Transport Voice, Video and Data Transparently over IP/Ethernet/MPLS Networks

TDMoIP®

IPmux product family

TDMoIP

RAD
data communications
Innovative Access Solutions

IPmux

The Evolutionary Approach to Convergence over IP/Ethernet/MPLS

IPmux is transparent to all signaling and protects investment in legacy services and equipment

Connecting traditional voice, video and data as well as LAN over IP/Ethernet/MPLS networks has become an attractive alternative to running parallel voice and data networks. It saves money by converging different traffic types onto one infrastructure and takes advantage of the simplicity and efficiency of IP routing and Ethernet switching.

RAD's IPmux™ line of TDM over IP (TDMoIP®) gateways transparently extends E1, T1, E3 or T3 circuits across packet-switched IP/Ethernet/MPLS networks. It is transparent to all protocols and signaling, and therefore supports legacy PBXs, including proprietary features. The IPmux enables enterprises to run voice, data and video over their IP/Ethernet-based networks, minimizing network maintenance and operating costs. It enables service providers to migrate to next-generation networks while continuing to provide all their revenue-generating legacy voice and data services. IPmux also benefits data carriers by enabling them to offer lucrative services – such as leased line, cellular backhaul and international toll bypass – over the packet-switched network. This allows them to maximize revenues from their IP, Ethernet or MPLS infrastructure with revenue-generating voice and leased line services to complement their existing data services.

TDMoIP® Driven

When Should You Use IPmux?

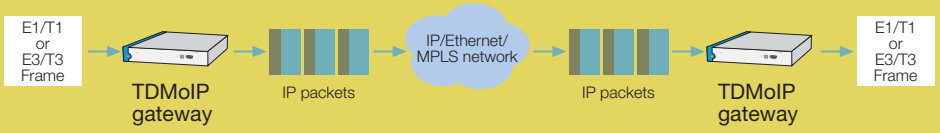
Many enterprises are migrating to IP/Ethernet/MPLS-based networks to accommodate the growth in Ethernet traffic. They would like to take advantage of the new, high bandwidth network to run voice in addition to data, to save money on their costly voice transmissions. Implementing an all-IP telephony system, however, is a revolutionary endeavor requiring equipment upgrades and replacement, whereas using IPmux with TDMoIP technology is an evolutionary step to running voice over the packet-switched network. IPmux uses all existing telephony equipment, maintains all legacy features and familiar dialing procedures. The enterprise can switch to a VoIP solution, if desired, when the expense can be justified.

The traditional way of provisioning leased line services is over legacy networks such as SDH/SONET, Frame Relay and ATM. Many carriers recognize the need to migrate to an IP-based network, but want to continue to offer their revenue-generating legacy services. Using IPmux TDMoIP gateways, carriers can run all leased line services together with data over the packet-switched network. IPmux also enables competitive carriers to compete with traditional carriers by adding leased line transmissions to their service package.

IPmux eliminates the dilemma for carriers regarding the type of network to deploy in Greenfield installations. With IPmux, a carrier can install a packet-switched network in Greenfields and extend services from its legacy networks over the Greenfield packet network without implementing any changes in operations, billing or service mix.

What Is TDMoIP?

TDMoIP is a TDM pseudowire transport technology developed by RAD for carrying E1, T1, E3 or T3 circuits across the packet-switched network, transparent to all protocols and signaling. It converts data streams into packets for transmission over the IP/Ethernet/MPLS network. At the destination site, the original bit stream is reconstructed by removing the headers, concatenating the payload and regenerating the clock. Efficient packetization techniques achieve very low (3 ms) end-to-end latency.



There are two implementations of TDMoIP:

Circuit emulation transparently delivers leased line services over the packet-switched network (implemented in RAD's IPmux product family and Megaplex™ ML-IP module)

Compressed voice maximizes bandwidth, reducing the cost of voice transmissions (implemented in RAD's Vmux™ product family – see the CVS brochure for more information)

Products

TDMoIP-Driven Products

RAD's IPmux family of TDMoIP gateways comprises a diverse mix of devices, from small customer-located equipment (CLE) to higher capacity aggregation units for the carrier's central office or point-of-presence (POP). The products facilitate a wide range of applications, including simple end-to-end circuit extension over IP and delivery of a variety of legacy services over packet-switched networks. RAD's Megaplex line of modular multiplexers, equipped with TDMoIP capabilities, offers a wide range of legacy services. These products can deliver voice, fax, modem and data services over IP/Ethernet/MPLS networks without compromising traditional PSTN quality.

IPmux-1E

TDMoIP Gateway

The IPmux-1E™ TDMoIP gateway supports digital E1/T1 trunks and analog and ISDN voice channels over Fast Ethernet fiber or copper links. User Ethernet-enhanced VLAN support and rate limiting offer different grades of service, while providing traffic isolation for multiple services or applications.

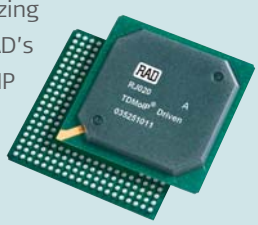
Megaplex Family

Modular Multiplexers

The Megaplex-2200™, Megaplex-2100™ and Megaplex-2104™ TDM multiplexers deliver a wide variety of services over TDM and packet-switched networks. The versatile, modular platform enhances the TDMoIP system solution with high capacity support for POTS, ISDN, low and high speed data, Ethernet and LAN-to-LAN traffic in daisy-chain and Resilient Fast Ethernet Ring (RFER) topologies.

Standardizing Legacy over Packet

RAD is a prominent member of the ITU, the Internet Engineering Task Force (IETF), the Metro Ethernet Forum and the MPLS/Frame Relay Alliance, where it is working together with other industry leaders to standardize the TDMoIP protocol. RAD was the first vendor to comply with MPLS Forum implementation agreements, for standardizing TDM over MPLS using AAL1 and voice trunking over MPLS using AAL2. RAD's TDMoIP chip enables other vendors to implement standards-based TDMoIP technology into their products, providing multi-vendor interoperability and a true carrier-class solution.



IPmux-14, IPmux-11

Multiservice Ethernet Gateways

The IPmux-14™ and IPmux-11™ customer-located Ethernet multiservice gateways enhance the IPmux line of TDMoIP devices with extended Ethernet support. In addition to delivering TDM-based services over packet-switched networks, the devices offer advanced Layer 2 (Ethernet) traffic engineering capabilities.

IPmux-16, IPmux-8

TDMoIP Gateways

RAD's IPmux-8™ and the NEBS-compliant IPmux-16™ are ideal for aggregating circuits at enterprise headquarters or a carrier's POP or central office (CO). They provide modular support for extending up to 16 E1/T1 circuits or two E3/T3 circuits over IP/Ethernet networks. The channelized T3 feature offers a POP/CO solution for grooming T1 or fractional T1 traffic from several sites onto a T3 link for transmission to an SDH/SONET add-drop multiplexer (ADM) or a Class 5 telephony switch.

Gmux-2000

High Capacity, Carrier-Class TDMoIP Gateway

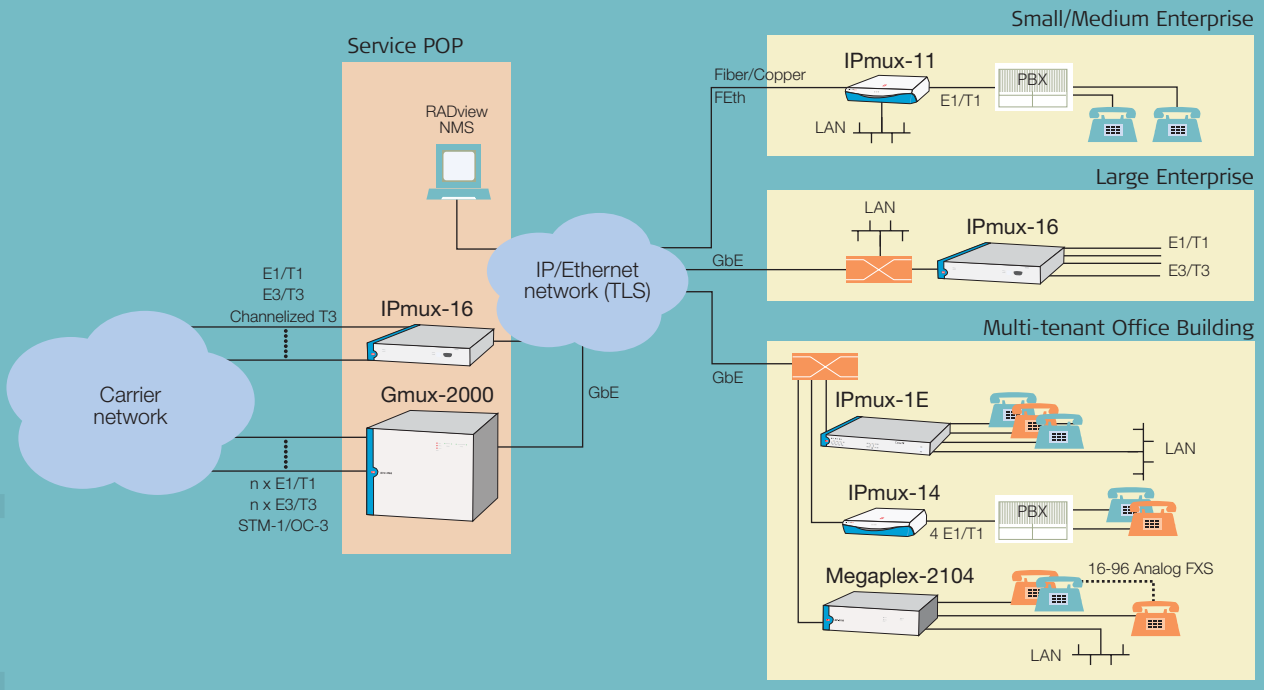
The Gmux-2000™ is a carrier-class TDMoIP gateway that concentrates up to 126 E1, 168 T1 or 12 E3/T3 links from multiple sites over two 155 Mbps STM-1/OC-3 trunks, creating an effective central site solution for carrying TDM-based traffic to smaller IPmux units over the packet-switched network. In addition, Gmux-2000 can provide 196 E1/T1 or 28 E3/T3 external interfaces. It enables carriers to deliver TDM voice and other legacy services over their lower cost IP/Ethernet/MPLS backbones.

Applications

Cost-Effective Legacy Migration

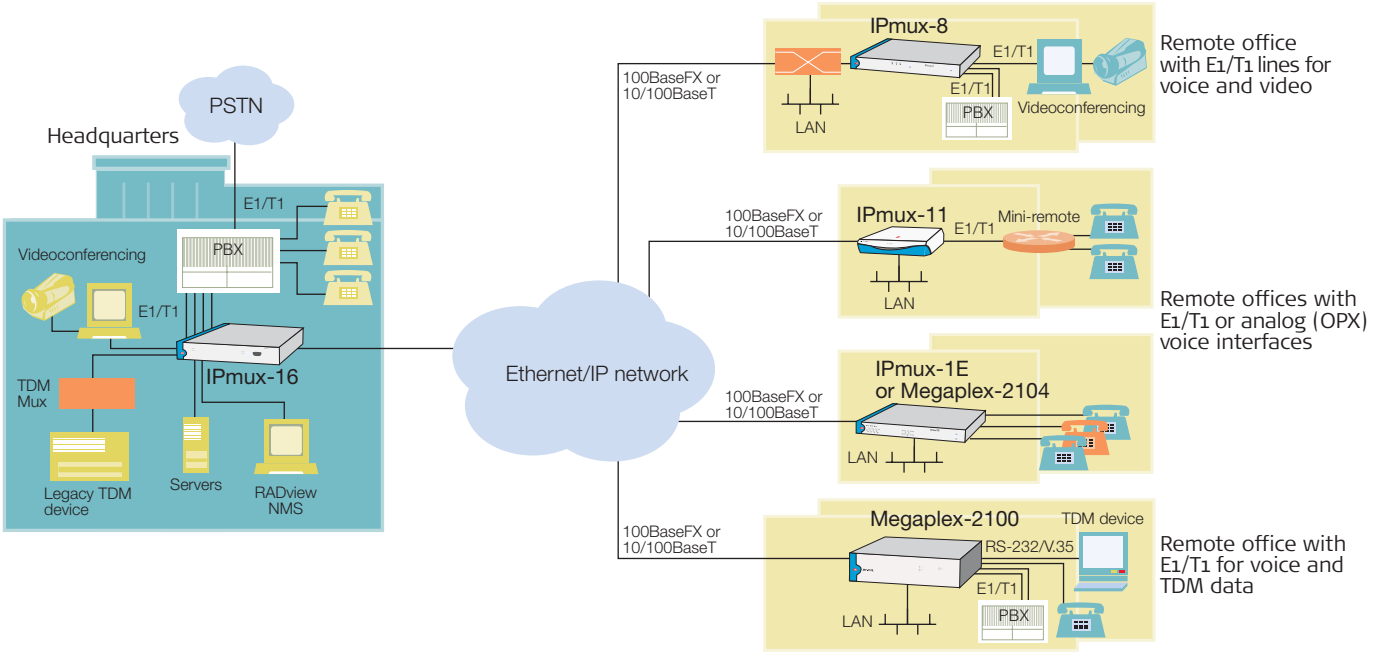
Leased Line Services over IP

The challenge for carriers is to cost-effectively provision broadband next generation services as well as leased line services, which are the carriers' main sources of revenue. Enterprises as well are seeking effective use of the broadband infrastructure to run all their traffic. The packet-switched network is the natural choice for new data services, but Gigabit Ethernet/IP backbones do not support legacy equipment and applications. RAD's TDMoIP technology enables carriers and enterprises to migrate to packet-switched networks and still benefit from all legacy and new services, streamlining operations over one network. TDMoIP technology is a win-win for both carriers and enterprises because it offers the most efficient way to provide TDM services to distributed enterprises and private customers looking for broadband data connectivity, transparent LAN services and access to PSTN services.



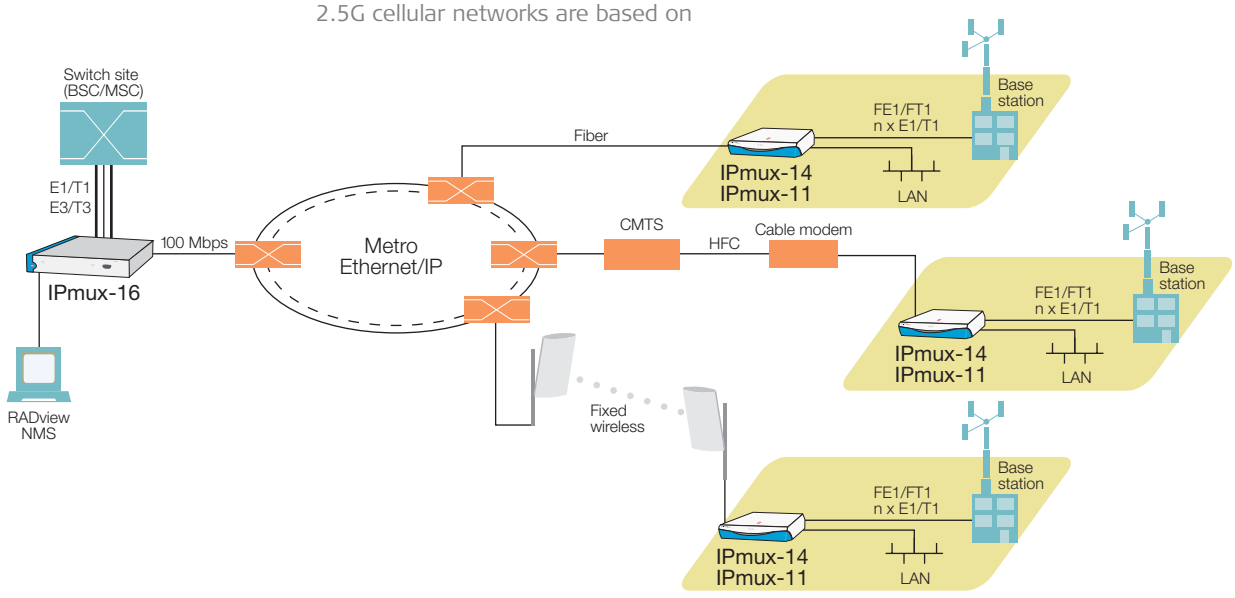
Voice, Video and Data over Ethernet

Ethernet provides high bandwidth at low cost and therefore is excellent for extending LAN and Internet services to remote sites on a campus or metropolitan network. RAD's IPmux and Megaplex devices extend E1/T1 services transparently over Ethernet-based data networks, eliminating the need for leased lines while supporting all voice, TDM and video applications transparently over IP. Enterprises enjoy better integration of all sites and lower network expenses.



IP Cellular Backhaul

A packet-switched network replaces the leased lines that connect the base stations (BTSs), base station controllers (BSCs) and mobile switching centers (MSCs). 2G and 2.5G cellular networks are based on switching performed at the MSC. TDMoIP is used to provide transparent transport with minimal delay. Supported access media include fiber, coax and fixed wireless.



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