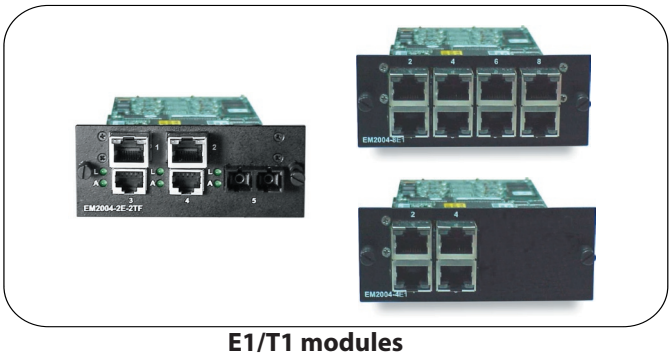
Voice over Ethernet - E1/T1 modules



E1/T1 modules

Overview

The OptiSwitch® E1/T1 solution is designed to transmit Voice (telephony) over Ethernet infrastructure . It features a carrier class architecture that enables TDM (voice) line emulation over Ethernet/IP (data) networks: a normal voice E1/T1 line is translated into IP frames, sent to a specific destination IP address and reconstructed on the other side to a normal E1/T1 line. This solution enables the extension of E1/T1 links over Ethernet/IP networks maintaining toll quality voice over the Ethernet QoS medium and offer smooth convergence of voice and data infrastructure.

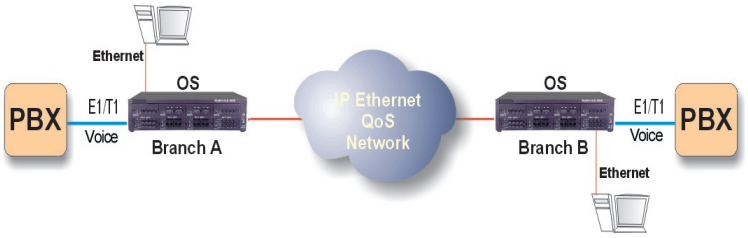
Solution Description

The E1/T1 module takes the incoming voice traffic from the E1/T1 links, packs it in IP frames using a standard G.711 coding and RTP\UDP encapsulation, and sends it as a standard RTP session to the configured destination IP address. The generated voice IP packets are sent through one of the OptiSwitch® Ethernet ports, and can travel through any QoS enabled IP network. The E1/T1 module, on the other side of the IP network, receives the voice IP packets, performs jitter-buffering (in order to isolate the E1\T1 port from forwarding-delay-variations on the IP network), and translates the packets back to E1\T1 TDM format on the E1\T1 interface. Voice channels on different E1\T1 trunks, i.e. several, partially filled, E1 trunks, can be sent to the same destination E1 port (highly utilized) on the other side of the IP network.

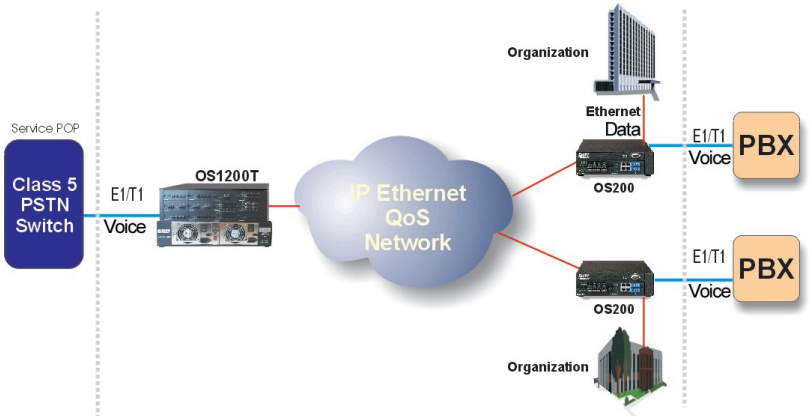
Features

- Supports framed (structured) E1/T1 links: all popular E1 and T1 framing standards (PRI, CAS, SS7, etc.).
- Supports echo-cancellation
- Supports silence compression: Voice-Activity-Detection (VAD) and Comfort-Noise-Generation (CNG). This feature may save more then 70% of network bandwidth resources (in comparison with existing E1/T1-over-IP solutions).
- Supports jitter-buffering to prevent IP network forwarding delay variations from influencing the E1/T1 voice traffic. Up to 150 mSec buffer is supported for each voice-channel.
- Supports Network (recovered) or Local TDM timing synchronization.
- Supports transport of any voice signaling on the signaling channels: the signaling channel is sent transparently to the other end, making the emulation transparent to any signaling protocol (CAS, as well as all forms of CCS).
- Supports per voice-channel resolution for transport of specific voice-channels from a full E1/T1 CAS line to different destinations.
- Supports loopbacks on the E1/T1 trunk level and the voice-channel level, from both the E1/T1 link side and the Ethernet side.
- Fully integrated inside the OptiSwitch chassis with full support for:
  - QoS: classification, rate-limitation, marking, traffic-prioritization and scheduling
  - VLAN tagging
  - Fast convergence using Rapid-Spanning-Tree
  - Ethernet usage based billing
  - Management throgh CLI, Telnet, SNMP
  - Configuration upload/download via TFTP
- Support T.38 fax with superior performance
- Channel aggregation

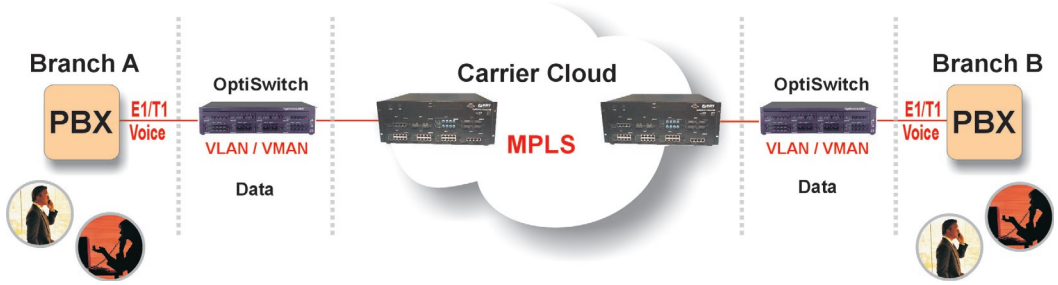
PBX to PBX for Enterprise Inter-Office E1\T1 and Data Connectivity



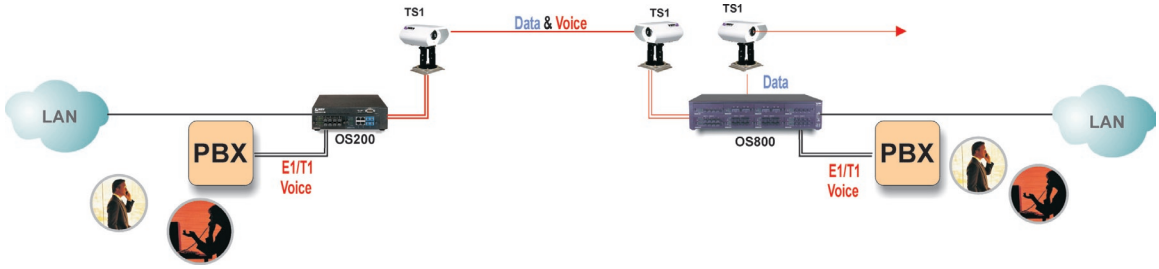
PBX/MUX to Public-PSTN for Enterprise / Multi-Tenant to Public-PSTN Connectivity



TDM Voice over MPLS



Wireless Voice and Data



Embedded Ethernet Classification

As part of the EM2004 quality of service aware OptiSwitch® modules, the E1 module implements Quality of Service by performing marking of the Type of Service (ToS) bits according to the DiffServ protocol or 802.1 VPT. The QoS marking is configurable through a variety of Layer 2–4 parameters. The on-board QoS switching engine is capable of recognizing the series of frames coming from the E1 channels as belonging to a specific flow, and applies the defined scheduling rules on such a circuit. The E1 module can be installed with any one of the EM2004 QoS series modules for the OptiSwitch® family.

Management

The configuration of a voice channel is performed by configuring the IP address of the destination module. Statistics and management information is collected in real time by the TDM gateway and switching engine and is reported to the chassis' management card. The built-in management card performs the functionality of the SNMP Agent, and it communicates with SNMP compliant systems.

E1/T1 modules - Technical Specifications

Diagnostic LEDs	Green - operative mode - E1/T1 port is syncronized with the oder of link. Red - non - fatal framing error Off - fatal error - LOS, AIS or else
QoS	E1/T1 configured as port access (DiffServ configuration) voice VLAN automaticaly configured for all voice port an interior port
Clocking	Network (from the TDM network) , local
Line coding	E1: AMI, HDB3 T1: B8ZS, AMI
Framing	E1: double-frame, CRC4-multi-frame, CAS-multi-frame T1: T4, D4 , ESF (F24), ESF, SLC96, ESF-JT
RTP sampling interval	5 msec, 10 msec, 20 msec
Jitter-Buffer minimum delay	0 - 300 msec
Echo-cancellation	On / Off
Silence compression	On / Off
Loopback	Remote (E1/T1 line), local (Ethernet), local-channel (Ethernet, Single voice-channel)

Order Info

Product	Description
EM2004-4E1	4 ports E1/T1 Voice TDM over Ethernet QoS module
EM2004-8E1	8 ports E1/T1 Voice TDM over Ethernet QoS module
EM2004-2E2TF/M	OS module with QoS support 2E1/T1+2TP+1FO/MM interfaces
EM2004-2E2TF/S1	OS module with QoS support 2E1/T1+2TP+1FO/S1 interfaces
EM2004-2E2TF/S2	OS module with QoS support 2E1/T1+2TP+1FO/S2 interfaces
EM2004-2E2TF/S3	OS module with QoS support 2E1/T1+2TP+1FO/S3 interfaces
EM2004-2E2TF/S4	OS module with QoS support 2E1/T1+2TP+1FO/S4 interfaces