

Consistent Performance on Access Devices

April 2012

Executive Summary

Service providers that used to offer enterprises and SMBs basic communication services around voice and data are now facing an increasing demand for more advanced services. As the workplace embraces popular trends such as distributed enterprises, remote workers, a mobile workforce and a growing number of small businesses, new data-intensive service offerings have emerged to accommodate these trends. Unified Communications, SIP Trunking, mobile VoIP, recording, and managed and hosted contact centers are some of the important services.

As a result there is an increasing concern among service providers and their business customers on how to ensure consistent performance in business networks that run many advanced applications. This white paper takes an in-depth look at the impact of these advanced services on the Multi-Service Business Gateways/Routers (MSBG, MSBR) used by service providers for enterprise connectivity, and how a multi-core architecture designed for consistent performance is key for successful delivery of advanced services.

The Demand for Integrated Services

In recent years, incumbent communications services providers have been experiencing an erosion of revenues from traditional voice services. The introduction of IP based communication technologies led to a dramatic decrease in voice call revenues. This trend, along with fierce competition in data connectivity services, has led to an overall decrease in the average revenue per user (ARPU).

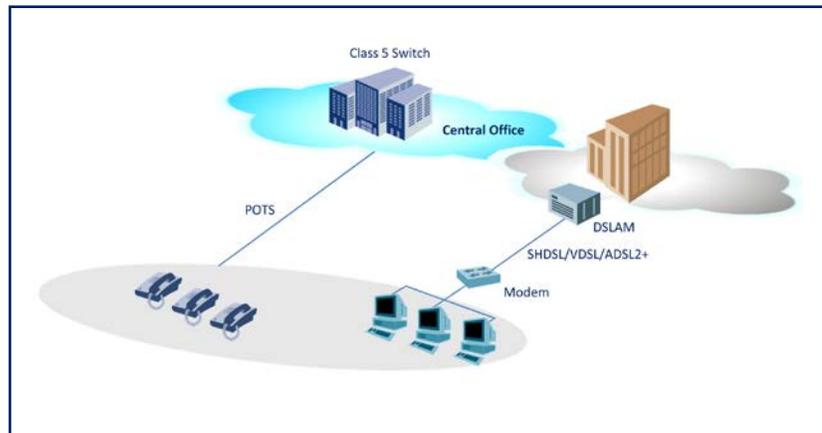
On the other hand, customers are expecting better voice quality and improved data connectivity with higher bandwidth. As a result, service providers are forced into investing in new technologies and augment their capital expenses (CAPEX).

Legacy SMB Communication Service Architecture

Carriers can use HDVoIP as a differentiator to increase call times and network usage, leading to higher Average Revenue per User (ARPU) and lower customer churn. Handling VoIP presents another challenge: that of how to deliver superior voice quality to users over complex data networks. Providers will use a SaaS-based quality monitoring management system to measure, monitor and track network activity to help optimize the Quality of Experience (QoE) of their VoIP services.

Voice services were delivered over legacy PSTN networks using analog lines or digital ISDN interfaces, and provided connectivity to the on-premise PBX. Data connectivity is provided by the service provider in various possible ways such as ADSL, SHDSL, Ethernet over Copper and Fiber. These services require an access device that provides the required connectivity.

Once these basic services are provided it is up to the enterprise to manage the additional IT and communication services. Such examples include firewall, enterprise router, inter-branch voice and data connectivity, redundancy and more. This requires the introduction of additional gear and equipment, usually from different vendors.



This inflection point reflects an opportunity for providers to start providing control and security services directly to the consumer. Providers will be able to offer consumers an “aspirational” lifestyle which is affordable and in return increase revenues from a managed service, improve customer retention and up-sell broadband access.

The Move to Integrated Solutions

The move towards SIP trunks creates an opportunity for service providers to bundle voice and data services on the same infrastructure. This allows service providers to offer advanced services and solutions either in the form of hosted services or on-premises managed services.

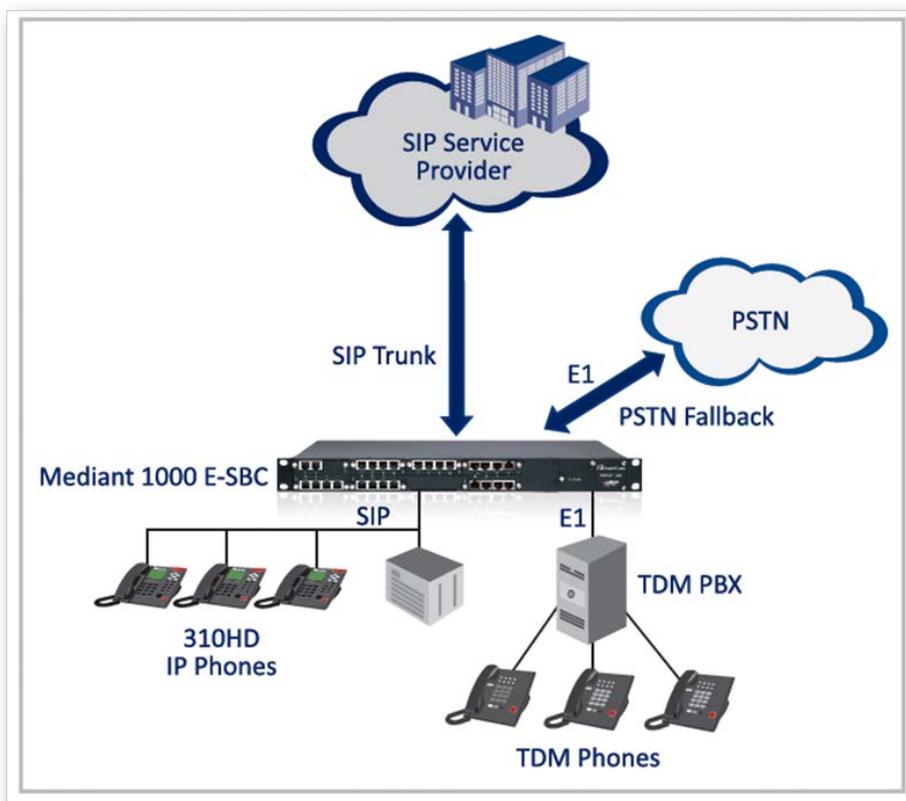
Offering these services using a single all-in-one solution appliance serves the SP targets of increasing its ARPU by introducing new services while reducing OPEX by using a single device to handle all connectivity, voice and data needs.

Voice Connectivity

Voice remains the basic means of communication for enterprises, however, the reliability and service availability promised using legacy PSTN networks must be maintained as networks are transitioning towards VoIP services carried over data lines using SIP trunks.

Enterprises today are using more than one network provider for voice communications with cases in which major business voice traffic is carried over non-regulated providers such as Skype and Google Talk.

Being the most important communication means for the majority of enterprises, it is expected that voice quality and continuity is maintained regardless of the rest of the data traversing the enterprise.



Video Communication

Video communication is ramping up – young people joining the workforce are more open to using this type of communication either through legacy video end points or through point-to-point networks and internet services directly from their workstations.

In addition, many businesses plan to adopt this type of communication with their customers (e.g., video enabled call centers). This symmetric and high bandwidth way of communication imposes additional stress on the traffic in and out of the enterprise. As in voice communication, users are reluctant to accept any visual impairment in their video communication sessions.

A Shift in Data Flow (Inside Out)

One of the common practices in enterprise data communication used to be that traffic was asymmetric in nature, where data download traffic (into the enterprise) was much higher than data upload traffic upload. This is not the case anymore. Upload traffic is increasing as more workers are becoming connected to the enterprise network from the outside and consume data which reside inside the enterprise LAN. This is the case for mobile workers carrying handheld data devices, and home workers who work remotely from their home offices and need to be connected to the enterprise data infrastructure.

Cloud Services

Unlike the traditional way of handling internal data, enterprises today are shifting towards cloud-based solutions such as storage, backup and even video conferencing. All of these services offered outside of the enterprise network impose additional bandwidth consumption on the WAN interface.

Implementing a ‘Consistent Performance’ Solution

Building an Incremental Solution

As enterprises face the challenge of adapting their communication infrastructure to meet these new challenges, some solutions in the market rely on adding components to the existing enterprise infrastructure. While this may provide a short term solution, the cost of ownership and the complication involved in managing additional devices make this approach less attractive to service providers.

The preferred solution is an integrated device which addresses all aspects of enterprise border connectivity and offers a single managed device offering WAN access, a router, firewall voice connectivity to legacy PSTN infrastructure and new SIP based communication services. All of these are provided by a single Multi-Service Business Router which needs to deliver all services with consistent and predictable performance.

The MSBR Incorporates Several Key Functions In One Box:

- WAN access
- Data router
- LAN switch
- VoIP Gateway that can also connect to legacy TDM and analog devices
- SIP normalization
- E-SBC & firewall
- Connection to multiple service providers to optimize the tariff rates
- PSTN fallback & life line
- General purpose server for running advanced applications

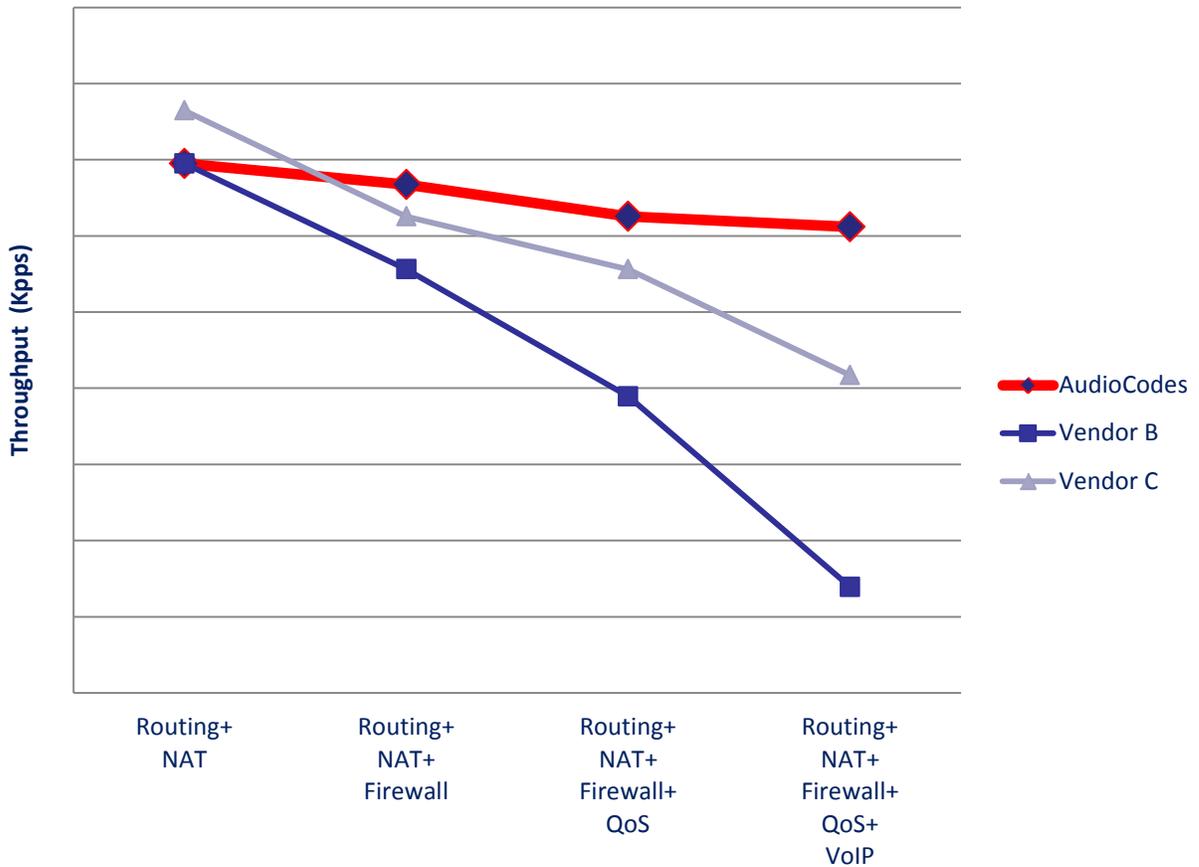
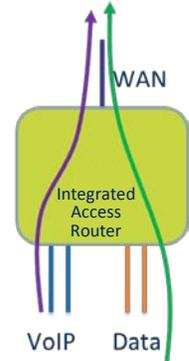
The broad functionality of the MSBR is valuable not just for supplying a single enterprise with many functions in a single box, but from a Service Provider's perspective, with even more value in enabling a single box to work in many different subsets of customer requirements, for instance, letting the Service Provider cover its customer base with fewer devices.

For example, an access router offering a WAN bandwidth of 10MB/s upload using SHDSL technology should maintain this performance when firewall service is activated. Voice continuity and adequate traffic prioritization should be maintained when a Session Border Controller (SBC) application is activated on the router.

Delivering a consistent and predictable performance is one of the service provider's key elements in upselling additional services to the enterprise customers without increasing CAPEX and OPEX costs.

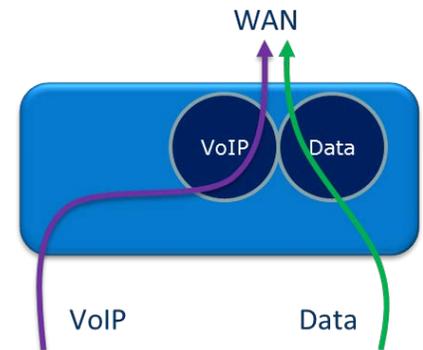
Multi-Core Processing in Integrated Devices

A simple Integrated Access Router is typically built around a single processor that is used to run all network related applications in a given business site. While it can make the device simpler and cheaper, using a single processing unit can drastically affect the performance of these applications when running in parallel. In particular, activating several advanced data services such as QoS, NAT and VPN and advanced VoIP services such as a media gateway, SBC, transcoding and SIP DPI can significantly reduce the total throughput of the device. The degradation in performance is illustrated by the gray and blue lines in the following graph, representing two models of single-processor:



To solve this issue and maintain high performance when running several Data and VoIP services in parallel, a few of the high-end MSBR devices use a multi-processor or a multi-core architecture. The idea is to utilize separate dedicated processors for different types of applications and services:

- Dedicated core for Data services
- Dedicated core for VoIP services
- General-purpose CPU for running advanced services such as conferencing, IVR, outbound calling
- Digital Signal Processor (DSP) for calculation intensive algorithms such as transcoding, echo cancellation and noise reduction



The resulting improvement in performance is demonstrated by the red line on the above graph. When running data and VoIP services in parallel, the multi-core MSBR maintains consistent data routing performance, regardless of which VoIP services were used. The multi-core MSBR also keeps a consistent VoIP session performance, while working in parallel to data routing, VPN and security applications.

About AudioCodes

AudioCodes Ltd. (NasdaqGS: AUDC) designs, develops and sells advanced Voice over IP (VoIP) and converged VoIP and Data networking products and applications to Service Providers and Enterprises. AudioCodes is a VoIP technology market leader focused on converged VoIP & data communications and its products are deployed globally in Broadband, Mobile, Enterprise networks and Cable. The company provides a range of innovative, cost-effective products including Media Gateways, Multi-Service Business Gateways, Session Border Controllers (SBC), Residential Gateways, IP Phones, Media Servers and Value Added Applications. AudioCodes' underlying technology, VoIPerfectHD™, relies on AudioCodes' leadership in DSP, voice coding and voice processing technologies. AudioCodes High Definition (HD) VoIP technologies and products provide enhanced intelligibility and a better end user communication experience in Voice communications.

©2012 AudioCodes Ltd. All rights reserved. AudioCodes, AC, HD VoIP, HD VoIP Sounds Better, IPmedia, Mediant, MediaPack, OSN, SmartTAP, VMAS, VoIPerfect, VoIPerfectHD, Your Gateway To VoIP and 3GX are trademarks or registered trademarks of AudioCodes Limited. All other products or trademarks are property of their respective owners. Product specifications are subject to change without notice.

Ref # LTRM-80034 04/12 V.1