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INTRODUCTION

Service providers looking to adding VoIP capabilities and solution providers creating advanced telephony applications are turning to media gateways.

SOLUTION OVERVIEW

The TMG-3200 Media Gateway enables service providers to introduce VoIP services while maintaining the quality and reliability of traditional TDM networks. Solution developers can use it to offer advanced application-based services.

EXECUTIVE SUMMARY

Service providers looking to cost-effectively expand their network footprints or grow their value-added services offerings are turning to media gateways. Solution developers are using these devices to deliver new applications for their service provider customers. There are a number of important considerations to take into account when choosing a media gateway platform. Those organizations looking to adopt a media gateway would do well to consider the **TelcoBridges™ Tmedia TMG3200** media gateway.

INTRODUCTION

Many service providers are adding VoIP capabilities to their networks, either to reduce costs when interconnecting with other carriers, to cost effectively build out their network footprints, to introduce advanced new services, or simply to transport voice traffic across their IP backbones. This is best accomplished using a media gateway, which enables VoIP services by bridging voice traffic between the public switched telephone network (PSTN) and IP networks.

Solution developers are also using media gateways to create advanced new applications that combine real-time communications from the network with stored local data to provide new subscriber-specific services.

SOLUTION OVERVIEW

Part of **TelcoBridges' Tmedia** family of products, the TMG3200 media gateway is a high-density carrier-grade telecom appliance capable of bridging TDM and IP networks, intermediating between various wireless, PSTN and IP voice protocols, and delivering advanced services such as hosted IP-PBX, Fax over IP, and SIP trunking. Whether sitting at the network core or the edge, the TMG3200 media gateway offers service providers the ability to introduce VoIP into their networks while maintaining the quality and the reliability of traditional TDM networks. Solution developers can use the TMG3200 media gateway to quickly develop and deploy advanced application-based services.

Table 1 highlights a number of features and benefits provided by the TMG3200 media gateway.

Table 1: Features and benefits

Features	Benefits
High-density, providing up to 64 x T1/E1/J1, or 3 x DS3 or 1 x OC3/STM-1 in a single 1U chassis	- Low cost per port - Up to 66% rack and space cost savings
Simultaneously supports multiple SS7 and ISDN PRI signalling variants	Flexibility to interface with any TDM equipment and/or service provider
Supports redundant SS7 links to achieve a high-availability configuration	Increased system up time
Low 150 Watt power consumption	Low OPEX – up to 80 % cost savings - significantly improves ROI
Redundant hot-swappable AC or DC power supplies	99.999% system availability
Extensive support for wireline and wireless codecs	Ability to connect with any VoIP network

CHOOSING A MEDIA GATEWAY

There are a number of important requirements that a service provider or solution developer should consider when choosing a media gateway platform. As we discuss these selection criteria, which include such items as port density, TDM interfaces, VOIP Audio Codec Selection, and echo cancellation, we will also examine how the TMG3200 media gateway addresses those requirements. In addition, we will also take a moment to consider a couple of additional features specific to the TMG3200 media gateway: its application development and delivery as well as operations, administration, maintenance, and provisioning capabilities.

Port Density

High density solutions are a cost-effective answer to network scalability requirements.

Port Density

As network infrastructure grows and the requirements for VoIP increase, so do the number of media gateways installed and the space and the power they consume, as well as the complexity of managing a large number of devices. It is crucial in this case to extend the network infrastructure using solutions that offer high port density and the ability to scale seamlessly. In service provider networks, devices with high port densities will simplify management and maintenance operations, enabling significant and recurring savings in operational expenditures.

Offering the industry-leading highest port density and the lowest operating cost for a media gateway in a 1U form factor¹, the TMG-3200 media gateway easily scales as service uptake increases. It supports up to 64 T1/E1/J1, 3 DS-3 or 1 STM-1 interfaces to a total 2048 IP voice ports in a single-unit, and offers expansion cards for IVR, VOIP and TDM. With an average 2/3rds less power consumption than competing products of similar capacity, the TMG3200 media gateway also supports the drive by service providers to reduce the environmental impact of their network footprint and increase their green credentials.

TDM Interfaces

The ability to handle multiple interface types and signalling protocols adds flexibility to network deployment and maintenance efforts.

TDM Interfaces

Flexibility in the selection and deployment of TDM links and signalling protocols is a key characteristic of a carrier-grade media gateway. Service providers, whether providing local, long-distance or international voice services, are interconnected with a multitude of other service providers using equipment from various vendors, each using multiple interface and signalling protocols and their variants. Directly connected to the service provider's traditional TDM switches through T1/E1/J1, DS3 or STM-1 links that use SS7 and/or ISDN signalling, the media gateway converts the voice traffic to VoIP and the signalling to SIP to reach remote VoIP end-points. Carrier-class media gateways such as the TMG3200 provide the flexibility to enable multiple interface types and signalling protocols.

It is critical for service providers to be able mix these interface types within a single media gateway device such that they may rapidly establish new interconnections, without having to deploy new devices in order to adapt to new requirements. Furthermore, independently of the interface type, signalling protocols such as SS7 and ISDN PRI have multiple variants. These protocols may vary due to requirements imposed by standards bodies, regulatory authorities in certain countries and sometimes even by certain equipment vendors.

The TMG3200 media gateway simultaneously supports T1/E1/J1, DS3 and STM-1 interfaces. It also provides the flexibility to enable signalling protocols and variants on an interface-by-interface basis. In fact, the TMG3200 media gateway supports more than twenty SS7 signalling variants and more than fourteen ISDN signalling variants. These signalling protocols can be enabled dynamically while the device is in service, avoiding any downtime and eliminating the need for planned maintenance windows to apply a new configuration through a device reboot.

¹ An optional 2U form factor, featuring 2nd redundant power supply, is also available.

VoIP Audio Codec Selection

The ability to bridge between different voice audio encoders based on available bandwidth and desired voice quality ensures that customer requirements are met cost-effectively.

VoIP Audio Codec Selection

While a voice stream is digitally encoded using Pulse Code Modulation (PCM) at 64 kbps on TDM networks, voice may be encoded using a wide variety of audio coding techniques on VoIP networks. These voice encoders (or vocoders) provide various advantages in terms of bandwidth, voice quality, and resilience to network degradation. Service providers will adopt the use of one or more vocoders on their VoIP networks according to their specific requirements in order to save bandwidth, to provide a certain level of voice quality, or simply to interoperate with other VoIP devices.

The TMG3200 media gateway supports a wide variety of wireline and wireless vocoders, the most popular being G.711, G.723.1, and G.729ab as well as T.38, which is used to carry fax communications over a VoIP network. The TMG3200 media gateway provides up to 2,048 VoIP ports using any mix of these codecs. The TMG3200 media gateway provides the ability to dynamically select which vocoders to use for a given phone call; it can also dynamically modify the choice of vocoder to adapt to changing network conditions. Many other audio codecs are supported, such as iLBC, AMR, GSM-FR, GSM-EFR, among many others.

Echo Cancellation

The inherent nature of IP communications can adversely affect the quality of voice conversations. Echo cancellation ensures that they remain are intelligible while improves the overall quality of the communication.

Echo Cancellation

The voice processing and transmission delays introduced when carrying compressed speech over an IP network may cause an echo of the voice signal to be reflected and heard by the talking parties. This echo can be removed using echo cancellation techniques. These involve the recognition of the original voice signal and its removal from the transmitted voice signal which appears later with some delay. Echo cancellation not only ensures that voice communications are intelligible, but it also improves the overall quality of the communication. The most widely used echo cancellation technique on VoIP networks is ITU-T G.168. Although powerful and effective, the application of G.168 echo cancellation requires powerful processors in order to cancel echoes across a large number of channels simultaneously.

To overcome this challenge and permit the use of echo cancellation on all VoIP ports simultaneously, the TMG3200 media gateway implements echo cancellation in dedicated VoIP processors, instead of standard digital signal processors (DSPs). This allows the TMG3200 device to enable G.168 echo cancellation on all VoIP ports without having to reduce the total number of ports supported. For example, the TMG3200 media gateway can be used at its maximum VoIP port capacity with G.168 echo cancellation (128 ms tail) activated on all ports simultaneously. This guarantees the best possible voice quality for VoIP communications.

Additional features of the TMG-3200 Media Gateway

As we indicated earlier, the TMG3200 provides a number of features over and above its core media gateway functionality.

Application development & delivery

The TMG3200 media gateway can act as a platform for offering advanced telephony applications. The included **TelcoBridges Toolpack** application development platform helps deploy these types of feature-rich applications.

Application development and delivery

The TMG3200 media gateway offers the ability to serve up advanced applications that tie together real-time communications from the network with stored local data to provide unique subscriber-specific services such as unified communications, ring-back tones, and pre-paid/post-paid service. Leveraging the **TelcoBridges Toolpack** application development platform, the TMG3200's on-board application server, and built-in storage (choice of compact flash drive or SATA disk), the TMG3200 media gateway provides a low footprint approach to rapidly developing and deploying these types of feature-rich applications.



**Operation, Administration,
Maintenance & Provisioning**

TelcoBridges Toolpack solution also supports operations, administration, maintenance, provisioning (OAM&P) activities, without causing service disruption.

SUMMARY

Service providers and solution developers looking to drive IP convergence or launch new applications would do well to consider the **TelcoBridges Tmedia TMG3200** media gateway.

Operation, Administration, Maintenance & Provisioning

For expanded network footprints and new valued-added services to contribute positively to revenue and profitability targets, the service provider must maintain its reputation for uptime and availability during the introduction, operation, and maintenance of new solutions and the activation of new subscribers and their services. Keeping these challenges in mind, **TelcoBridges** has designed Toolpack OAMP, an operations, administration, maintenance, provisioning (OAM&P) solution. Packaged in an intuitive yet powerful user environment featuring one-click installation, Toolpack OAMP is a customer premise-based tool that enables the service provider to perform the initial set-up of the TMG3200 media gateway and any subsequent maintenance operations. These maintenance operations range from the simple, such as the collection of statistics and alarms, to the more complex, such as system configuration changes, the addition of new hardware or software components, and the application of software patches or software upgrades. Toolpack OAMP helps the service provider enhance its system capabilities through changes to capacity or capabilities, without causing service disruption.

SUMMARY

Service providers looking to cost-effectively expand their network footprints or grow their value-added services offering are turning to media gateways. These devices enable VoIP services by bridging voice traffic between the public switched telephone network (PSTN) and IP networks. Solution developers use these devices to deliver new enhanced subscriber applications.

Those organizations looking to adopt a media gateway platform would do well to consider the **TelcoBridges Tmedia TMG3200** media gateway. In addition to providing high port density and core media gateway functionality such as bridging TDM and IP networks and intermediating between various wireless, PSTN and IP voice protocols, and providing echo cancellation, the TMG3200 media gateway offers support for application development.

For more information on how the Tmedia TMG3200 media gateway can help transform your service offerings, visit www.telcobridges.com.

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ABOUT TELCOBRIDGES

TelcoBridges is clearly defining the future of communications technologies. By supplying the industry's best telecom platform, **TelcoBridges** is helping telecom developers and integrators of VoIP and TDM solutions realize their bright ideas. **TelcoBridges'** customers develop and deploy carrier-grade telecom solutions for some of the world's largest operators in over 45 countries. These solutions include: mobile value-added services, location-based services, video calling applications, network monitoring, media gateways, switching, IVR, unified communications solutions, and more. For additional information, please visit www.telcobridges.com.