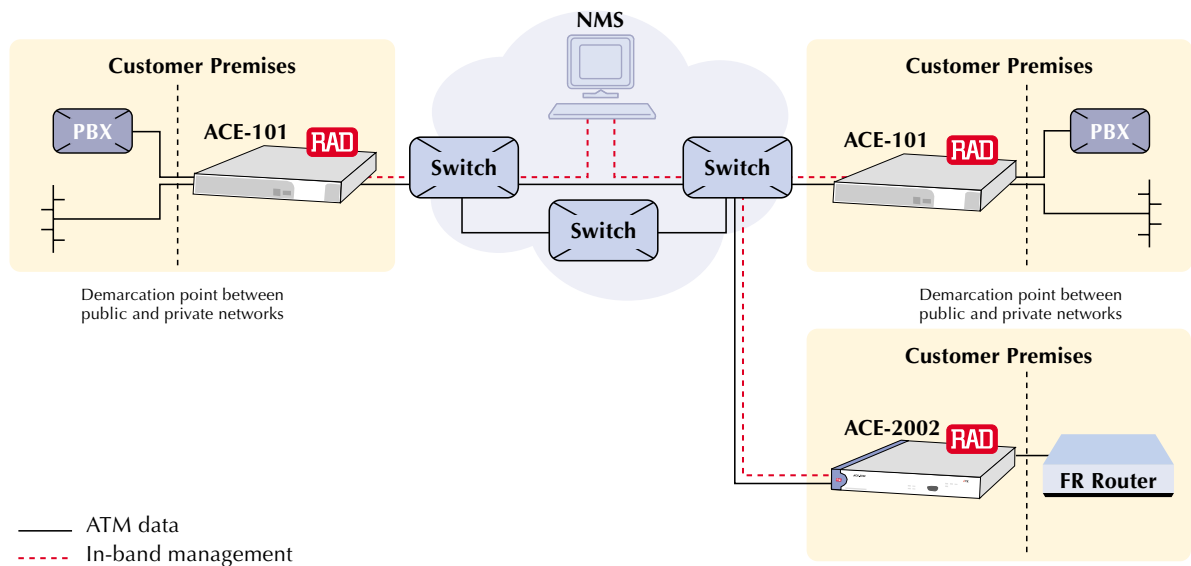


Direct Connectivity of All Protocols over ATM

As interworking NTUs, ACE devices can deliver different protocols, such as LAN, CES, Frame Relay, E1/T1, E3/T3 and four HDLC, over the ATM network. The CES port enables connection of PBXs or any TDM

device to the ACE device and emulates circuits over the public ATM network.

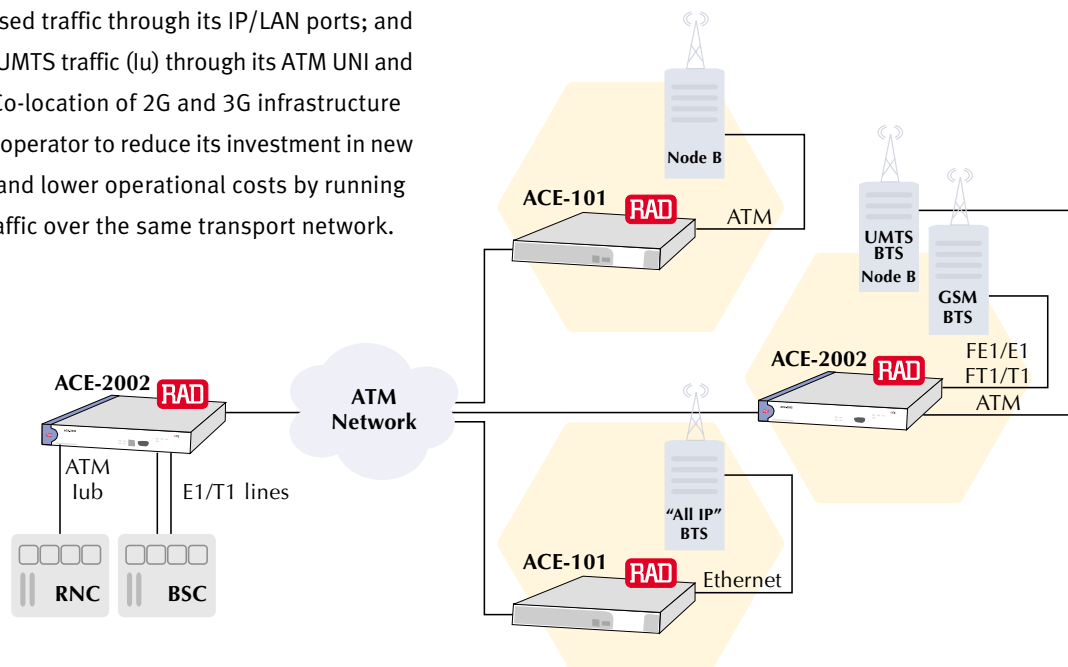
ACE products also offer a hybrid LAN and E3/T3 CES module, which maximizes the use of fiber or wireless links in point-to-point applications.



ATM Services for Cellular Operators

Cellular operators can use the ACE-101 or ACE-2002 multiservice access concentrator to run 2G/2.5G and 3G traffic over the same ATM access network. The ACE device can aggregate the traffic from various access ports, connecting GSM traffic (Abis and A links) through its E1 CES ports; GPRS, EDGE (Gb and Gs) and all future IP-based traffic through its IP/LAN ports; and ATM-based UMTS traffic (Iu) through its ATM UNI and IMA ports. Co-location of 2G and 3G infrastructure enables the operator to reduce its investment in new equipment and lower operational costs by running the radio traffic over the same transport network.

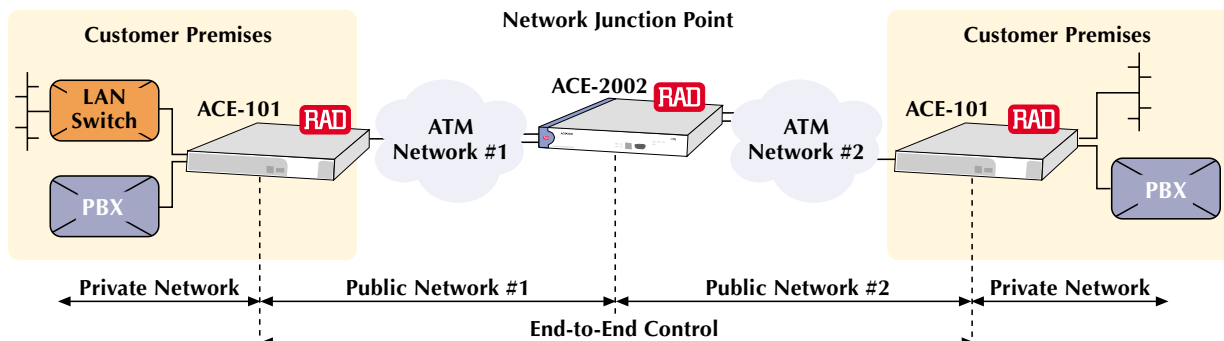
Scalability of the solution allows incremental deployment and network expansion upon demand. RAD's family of ATM access units, located at each base station and base station controller, provides a demarcation point for end-to-end control of the service (I.610 OAM flows), sophisticated traffic management tools and a wide range of access interfaces.



Network Junction Unit Provides End-to-End Control

ACE-2002 serves as a network junction unit (NJU) to define a demarcation point between two public networks. ACE-2002 allows automatic protection

switching on the user and network sides. This improves network efficiency and ensures end-to-end Quality of Service support. ACE-101 allows service providers to offer LAN connectivity and data and voice services over ATM networks.





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