Microsoft

Integrating Telephony with Office Communications Server 2007

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Microsoft® Office Communications Server 2007

Abstract

This paper defines in detail Microsoft's strategy and approach to an enterprise's integration of its telephony systems with Office Communications Server 2007. Progressively more detailed levels of technical information are included to provide readers in various disciplines an understanding of the integration that we are striving to achieve.

In order to address the needs of our diverse customer base, we have defined several deployment scenarios and each is described in detail, including high-level feature descriptions, migration paths and call flows. A broad ecosystem of partnerships has been created to facilitate the deployment scenarios and to smooth the path to deployment and integration. Programs to support these partnerships have been implemented and these are also described. Information that is dynamic in nature is maintained within web pages on http://www.microsoft.com and will be supported by links to partner web sites.

This paper is written as a supplementary text to various other documents which describe Microsoft's unified communications strategy, value proposition, features and functions. Please refer to those documents for further information.

The intended audience for this paper is Microsoft customers, partners and the industry at large. A glossary of terms is included in the appendices for those unfamiliar with some of the terminology in this paper.

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Introduction

On June 26th, 2006 at a Strategy Day event held in San Francisco, Microsoft stated its intention to enter the emerging unified communications product space with software technology that would be based on earlier releases of Microsoft® Exchange Server, Microsoft® Office Live Communications Server and Microsoft® Office Communicator. With the release of Microsoft® Exchange Server 2007, Microsoft® Office Communications Server 2007, and Microsoft® Office Communicator 2007, Microsoft's unified communications platform delivers streamlined communications for enterprise users that enables them to find the best way to communicate directly from the applications they use most (e.g. Microsoft® Office Outlook®). The concepts of context-based, person-centric collaboration that shipped with Live Communications Server 2005 and Microsoft® Office Live Meeting 2005 are now tightly integrated with multi-modal communications using voice, video, web-conferencing and instant messaging.

For over 100 years, telephony has played an increasingly important role in business communications. With the advent of mobile networks, the ability to communicate in almost any location and situation has increased the reliance of business users on telephony. Clearly unified communications means, above all else, the integration of telephony with other important forms of communication to provide streamlined communications for business users. Therefore, telephony integration is a critical component of Microsoft's unified communications strategy.

When considering the integration of telephony with IP-based communications in a business environment the thought "**easier said than done**" will occur to many readers. The telephony world is highly regulated, with every national government playing a role in regulation of telephony service providers, telecom devices, and, in some cases, telecom technology standards. Many different national networks operate on various dialects of telephony standards and many countries require that vendors have their telecom products certified by the national telephony authorities. Some telephony business markets have undergone deregulation over the last 20 years, but this has added complexity by increasing the number of vendors and service providers, all of whom have made different product and technology choices.

As a consequence of the situation described above, enterprise telephony has become increasingly complex in terms of architecture and feature functionality as well as its integration with business processes -- e.g., call centers. Today, the average enterprise of at least moderate size and age owns multiple installations of PBX spanning several generations of technology. Furthermore, companies that have expanded by acquisition often have several different vendors' products in their communications infrastructure. Personal habits, operational preferences and the inherent limitations of telephony and the traditional telephone form factor have created a myriad of features and functions that are addressed more intuitively within unified communications.

We have built a number of strategic partnerships with vendors who provide much of the current enterprise telephony infrastructure. These partnerships are critical to successfully integrating Office Communications Server 2007 with enterprise telephony systems. We have engaged in technology exchanges with these partners and we continue to work with them to validate the interoperability of our respective solutions. Additionally, to provide broad coverage for the spectrum of telephony solutions in which our customers have already invested, we are establishing and participating in broad interoperability verification programs.

Complexities notwithstanding, the integration of enterprise telephony systems with unified communications is an imperative. Office Communications Server 2007 delivers software-powered VoIP functionality that works with enterprises' existing messaging and telephony infrastructure and can adapt to changing business needs. With Microsoft's customers around the world numbering in the hundreds of millions, we face an integration challenge that spans the entire spectrum of telephony. Microsoft's Unified Communications Group (UCG) has carefully considered various options to integrate with the telephony world and a necessary part of our strategy has been to simplify the telephony interface as much as possible. This paper details for our customers, partners and the industry at large the approach that we have defined and the various programs that we are putting in place to support this strategy.

Microsoft and Telephony Partners

Microsoft works with a broad range of partners to enable the unified communications vision, including those in the telecom industry most impacted by the emergence of unified communications products and solutions, namely the gateway and PBX vendors.

Voice communication has long been a siloed activity within the enterprise; it has been purchased, provisioned and managed separately from the rest of the IT infrastructure. Convergence has seen three basic waves of change in this view. The first wave combined voice and data traffic on backbone networks. Later, IP PBXs allowed for that traffic to be combined at the desktop level. The final wave, represented by unified communications, integrates voice with other communications methods and data at the application level.

This transition has profound implications for vendors in this area, both technologically and from a business perspective.

On the technology front, the integration of voice means that the standalone box known as a PBX ceases to exist as an independent silo, and the monolithic, vertically-integrated functions therein have been disaggregated and replaced by a set of services that live in a highly distributed model borne over an IP network. Many of these services, such as directory or presence services, no longer exist as separate for voice communications, but rather subscribe to those services which already exist within IT, such as email, IM, policy and security. Increasingly the new world begins to assume roles and attributes from the PC eco-system, which is not vertically integrated, but consists of a number of key world-class vendors who provide the horizontal platforms and capabilities. Independent Software Vendors (ISVs) build applications and add value on top of those platforms; peripheral vendors add functionality through devices.

In the fullness of time, communications will become a truly universal and standards-based network, and it will be a plug-and-play experience. But for the foreseeable future, there will continue to exist many forms of voice technologies, protocols, standards and regulatory environments in which interoperation and co-existence is required. The installed base of PBXs is massive, and the business users of those systems expect their investments to be protected. The expertise the telecom vendors have amassed over the years uniquely positions them to provide integration leadership, both in products and in consultancy.

The opportunities will also expand as unified communications enhances workflow, becoming more integrated with line-of-business processes and applications. Once again, many of these vendors have deeply established market positions within certain verticals and this competence will apply directly to unified communications.

Building applications which are well integrated with Microsoft platforms, in particular Exchange Server 2007 and Office Communications Server 2007, will provide a rich functional base and the potential for broad market adoption for value-added capabilities. We will also work on developing the right distribution and support models which will compliment Partners' expertise and jointly train our channels on voice and core Microsoft technologies for unified communications.

Intermediation of Telephony

As has already been stated in this paper, the complexity of the telephony infrastructure is a major issue that we have had to consider in determining our strategy. Furthermore, as a later entrant into the telephony space, there are certain required areas of engineering expertise that we do not possess and we do not see those areas as an opportunity to innovate and differentiate. This, coupled with the fact that customers have already made significant investments in their telephony infrastructure, has led us to conclude that it is better for us to interoperate with existing telephony elements via Internet Protocol technologies than make our own investments in telephony protocols.

Microsoft's Unified Communications Group is already a leader in next-generation communications – using SIP, SIMPLE and Real-time Protocol (RTP) media technologies. Live Communications Server 2003 & 2005, Office Communications Server 2007 and Office Communicator 2007 have set the bar for enterprise grade communications solutions with significant innovations and advancements in the areas of:

- Intuitive user experience
- Multi-modality (e.g. voice, video, text messaging, web collaboration)
- Ad-hoc multi-party, multi-modal conferencing
- Integration with business applications
- Rich Presence
- Mobility
- Security
- Regulatory Compliance
- Scalability
- Total Cost of Ownership (TCO)
- Operational Control

Delivering these innovations has required that we adopt the latest standards and technologies in our software; we have also often found it necessary to push the boundaries of the state of the art beyond what is currently generally deployed. Some examples of these technologies are:

- The use of Transport Layer Security (TLS) to encrypt SIP messages to facilitate more secure signaling
- The use of Secure Real Time Protocol (SRTP) to encrypt media packets to facilitate private conversations
- The use of a broad range of SIP methods and headers defined in various IETF RFCs to facilitate a rich set of feature functions required of an enterprise grade communications platform
- The early adoption and deployment of the emerging ICE standard for Media/NAT traversal to facilitate the mobility of clients outside the enterprise network
- The creation of advanced Real-time Protocol codecs that deliver a high quality audio experience by providing resilience to bandwidth congestion and other adverse network conditions that can be found on the public Internet
- The early use of draft standards to facilitate ad-hoc multi-media real-time conferencing
- The use of the inherent functions of the Windows Server platform to provide a seamless management and monitoring experience

When we examined the telephony market we found that, while many vendors had made initial investments in next-generation communications using SIP and RTP, the technology implementations were often several generations behind those being utilized in Office Communications Server 2007. One example of this is that few of these elements supported TCP as a SIP transport protocol even though this was part of the original SIP specification, IETF RFC 2543, which was ratified in March 1999. Even fewer vendors support SIP over TLS which was specified within IETF RFC 3261 in June 2002; as stated above, our clients and servers use this method to encrypt SIP traffic. Therefore, a consequence of Microsoft's progressive standards support and innovation is that our Clients and Servers do not interoperate with some SIP-based telephony elements.

One interoperability option that we considered was that our clients and servers could be adaptive and could interoperate with telephony elements at the level of technology that they were able to support. The disadvantages of this approach were that:

1. The value of our advanced features in the areas of security, audio quality, mobility and network resilience would be nullified when a user makes a PSTN call

2. The mechanism within SIP that would enable this (i.e. the SIP OPTIONS method) was not generally supported within telephony elements

3. The test matrix of multiple Microsoft clients and servers being tested against each of the thousands of proprietary incremental telephony elements would be unmanageable

A second option that we considered would be for the Microsoft Unified Communications Group to issue specifications that would enable partners to implement the features that we had implemented. The disadvantages of this were that:

1. When we started planning for the unified communications products in 2005, we did not have a clear sense of the feasibility of influencing partners' development roadmaps (particularly in such a significant way) in order to facilitate interoperability with our clients and servers

2. Since we knew how much time and effort it took for us to implement these mechanisms, we knew that partners' implementation timelines would be a gating factor on customers being able to take advantage of the value of Microsoft unified communications.

3. Many of Office Communication Server's innovations require significant CPU cycles (e.g. encryption, bandwidth variable codecs, etc.) and the hardware in currently deployed telephony elements is often inadequate to support this processing load in addition to the currently supported functions. Causing customers to conduct the required "fork-lift upgrade" to address this issue is clearly counterproductive to our efforts to gain widespread deployment of Office Communications Server and Office Communicator.

A third option that we considered was to provide a "front end" element that would:

1. Intermediate signaling and call flows via a back-to-back-user-agent (B2BUA); including adding or removing elements of a SIP transaction that were not supported by most telephony elements

2. Transcode RTP media flows from traditional codecs such as G.711 to our advanced audio codec: Real-time Audio (RTAudio).

3. Act as an ICE client to enable PSTN-originated media flows to traverse intervening NATs and firewalls.

4. Enroll in the management, monitoring and provisioning scheme (leveraging familiar management technologies such as WMI, MMC, AD, and System Center) to extend our seamless management functions to the PSTN and PBX

A fourth option would be to implement any combination of the first 3 options. This was immediately discarded for reasons of cost and complexity (for Microsoft, our partners and customers) as well as the lack of certainty that the combination approach would actually work in any given situation.

The third option is the most effective from a pragmatic standpoint as described above and was selected as the only option which would not only work across the board, but also allow us to quickly bring solutions built using Office Communications Server 2007 to our customers. The element that fulfills the telephony intermediation function has become the Office Communications Server role of Mediation Server. Furthermore, when we analyzed the initial purchase cost of Mediation Server, we came to realize that this was very small in comparison to the initial purchase cost other adjacent telephony elements; i.e. an IP-PSTN Media Gateway or a forklift upgrade to an IP-PBX.

Refinements to the intermediation strategy in the 2007 release as well as later releases will significantly reduce this cost to a negligible level. As described later, we are making it possible for partners to ship Mediation Server to run on Media Gateways, rather than installed on a separate server element. Other strategic refinements are under consideration, including expanding the role of Mediation Server to handle such things as:

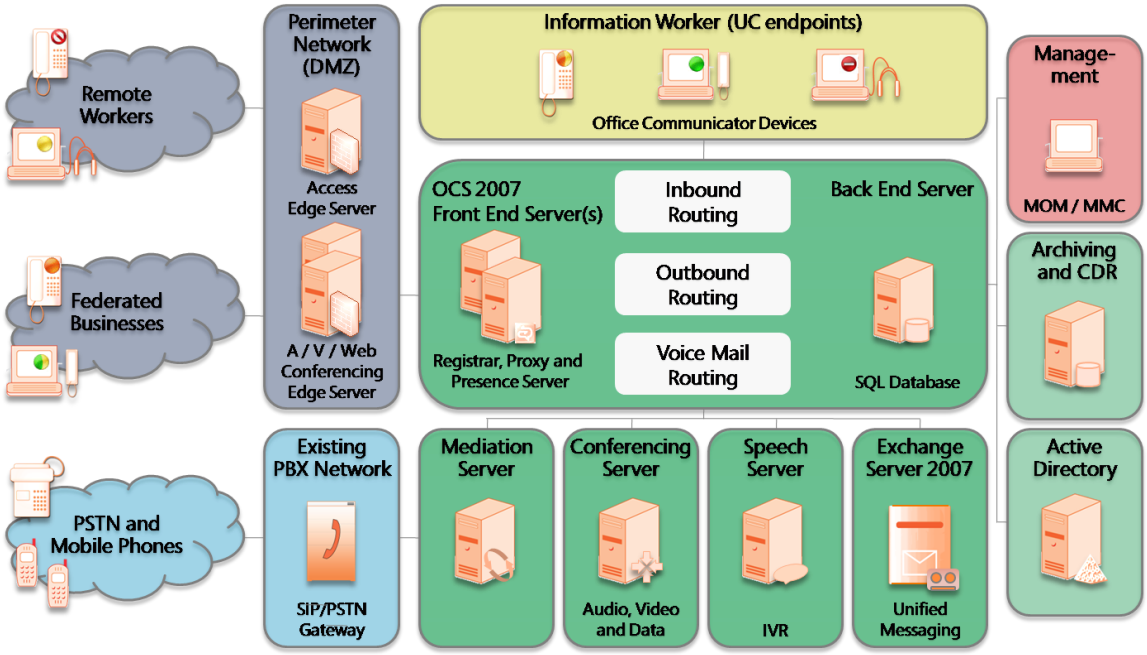
- Providing intermediation for a pool of Media Gateways
- Interoperating with PSTN Service Provider network elements
- Providing branch office survivability functions
- Providing legacy telephone device interoperability

The testing of telephony integration with Office Communications Server that has been conducted at the time of writing includes the deployment of Mediation Server in conjunction with IP-PSTN Media Gateways in a significant number of live customer test deployments as well as running part of the Microsoft corporate voice network. We have found that Mediation Server addresses the original goals that were defined for it, as well as contributing to the overall security of an Office Communications Server 2007 deployment by partitioning insecure PSTN voice calls from Office Communications Server voice calls that have integrated security.

Overview of Telephony Integration

Architectural Overview

Microsoft's unified communications leverages standards and published interfaces to interoperate and integrate with existing telephony and applications infrastructure investments, offering a flexible integration of telephony with other business communications tools.



Voice Functionality

While Office Communications Server 2007 is not a PBX, a user is able to use an Office Communications Server endpoint (e.g., Office Communicator 2007, an Office Communicator IP handset or peripheral device, Office Live Meeting Console and the Microsoft® RoundTable™ device) to communicate with the telephony world in a powerful and intuitive way by integrating with traditional telephony equipment. Some of the voice features and functions included in our unified communications software include:

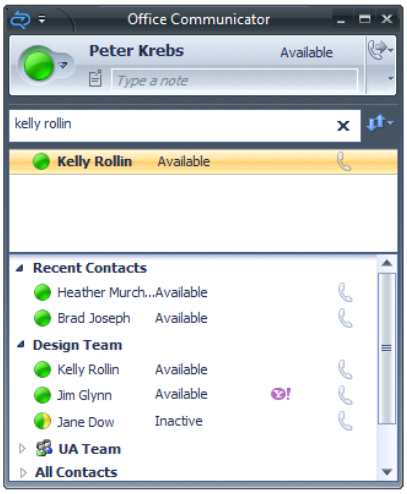
(Note that the following is an illustrative subset and is not a full feature list)

- An Office Communications Server endpoint can:
    - Click to dial from the Office Communicator 2007 contact list, corporate directory or Outlook contact list
    - Traditional digit dialing in the UI or via a

keypad pull down window.

- Accepting or deflecting inbound calls
- Call forwarding (rule based) and transfer (blind and attended)
- “Click to conference” or escalate two party call to conference

- Voicemail provided by Unified Messaging in Exchange Server 2007:
  - Voice Mail access through the telephone and Microsoft Office Outlook inbox
  - Use the phone to manage e-mail, calendar, and personal contacts
  - Take action using speech recognition or touch tone
  - Main switchboard and search directory service
  - Customizable auto attendant



- Office Communications Server 2007 providing next generation call-routing functionality:
  - Profile based call routing
  - Call routing independent of physical location
  - Application of global routing rules
  - Toll-free calling for calls that can be routed via Voice Federation

The Office Communications Server Difference

While the features described above are only a representative sample of telephony type features offered by an Office Communicator 2007 endpoint, it is well understood that today’s PBXs typically have many hundreds of such features. As previously discussed in this paper, the number of features is partly a function of:

- the amount of time that PBXs have been sold on the market
- the number of players in the market and their need to differentiate themselves
- adaptations due to the inherent architectural limitations of telephony

For example, many of the features implemented in a PBX are intended to ensure that calls are not missed and/or do not end up in voicemail: so-called “find-me, follow-me” features. Unified communications uses a fundamentally different paradigm to address the underlying customer need.

At the basis of Office Communications Server are three simple yet fundamental concepts that significantly change the communications experience:

- Person centric communications using a single identity: you communicate with a person, you don't dial a device.

- Presence based communications: you only attempt to communicate with someone who is advertising their willingness and ability to communicate with you at any given moment.

- Streamlined communications: you can choose the right communications method, move from one communications method to another, and maintain the context of all communications methods (e.g. subject, content, etc.) across the different methods.

Single identity and rich presence are the foundation for the deployment of software-powered VoIP. Office Communicator 2007 allows for presence status to be controlled directly by the user, or automatically based on Office Outlook calendar, login status, phone status and other sources of information. Users can set different levels of access for different contacts, allowing for inbound requests to be handled automatically based on a combination of access level and presence state. Finally, ensuring you can reach the right person, right now using the optimal method of communication saves time and improves productivity.

This new communications paradigm renders many of the features in a PBX redundant and offers a simpler and more effective way to communicate. As the telephony interface with Office Communications Server, this means that the basic call setup, teardown and redirection features are all that is required to provide a user with an effective and intuitive PSTN experience.

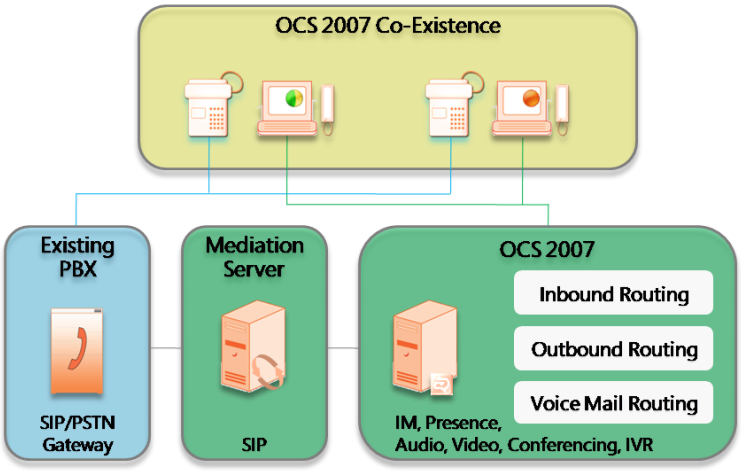
IP-PBXs have become increasingly common since the turn of the century, so the notion of all IP telephony is not new. With the advent of free VoIP hosted by popular internet services such as Windows Live, Yahoo!, AOL and Skype; consumers have started to experience the power of an IP voice experience.

However, Office Communications Server 2007 is not meant to be a PBX but an alternative communications mechanism to that offered by a PBX. There are a number of reasons why Office Communications Server and Office Communicator 2007 should not be considered as a PBX replacement and these will be discussed below.

Office Communications Server Deployment Scenarios

The 2007 Office Communications Server release supports several scenarios that address different customer deployment strategies and timelines, as well as customers' existing telephony investment mix.

Office Communications Server 2007 Co-existence



This scenario involves a PBX coexisting with Office Communications Server 2007 and Office Communicator 2007 to provide a flexible and powerful combination of traditional telephony and unified communications. Since almost every customer today has already deployed one or more PBXs, this is arguably the most broadly available deployment option for Office Communications Server 2007. There are two general categories of this scenario.

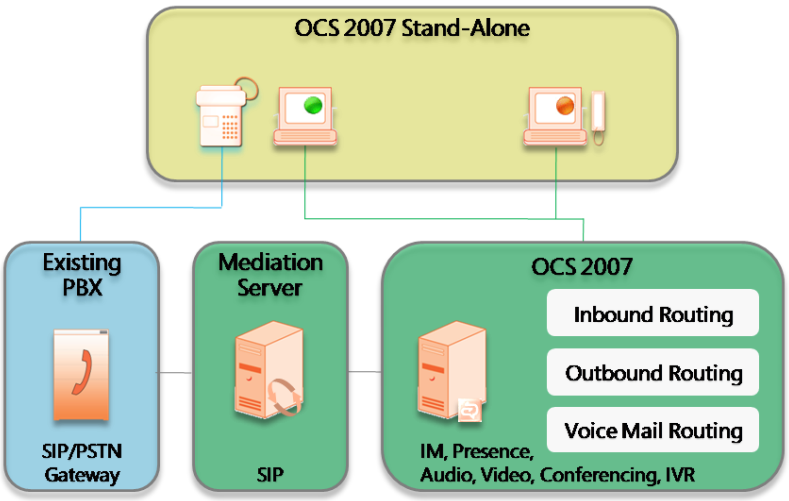
The first category is the native integration of a PBX with Office Communications Server 2007 and Office Communicator 2007. The PBX must natively support SIP and IP media in a form that is interoperable with Microsoft unified communications. Microsoft announced this mechanism in March 2007 and a number of significant PBX vendors have signaled their intent to support this scenario, including Nortel Networks. An interoperability specification[1] for this scenario is available to PBX vendors, along with a program to support the integration testing of vendors' products with Office Communications Server 2007 and Office Communicator 2007; this will be discussed in more detail below. Note that only the latest PBX models will support this mechanism and, even then, it is likely that a software upgrade must be supplied by the PBX vendor.

In the event that a customer's PBX infrastructure does not natively support this scenario, an alternative approach would be to use a Microsoft-certified IP-PSTN media gateway to provide integration between Office Communications Server and the PBX. A number of these media gateways are available within the Microsoft Unified Communications Media Gateway partner program (for the current list, see http://go.microsoft.com/fwlink/?LinkID=87482). These media gateways interoperate with the Office Communications Server Mediation Server via SIP and IP media on one side and with the PBX on the other side via telephony protocols such as QSIG, PRI or CAS. This can be an attractive option for

[1] Note that this specification does not deviate from SIP standards but does contain additional mechanisms to ensure that calls forked from UC to a PBX are not forked back, thus creating an infinite loop.

customers in enabling Office Communications Server 2007 Co-existence, as the integration of a media gateway is significantly cheaper and less disruptive than a PBX upgrade.

Office Communications Server 2007 Stand-alone



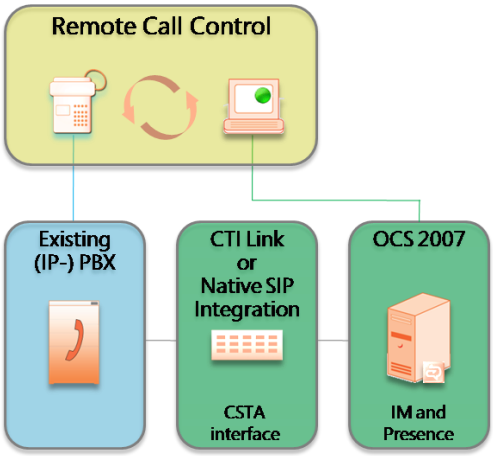
Arguably the most progressive option for the deployment is to exclusively use Office Communications Server 2007 and associated elements for the voice communications needs of a department or an enterprise, eliminating the PBX phone altogether for those users. Enabling this scenario, software-powered VoIP can be provided first to groups such as highly collaborative teams, information workers who are often travelling, mobile and home office workers, and more generally speaking, to people who use their personal computer all the time and wherever they are.

When deployed as a departmental solution, Office Communications Server 2007 stand-alone is distinct from Office Communications Server 2007 co-existence in that the enterprise dial plan is partitioned between Office Communications Server users and PBX users. This means that users have either a PBX phone or an Office Communicator endpoint, but not both.

The main advantage is that required changes to the PBX are again very limited because technically the scenario is an addition of another node to the existing telephone infrastructure. Adding a networking interface to an existing PBX and rerouting incoming calls for migrated users to this interface are the telephony world's standard procedures. As a result, this scenario is utilized as a migration strategy (see "Migration Strategies" below) or in the situation where a given PBX is not capable of forking calls and therefore cannot be integrated into an Office Communications Server 2007 Co-existence scenario.

Remote Call Control

Remote Call Control was the PBX integration mechanism that initially shipped with Live Communications Server 2005 and Office Communicator 1.0. In this scenario, users can issue commands from Office Communicator 1.0 to the PBX for their telephone extension, e.g. click to call, accept call, deflect call (e.g. to another phone number or voicemail) hang up call. Office Communicator 1.0 did not act as a "softphone" in this scenario. The PBX phone was the default device used for the voice conversation; Office Communicator 1.0 merely sent commands to the PBX to carry out actions on the calls routed to the user's extension.



The protocol used for this integration is the CSTA over SIP standard TR/87, and a 3rd party CSTA server is commonly required in order to provide the integration. These TR/87 gateways are provided by Genesys, Siemens or British Telecom; however, a growing number of PBX vendors (e.g. Nortel) natively integrate this mechanism into their PBX. The advantage of CSTA as an integration mechanism is that most PBX types and models support this technology, thereby enabling a powerful addition to user functionality without having to affect the PBX installation or configuration.

With more recent versions of PBXs or the appropriate 3rd party integration, this scenario is supported in the Office Communications Server 2007 release and can continue to work alongside the Office Communications Server 2007 Co-existence scenario described above.

Unsupported Scenarios

In order to deliver Office Communications Server 2007 on schedule and with quality, scope limitations were applied to the release that made it necessary to defer certain functions and scenarios to later releases.

Branch Office Survivability

The Office Communications Server 2007 stand-alone scenario does not make provision for the survivable deployment of Office Communications Server in a remote or branch office (i.e. remote from the Office Communications Servers) possible since the issue of maintaining communications during an IP network failure has not been addressed in this release. In the event of a failure of the Wide Area IP network, an Office Communicator endpoint that is remote from the core Office Communications Server deployment will lose all ability to communicate with other clients and the PSTN. This is true for other clients and even media gateways that are on the same Local Area Network, since all communications are routed via Office Communications Server.

Customer feedback on requirements and optimal approach is being evaluated in planning for upcoming releases. Options for covering this scenario are being evaluated which use our key precepts of standards support and broad interoperability.

"SIP Trunking"

"SIP Trunking" is a loosely defined term in the industry and has been used in several ways, including:

- The use of SIP and RTP to communicate from one enterprise to another over IP networks (i.e. without using PSTN networks)

- The use of SIP and RTP to communicate from one voice infrastructure element (e.g. an IP-PBX) to another within the enterprise IP network

Both of these scenarios **are** supported in the Office Communications Server 2007 and Office Communicator 2007 release. We consider these to be variants of "voice federation" and not necessarily related to traditional telephony.

Another definition of "SIP Trunking" is the use of SIP and RTP to pass telephony traffic from the enterprise to a telephony network provider without traversing PSTN networks. The main benefit of this scenario is that PSTN traffic is often carried over IP within the service provider's network – having been converted from traditional telephony to IP and back to traditional telephony to complete the call. Since telephony operators carry calls over IP it is more economical for them to take a call that originates in SIP and RTP as far as possible to a termination point before converting it to telephony (if at all, in the case of a called party who has also deployed "SIP Trunking"). While this could also be viewed as another form of federation, there are aspects of this scenario that prevented us from including it in the 2007 release, including the recent emergence of standards supporting this scenario and the subsequent lack of support for those standards in many PSTN networks.

Over the next two years, this latter type of "SIP Trunking" will be thoroughly examined by the Microsoft Unified Communications Group. If, as we expect, Service Providers will be able to support this scenario, it will be possible for enterprises to consider this an alternative to direct integration with the PSTN.

Hosted Telephony

The Live Communications Server 2005 release featured a deployment model that enabled customers who purchased telephony functionality from Service Providers as an alternative to hosting their own PBX deployments could also purchase access to Live Communications Server 2005 and Office Communicator 1.0: this mechanism was called HMC (Hosted Messaging and Collaboration). In some Service Provider deployments, HMC was integrated with hosted voice services via the CSTA/Remote Call Control mechanism described above. In the Office Communications Server 2007 and Office Communicator 2007 release, this scenario will not be supported. There are many constraints that prevented this scenario – including many of the standards issues described above in "SIP Trunking". Once again, over the next two years, the Microsoft Unified Communications Group has the charter to reexamine the situation and determine whether the telephony network environment will become amenable to the deployment of this scenario.

Non-Office Communicator Endpoint Support

Microsoft Office Communications Server 2007 supports a wide range of devices supporting the Office Communicator Phone experience. Microsoft Office Communicator 2007 IP phones and peripheral devices take advantage of the intuitive interface, rich presence and voice calling features of Office Communicator 2007 and allow the end user to have an innovative phone experience. The Microsoft Unified Communications Group has published reference designs and interoperability specifications that have enabled broad device support through third parties. Since this presence model and single persona concepts are not available with existing SIP endpoints today, they will not connect directly to Office Communications Server 2007.

Legacy telephony endpoints such as analog phones, fax machines and modems can still be connected to an existing PBX or IP-PBX, interoperating with Office Communications Server 2007 as specified in the scenarios detailed above. Alternately, these devices can be connected to analog ports on a certified gateway. Over the next two years, the Unified Communications Group will be examining the requirement for certain devices that are either mission critical (e.g. modems) or cannot be replaced by a native Office Communicator endpoint (e.g. elevator phones) to be supported natively within an Office Communications Server 2007 deployment.

Media Gateway Integration

Media Gateways play a vital role in unified communications – bridging users from the Office Communications Server 2007 and PSTN worlds together when a SIP-enabled PBX is not present requires a Media Gateway with Office Communications Server 2007.

While gateways can help complete the picture, the advancements in Office Communications Server 2007 potentially create another gap with what the gateways can support today. Office Communications Server 2007 utilizes the latest SIP, security and audio codec capabilities to deliver an enterprise-class VoIP software solution.

As discussed earlier in this paper, Mediation Server was created to help reduce the amount of change needed to interoperate with Office Communications Server 2007, in many cases requiring just a software upgrade and configuration changes to a gateway. During development of Office Communications Server 2007 we have worked with a select number of gateway partners to help adapt their current gateway products to work with Mediation Server. A list of supported gateways can be found at: http://go.microsoft.com/fwlink/?LinkID=87482

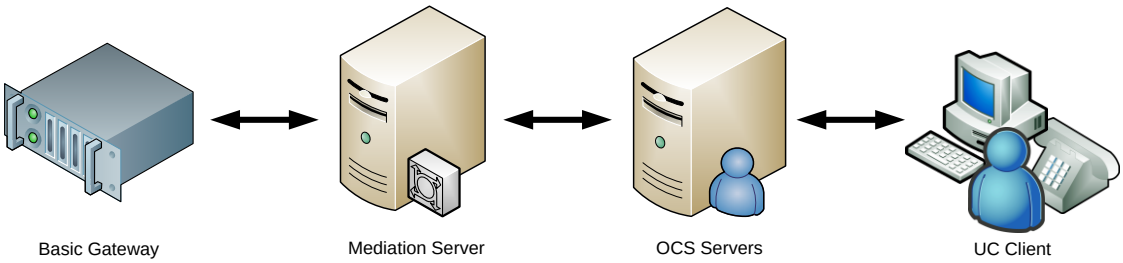
We are also working with Media Gateway companies to evolve their gateway solutions to natively support Office Communications Server 2007's advanced features, and eventually replace the need for a Mediation Server. We expect to see these advancements become available in the coming years.

To categorize the current landscape of gateways available, Microsoft defines two major classes of Gateways: Basic (including Basic Hybrid), and Advanced.

Basic Media Gateways

A Basic Media Gateway is a traditional gateway appliance that supports key functionality including SIP, e164, TCP as a SIP transport, Fax, G.711, number manipulation, and others as described in the specification readily available to Media Gateway partners. As these gateways don't support certain functionality such as RTAudio or ICE, they require the Microsoft Mediation Server to interoperate with Office Communications Server 2007.

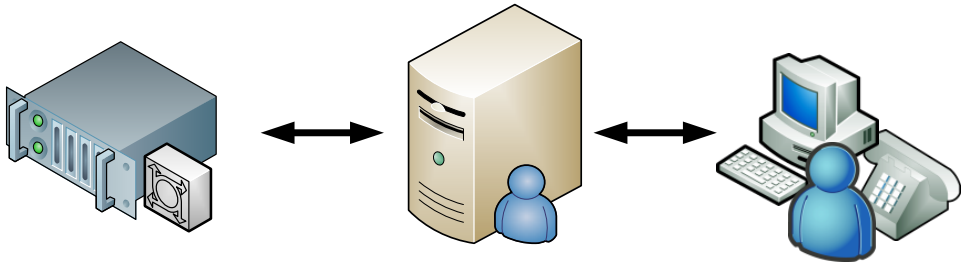
The benefit to this is that many of the common gateways in use today may support interoperation with Mediation Server through a simple ROM update and configuration.



Hybrid Basic Media Gateways

Considered part of the Basic Gateway family (due to not natively supporting advanced features of Office Communications Server 2007), Basic Hybrid Gateways are a combination of a Basic Media Gateway (typically as a card) that coexists with a Windows Server blade running Mediation Server.

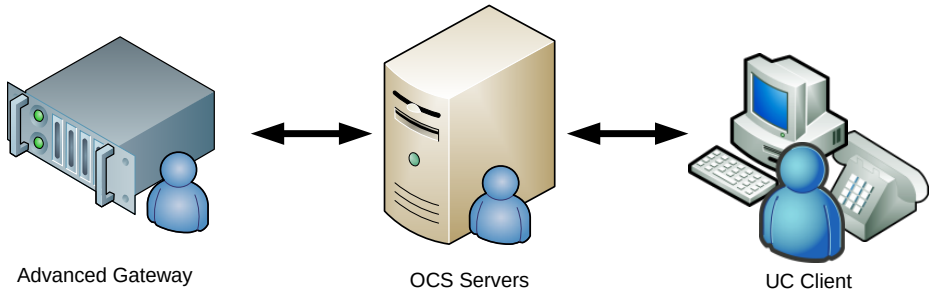
The benefits to this design are having a single box to physically manage, making it easier for IT to deploy. These boxes can also come pre-configured to work with Office Communications Server 2007, making them simpler to setup.



Advanced Media Gateways

An Advanced Media Gateway natively takes advantage of certain “advanced” features (such as native RTAudio, SRTP, ICE, and SDP over TLS) that enable it to interoperate directly with the Office Communications Server deployment without the need for a separate Mediation Server. The benefits to this are a single appliance that IT professionals can deploy and manage, and there is more room to improve performance on audio quality and concurrent calls due to natively supporting the advanced features of Office Communications Server 2007.

Advanced Gateways are currently not available with the release version of Office Communications Server 2007. We anticipate this class of gateway being available in CY 2008.



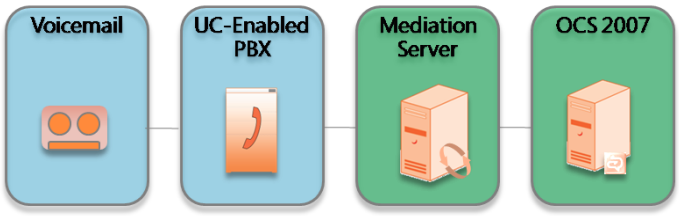
PBX Integration

As stated above, Microsoft unified communications offers customers the opportunity to integrate PBXs with their Office Communications Server 2007 deployment and enjoy the benefits of a streamlined communications experience. The path to this experience is dictated in part by customers' current PBX infrastructure. Here we will examine the main types of PBX and the options for integration with Office Communications Server 2007.

UC-Enabled PBX

As described above, Microsoft announced its PBX integration program in March 2007 and offers PBX vendors a mechanism that enables their products to integrate with Office Communications Server deployments. This mechanism is described in detail in an interoperability specification that is freely available to current and future partners and is described in greater detail below. The specification calls for native integration via the well defined industry standards of the Session Initiation Protocol (SIP) and Real-time Protocol (RTP) media.

As with Media Gateways, the point of integration is the Mediation Server. The Mediation Server provides the functions described in sections above, as well as playing a role in ensuring that calls forked from one element are not forked back to the originating element, thereby avoiding an infinite loop.



Microsoft announced its Innovative Communications Alliance partnership with Nortel Networks in July 2006 and has made similar statements of intent with other partners, including Cisco, Avaya, Siemens, Alcatel-Lucent, Ericsson, Mitel and NEC. Over the remainder of 2007 we intend to make other announcements with regard to interoperability testing and availability of products certified for integration with Office Communications Server 2007. See http://www.microsoft.com/uc/ for the most up to date list.

UC-Capable PBX

Any customer who has deployed an IP PBX from a vendor who has certified interoperability with Microsoft should be able to enable Office Communications Server 2007 integration via a software upgrade from that vendor. Clearly, the PBX must be a model that is capable of supporting the Microsoft interoperability specifications around SIP and RTP media. PBX vendors who support Office Communications Server 2007 will best be able to advise customers on their upgrade options.

Non-UC-Capable PBX

There are many PBX models in use today that are not built upon an IP architecture; rather, they belong to the TDM (Time Division Multiplexing) generation of PBX. Customers who have deployed PBXs of this era may find that, depending on their vendor's architecture, they are not software upgradable to native Office Communications Server 2007 interoperability. There will also be cases where a PBX vendor has chosen not to participate in interoperability with Microsoft or has, for some other reason, no upgrade path for a PBX that a customer owns. These customers have a choice of:

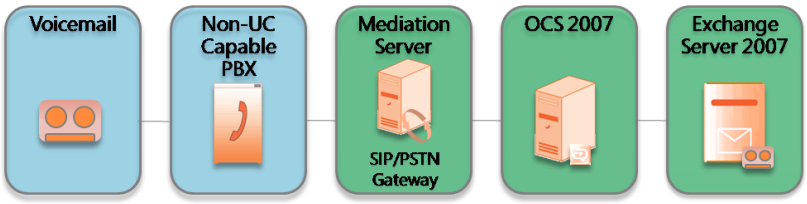
1. Upgrading their telephony infrastructure to a UC-Enabled PBX

2. Integrating the existing PBX into the Office Communications Server deployment via the use of a Media Gateway to communicate with Office Communications Server 2007. For use with the Co-existence scenario, this requires that “call forking” is supported on the PBX

3. Either:

    a. Replacing PBXs within the enterprise communications infrastructure with an Office Communications Server 2007 stand-alone deployment over an appropriate transition period

    b. Enabling interoperability between an existing PBX and the Office Communications Server deployment where users are homed on either the PBX or Office Communications Server 2007, allowing calling between the two systems. This does not provide the integration of the calling experience for a single user on a PBX phone and an Office Communicator endpoint.



Further information on Migration Strategies is provided in a later section of this paper.

Telephony Integration Features and Mechanisms

This section describes telephony integration with Office Communications Server at a more technical level.

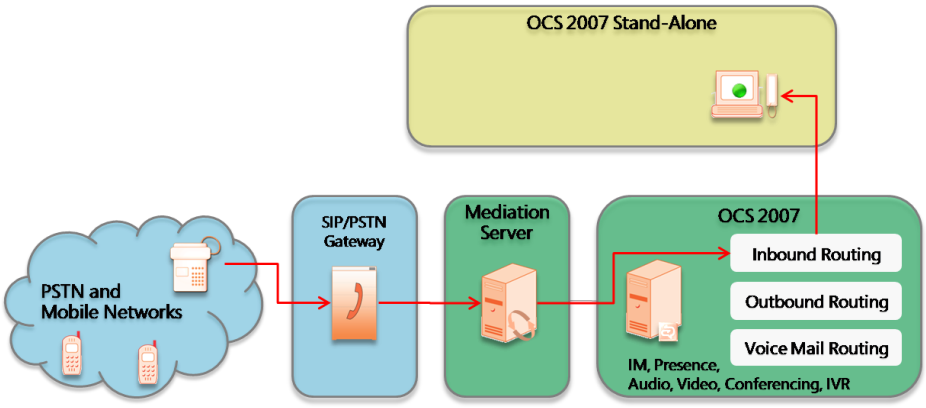
Office Communications Server 2007 Stand-alone Telephony Integration

As described above, Media Gateways offer various levels of IP technology support, not necessarily to the full capabilities of an Office Communications Server deployment. In order to enable interoperability with as many vendors as possible, we have simplified the interface being offered to Office Communications Server via the Mediation Server. This is not to say that the number of functions available to a user in a PSTN call has been restricted; rather that the combination of the call scenarios defined below addresses the requirements of an Office Communications Server deployment for PSTN interoperability.

Call Flow diagrams for the following features can be found in Appendix A for those interested in additional detail.

Inbound Call

A call made from a PSTN network to a user of an Office Communicator endpoint will be routed by the service provider to the trunk line at the edge of the enterprise network. This trunk line will be attached to the Media Gateway which supports the telephony protocol being offered by the PBX or the telephony service provider. The Media Gateway converts the "call alert" to a SIP INVITE transaction and passes that to the adjacent Mediation Server. This SIP INVITE contains a range of information including the telephone numbers of both the calling party and the called party. The Mediation Server passes this SIP INVITE to Office Communications Server 2007 which performs a "reverse number lookup" (RNL) of the called party number and converts that to a SIP address (e.g. sip:user-alias@contoso.com). This allows Office Communications Server 2007 to route the call as a normal SIP transaction.

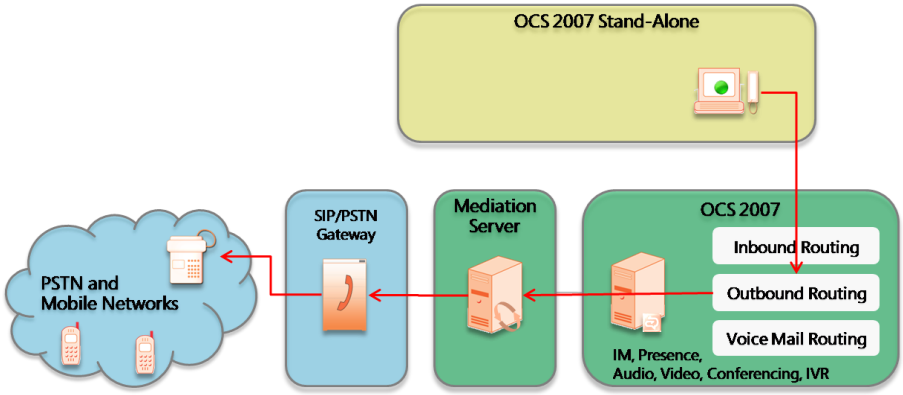


Office Communications Server 2007 applies routing rules defined by the network administrator and the user in question, as well as determining if the user is online and available to take telephone calls. Once Office Communications Server 2007 has identified one or more Office Communicator devices or external PSTN numbers (cell phone, hotel room, etc.) as targets for the SIP INVITE, those devices are put in a "ringing" state and the user has the option of taking the call on a given device or deflecting it to another device or voicemail. Once the user has "picked up" the call, the device in question has voice media (i.e. sound) routed to it by the Mediation Server. At this point, the Mediation Server signals to the Media Gateway that an Office Communicator device has opened a voice channel and the caller stops hearing

the ringing tone and the call is connected. Any Office Communicator device that was “ringing” and was not “picked up” will receive a SIP CANCEL.

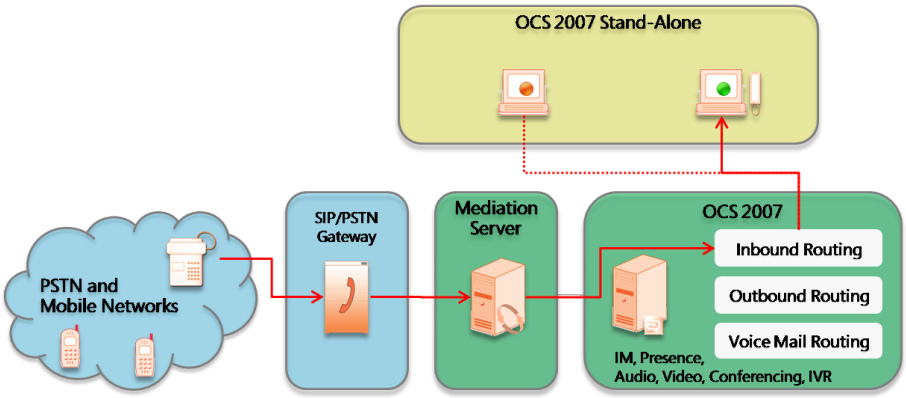
Outbound Call

A call made by a user of an Office Communicator endpoint to a PSTN number is routed as a SIP INVITE from the Office Communicator endpoint to Office Communications Server 2007. It may be that the caller intended to call another user of an Office Communicator endpoint, but the routing rules within Office Communications Server 2007, as well as the “presence” state (i.e. willingness and ability to communicate) of the called party, cause the target of the SIP INVITE to be converted from a SIP address (e.g. sip:user-alias@contoso.com) to a telephone number (e.g. sip:+14255551212@contoso.com). At this point, Office Communications Server 2007 routes the SIP INVITE to a Mediation Server that provides coverage for this country/area code. Mediation Server forwards the SIP INVITE to the appropriate Media Gateway and the Media Gateway turns the SIP INVITE to a traditional telephone call that is routed via a trunk line to the PSTN. The called party either answers the call or the call is routed to voicemail. At that point, the telephony network signals to the Media Gateway that voice media should start to flow and this message is relayed back to the caller’s Office Communicator endpoint and the call is connected.



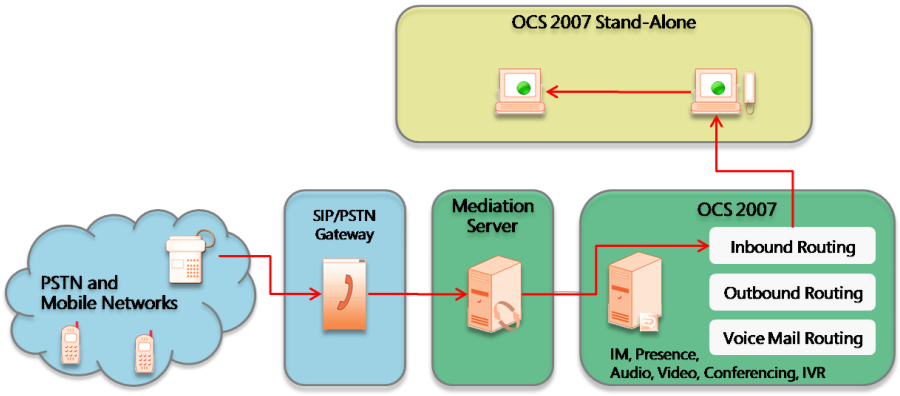
Call Forward & Transfer

A user of an Office Communicator endpoint has the option of forwarding calls either on a selective basis or for all calls. This call redirection is done by Office Communications Server 2007 substituting a different SIP address as the called party and therefore the media gateway is unaware that the call is being rerouted.



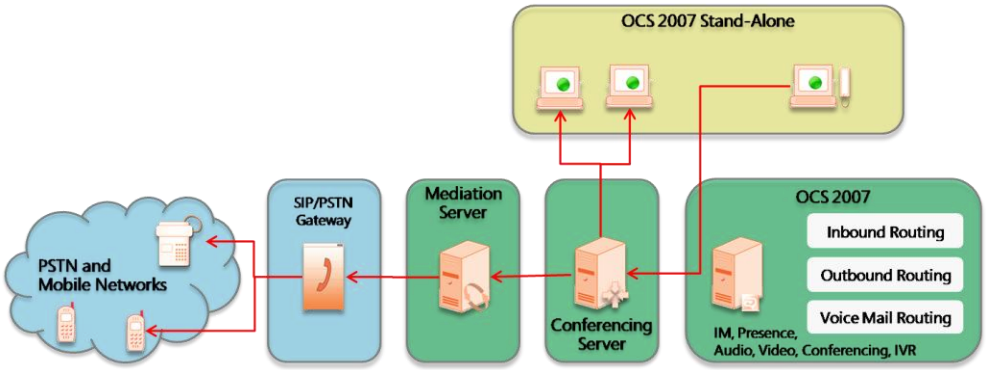
A user of an Office Communicator endpoint may also transfer a call to another party. However, the mechanisms used within Office Communications Server to facilitate transfers (e.g. SIP REFER) are not

uniformly supported across the range of available media gateways. Therefore, Mediation Server executes transfers by putting the media gateway (and therefore the PSTN caller) “on hold” for a brief moment while the call is transferred within the network.



Conference

Escalating a two party call (where one party is a PSTN caller) to an ad-hoc multi-party call is simple and intuitive for a user of an Office Communicator endpoint. In simple terms, Office Communicator 2007 establishes a conference on the Office Communications Server conference server and transfers the call in progress to the conference server (see Call Transfer above). For conference calls involving other participants that are only available on PSTN, the conference server “dials out” to the PSTN via the Mediation Server as a simple outbound call.

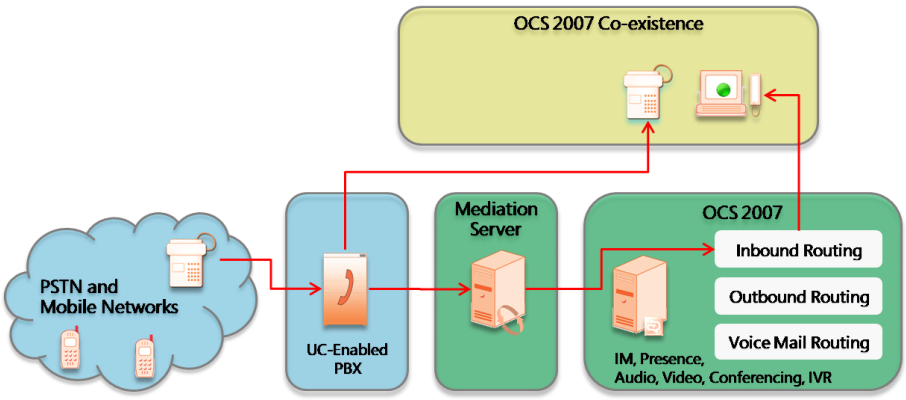


With the notable exception of a "Greenfield site", a customer considering an Office Communications Server deployment will already own a PBX which is used for PSTN connectivity and intra-office extension dialing. The range of features described below represents the full set of functions required for a streamlined experience as described in the Office Communications Server 2007 Co-existence scenario described above. Where these functions are not available in the scenario, this will be made clear.

Call Flow diagrams for the following features can be found in Appendix B for those interested in additional detail.

Inbound Call

A user of an Office Communicator endpoint is able to take an inbound PSTN call as per the Media Gateway Inbound Call scenario described above. However, the main difference is that the PBX forks the call to both the called party's Office Communicator device(s) and to the PBX extension that is associated with that user – all of the called party's endpoints start to "ring". The called party has the option of picking up the call on either the telephone or any of the UC devices. Once the call has been picked up on one endpoint, the remaining endpoints stop ringing. In the case of the call being picked up on the telephone, the PBX generates a SIP CANCEL to close the SIP INVITE transaction with the Office Communicator devices.

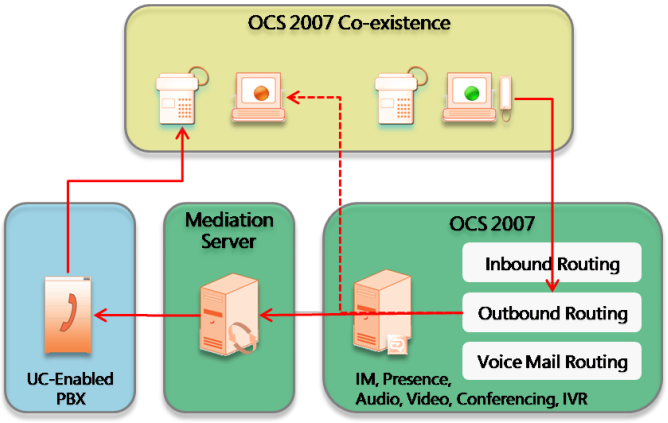


When a PBX is deployed alongside the Office Communications Server 2007 Stand-alone scenario, the call forking mechanism is not invoked.

Outbound Call

A user of an Office Communicator endpoint is able to place a PSTN call as per the Media Gateway Outbound Call scenario described above; the only difference is that the PBX is acting as the media gateway to the PSTN.

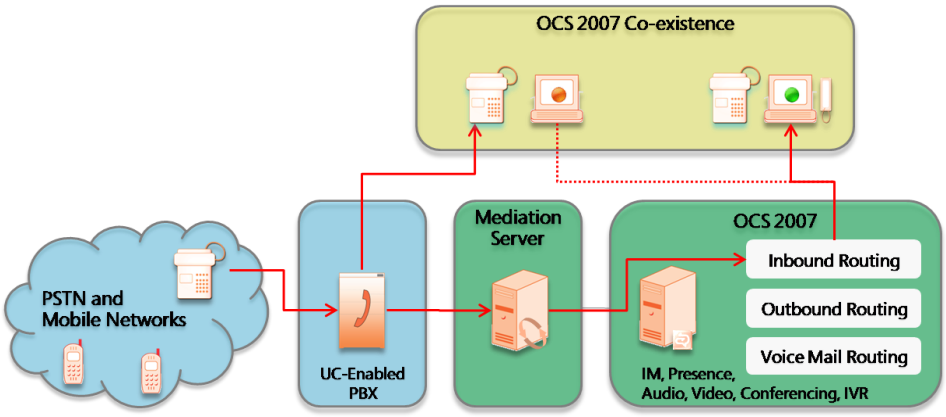
If the call is made to another user of an Office Communicator endpoint, Office Communications Server 2007 forks the SIP INVITE to both the called party's device(s) and to the PBX extension that is associated with that user – all of the called party's endpoints start to "ring". The called party has the option of picking up the call on either the telephone or any of the Office Communicator devices. (Of course, the device does not have to be physically adjacent to the phone, the user could be "roaming" in a hotel room in a different country.) Once the call has been picked up on one endpoint, the remaining endpoints stop ringing. In the case of the call being picked up on an Office Communicator device, Office Communications Server 2007 generates a SIP CANCEL to close the SIP INVITE transaction with the other devices and the PBX.



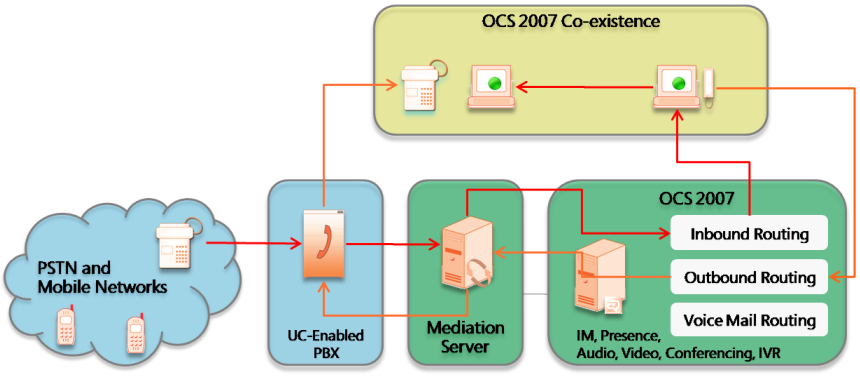
When a PBX is deployed alongside the Office Communications Server 2007 Stand-alone scenario, the call forking mechanism is not invoked.

Call Forward & Transfer

Call forwarding works as described in the Media Gateway section above. The difference is that if the call is forwarded to another user of an Office Communicator endpoint, the call forking mechanism described above (if available) is initiated.

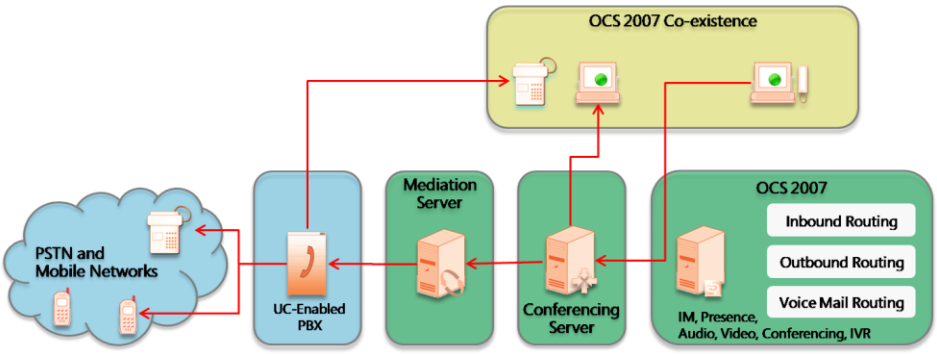


Call transfer works as described in the Media Gateway section above. The difference is that if the call is transferred to another user of an Office Communicator endpoint, the call forking mechanism described above (if available) is initiated.



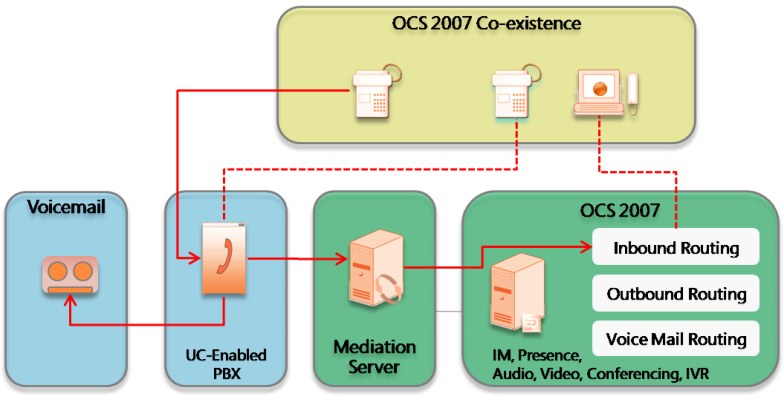
Conference

In the Office Communications Server 2007 Co-existence scenario, conference calls are established on the element that initiates the conference. If Office Communicator 2007 establishes a conference on the Office Communications Server Conferencing Server, telephones are enrolled in the conference via "dial-out" as an outbound call leg as described above. If a PBX user initiates a PBX conference (e.g. 3-party conference or "meet me" conference) a user of an Office Communicator endpoint can join or be "dialed-in" to the conference as a normal inbound or outbound call leg as described in the Media Gateway section above.



Do Not Disturb

If a user of an Office Communicator endpoint sets a "Do Not Disturb" rich presence status, the client will reject the call with a SIP 480 and the SIP transaction will be terminated. A SIP 480 will be sent to the PBX to stop the user's telephone from ringing and deflect the call to Voicemail.



Partner Ecosystem

Microsoft is actively developing the partner ecosystem to support unified communications and is currently working with key strategic partners to develop products that conform to system specifications to support Office Communications Server 2007. More information can be found at the press release located here: http://www.microsoft.com/presspass/press/2007/may07/05-22InteropRoadmapPR.mspx. Additional partners and products will be announced closer to the release of Office Communications Server 2007 and Office Communicator 2007 and will be available at: http://www.microsoft.com/uc/partners.

Customers will look for solutions that have been tested and qualified by Microsoft to seamlessly integrate with Office Communications Server 2007 to provide a high quality initial experience and lower deployment costs. Customers can have confidence that these products have demonstrated proven enterprise-class scalability and enhanced security at lower operational cost.

Media Gateways

Microsoft's strategic partners for media gateways have demonstrated that their products interoperate with Office Communications Server 2007 to enable connectivity to the PSTN directly, or via a non-UC Capable / non-UC Enabled PBX. The qualification program ensures that gateway partner products meet the requirements needed by Office Communications Server 2007 in areas of audio quality, gateway features, connectivity, performance, security, and ease-of-use. Current strategic partners for media gateways can be found at: http://go.microsoft.com/fwlink/?LinkID=87482

PBX Co-existence

Microsoft is committed to ensuring that customer's current PBX solutions can interoperate with Office Communications Server 2007 to handle scenarios defined as PBX co-existence by Microsoft. This requires that PBX vendors support certain specific features and handle many end-user scenarios. The PBX co-existence program will focus on key areas of PBX call handling, signaling, audio quality, performance, loop-back detection, connectivity, and other defined items of the specification. The most up to date list of partners who have announced their intention to support this specification can be found at: http://www.microsoft.com/presspass/press/2007/may07/05-22InteropRoadmapPR.mspx

In addition, Microsoft is developing programs to broaden scope to non-UC capable PBXs.

Microsoft's strategic media gateway partners have also committed to evaluating PBXs that are not on their current interoperability list with a view to establishing the business case for extending their certification to selected PBX makes and models. Microsoft will continue to work closely with our media gateway partners and with systems integrator partners to ensure that customers can benefit from the broadest possible coverage of PBX types.

Customers always have the option of upgrading their PBX installed base to the versions that are certified by the PBX vendors as being compatible with Office Communications Server. However, if customers choose to maintain their existing investment in PBX technology, they have the opportunity to deploy either the Office Communications Server 2007 Co-existence or Office Communications Server 2007 Stand-alone scenario in conjunction with a media gateway certified with Office Communications Server that supports the PBX model in question. In making this decision, a careful cost-benefit analysis must accompany a technology strategy review that defines the short, medium and long term goals and objectives for enterprise communications.

Migration Paths and Integration Strategies

Building the Foundation

There are certain prerequisites for an Office Communications Server deployment that will enable the migration to telephony integration:

1. Provide a single identity and a single directory for the organization by deploying Microsoft® Active Directory® including the required schema extensions

2. Enable rich presence and instant messaging for the organization by deploying or migrating to Office Communications Server 2007 including Office Communicator 2007

3. Making a strategic decision on the required deployment scenario in conjunction with a similar decision on corporate voicemail

The third step is critical. There are a range of factors that will influence this decision, including:

- Financial, including current and future operating expenses as well as capital budget

- Corporate goals and expected ROI for unified communications deployment

- Current technology investments, especially those in telephony equipment

The scenario and feature descriptions provided elsewhere in this document will provide an initial guide on deployment scenarios; however customers are encouraged to fully familiarize themselves with the available VoIP documentation for Office Communications Server 2007.

Of particular note are deployment decisions for Microsoft Exchange Server 2007 along with the Exchange Unified Messaging option:

- In the Office Communications Server 2007 Co-existence scenario, Exchange Server 2007 with Unified Messaging is only supported as a PBX voicemail option since this scenario assumes that voicemail is provided by the PBX.

- In the Office Communications Server 2007 Stand-alone scenario, Exchange Server 2007 with Unified Messaging is integrated with Office Communications Server 2007.

PBX to Office Communications Server 2007 Co-existence

The Office Communications Server 2007 Co-existence scenario requires that the PBX be UC-enabled. The issue of UC-enablement has been discussed in sections above and the options for a given PBX should be evaluated carefully on a cost/benefit basis. Once it has been determined whether a PBX can be UC-enabled, customers are then able to evaluate their options with respect to upgrading their PBX infrastructure vs. installing media gateways.

Note that some PBXs, particularly those that do not support call forking, cannot be integrated with Office Communications Server 2007 Co-existence scenario. These PBXs can, however, be partially integrated with the Office Communications Server 2007 Stand-alone scenario discussed in the next section.

A five track project plan can then run in parallel:

1. Office Communications Server implementation

2. PBX UC-enablement (if required)

3. Exchange Server 2007 implementation (if required)

4. Media gateway deployment (if required)

5. Remote Call Control gateway deployment (if required)

Once task 1 is complete, users can be provisioned on Office Communications Server 2007 in rich presence/instant messaging mode as a precursor to linking the PBXs to Office Communications Server 2007. If Remote Call Control will also be enabled, then the migration of users to RCC could be another interim step.

PBX to Office Communications Server 2007 Stand-alone

At face value, this migration path is one of the simplest: a three track project plan can run in parallel:

1. Office Communications Server implementation

2. Exchange Server 2007 implementation

3. Media gateway deployment

Once the infrastructure is production-ready, users can be provisioned on Office Communications Server 2007 in rich presence/instant messaging mode as a precursor to migrating them from the PBX. The migration of users can be initiated in phases until the PBX has no extensions left on it: the PBX can then be decommissioned. If the intent is to maintain the PBX for a subset of users then, clearly, the PBX is not decommissioned and the PBX users remain essentially unaffected. Moving telephone extensions from a PBX to Office Communications Server requires that DID numbers (if any) and trunks are re-homed on the media gateway(s).

Office Communications Server 2007 Co-existence to Office Communications Server 2007 Stand-alone

This migration path is used when Office Communications Server 2007 Co-existence is used as a stepping stone to Office Communications Server 2007 Stand-alone. Office Communicator 2007 users will already be familiar with the paradigm – the only change is that they will start to use Office Communicator telephone devices and Exchange Server 2007 Unified Messaging instead of PBX phones and voicemail.

A two track parallel project plan is required

1. Exchange Server 2007 implementation

2. Media gateway deployment (if media gateways were already deployed as part of Office Communications Server 2007 Co-existence, a carefully managed repurposing of these gateways is required as they change their role in the network)

Once the full Office Communications Server 2007 Stand-alone infrastructure is production-ready, users can migrate to Exchange Server 2007 Unified Messaging and their Office Communicator telephone device in phases until the PBX has no extensions left on it: the PBX can then be decommissioned. Moving telephone extensions from a PBX to Office Communications Server 2007 requires that DID numbers (if any) and trunks are re-homed on the media gateway(s).

“Greenfield” to Office Communications Server 2007 Stand-alone

This migration path is the simplest: a three track project plan can run in parallel:

1. Office Communications Server implementation
2. Exchange Server 2007 implementation
3. Media gateway deployment

Once the infrastructure is production-ready, users can be provisioned on Office Communications Server 2007.

Summary & Conclusions

After 100 years of development, business telephony is as complex as it is pervasive. Microsoft's unified communications initiative is designed to combine 20th Century business telephony with 21st Century business communications mechanisms such as:

- person-centric, context-driven calling
- rich presence
- instant messaging
- video calling and conferencing
- unified messaging
- ad-hoc multi-party, multi-modal conferencing

Customers have made significant investments in their telephony infrastructure and we understand that changes in mission critical systems cannot be made overnight. Microsoft's telephony integration strategy is fundamentally partner-centric; we have invested in broad partnerships in the telephony market to ensure that customers can integrate the systems they depend on today with the systems that they will depend upon tomorrow.

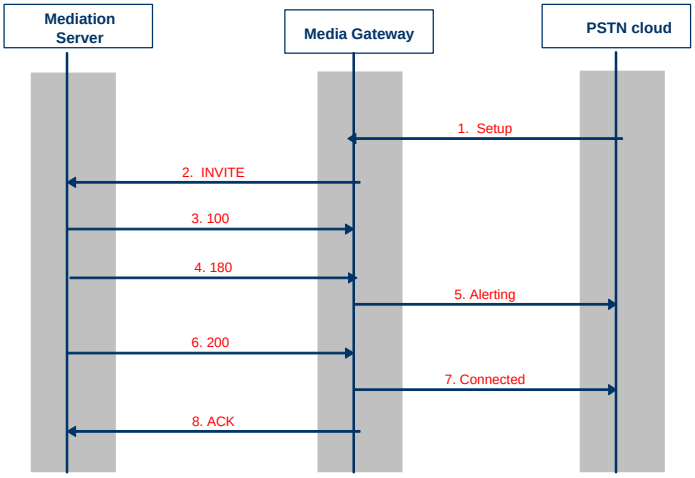
Partners are considering the role that their solutions play in the unified communications era. Office Communications Server 2007 is not a PBX: it is an additional set of communications functions. Our approach to telephony integration with Office Communications Server 2007 is dependent on the partner ecosystem and the partner certification programs that we are putting in place.

We do not underestimate the complexity of the issues involved with Office Communications Server implementation. In order to better inform our future customers and partners, this paper has explained our Office Communications Server telephony strategy in depth. We hope that the reader will now better understand the challenges, options and solutions that we are offering and that this will provide the impetus to further investigate and better understand the considerable benefits to be realized from telephony integration with Office Communications Server 2007.

APPENDIX A – Office Communications Server 2007 Stand-alone Scenario – Call Flows

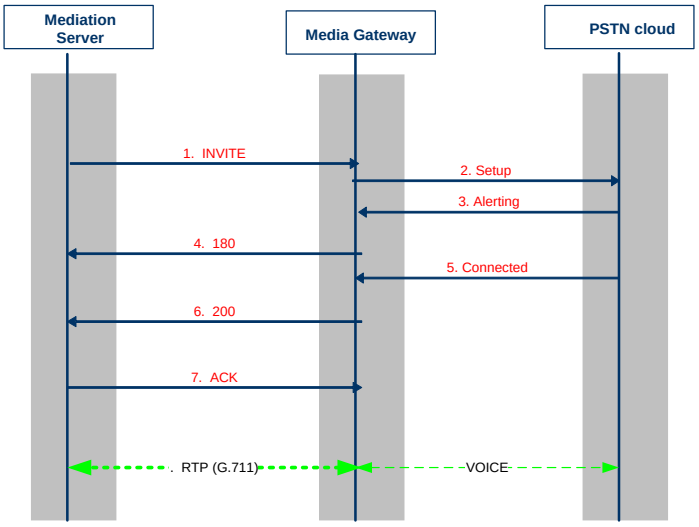
Inbound Call

Office Communications Server 2007 takes an inbound call from PSTN.



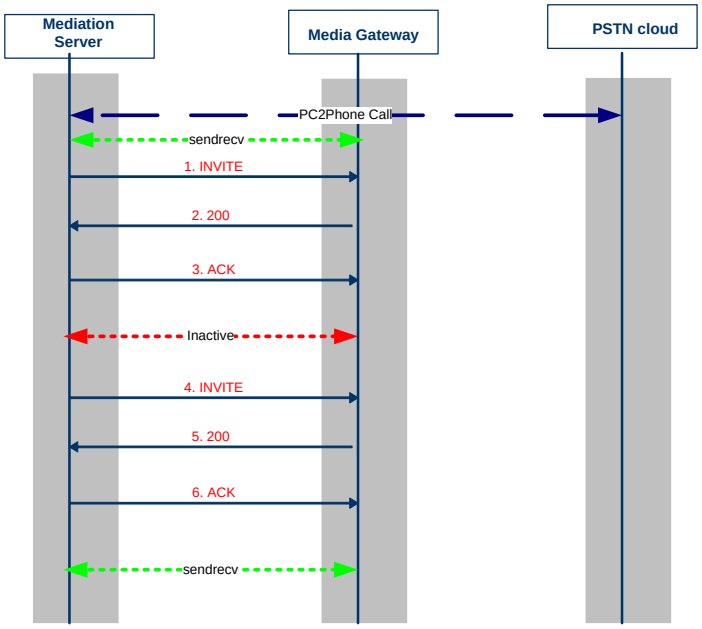
Outbound Call

Office Communications Server 2007 makes an outbound call to PSTN.



Call Placed on "Hold"

Office Communications Server 2007 places a call in progress on "hold" and takes the call off "hold". Note that this mechanism is used to facilitate all mid-call transactions, including Transfer and Escalate to Conference. This approach simplifies the Office Communications Server 2007 interface in order to ensure the broadest possible coverage of the Media Gateway market.

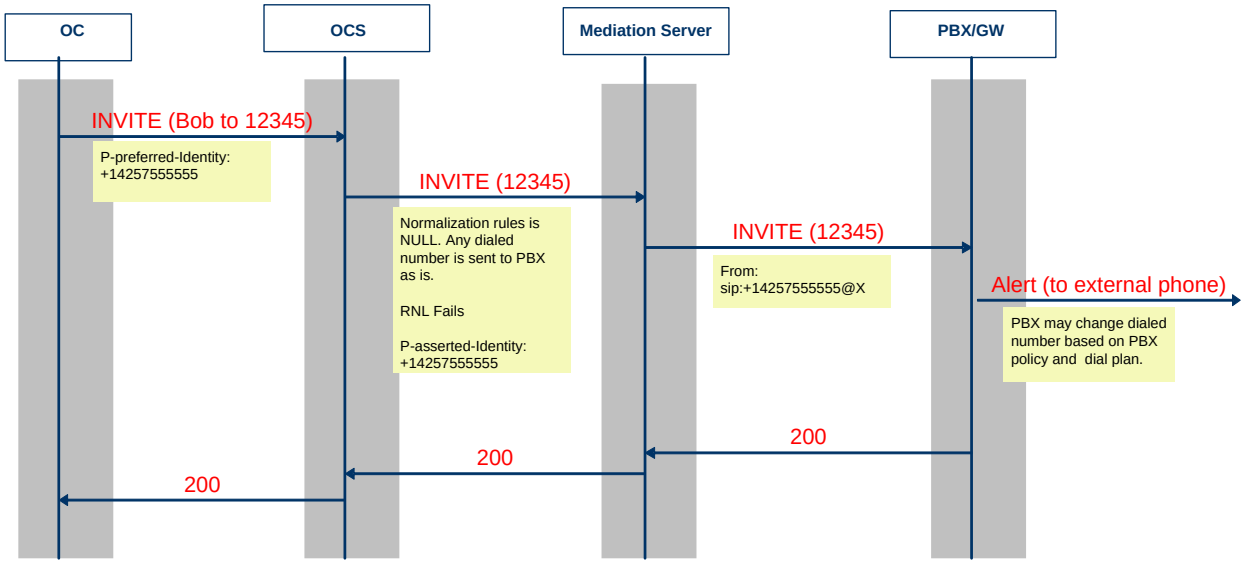


APPENDIX B – Office Communications Server 2007 Co-Existence Scenario – Call Flows

For the purposes of brevity, only an illustrative subset of features and related call flows is provided.

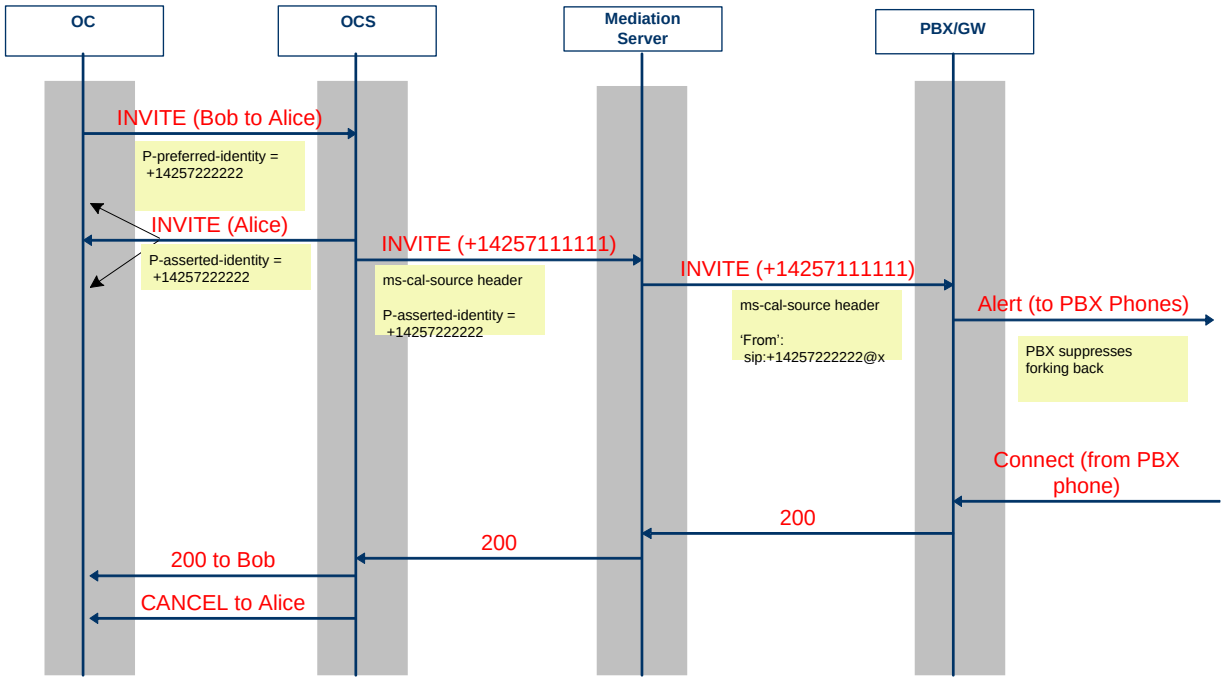
Make a Call

Office Communicator 2007 dials an external phone number.



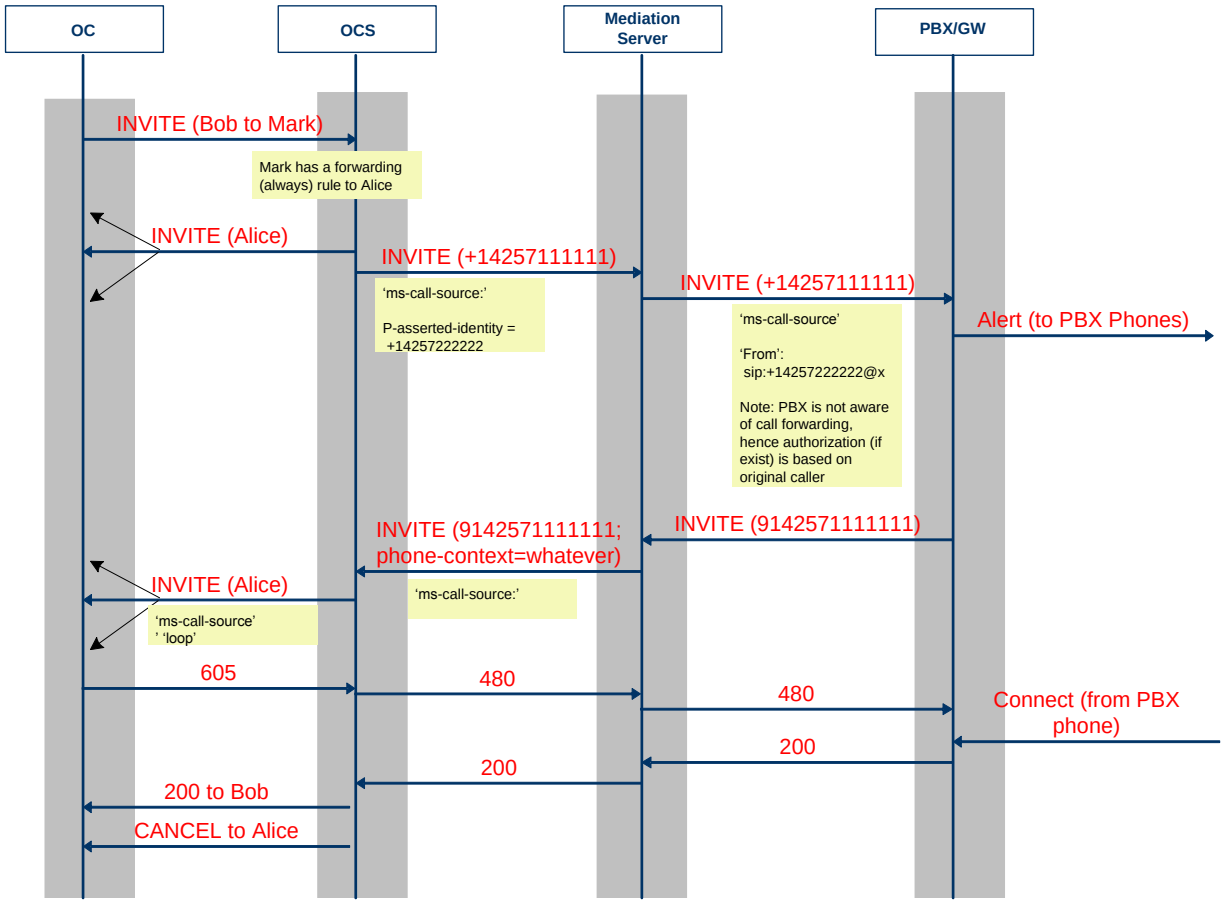
Answer a Call

Office Communicator 2007 calls and the telephone answers



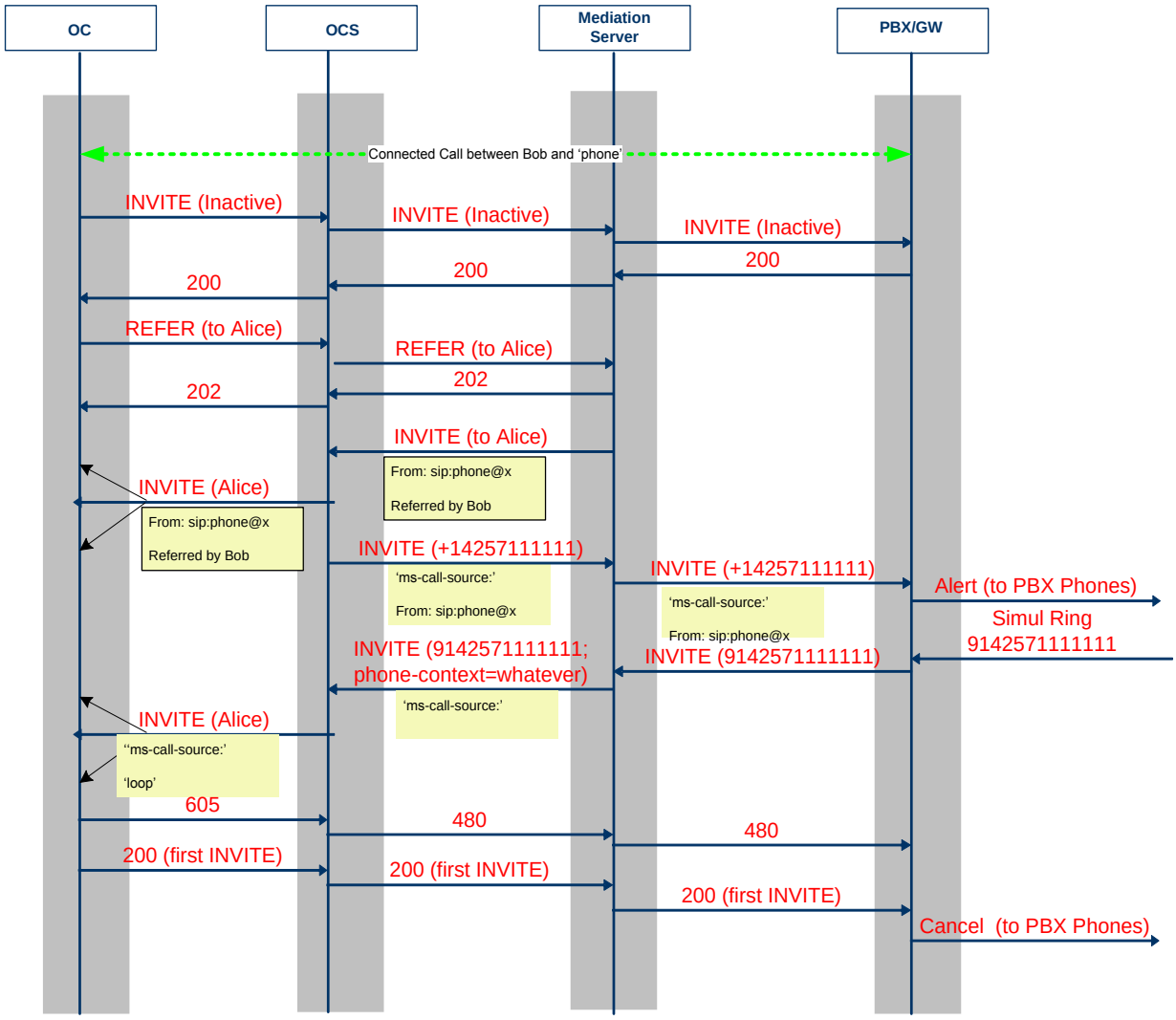
Forward

Office Communicator 2007 calls, called party has set Office Communications Server 2007 to “forward always” – telephone answers.



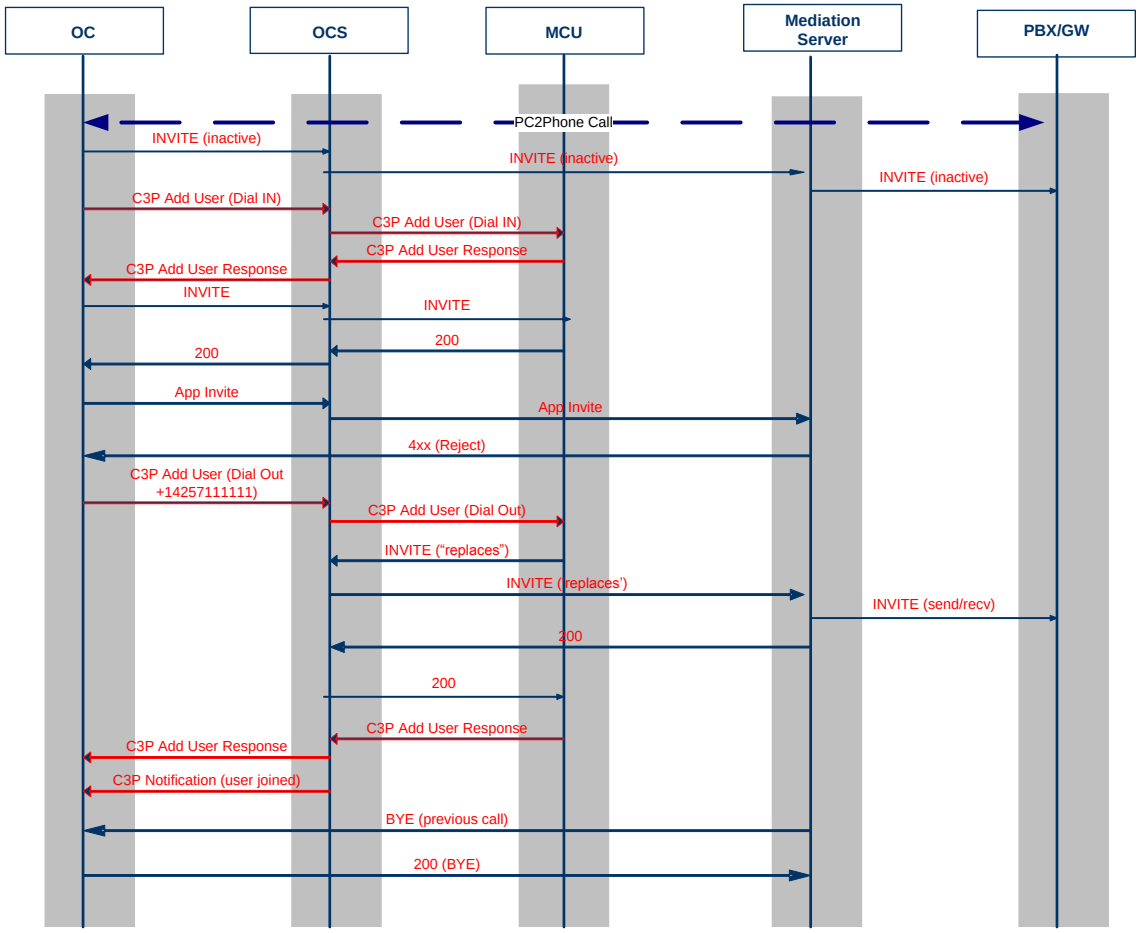
Transfer

Office Communicator 2007 in a call with a telephone initiates a single-step transfer to another Office Communicator 2007 user.



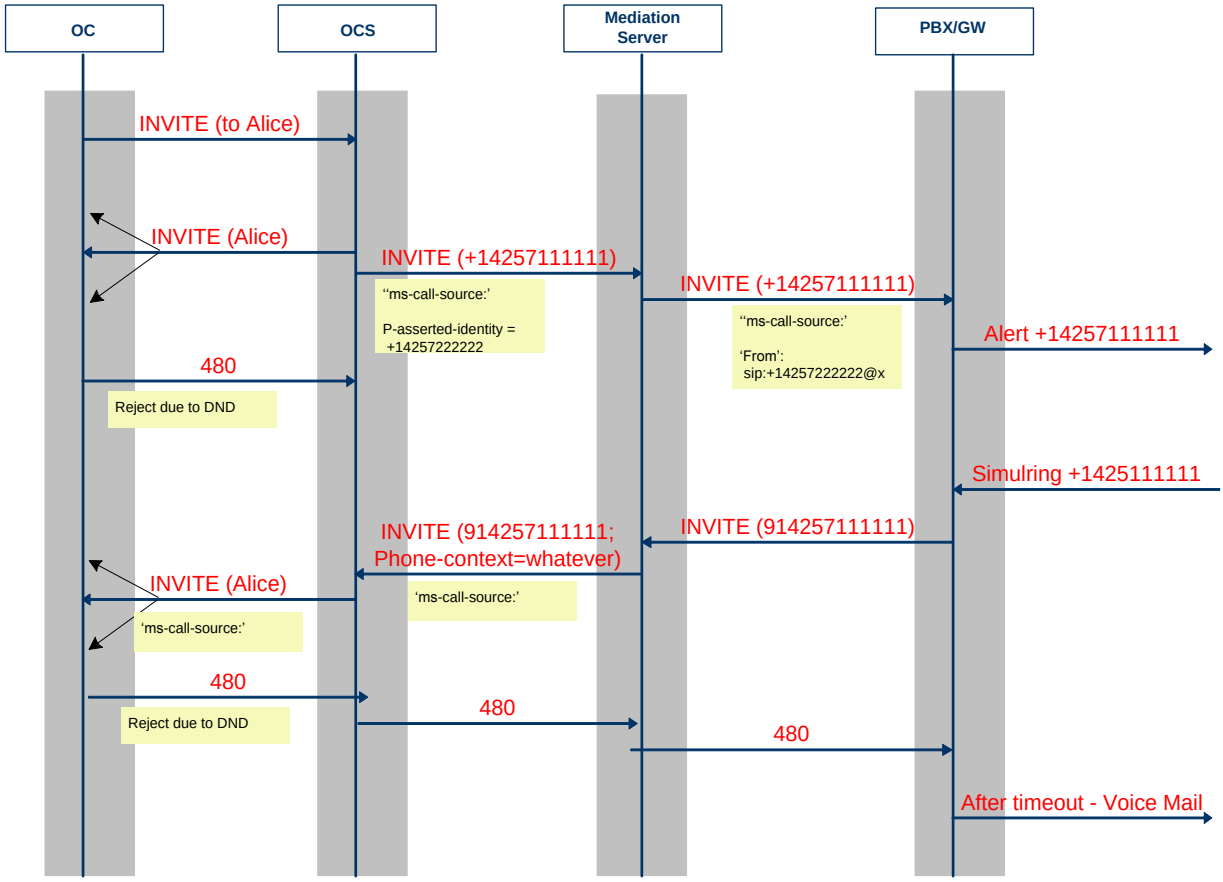
Conference

Office Communicator 2007 in a two-party call with a telephone escalates to a multi-party call with another telephone user.



Do Not Disturb

Office Communicator 2007 calls another Office Communicator 2007 user who has set “Do Not Disturb”



GLOSSARY

AD - Active Directory – a Microsoft corporate directory product.

CAS - Channel Associated Signaling – a form of digital telecommunications signaling.

CSTA

Computer Supported Telecommunications Applications – an abstraction layer for telecommunications applications that is independent of underlying protocols.

ICE

Interactive Connectivity Establishment – an emerging IETF standard that deals with the negotiation of real-time media packet traversal across NATs and firewalls.

IETF

The Internet Engineering Task Force (www.ietf.org) is a large, open, international community of network designers, operators, vendors, and researchers concerned with the evolution of Internet architecture and the smooth operation of the Internet. It is open to any interested individual.

IP

Internet Protocol – the standard that controls the routing and structure of data transmitted over the Internet.

Media Gateway

A translation device used to connect disparate communications networks. In this paper, we use this term to mean a device that connects the PSTN or a PBX with unified communications networks.

MMC - Microsoft Management Console – a management feature of Microsoft Windows.

NAT

Network Address Translation – an IETF standard that defines the separation of internal or private IP addresses from external or public IP addresses

PBX (PABX in some countries)

Private Branch Exchange – an enterprise class telephony switch owned and operated by a company and hosted on its own premises, typically one per office or branch location. Some of these switches are operated by Service Providers on behalf of enterprises; however with the advent of VPN, the physical location of the switch is becoming less important.

PRI

Primary Rate Interface – a telecommunications standard for carrying voice and data packets between two physical locations.

PSTN

Public Switched Telephone Network – a traditional telephone network that leverages protocols such as SS7, TDM, QSIG, etc. These networks are digital networks, but are not IP-based networks.

QSIG - A set of ISDN-based protocols used for signaling between PBXs.

RFC

"Request for Comments" – an IETF ratified standards document that defines certain technologies and/or protocols. E.g. RFC 3261, the "root" RFC for a growing range of standards that define the SIP protocol.

ROM

Read Only Memory – a class of storage media used to store firmware in computers and similar devices (e.g. Media Gateways).

RTP

Real Time Protocol provides end-to-end network transport functions suitable for applications transmitting real-time data, such as audio or video, over multicast or unicast network services. (See RFC 1889)

SIMPLE

The Session Initiation Protocol (SIP) for Instant Messaging and Presence Leveraging Extensions is a set of extensions to the SIP protocol that enables the sending and receiving of presence and instant messaging traffic. (See RFCs 3265 & 3428)

SIP

The Session Initiation Protocol (SIP) is an application-layer control (signaling) protocol for creating, modifying, and terminating sessions with one or more participants. These sessions include Internet telephone calls, multimedia distribution, and multimedia conferences. (See RFC 3261 et al.)

TCP

Transport Control Protocol – a protocol that defines the transmission of data packets across an IP network.

UC – Microsoft Unified Communications (i.e. the product)

UCG – Unified Communications Group (i.e. the Microsoft product group that creates UC)

VoIP

Voice over IP – a term that describes the use of IP networks to carry telephony traffic as well as the technology required to facilitate voice traffic on IP networks.

WMI - Windows Management Instrumentation – a management feature of Microsoft Windows.