APPLICATION NOTE

Microsoft Unified Communications Network Architectures

Introduction

With Microsoft gaining momentum as the standard office Information Technology (IT) infrastructure provider for data as well as for voice, Enterprises face many challenges in the migration from their legacy deployed infrastructure to the new Microsoft Unified Communications (UC) network. The challenges are in the design of an optimized network that offers converged voice and data, while minimizing the migration expenses by reusing the existing infrastructure.

A key component in the Microsoft UC network is the media gateway. The media gateway connects Microsoft Office Communications Server 2007 R1 & R2, Microsoft® Lync™ server 2010, and Microsoft Exchange Server 2007 & 2010 to the existing legacy telephony PBX and to the PSTN.

Enterprises face a migration challenge not only at the time of initial deployment of the Microsoft UC network, but also at subsequent upgrades of the Microsoft software versions where once again they wish to reduce migration expenses and protect the infrastructure investment rolled out in the past. The Enterprises goal in the Unified Communications version upgrades is to acquire the added functionality with minimum investments, achieving the upgrade by performing only software upgrades while avoiding hardware replacement.

The Microsoft UC network should be designed as a high availability network with branch office survivability and no single point of failure, ensuring service continuity and overcoming any malfunction in the network.

For each Microsoft UC products release, Microsoft has defined a list of Media Gateway types approved for use in their network and has detailed the functionality of each type.

AudioCodes

Microsoft GOLD CERTIFIED Partner

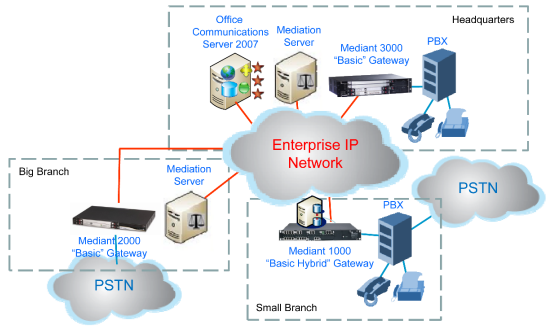
Exchange Server 2007 and Office Communication Server 2007 R1

With the release of Exchange 2007 and Office Communications Server 2007 R1 in 2007, AudioCodes was one of the few vendors to provide gateways for Exchange Server 2007 as well as for Office Communications Server 2007. In addition, AudioCodes gateways were one of very few gateways that supported both these Microsoft platforms simultaneously on the same gateway.

Media Gateway Types:

- IP Gateway for Exchange 2007
- Basic Gateway and Basic Hybrid Gateway R1 for Office Communications Server 2007 R1

Typical Network Layout - Office Communications Server 2007 R1



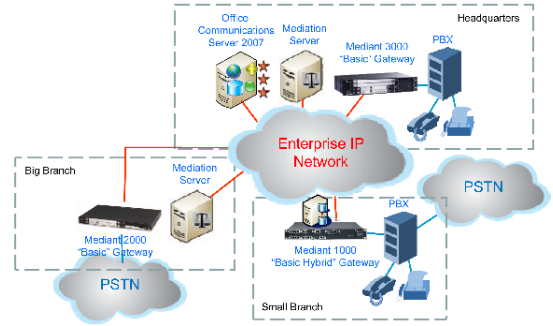
Office Communication Server 2007 R2 and Exchange Server 2007

With the release of Office Communications Server 2007 R2, which elevated the system to a 64-bit only architecture, AudioCodes adapted its solution to this architecture and has been delivering Office Communications Server R2-compliant gateways.

The Media Gateway types include:

- IP Gateway for Exchange 2007
- Basic Gateway & Basic Hybrid Gateway R2 for Office Communications Server 2007 R2

Typical Network Layout - Office Communications Server 2007 R2

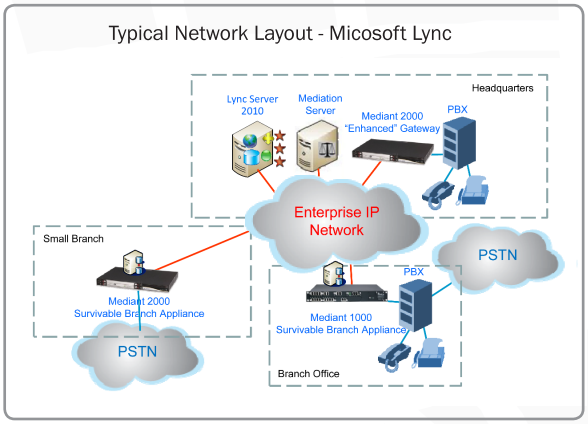


Lync Server 2010 and Exchange Server 2010

Lync Server introduces, for the first time a survivability solution for the Microsoft UC architecture. AudioCodes is one of the only vendors that support field upgradability from “Basic” and “Basic Hybrid” gateways to “Survivable Branch Appliance”. This is featured on both AudioCodes Mediant 1000 and Mediant 2000 Media Gateways, supporting Microsoft Lync Server.

The Media Gateway types include:

- IP Gateway for Exchange 2010
- Enhanced Gateway & Survivable Branch Appliance (SBA) for Microsoft Lync Server 2010



Summary of Microsoft Gateway Types

The Basic gateway and Basic Hybrid gateway are the gateway types supported by Microsoft for Office Communications Server 2007 R1 and Office Communication Server 2007 R2.

The difference between the Basic gateway and the Basic Hybrid gateway is in the location of the Microsoft Mediation Server:

- **Basic gateway** – the Mediation Server is located externally to the gateway
- **Basic Hybrid gateway** – the Mediation Server is hosted on the gateway platform

Microsoft® Lync™ introduces a new set of supported gateways, providing additional functionalities such as network survivability, load balancing of Mediation Servers for incoming calls, early media, forking, and SRTP.

For Lync Server, the gateway types are replaced as follows:

- **Enhanced Gateway** – replaces the Basic gateway
- **Survivable Branch Appliance (SBA)** – replaces the Basic Hybrid gateway

The Basic Gateway and Enhanced Gateway are supported on all AudioCodes Media Gateways, starting from the analog MediaPack 11x gateways, all the way up to the fault-tolerant, high density Mediant 8000 with 16,000 channels.

The Basic Hybrid Gateway and the Survivable Branch Appliance (SBA) are supported on AudioCodes Mediant 1000 and Mediant 2000 gateways. These gateways are shipped pre-equipped with a 64-bit CPU on the OSN Server and pre-installed with the Mediation Server or Survivable Branch Appliance software.

Therefore, with AudioCodes' solution, customers can use the same gateway hardware for all gateway types, and also remotely upgrade the gateway software from "Basic Hybrid R2" configuration to "Survivable Branch Appliance" with the Mediant 1000 and Mediant 2000.

Investment Protection

Capital expense savings and network design simplification

The migration from the legacy office network to the Microsoft Unified Communications environment, as well as the upgrades between Microsoft UC software versions can prove very costly if the existing deployed infrastructure needs to be replaced with new equipment. Enterprises strive to reduce migration expenses by minimizing the need to purchase new equipment and alternatively, re-use existing infrastructure. This can be achieved by overcoming the connectivity and interoperability challenges between the existing infrastructure and the Microsoft UC solution components.

Eliminate Replacement of Media Gateways

The migration from the legacy Enterprise telephony network to the converged Microsoft Unified Communication network requires either replacement of the existing TDM telephony infrastructure or the use of Media Gateways to converge the networks. The Enterprise's goal is to reduce its long term expenses by investing in convergence equipment that do not have to be replaced at later stages when the Enterprise grows or when Microsoft releases future versions that introduce new gateway architectures.

AudioCodes Solution:

AudioCodes Media Gateways provide ultimate investment protection. The same AudioCodes Mediant 1000 and Mediant 2000 platforms remain the basis for all flavors of the Microsoft gateways. These same gateways are also upgradable from Basic Hybrid R2 "Basic Hybrid" configurations to Microsoft Lync Survivable Branch Appliance (SBA) configurations with a software upgrade only.

Interface Modularity and Scalability

Mediant 1000

Mediant 2000

Support of different flavors of PSTN Trunking (E1/T1/BRI/FXO) and fax/analog phone connections on the same gateway

Enterprises migrating from legacy TDM office networks to the Microsoft UC architecture, deploy Media Gateways for connectivity between the IP and TDM/PSTN network components. Enterprises grow over time and want to avoid the necessity in replacing their existing media gateways with larger gateways or with gateways with other interfaces. Enterprises wish to retain their existing infrastructure, while simply adding interfaces to their already deployed gateways.

AudioCodes Solution:

AudioCodes family of Media Gateways for Microsoft UC applications offers a scalable solution, ranging from two analog ports all the way up to high availability gateways with 16,000 channels. AudioCodes gateways can meet the needs of every business size and application. Implementing AudioCodes gateways reduce operational expenditure (OPEX), since they are designed from the same core technology, reducing the need for redundant training, support and interoperability testing.

The Mediant 1000 is a modular gateway supporting a combination of FXS, FXO, BRI and E1/T1 interfaces, starting from four concurrent calls and growing up to a maximum of 120 concurrent calls.

The Mediant 2000 is a fixed digital gateway supporting a scalable pay-as-you-grow approach from 30 to 480 concurrent calls.

Connectivity of Existing and Price Compelling SIP IP Phones

Enterprises considering migrating to Microsoft UC face the price barrier of IP Phones, which can reach up to 70% of the overall system cost.

Connecting existing and new cost-effective non-Microsoft certified IP Phones to Microsoft UC using a certified Microsoft protocol interface

Today, many Enterprises already have deployed IP Telephony systems for which they have acquired IP Phones. These phones are relatively new investments to the Enterprises, who want to avoid replacing these IP Phones with new expensive Microsoft-compliant IP Phones.

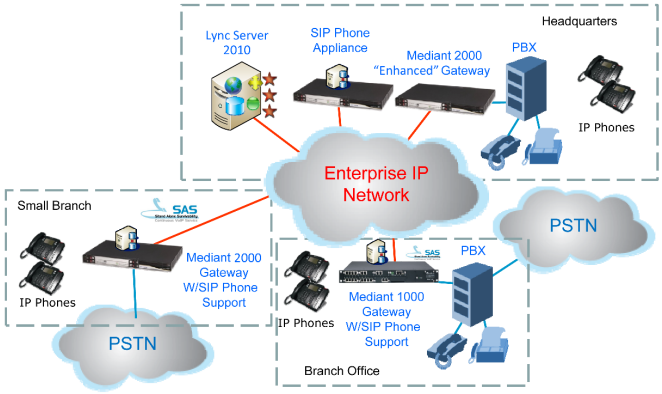
Enterprises without an existing install-base would want to deploy cost-effective IP Phones and avoid deploying expensive, Microsoft-compliant phones.

AudioCodes Solution:

Enterprises with existing IP Telephony deployments can reduce their migration expenses to Microsoft UC, by implementing AudioCodes SIP Phone Support (SPS) solution to integrate their existing IP Phones into Microsoft Office Communications Server and Lync Sever networks.

Enterprises without IP Phones can reduce migration expenses to Microsoft UC, by deploying AudioCodes cost-effective, high-quality 300HD series IP Phones, or alternatively, by integrating cost-effective IP Phones from other vendors into the Microsoft Office Communications / Microsoft Lync environment.

AudioCodes SPS and 300HD IPPhone Series in Microsoft Lync Network



AudioCodes SPS solution enables the integration of standard SIP phones directly into the Microsoft environment, using the SIP-to-SIP functionality that is embedded in AudioCodes' Media Gateways. The AudioCodes gateway translates between the standard SIP implementation used by most industry standard IP Phones and the Microsoft-specific protocol implementation of the IP Phones.

AudioCodes 300HD IP Phone family is designed to support many of the unique Microsoft features such as the Microsoft proprietary CODEC - RTA narrowband and wideband, Microsoft presence information, and many more.

Connectivity of Existing Legacy Analog Devices

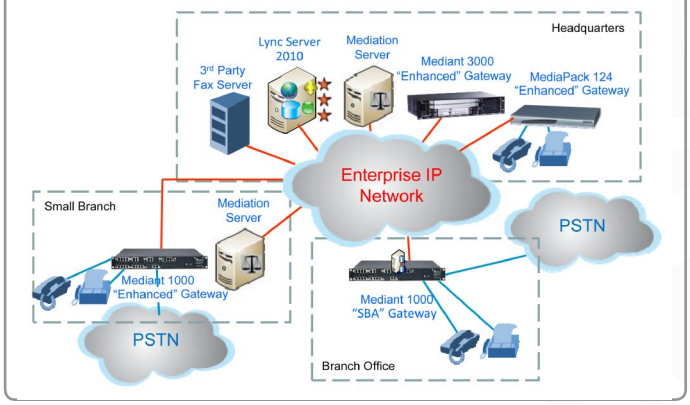
Legacy analog equipment does not need to be replaced when migrating to the Microsoft UC environment. Instead, it can become a part of the Microsoft network, connected through Media Gateways. Enterprises migrating to the Microsoft environment as a PBX replacement need support for their analog devices such as phones, faxes, and modems. Lync Server 2010 now offers this feature.

Maintaining investment in existing phones, fax machines and modems

Fax support is another important issue in the Microsoft environment. Microsoft Exchange Server 2010 does not support fax termination (which was supported in Exchange 2007), but Enterprises still need the ability to send and receive faxes with their fax machines.

AudioCodes gateways support of combined analog and digital interfaces,,together with the support of intelligent fax recognition and routing, offer the support of analog devices in the Microsoft network. The support of analog devices can be provided without deploying new Media Gateways, since analog modules can be added to the already deployed AudioCodes Mediant 1000 gateways.

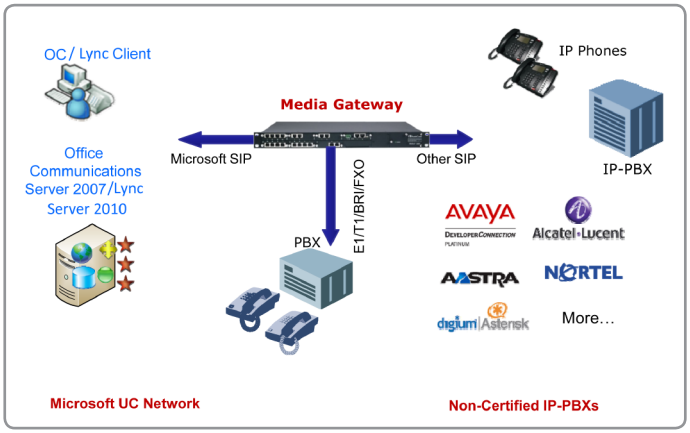
AudioCodes Connectivity of exsisting analog devices in Microsoft Lync Network topology



Interoperability of Microsoft Office Communications Server to "Non-Certified" Equipment and Networks

Most of today's deployments of Microsoft Office Communications Server and Microsoft Lync Server involve the coexistence of Office Communications Server / Lync Server with legacy PBX/IP-PBX, requiring connectivity and interoperability with the two systems.

Easy connection to any PBX (IP to TDM) or IP-PBX (IP to IP)



Most Enterprises with a deployed PBX/IP-PBX will continue using their PBX/IP-PBX and will require connectivity to the Microsoft environment. Connecting TDM PBXs to Office Communications Server / Lync Server is always done through a Media Gateway. The connectivity of existing IP-PBX to the Microsoft environment can also be achieved through a Media Gateway, saving interoperability efforts typically required between the IP-PBX manufacturer and Office Communications Server / Lync Server. The completion of interoperability that is required between the existing IP-PBX and Office Communications Server / Lync Server is a lengthy process that can be reduced by using a Media Gateway that is already interoperable with both network components.

AudioCodes Solution:

One of AudioCodes major strengths is its impressive interoperability list between AudioCodes Media Gateways and leading PBXs, IP-PBXs, legacy phones and other telephony equipment.

The advantage of AudioCodes Media Gateways being fully interoperable and certified by Microsoft as well as by most telephony equipment vendors in the market makes it ideal to use for fast-and-easy integration of Microsoft UC with almost any existing telephony equipment at the Enterprise.

Leading PBX manufacturers such as Alcatel-Lucent with their Omni-PCX Enterprise edition have chosen to use AudioCodes IP-to-IP gateways to connect to the Microsoft environment, instead of building direct SIP interoperability with Microsoft themselves, gaining quick time-to-market and investment protection in existing PBX hardware and software.

SIP Trunking

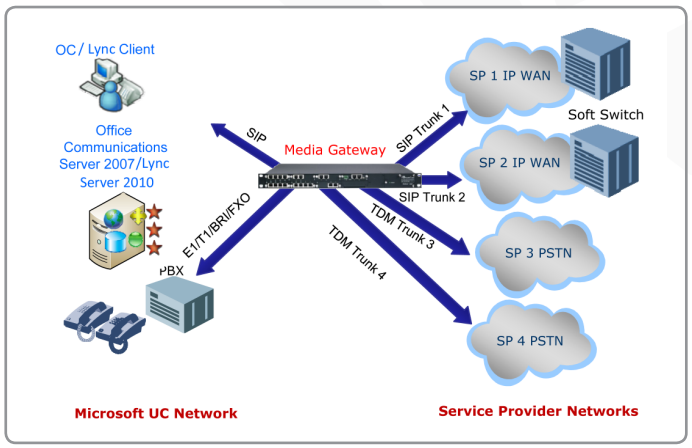
As Microsoft enters the UC world, it faces challenges to connect Office Communications Server / Lync Server to the telephony network, verifying interoperability and certifying the Office Communications Server / Lync Server with various SIP Trunking service providers worldwide.

Operation cost saving using SIP Trunking connectivity to Service Providers

AudioCodes Solution

AudioCodes Media Gateways have been certified and deployed by many PSTN and SIP Trunking service providers worldwide, offering full interoperability.

Enterprises can shorten the Microsoft UC deployment cycle by eliminating the need for Microsoft to complete the interoperability certification with their service provider. By implementing AudioCodes Media Gateway for connectivity between the Office Communications Server / Lync Server and the service provider, Enterprises can achieve immediate interoperability.



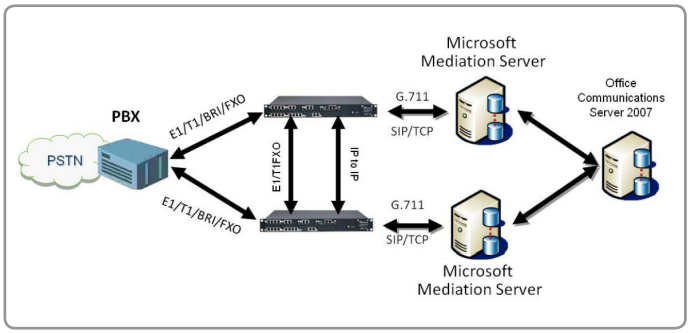
AudioCodes Media Gateways also offer simultaneous connectivity to several PSTN and SIP Trunking service providers, providing least cost routing and redundancy.

Design of High Availability Networks

Many Enterprises deploying Microsoft UC require that their networks are fault tolerant and fully redundant. As such, they need to plan their solution to include no single point of failure, to ensure phone call flow to and from the organization at all times.

Redundancy - Crossover Gateway Resilience

PSTN-VoIP network connectivity for Microsoft Office Communications Server involves three distinct components: Microsoft Office Communications Server, Microsoft Mediation Server, and a Media Gateway. All three components can be duplicated to allow fault tolerance, but even a fully duplicated configuration using standard "Microsoft Certified" Media Gateways may not ensure service continuity in all failure scenarios.



AudioCodes Solution

Implementing AudioCodes "Crossover Gateway Resilience" in Microsoft UC network provides a solution for all failure scenarios, including both Medition Server and PSTN trunk failures, whereas typical configurations will either drop all calls or result in 50% call capacity reduction.

AudioCodes unique "Crossover Gateway Resilience" feature allows Microsoft UC customers to deploy a fully redundant PSTN connection in their system, covering all failure scenarios and maximizing the utilization of PSTN trunks, without the need to change PBX configurations.

AudioCodes "Crossover Gateway Resilience" is a redundancy scheme that includes various"crossover" paths of sophisticated call routing, as well as PSTN Fallback and IP-to-IP call routing, in parallel to traditional PSTN-to-IP call routing. It is a fully redundant solution with no single point of failure. An added benefit is the fact that there is no need to change the configuration of the Enterprise legacy PBX or PSTN service parameters.

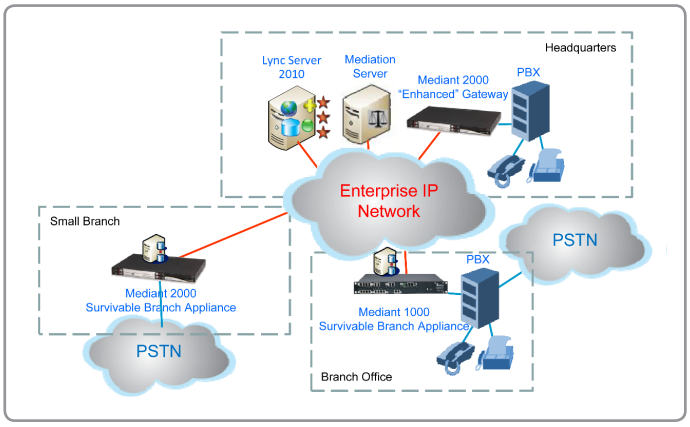
Branch Office Survivability with Survivable Branch Appliance

Enterprises require that their telephony system be available at all times, with zero tolerance downtime. They expect the Microsoft network to offer a survivability mechanisms that will ensure telephony connectivity also upon WAN failure.

Support for SIP phone backup during WAN failures

Microsoft has introduced the Survivable Branch Appliance (SBA) with Lync Server 2010.

Achieving the survivability goal in Microsoft UC deployments with prior releases to Lync Server 2010 is challenging, since Microsoft did not offer survivability mechanisms. This places the risk of call discontinuity upon WAN failure scenarios, as branch office IP Phones and Office Communicators are connected remotely over the WAN to the Office Communications Server located at the headquarters.



AudioCodes Solution:
AudioCodes Media Gateways, the Mediant 1000 and Mediant 2000 meet the SBA requirements, by running the Microsoft SBA software on AudioCodes OSN server integrated in the Media Gateways.

SBA deployment on AudioCodes gateways offers several competitive advantages:

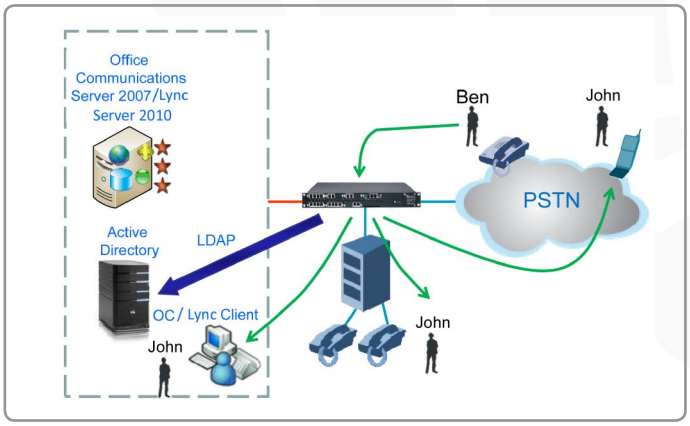
- **Gateway Stability and Reliability -** Unlike most gateways in the market which encounter stability problems caused by running their gateway software and the Microsoft SBA software on a single general purpose server, AudioCodes Mediant 1000 and Mediant 2000 Media Gateways host the Microsoft SBA software on a separate, dedicated platform

- **Interface Flexibility and Modularity -** Audiocodes Media Gateways offer a modular scalable design with a variety of interfaces including FXS, FXO, E1/T1, and BRI

Prior to Lync Server 2010, customers can use AudioCodes "Stand Alone Survivability" (SAS) feature to support survivability for selected standard SIP IP Phone users. Implementing a combination of a centralized SIP Phone Support (SPS) server and AudioCodes SAS at the branch office, customers can save on the cost of SBAs, enabling survivability of standard SIP IP Phones connected to the Microsoft environment.

Active Directory - Easy User Migrtion to Microsoft Unified Communications and Destination Redundancy

Enterprises deploying Microsoft UC typically use Microsoft's Active Directory to perform a phased and gradual migration of their users from the existing legacy telephony system to the new Microsoft environment, routing calls to various destinations according to the information stored in Active Directory.



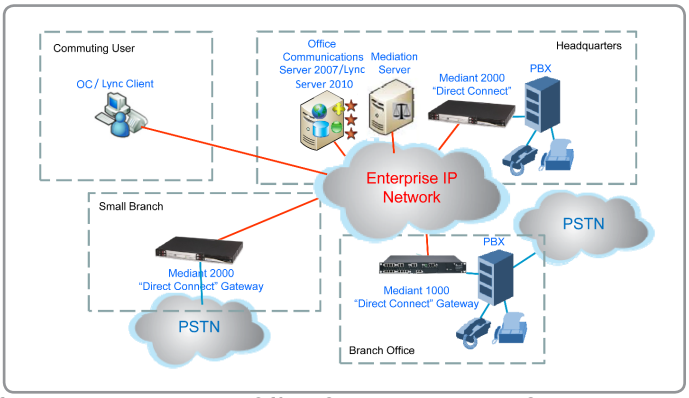
The importance of the use of Active Directory after the completion of the migration phase is in the redundancy that it provides. Upon any subsystem failure, the network can route calls to an alternative destination number based on Active Directory, providing redundancy in reaching the user.

AudioCodes Solution:

Active Directory Lookup is embedded in AudioCodes' gateway SIP Stack for the two applications - Routing and Redundancy. AudioCodes products support the combination of all these protocols, allowing for full security and encryption of multimedia transport between the Enterprise branches over the Service Provider network.

"Direct Connect" Gateways - Microsoft UC Implementation without Mediation Servers

Enterprises seek to reduce the cost of migration to Microsoft UC solutions. An expensive component in the traditional Microsoft UC deployment is the Mediation Server, which is installed at Enterprise headquarters and at each branch office.



Eliminating the need for Mediation Servers or even reducing the number of deployed Mediation Servers can dramatically reduce the cost of implementing the Microsoft solution.

AudioCodes Solution:

AudioCodes Media Gateways can be configured for "direct connect" to Office Communications Server / Lync Server. In this setup, the gateways communicate directly with Office Communications Server / Lync Server without requiring the intermediation of a Mediation Server.

This configuration does not require Mediation Servers, but mandates that all of the gateways reside on the same IP domain without NAT being used. In addition, the support of calls destined to the PSTN from commuting users requires a single Mediation Server at the headquarters.

AudioCodes "direct connect" gateways significantly reduce the cost of the Office Communications Server / Lync Server network deployments, by eliminating the need for deploying Mediation Servers at the branch offices.

Worldwide PSTN Homologations

Direct PSTN connectivity in any country

With customers migrating from legacy telephony to a pure Microsoft UC environment, Office Communications Server / Lync Server are changing thier roles from co-existing with the legacy PBX/IP-PBX to replacing it entirely by providing full PBX/IP-PBX functionality. In this new offering, Office Communications Server / Lync Server needs to connect directly to the PSTN, through a Media Gateway. The direct connectivity of Office Communications Server / Lync Server to the PSTN through the Media Gateway changes the requirements of the Media Gateway, from interoperating with the TDM PBX to interconnecting directly to the PSTN. This new network configuration requires PSTN homologations of the Media Gateway in all countries in which Office Communications Server and Lync Server are deployed.

AudioCodes Solution:

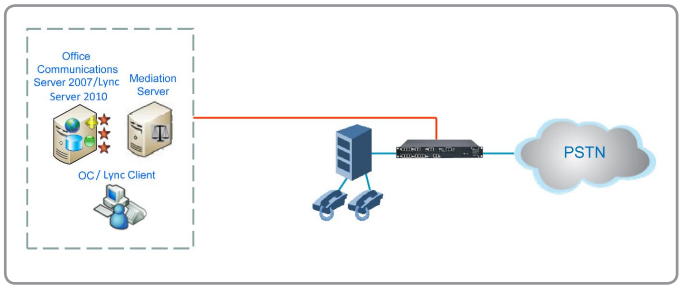
AudioCodes' Media Gateways are deployed and successfully homologated in over a hundred countries

Drop-and-Insert Configuration

Savings in expensive legacy PBX upgrade and maintenance

In Common Network architectures, Microsoft Office Communications Server coexists with the legacy PBX. In such an architecture, the legacy PBX is connected to the PSTN network and the connection to Office Communications Server / Lync Server requires an upgrade to the legacy TDM PBX with an additional expensive trunk card and reconfiguration of the PBX routing rules to accommodate the new network configuration.

These hardware and software changes to the legacy PBX are typically very expensive, both from CAPEX and OPEX point of views.



AudioCodes Solution:

AudioCodes Media Gateways support Drop-and-Insert configuration, allowing connection to the Office Communications Server / Lync Server with the legacy PBX, eliminating the need for any PBX hardware or software changes. Thus, AudioCodes offering provides full investment protection and avoids any unnecessary investments.

In the Drop-and-Insert configuration, the gateway is connected between the PBX and the PSTN, interfacing between the PBX and the PSTN network, and thereby avoiding the need for an additional PBX Trunk or the reconfiguration of the PBX routing rules.

Another important advantage of this configuration offering is the full survivability of the network that it provides. This is achieved by a metallic relay mechanism embedded in the gateway that connects the PBX directly to the PSTN during the improbable case of a failure in the gateway.

Single Manage Point of Demarcation

Enterprises that are planning to upgrade their voice and data infrastructure will benefit from the integration of all required network edge services into one single platform. These Enterprises can integrate the WAN Access Device, Router, Data Firewall, Media Gateway and Session Border Controller functionalities into a single device connected to the SIP Trunking Service Provider network.

All-in-One Box reducing CAPEX and simplifying maintenance and managment

AudioCodes Multi-Service Business Gateways are ideal for this application. They integrate all the above mentioned functionalities into a single, integrated device, saving both capital and operational expenses,while making the life for the Enterprise, as well as the Service Provider, much easier.

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, Cable, and Enterprise networks. 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.

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

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