

IPmux-24



IPmux-24, IPmux-216

TDM Pseudowire Access Gateways

- Extends TDM, HDLC and Ethernet services over packet transport
- Up to four (IPmux-24), eight or 16 (IPmux-216) E1/T1 TDM user ports
- Three SFP-based fiber or copper Fast Ethernet or Gigabit Ethernet interfaces
- Multi-standard TDM pseudowire ASIC: TDMoIP, CESoPSN, SAToP, HDLCoPSN, CESoEth
- ITU-T G.8032 Ethernet Ring Protection Switching (ERPS) for sub-50 ms restoration; Ethernet link and TDM pseudowire redundancy
- Ethernet OAM: IEEE 802.3-2005 (formerly 802/3ah), 802/1ag, ITU-T Y.1731
- High precision clock recovery for 2G/3G cellular traffic over PSN
- QoS per 802.1p, ToS/DSCP, EXP
- MEF-9, MEF-14 certified for EPL, EVPL services

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The IPmux-24 and IPmux-216 TDM pseudowire access gateways transparently deliver framed or unframed E1 or T1 signals, HDLC-based data streams, and user LAN traffic over packet switched networks, via copper or fiber Fast Ethernet or Gigabit Ethernet uplinks.

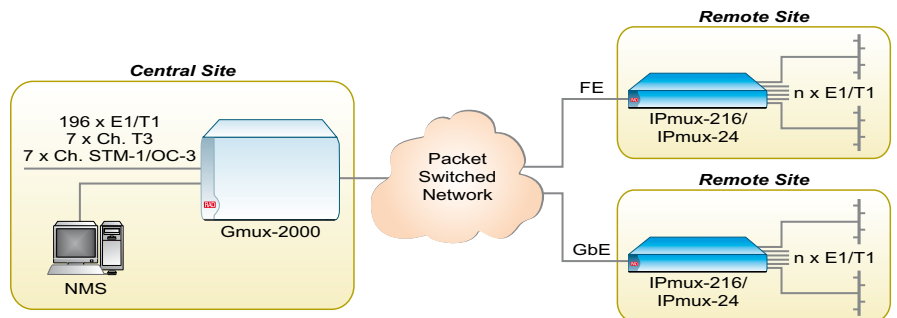
The devices' compact design, ease of installation, and advanced traffic management capabilities enable carriers to extend their services from legacy backbones over greenfield packet networks, without affecting customer experience or replacing existing end-user equipment. They also allow service providers to add traditional leased line services to their Layer 2 portfolio and permit enterprises to reduce their IT expenses on PSTN connectivity and branch-to-branch communications. In addition, they support cellular operators in migrating their services to economical packet switched backhaul.

Advanced pseudowire functionality

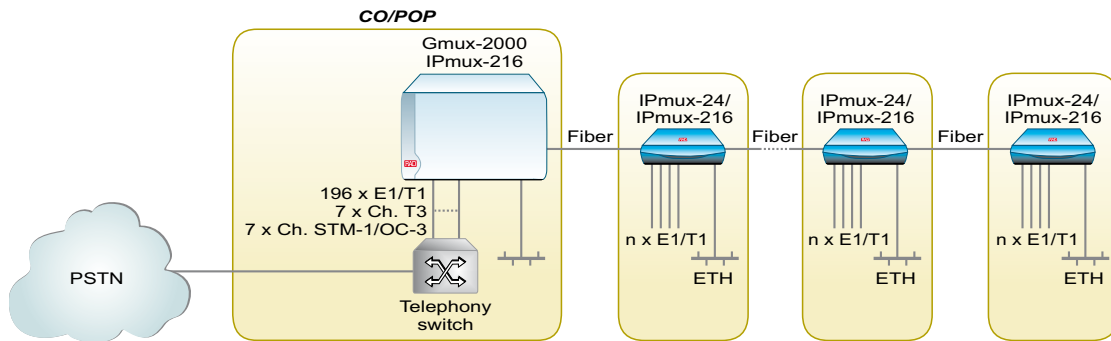
The IPmux-24 and IPmux-216 feature enhanced pseudowire performance with minimal processing delay, including support for all standard TDM circuit emulation modes, such as TDMoIP, CESoPSN, SAToP, HDLCoPSN, and CESoEth (MEF-8). The devices enable each timeslot to be assigned a separately configured pseudowire connection, thereby supporting multiple PW flavors simultaneously, with a 64-circuit pseudowire capacity (IPmux-24), or a 256-circuit pseudowire capacity (IPmux-216). By grooming DS0-level bundles, the devices also facilitate an efficient use of the expensive TDM ports.

Clock recovery and timing

The IPmux-24 and IPmux-216 ensure end-to-end timing accuracy for real-time services across non-deterministic packet networks. Featuring



E1/T1 extension over packet switched network



Daisy-chain application





adaptive clock recovery (ACR) capabilities per port, a remote IPmux-24 or IPmux-216 can accurately regenerate an original clock transmission in varying network load conditions. The IPmux-24 conforms to ITU-T G.823/G.824 traffic and synchronization interface requirements and to G.8261-defined scenarios, providing low latency, attenuating delay variations and enabling service resiliency. Such high precision clocking attributes provide a frequency accuracy level of 16 ppb, guaranteeing a smooth operation of 2G and 3G cellular equipment over PSNs.

Ethernet QoS and VLAN capabilities

The IPmux-24 and IPmux-216 include an internal Ethernet bridge, operating in either VLAN-aware or VLAN-unaware mode. They support VLAN tagging per IEEE 802.1Q and VLAN stacking (Q-in-Q), which allow traffic separation between different users or services. Supporting Ethernet Private Line (EPL) service provisioning, the

devices also include enhanced traffic engineering and CIR/CBS rate limitation features, thereby enabling service providers to granularly adjust bandwidth to fit capacity requirements. SLA enforcement and QoS guarantees are supported by four Strict Priority queues, classified by VLAN tags, per port 802.1p bits, IP Precedence, or ToS/DSCP bits.

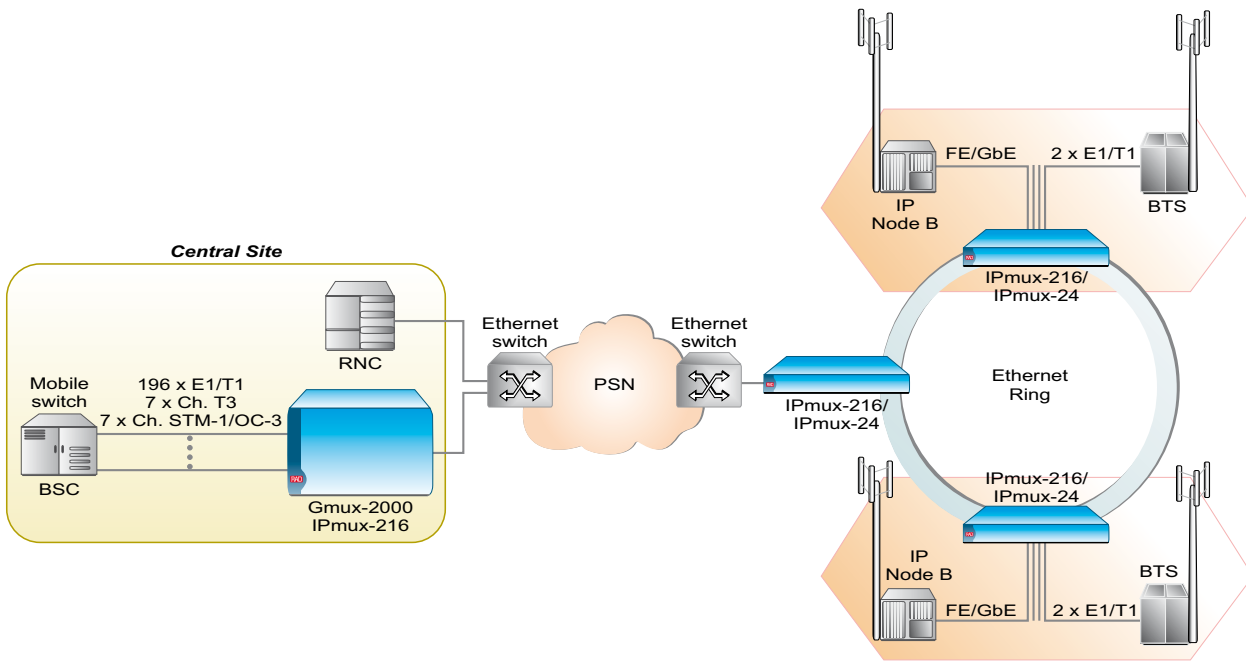
OAM and diagnostics

The IPmux-24 and IPmux-216 incorporate a complete Ethernet OAM suite that includes Ethernet Link OAM (IEEE standard 802.3-2005, formerly 802.3ah), Ethernet Service OAM (IEEE 802.1ag) and Performance Monitoring (ITU-T Y.1731). Diagnostic loopbacks can be remotely activated, while network condition statistics for the LAN and IP layers are also monitored and stored by the device. Performance monitoring parameters include packet loss, packet mismatch and packet delay variation.

Service center management and security

The IPmux-24 and IPmux-216 feature flexible management capabilities, including local management via an ASCII terminal (RS-232). In addition, remote management can be performed either inband or out-of-band, using the network or user ports, while maintaining separation between management and user traffic via the use of VLANs. Advanced FCAPS (Fault, Configuration, Administration, Performance, Security), service provisioning and diagnostic tools are provided by RADview-SC/TDMoIP, RAD's network management system, via an SNMP-based GUI.

The devices also support a variety of access protocols, including Telnet, SNMP, Web server, and TFTP. Incorporated security features include Secure Shell (SSH), Web-based Secure Socket Layer (SSL), SNMPv3, and RADIUS.



Mobile backhaul application over an Ethernet ring

