Data Sheet

Megaplex-4

MPW-1

TDM Pseudowire Access Gateway

- TDM multiplexing and Ethernet switching for transmitting voice and sync/async data over packet-switched networks
- Pseudowire/circuit emulation as per TDMoIP, CESoPSN, SAToP, HDLCoPSN, and more
- Industry-leading adaptive clock recovery mechanism over packet-based networks
- Extensive OAM and performance monitoring capabilities
- Three Ethernet ports with auto-detection of Fast Ethernet SFP or UTP 10/100BaseT
- Three timing modes: Internal, External, or Adaptive clock from network

Megaplex-4 equipped with the MPW-1 module provides legacy services over packet-switched networks (PSN). MPW-1 receives the data stream from other modules in the Megaplex-4 chassis (E1/T1, SHDSL, data or voice ports) via the Megaplex backplane, and converts it into IP or MPLS packets for transmission over Ethernet, IP or MPLS networks.

The packets are transmitted to the PSN via any MPW-1 Ethernet port or any Ethernet port (GbE, FE or VCG) of a module installed in the chassis. A remote pseudowire device converts the packets back to the original user traffic format.

PSEUDOWIRE

The ASIC-based architecture provides a robust and high performance pseudowire solution with minimal processing delay.

MPW-1 transports legacy TDM traffic over packet according to a variety of standards, including TDMoIP, CESoPSN, SAToP, and HDLCoPSN.

The proper balance between the PSN throughput and delay is achieved via configurable packet size.

A jitter buffer compensates for packet delay variation (jitter) of up to 180 msec in the network.

Optimal handling of pseudowire traffic within the PSN is achieved by configuring the following parameters:

- For Ethernet transport networks: outgoing pseudowire packets are assigned to a dedicated VLAN ID according to 802.1Q and marked for priority using 802.1p bits.
- For IP transport networks: outgoing pseudowire packets are marked for priority using DSCP, ToS, or Diffserv bits. This allows TDMoIP packets to be given the highest priority in IP networks.
- For MPLS transport networks: outgoing pseudowire packets are assigned to a specific MPLS tunnel, and marked for priority using the EXP bits.

ETHERNET

The 3-port 10/100BaseT interface includes a built-in flow classification engine that performs single or double VLAN tagging according to IEEE 802.1Q and 802.1p. The interface performs autonegotiation for plug-and-play Ethernet connectivity and complies with IEEE 802.3/Ethernet V.2 standards.

The external Ethernet ports can be ordered with two types of interfaces:

- 10/100BaseTx interfaces terminated in RJ-45 connectors
- Sockets for Fast Ethernet SFP transceivers. RAD offers several types of SFPs with optical interfaces, for meeting a wide range of operational requirements (SFPs with copper interfaces are also available).

It is strongly recommended that this device be ordered with original RAD SFPs installed. This will ensure that comprehensive functional quality tests on the entire assembled unit, including the SFP devices, have been performed by RAD prior to shipping. RAD cannot guarantee full compliance with product specifications for units using non-RAD SFPs.

The Ethernet switch routes traffic between the module Ethernet ports, the PW engine and the CL module Ethernet traffic subsystem (for connection via the CL GbE ports to a packet-switched network, or for transmission through the SDH network via virtually concatenated groups (VCGs)), and between module Ethernet ports and PWs.

RAD
Your Network's Edge

MPW-1

TDM Pseudowire Access Gateway

CROSS-CONNECT

In the MPW-1 module, a pseudowire (PW) transports a group of up to 31 timeslots (individual or multiple).

Eight internal DS1 ports connect the module to any module inside the Megaplex-4 chassis.

MPW-1 handles up to 128 connections (16 PWs per internal DS1 port); a chassis can handle up to 640 connections. In addition, the module's Int-DS1 ports are part of the Megaplex DS0 cross-connect subsystem.

TIMING

MPW-1 can operate in three timing modes:

- Internal mode: The Megaplex internal oscillator is the source for the timing used by Ethernet links and other I/O modules. MPW-1 is the sole clock source for all the units in the network.
- External mode: one of the I/O modules is the source for the system timing.
- Adaptive mode: the MPW-1 timing clocks are regenerated using the adaptive method, according to the monitored received packet rate from the IP network. The timing is then also passed on to the I/O modules. End-to-end synchronization between circuits is maintained by deploying advanced clock recovery mechanisms.

The system clock ensures a single clock source for all TDM links, and uses master and fallback timing sources for clock redundancy.

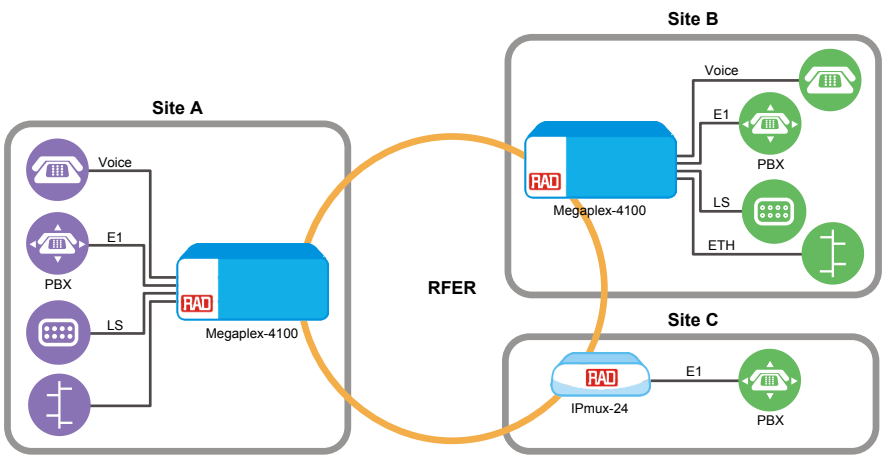

Figure 1. Resilient Topology over Dark Fiber for Ethernet and TDM Traffic

RESILIENCY

DS1 Protection

The MPW-1 module provides redundancy protection between internal DS1 ports, and between an internal DS1 port and a user-selected legacy TDM port (E1, T1, SHDSL, PDH, etc.) with redundancy. Therefore, the pseudowire traffic is also protected by the redundancy function. The pseudowire redundancy mode depends on the use of OAM:

- When OAM is disabled, the pseudowire redundancy mode is 1+1, meaning that the traffic is also sent on the standby pseudowire
- When OAM is enabled, the pseudowire redundancy mode is 1:1, meaning that only OAM packets are sent on the standby pseudowire. This minimizes packet traffic when a pseudowire is inactive due to the redundancy mechanism.

Resilient Fast Ethernet Ring

MPW-1 employs RAD's Resilient Fast Ethernet Ring (RFER) technology to construct self-healing 100-Mbps Fast Ethernet fiber or copper ring topologies (ring resiliency functions similarly to that of STM-1 networks). In the event of link failure on any segment of the ring, RFER reroutes the TDMoIP traffic within 50 ms, fast enough to maintain the required voice quality.

RFER enables enterprises, campuses, power companies, transportation companies and utilities to create highly reliable networks, using dark fiber or dry copper in a ring topology.

Survivability is further enhanced by RFER's scalable support for multiple rings, which eliminates the risk of a single point of failure. This is ideal for dispersed applications, such as commuter railroads.

FAULT PROPAGATION

MPW-1 modules perform fault propagation for pseudowires; if a problem is detected on a pseudowire, the attached physical port receives a fault indication and vice versa.

OAM AND DIAGNOSTICS

LAN and IP layer network condition statistics, such as packet loss and packet delay variation (jitter), are monitored and stored by the device.

Performance is monitored by storing Ethernet and IP-layer network condition statistics, such as packet sequence errors (loss or misorder) and packet delay variation (jitter).

RAD's TDM PW OAM mechanism verifies connectivity and prevents pseudowire configuration mismatch.

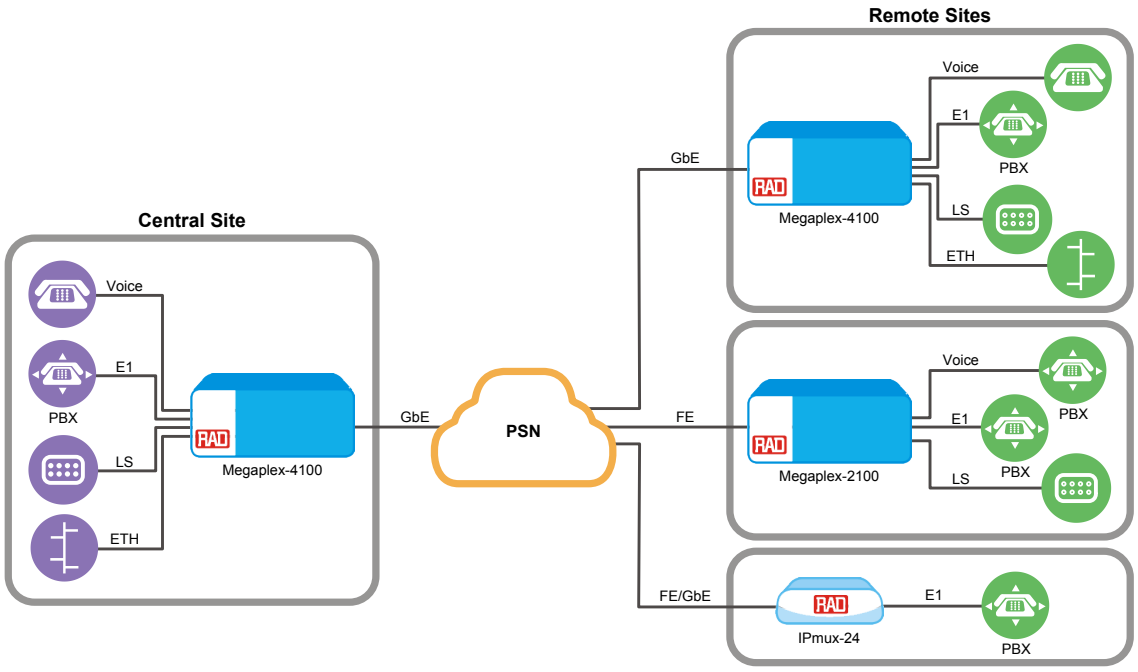

Figure 2. Migrating Existing TDM-Based Services to Next Generation Packet Switched Network

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TDM Pseudowire Access Gateway

Specifications

ETHERNET INTERFACE

Number of Ports
3 fiber-optic or 3 UTP

Data Rate
10/100 Mbps (Fast Ethernet)
Autonegotiation (copper only)

Total Bandwidth per Module
100 Mbps per module

Maximum Frame Size
1600 bytes

Connectors
3 x RJ-45, shielded, or
3 x SFP socket (for transceivers, see *Ordering*)

SFP Transceivers
For full details, see the *SFP Transceivers data sheet* at www.rad.com

Indicators (per port)
LINK (green) – LAN link integrity
ACT (yellow) – LAN data activity

PSEUDOWIRE

Standard Compliance
IETF: RFC 4553 (SAToP), RFC 5087 (TDMoIP), RFC 5086 (CESoPSN)

ITU-T: Y.1413

MFA: IA 4.1, IA 8.0.0

Number of PW Connections
128 per module (up to 640 per chassis)

Jitter Buffer Size
0.5–200 msec (unframed) with 1 µsec granularity

2.5–200 msec (framed) with 1 µsec granularity

Clock Modes
Internal, External, Adaptive

DIAGNOSTICS AND STATISTICS

Diagnostics
Local and remote loopbacks on selected timeslots of the internal DS1 ports
Ping test

Statistics
Ethernet Statistics (per RFC 2819)
Jitter buffer indication (overflow, underflow, sequence error)

GENERAL

Power Consumption
8.5 W

Environment
Operating temperature:
- Regular: -10°C to 55°C (14°F to 131°F)
- IEEE-1613 certified options: -20°C to 55°C (-4°F to 131°F)

Storage temperature: -20°C to +70°C (-4°F to +158°F)
Humidity: up to 95%, non-condensing

Ordering

RECOMMENDED CONFIGURATIONS

MP-4100M-PW-1/3XUTP
TDM Pseudowire Access Gateway, 3 UTP Ethernet connectors

SPECIAL CONFIGURATIONS

Please contact your local RAD partner for additional configuration options.

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