

# Application Description

## AudioCodes TDM Tunneling Feature

Powered by AudioCodes Mediant™ 2000 Gateways

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# **AudioCodes Mediant™ 2000 TDM Tunneling Feature Application Description**

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## Benefits for Network Equipment Providers and Operators

- Full end-to-end TDM tunneling over IP solution
- Transparent E1/T1/J1 connectivity over standard IP networks, both in carrier and enterprise environments
- Cost-effective method to transport leased lines over converged packet networks
- Scalable down to individual timeslots (used as semi-permanent connections)
- Easy-to-configure using Mediant 2000 embedded GUI Web server, both for end-to-end TDM Tunneling or softswitch control
- Can be located at central sites (or POPs) and remote sites for aggregating traffic from multiple TDM sources
- Supports mixed H.323 IP telephony and point-to-point connections on the same gateway
- Using the Mediant 2000 SS7 Tunneling option, provides reliable SIGTRAN-based solution for supporting F-links (SS7 signaling link and voice channels on same trunk span)
- Reliable transport of CAS signaling and DTMF relay (using RFC 2833)

**Figure 1: Mediant™ 2000 VoIP Gateway**



## About the Mediant™ 2000 VoIP Gateway

AudioCodes **Mediant 2000** is based on the VoIPerfect™ architecture, AudioCodes' underlying, best-of-breed core technology for all of its products. The Mediant™ 2000 VoIP Gateway is the cost-effective, entry-level member in the AudioCodes family of market-ready, standards-compliant, media gateway voice network products. Intelligently packaged in a stackable 1U chassis especially designed for small, medium or remote locations, the Mediant 2000 is the right-sized solution for various market needs, such as VoIP Trunking, Toll Bypass, IP-Centrex, and Enterprise Networking. The **Mediant 2000** incorporates up to 16 digital trunk spans and supports a broad selection of voice and signaling-related processing algorithms, including G.711, G.723.1 and G.729A Vocoders, G.168-2000 compliant echo cancellation, a wide selection of In-band and Out-of-band tone detection and generation, as well as signaling protocol support, including ISDN PRI, SIGTRAN (M2UA, M3UA, IUA) and CAS.

The Mediant™ 2000 is a member of AudioCodes' Voice Network Products, of which more than 10 million Voice over Packet (VoP) ports have been deployed in over 100 countries around the world.

## Overview

TDM Tunneling allows Telcos, service providers, and enterprises to tunnel groups of digital trunk spans or timeslots over the Internet/IP network as a low cost, but reliable solution, even in cases of limited infrastructure. TDM Tunneling utilizes the internal routing capabilities of the Mediant 2000 (working without Gatekeeper or MGC control) to receive voice and data streams from TDM (1 to 16 E1/T1/J1) spans or individual timeslots and convert them into packets for transmission over the IP network. The timeslots are transmitted to the IP network via one of the dual, redundant 10/100 BaseT Ethernet ports. A Mediant 2000 at the opposite location converts the IP packets back to TDM traffic. Each timeslot can be targeted to any other timeslot within a trunk in the opposite Mediant 2000. Configuration of this feature is easily performed and modified using the built-in Web-based GUI. Timeslots (or B-channels) can be mapped using point-to-point and point-to-multipoint gateway distributions. Using the point-to-multipoint configuration enables connection of remote TDM nodes to centralized TDM nodes via the IP network, which is more economical due to savings on TDM transmission costs. The Mediant 2000 automatically sets up and maintains all the end-to-end IP connections between the gateways (e.g., at gateway power-up or in the case of call release due to network or transmission problems, or in case of physical reset).

Transported channels can use low-bitrate vocoders for voice compression and RTP Multiplexing<sup>1</sup>, resulting in significant bandwidth savings (e.g., for SS7

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<sup>1</sup> Future availability.

bearer channels) or they can be transported transparently (e.g., for D-channel or in-band MF tones).

The managed point-to-point configuration is a robust solution, based on a redundant Ethernet network interface. In case of LAN failure, the TDM interface's physical layer will be disabled, resulting in an alarm notification to both sides of the connection. It is possible to take advantage of the Alternative Routing facilities of the Mediant 2000 to route to a redundant TDM node (connected via an additional Mediant 2000). This feature is activated when it not possible to access the original TDM node (e.g., using ICMP/PING and/or QoS monitoring methods). The Mediant 2000 can be equipped with a dual AC power supply, further enhancing the reliability of the TDM Tunneling solution.

The TDM point-to-point feature can be used alongside H.323-controlled ports in the same gateway, thereby increasing its flexibility in a hybrid TDM/IP network that evolves into a fully converged IP network. The same Mediant 2000 gateway can be used now – in a TDM bypass configuration and in the future – as a media gateway under the control of a softswitch using standard VoIP protocols (i.e., SIP, H.323, MEGACO, and MGCP).

TDM Tunneling is particularly attractive for operators, who may not own the transmission infrastructure, resulting in OPEX savings. Typical applications include connecting remote TDM switching units or connecting PBXs to Central Offices. This feature can also be used in conjunction with the SS7 Tunneling option allowing transport of point-to-point signaling and voice channels on the same trunk span (F-links).

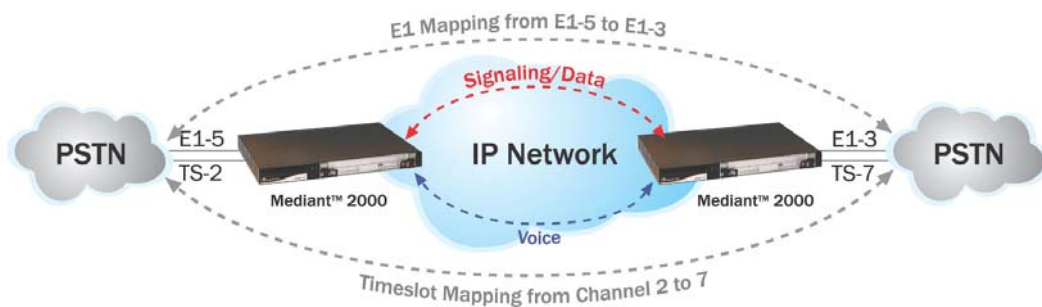
## Mediant 2000 TDM Tunneling Features

- Supports up to 16 E1, T1, and J1 digital trunk spans
- Up to 100 different groupings of E1/T1 spans or fractional timeslots from one TDM node to another
- “Any-to-any” switching of timeslots can be configured, including point-to-point or point-to-multipoint gateway distributions
- One or two span types (either E1, T1, and J1) can be supported on same gateway (on 16-span models)
- Supports 64/56 kbps voice (bearer) and support for data and signaling protocols, including ISDN-PRI, QSIG, DPNSS, CAS, and SS7
- Robust transport of DTMF and CAS signaling using RFC 2833 payload format
- Supports SS7 bearer and signaling channels on same trunk span (F-links) in conjunction with SS7 Tunneling option
- Using AudioCodes Mediant 2000 supplies all the inherent advantages of AudioCodes VoIPerfect™ architecture:
  - Low-bitrate vocoder (compression) and silence suppression can be used for voice packets in order reduce bandwidth consumption
  - Reliable fax transmission and reception using Fax Relay (T.38) or bypass to G.711 from low-bitrate vocoders
  - Configurable packet size for tradeoff between bandwidth usage and packet delay
  - Adaptive jitter buffer for optimized buffering packet delay variations (up to 300 msec)
  - Long Echo-cancellation tail (up to 128 msec) – essential in cases of long transmission delay
  - Optional RTP redundancy (RFC 2198) for data (signaling) channels for resilience to packet loss on noisy IP networks
- In case of LAN failure, physical layer of trunks is disabled on both sides
- Reliable solution, based on redundant Ethernet and dual power supplies
- Easy to maintain solution using Web-based GUI, remotely accessible from Web browser clients
- SNMP support
- T1/E1 physical layer alarms monitored on Web-interface GUI as well as via SNMP traps (per RFC 2495)
- TDM Tunneling and H.323 control of individual channels can co-exist on same gateway
- QoS support based on DiffServ/ToS
- Self-test on power up or on initialization of hardware components
- Compact 1U, 19” chassis

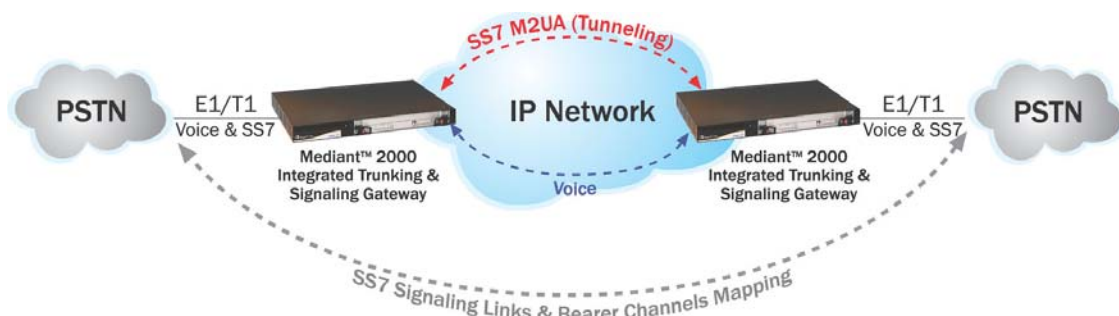
## Network Architecture

Groups of timeslots (partial or full E1/T1/J1 trunks) are configured to connect automatically between Mediant 2000 gateways, using their internal routing capability. Connections can be configured between individual timeslots or trunks of any type supported by the Mediant 2000, namely E1, T1, or J1 digital spans (see Figure 2). Such semi-permanent connections, once pre-configured from the Web interface, remain set up until they are manually torn down. The TDM Tunneling feature can be configured to differentiate between transport of data and voice. For example, data can be transported transparently and voice channels can use VoIP vocoders (compression). The TDM Tunneling feature can be used to transport SS7 bearer (voice) channels in addition to SS7 links (e.g., F-links), using the SIGTRAN-based SS7 Tunneling option supported by the Mediant 2000 (see Figure 3).

**Figure 2: TDM Tunneling Architecture**



**Figure 3: TDM & SS7 Tunneling Architecture**



## Typical Applications

- TDM link replacement for long-haul (e.g., international, satellite, etc.) and short-haul (e.g., national, city carrier, etc.) connections
- Transporting TDM F-links over IP when used in conjunction with the Mediant 2000 SS7 Tunneling feature
- Connecting remote switching units and PBXs to Central Offices
- Hosted services to multiple PBXs via centralized gateway connected to softswitch
- Cellular operators' mobile network (e.g., BSC-MSC, MSC-MSC/HLR)
- Access to fixed timeslot resources, such as announcements, time of day, etc.
- Cross-connect between E1, T1, and J1 spans
- Connections between PBXs in different campuses
- Remote test access to TDM equipment

For up-to-date and more detailed information about AudioCodes VoIP Gateways including marketing brochures and related press releases, visit AudioCodes' Website at [http://www.audiocodes.com/Main\\_ID138\\_1.html](http://www.audiocodes.com/Main_ID138_1.html).

## **About AudioCodes**

AudioCodes Ltd. (NASDAQ: AUDC) enables the new voice infrastructure by providing innovative, reliable and cost-effective Voice over Packet technology and Voice Network products to OEMs, network equipment providers and system integrators. AudioCodes provides its customers and partners with a diverse range of flexible, comprehensive media gateway and media processing technologies, based on VolPerfect™ – AudioCodes' underlying, best-of-breed, core media gateway architecture. The company is a market leader in voice compression technology and is a key originator of the ITU G.723.1 standard for the emerging Voice over IP market. AudioCodes' voice network products feature media gateway and media server platforms for packet-based applications in the wireline, wireless, broadband access, and enhanced voice services markets. AudioCodes enabling technology products include VoIP and CTI communication boards, VoIP media gateway processors and modules, and CPE devices.

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