AudioCodes Carrier/Service Provider Applications – Quality, Cost-effective Solutions for Every Network

An examination of applications of Voice over IP in carrier and service provider networks that can reduce costs and expand addressable markets demonstrating the flexibility and capabilities of AudioCodes’ CPE and Networking products.

Introduction
AudioCodes Ltd. designs and manufactures a diverse range of award-winning media gateway, media server, network security and IP Phone products and technologies that enable the new voice infrastructure.

AudioCodes’ products play an important role in the migration of the global telecommunications infrastructure from TDM to IP technologies by interconnecting the new IP, Wireless and legacy TDM core networks. In addition, AudioCodes’ products also enable enterprise and residential customers to connect their TDM equipment to IP networks, IP equipment to the legacy TDM core or dissimilar IP equipment with IP-to-IP mediation.

AudioCodes delivers its reliable, innovative and cost-effective products around the globe to a range of markets including carriers, service providers, telecommunication equipment manufacturers, enterprises, systems integrators, distributors and value added resellers.
Typical Applications

AudioCodes’ Media Gateway products can be applied to an almost endless array of applications and configurations. However, a few common example applications, as described in this application note, demonstrate the role that AudioCodes’ Media Gateways play in service provider and carrier networks.

Hosted Voice-over-Broadband for Residential/SOHO

A broad spectrum of carriers and service providers are now offering services to residential and SOHO subscribers utilizing Voice over Broadband (VoBB) to deliver a quality and cost-effective replacement to traditional residential telephony service. With VoBB, both the core of the network and the last-mile delivery mechanism utilizes IP infrastructure. The functionality of the VoBB network is controlled and services are managed with one of the many brands of Softswitch applications and/or SIP Application Servers.
Connecting the VoBB application to PSTN carriers is accomplished by using an AudioCodes Mediant™ 3000/5000/8000 carrier-class media gateway. The gateway converts the IP calls to either T1/E1 or DS3 formats, interfacing with Class 4 switches in the PSTN.

In many cases, the last mile delivery is accomplished over existing unmanaged or open internet facilities. In these cases, an AudioCodes nCite™ Session Border Controller is utilized, protecting the carrier network core from attack and enabling NAT traversal to the subscriber premise.

At the customer premise, subscribers are connected to the VoBB application via an AudioCodes MediaPack™ 20x Analog Telephone Adapter (ATA). The ATA connects legacy analog telephones, fax machines or credit card machines at the customer premise to the service.

In larger multi-tenant or hospitality applications, many installations find it advantageous to use one or more AudioCodes MediaPack™ 124 (MP-124) analog media gateways in a common wiring closet. The MP-124 provides 24 FXS ports and connects to the existing analog telephone lines that lead to each residential unit and allows continued use of existing legacy analog equipment. Using the MP-124 in multi-tenant applications simplifies many installations and reduces the number of devices and per-subscriber equipment and maintenance costs.
To allow subscribers access to advanced features and higher-fidelity HD VoIP calling, the 300HD IP Phone products can be used on-premise. With superior voice quality, large display and multiple line appearances, small-office/home-office workers and residential customers can enjoy business-grade IP communications services at home.

In configurations where the carrier peers with other carriers via IP, an AudioCodes nCite™ Session Border Controller is frequently utilized to provide interoperability and security between the two carrier networks.

**IP Centrex**

IP Centrex is an IP-based hosted business communications solution, replacing legacy Centrex services for small and medium businesses. With IP Centrex, the service provider installs phones and other access devices in the customer premise and provides application services with a hosted software application that is centrally located in the service provider network operations center.

A significant business advantage for IP Centrex services is the reduced up-front costs for the business, eliminating the fixed costs of the switching equipment usually associated with premise-based IP-PBXs. IP Centrex services are usually sold as a per-seat / monthly subscription model, allowing businesses to control costs as they grow.

Compared to residential VoBB applications, SMB and enterprise IP Centrex deployments have many more subscribers across numerous networked facilities. As a result, carriers that offer IP Centrex services must support a much higher number of simultaneous calls and a greater level of reliability and survivability.

*Figure 3: IP Centrex*
In these applications, the AudioCodes Mediant™ 1000 MSBG provides the connectivity and point of demarcation between the carrier WAN and the enterprise LAN. The MSBG provides important security and survivability functions, including:

- Data Router – managing traffic between the service provider and the on-site data equipment or PCs
- SIP Aware Firewall – blocking malicious traffic and managing the pinholes in the firewall to match the negotiated ports for the RTP streams
- Stand Alone Survivability – enabling continued operation in the case of a WAN failure
- Local e911 – routing 911 emergency calls to a local PSTN line, ensuring that the emergency services arrive at the right location and in cases where the WAN is down

**SIP Trunking for TDM PBXs**

SIP trunking is exploding in popularity as a means to eliminate the cost of traditional T1 voice-only circuits and moving the voice traffic over a data circuit to a SIP trunking service provider. By combining physical facilities and consolidating traffic, the SIP trunking service provider can offer identical services such as legacy TDM T1 trunks, but at a fraction of the cost.

However, SIP Trunks cannot be directly integrated into the vast majority of the installed TDM PBXs. Integrating the two requires a media gateway to convert from SIP to the T1 format that is compatible with the PBX.

![Figure 4: SIP Trunking for TDM PBXs](image)

A significant business benefit of this strategy is that it allows the cost savings to be realized immediately and postpones/separates the decisions or costs associated with PBX replacement. This strategy also avoids purchases of expensive and special-purpose upgrades to an aging TDM PBX that will eventually be replaced. In many cases, waiting for the replacement of the PBX can cause months of evaluations, RFIs, departmental buy-in and securing credit. Avoiding these delays is important for reducing the time-to-close for service providers.

The AudioCodes Mediant 1000 is a prime example of a modular and scalable media gateway that converts from the SIP trunking service to a wide range of TDM protocols and physical interfaces. For very small analog-only installations, the AudioCodes MediaPack™ 11x line of analog media gateways is an alternative low-cost solution.
A significant advantage of this strategy is that if at some point in the future when the TDM PBX is replaced with an IP-PBX, the Mediant 1000 media gateway devices can be upgraded to a Mediant 1000 MSBG. Once upgraded, the MSBG will continue to play an important role in the IP-PBX interoperability, security and survivability (see below).

**SIP Trunking for IP-PBXs**

As customers begin to replace their TDM PBXs with IP-PBXs, the interface to SIP Trunks takes on new challenges, including:

- **SIP Interoperability** – does the IP-PBX interoperate with the SIP trunks today and in the future?
- **Security** – how will the enterprise and service provider protect each other from malicious attacks?
- **Survivability** – will the enterprise be able to make emergency calls in a situation where the WAN or SIP trunks are inoperable due to network or equipment failures?

**Figure 5: SIP Trunking for IP-PBXs**

The Mediant 1000 MSBG can solve these challenges and provide connectivity between the SIP trunking service provider and the enterprise IP-PBX. The MSBG provides important security and survivability functions, including:

- **Data Router** – managing IP data traffic between the service provider and the on-premise data equipment
- **SIP Aware Firewall** – blocking malicious traffic and managing the pinholes in the firewall to match the negotiated ports for the RTP streams
- **Enterprise-class Session Border Controller** – securing the interface between the enterprise and service provider and solving NAT traversal issues
- **Stand Alone Survivability** – enabling continued operation in the case of a WAN failure
- **Local e911** – routing 911 emergency calls to a local PSTN line, ensuring that the emergency services arrive at the right location or in cases where the WAN is down
- **Local Analog Devices** – including fax machines, credit card authorization machines, alarm panels and other devices that need an FXS port on-premise
Inter-Office Voice Networking (Dedicated Line Replacement)
Many distributed enterprises use dedicated TDM voice circuits or PSTN calling to make phone calls between their facilities. The cost of inter-office calling or dedicated circuits is frequently a significant portion of the total communications expenditures. At the same time, most distributed enterprises also depend on a data service provider supplied WAN that provides data connectivity between the various offices, facilitating point-of-sale and inventory systems.

By interconnecting the existing PBX or Key Systems at offices with AudioCodes media gateways, the data service provider can transport voice traffic over the WAN. This strategy benefits the business by eliminating the cost of dedicated TDM circuits and toll charges for inter-office calling. Advanced installations also utilize least-cost routing techniques to reduce the cost of off-network calling.

CPE Media Gateway Products
AudioCodes’ Customer Premise Equipment (CPE) products include a range in densities from very small two line Analog Telephone Adapters (ATAs) up to 16 T1/E1 circuit digital trunking gateways. The AudioCodes CPE line supports SIP, H.248 and H.323 (depending on the model); and are interoperable with over 100 different software applications from our eco-system partners.
MediaPack low-density products (depending on the model) support analog FXS or FXO lines, or digital ISDN BRI circuits. The mid-density Mediant™ 600 is a cost optimized digital media gateway that supports either eight ISDN BRI circuits or up to two digital T1/E1 circuits. The flexible and scalable Mediant 1000 is highly modular, using hot-swap modules that support a wide range of analog FXS/FXO, ISDN BRI, and up to four digital T1/E1 voice circuits. The Mediant™ 1000 also offers the unique Open Solutions Network (OSN) server, allowing customer applications to reside within the media gateway and enable "one-box" communications appliances. The Mediant™ 2000 addresses the high end of the CPE market with a scalable digital-only media gateway capable of up to 16 T1/E1 circuits.

The newest member of the family is the Mediant™ 1000 Multi-Service Business Gateway (MSBG). This platform integrates a number of separate devices, including WAN network access, router, firewall, session border controller, media gateway and application server into one compact and easy to install package. The Mediant 1000 MSBG solves many of the challenges that service providers and large distributed enterprises have been struggling with as they bring VoIP to the mass market.

**Carrier and High Availability Media Gateway Products**

Moving up in density, AudioCodes’ Mediant product line offers a complete family of Carrier and High Availability media gateways. With densities from 480 up to 16,000 channels, this product group fits into carrier core network infrastructure and large enterprise applications where density and reliability are important factors.

![MSBG](image.jpg)

*Figure 8: Carrier and High Availability Media Gateways*
Beginning with the Mediant™ 3000, AudioCodes also offers high availability features, including 1+1 and N+1 redundant gateway blades, dual power supplies, fans and network switches as required to serve the high reliability demands of large carriers.

**AudioCodes IP Phone Products**

AudioCodes 300 Series of HD VoIP enabled IP Phones offer a new dimension of voice call quality and clarity for the Enterprise and Service Provider markets. This product line enables AudioCodes to provide an end-to-end solution which relies heavily on the technological infrastructure and proven track record in providing state-of-the-art high quality VoIP products for Enterprise, Wireline, Wireless and Cable applications.

![Entry Level Model](310HD)
- LCD Display with backlight
- 2 x 16 characters
- 10 speed dial keys
- VoIPerfectHD™ functionality
- Speakerphone
- PoE or Power adaptor

![Premium Model](320HD)
- Graphic LCD Display
- 132 x 64 pixels
- 4 lines support with indicators
- 12 Speed Dial keys with Busy Lamp Field
- Headset Interface
- VoIPerfectHD™ functionality
- PoE or Power adaptor

![Executive Model](350HD)
- Color TFT LCD Display
- 480 x 272 pixels
- 6 lines support with indicators
- 12 Speed Dial keys with Busy Lamp Field
- VoIPerfectHD™ functionality
- PoE or Power adaptor

The 300 Series of IP Phones meets a growing demand for High Definition VoIP solutions in end-user phones and terminals, providing high voice fidelity, advanced security and features and enhanced user interface. The 300 Series of IP Phones are widely interoperable with numerous IP-PBXs, Softswitches and IP Centrex solutions.
AudioCodes Differentiators
These applications and many more leverage key AudioCodes points of differentiation:

- Superior Voice Quality – as demonstrated at the ETSI Speech Quality Test Event, where AudioCodes was the only participant to successfully pass all 12 rigorous tests
- Interoperability – validated and certified with over 100 industry leading software applications and PBXs, reducing integration time and complexity
- Security – support for SRTP and SIP over TLS, HTTPS and other industry standard security protocols allows for end-to-end security for sensitive applications in government, financial and healthcare industries
- Consistency – based on common core technology, AudioCodes’ products offer a consistent user interface, product feature set and broad interoperability across the entire line, from the smallest ATA all the way up to the largest carrier-class gateway. This dramatically reduces training and the time spent performing interoperability testing
- Scalability – a range of product densities and expandability enables managed and cost-effective growth
- Energy Efficiency – lower power consumption reduces operational costs for years to come
- Affordability – with a diverse range of products that fit in to almost every budget

More Information
For more information on these and other AudioCodes’ products, see:
www.audiocodes.com/products

To see a number of related case studies showing these deployment models in the real-world, see:
http://www.audiocodes.com/case-studies
About AudioCodes

AudioCodes Ltd. (NasdaqGS: AUDC) provides innovative, reliable and cost-effective Voice over IP (VoIP) technology, Voice Network Products, and Value Added Applications to Service Providers, Enterprises, OEMs, Network Equipment Providers and System Integrators worldwide. AudioCodes provides a diverse range of flexible, comprehensive media gateway, and media processing enabling technologies based on VoIPerfect™ - AudioCodes’ underlying, best-of-breed, core media architecture. The company is a market leader in VoIP equipment, focused on VoIP Media Gateway, Media Server, Session Border Controllers (SBC), Security Gateways and Value Added Application network products. AudioCodes has deployed tens of millions of media gateway and media server channels globally over the past ten years and is a key player in the emerging best-of-breed, IMS based, VoIP market. The Company is a VoIP technology leader focused on quality and interoperability, with a proven track record in product and network interoperability with industry leaders in the Service Provider and Enterprise space. AudioCodes Voice Network Products feature media gateway and media server platforms for packet-based applications in the converged, wireline, wireless, broadband access, cable, enhanced voice services, video, and Enterprise IP Telephony markets. AudioCodes’ headquarters and R&D are located in Israel with an additional R&D facility in the U.S. Other AudioCodes’ offices are located in Europe, India, the Far East, and Latin America.

International Headquarters
1 Hayarden Street, Airport City
Lod 70151, Israel
Tel: +972-3-976-4000
Fax: +972-3-976-4040

AudioCodes Inc.
27 World’s Fair Drive,
Somerset, NJ 08873
Tel:+1-732-469-0880
Fax:+1-732-496-2298

Contact us: www.audiocodes.com/info
Website: www.audiocodes.com

©2009 AudioCodes Ltd. All rights reserved. AudioCodes, AC, AudioCoded, Ardito, CTI2, CTF, CTI Squared, HD VoIP, InTouch, IPmedia, Mediant, MediaPack, NetCoder, Netrake, Nuera, Open Solutions Network, OSN, Stretto, TrunkPack, VoicePacketizer, VoIPerfect, VoIPerfectHD, What’s Inside Matters, Your Gateway To VoIP and 30X are trademarks or registered trademarks of AudioCodes Limited. All other products or trademarks are property of their respective owners.

Ref. # LTRM-09047 03/09 V.1