# MiVoice MX-ONE

## Overview Guide

### Release 7.3 SP1

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# Contents

# MiVoice MX-ONE Solution Overview

This chapter provides a high-level technical description of the MiVoice MX-ONE system. It includes a brief description of the system components, the network architecture, and external interfaces together with general feature descriptions for MX-ONE. For more detailed description of specific features and components, separate dedicated description documents should be referred.

It is recommended to read the *SYSTEM OVERVIEW MIVOICE MX-ONE DESCRIPTION* before reading this description, in order to get an overview of the solution architecture and its components.

This description covers all installation alternatives, i.e. Turn-key solution, Virtual appliance and SW only.

In this context, the term user is defined as an end-user within the enterprise that uses MX-ONE for daily communication. The user can access MX-ONE through several different terminals or applications. Thus, each user can have several extensions, for example, one extension for fixed telephony and one for mobile telephony.

Throughout this document there will be references to other documents that provide more detailed information about different subjects.

For information about how to implement/deploy MX-ONE, see the description for MX-ONE SYSTEM PLANNING.

For information about telephony features and capacity data, see the description for MX-ONE SERVICE NODE FEATURE LIST and the description for MX-ONE CAPACITY.

For information about supported terminals and clients, see TERMINAL OVERVIEW and MX-ONE FEATURE MATRIX, and for supported applications, see the MX-ONE SOLUTION PRODUCT COMPATIBILITY MATRIX.

## Introduction

MiVoice MX-ONE is a complete communications solution that is highly flexible to address the business communication needs in different vertical segments and sizes, scaling from 50 to 500K users in a single system. In this document the system will generally be called MX-ONE.

Not only does MX-ONE provide excellent voice and video communications, but it also provides the necessary applications to offer true Mobility and Unified Collaborative Communications. The combined solution addresses Enterprise communications need for all types of businesses in over 70 countries worldwide.

### Standards Based Approach

MX-ONE is designed for use in an open standards based software and hardware environment, using industry standard servers with a LINUX SUSE & Windows server operating systems. Furthermore, together with strong support for open standards, such as SIP, CSTAIII/TR87 and Web services, it comes with support for a full range of network and user side interfaces, enabling connection to a variety of public networks as well as 3rd party systems and applications.

It also provides a strong migration capability, where existing MD110 and Mitel TSW customers can maintain a portion of already made investments and migrate to new technology and services at their own pace.

## Fixed Mobile Convergence

Today's users are expecting to have all types of communication services combined and integrated in the same application GUI on the device of their choosing, whether in the office or when they are on the move.

MX-ONE sets the standard for Fixed Mobile Convergence with its mobile extension feature, where mobile phones are integrated as an integral part of the office communications system with access to a complete feature set.

The Fixed Mobile Conversion (FMC) is a smart phone application that is integrated with MX-ONE to provide Fixed Mobile Convergence. An FMC user is seen by the system as a normal SIP user thanks to the FMC controller, a software based Fixed Mobile Convergence gateway that inter-connects the mobile network (via SIP trunk) to the MX-ONE on the customer enterprise LAN. The FMC controller can reside as virtual machine or be delivered as an appliance.

An added feature with the FMC controller is the possibility for users to roam between GSM/3G/4G networks and the company Wi-Fi network with seamless handover in either direction (mobile phone dependent) during a call.

The FMC mobile apps for iOS and Android provide a rich graphical end-user interface for a variety of telephony services and offers features such as corporate directory look-up, activity call routing management and presence information.

The FMC also provides call routing without mobile operator support and advanced cost saving features (Dynamic LCR and traveling SIM) for international roaming users. For access to corporate contacts and rich presence information the FMC integrates with the Mitel BluStar Server (presence engine).

## Unified Communications and Collaboration

With MiVoice MX-ONE 7.x the customer can benefit from native Unified Communication and Collaboration (UCC) through integration of Mitel’s MiCollab portfolio, offering multi-media collaboration (voice, video and IM) through a variety of soft-phones and CTI call control clients for PCs, tablets and smart-phones. These can be combined with the Mitel BluStar Ecosystem clients, as well as desktop SIP end-points, ranging from the Mitel Conference & Video phone, to a full range of SIP terminals.

The MiCollab suite works as a SIP based client-server system which through standards based integration provides call control and feature-support natively by MiVoice MX-ONE.

Mitel's MiCollab portfolio provides businesses with a comprehensive, end-to-end UCC solution with a versatile and consistent user interface across different devices. MiCollab offers a natural collaboration experience and fully embraces trends such as presence information, IM, multi-party and personal video communication as well as increased use of smart phones and tablets in the workplace.

MiCollab helps users work together more effectively, e.g. on the fly video conferencing with remote workers, road-warriors and teams working on the same project to exchange ideas more easily and collaborate more efficiently. Mitel's focus across the portfolio is a unified user experience, facilitating user-adoption through a consistent look and feel, regardless of the device used.

Mitel Application Server (MAS) is the core of the MiCollab suite. The MAS handles the clients, contacts, presence as well as control of, and signaling between, the MiCollab components and the MX-ONE system. All user-provisioning is handled through the MX-ONE Provisioning Manager and automatically executed via the MAS server.

Integrated with the MAS server the below MiCollab server applications are delivering UCC services to the end-users:

The MiCollab AWV (audio, web and video) suite multi-media meet-me web-based desktop sharing and video conferencing. Its web based conference administration portal allows users to setup and manage their conferences directly from any MiCollab client, or from any PC via web browser.

MiTeam and MiTeam Meetings also part of the MiCollab portfolio, is a set of work-stream communications and collaboration tools that provide a highly collaborative, persistent workspace for team-based meetings, conversations, content collaboration and project management.

Mitel NuPoint Unified Messaging (UM), which provides messaging functions from basic voice mail to advanced unified messaging.

MiVoice Border Gateway (MBG), a platform for secure communication with remote tele-workers, can also be used.

MiCollab Fixed Mobile Convergence, when the MiCollab for Mobile Client user initiates a MiCollab call, a native mobile call is placed using the mobile number configured as EHDU or Remote Extension. Through the Terminal Selection Service (TSS) in MX-ONE, and the corresponding functionality in the MiCollab clients, the users with multiple terminals can select which terminals/applications should ring and be used.

## Collaboration Management - Managing How You Want To Be Reached

Another aspect to consider is Collaboration Management or the possibility to manage how calls are routed based on a user's presence or activity.

The Mitel Collaboration Management Suite (Mitel CMG) offers solutions to fully automate this process by integrating into a company's calendar system and setting diversions or personal number routing profiles for a user, based on their calendar activities.

The system comes with a Web based Self-service portal (Mitel Micollab) that allows users to set these call routing options up based on their preferences. Once they are setup, the user no longer has to worry whether or not his diversions are set or if customer calls are being handled in his absence. He can even change them on the fly, through a simple press of a button, if something urgent comes up that was not planned.

The web portal also offers other services, such as directory search, presence and line state and click to call. It is designed using responsive web technology, enabling it to be used on any device - PC, Mobile or tablet - regardless of location. This means that even out of the office, MiCollab users have access to their services on any mobile device with a browser. Additionally, it integrates with other parts of the portfolio, FMC as an embedded link.

## Attendant Services - A Company’s Face To The World

When professional attendant services are needed with MX-ONE, Mitel InAttend is the platform of choice. It is a Windows based client-server architecture than integrates with a customer's Microsoft Active Directory and calendar systems. Attendants have a full featured PC based client that offer all the expected features for a professional attendant, including SIP soft-phone (or hard-phone) with advanced attendant call handling features (keyboard or mouse), multiple queues, A/B panels, advanced directory search, view users' presence, line state and calendar activities, messaging, etc. In other words, everything an attendant needs to provide fast and efficient service to customers.

The Mitel BluStar Server (Presence engine) is embedded in the solution enabling the attendants to get real time presence and line state, It uses industry standards based interfaces such a SIP/simple, CSTAIII and UCMA to provide rich presence information from different systems, including MX-ONE, Cisco CUCM and Microsoft Lync 2013/Skype-for-Business. This makes sure the attendants have federation of all relevant status information in one place, regardless of the system users are connected to. The key benefits are efficiency and better customer service.

Furthermore, Mitel InAttend has tight integration with Mitel CMG, enabling it to see and even manage user presence/activities and diversions. Mitel InAttend is a scalable solution that can start with one attendant for medium sized companies, yet scale to large organizations with 100 or more attendant consoles.

## One Solution Addressing Different Business Models

The MX-ONE design and license models are built to work either as Customer Premises (CPE) deployment or as a Cloud or hybrid Cloud deployment. Its license model is built up to enable support for a either a traditional Capital Expenditure (CAPEX) model or OPEX based subscription models. The license reporting software embedded in the system allows accurate and secure license usage monitoring needed for a subscription based licensing model. The system license usage information is reported on a monthly basis, enabling a "pay for what you use" model.

The MX-ONE Private Cloud offering provides customers the same user-experience as a traditional premises-based deployment and only differs in the license delivery model.

The following deployment variants exist for the MiVoice MX-ONE solutions:

- MiVoice MX-ONE CPE Turnkey solution deployment. For large (and medium) CPE solutions.
- MiVoice MX-ONE CPE Software only deployment. For large (and medium) CPE solutions.
- MiVoice MX-ONE CPE Virtual appliance deployment. For large (and medium) CPE solutions.
- MiVoice MX-ONE Express, single server pre-packaged smaller solution (30-1500 users) with UCC and FMC, running on an ASU-II server, or as “Software only” for a VMware deployment. A wizard simplifies installation and configuration.

  **NOTE:** The MiVoice MX-ONE Express is not supported from MX-ONE 7.0 release onwards.
- MiVoice MX-ONE MLA (Managed Services License Agreement), cloud deployments with feature based user licensing. Includes UC and FMC, and a wizard to simplify installation and configuration.

## Management System

The Management solution continues to grow with its single point of entry approach, offering an efficient way of managing the system. Additionally, this release features full virtualization support for the MX-ONE Service Node call server and UCC applications offering HW consolidation and enhanced resiliency options.

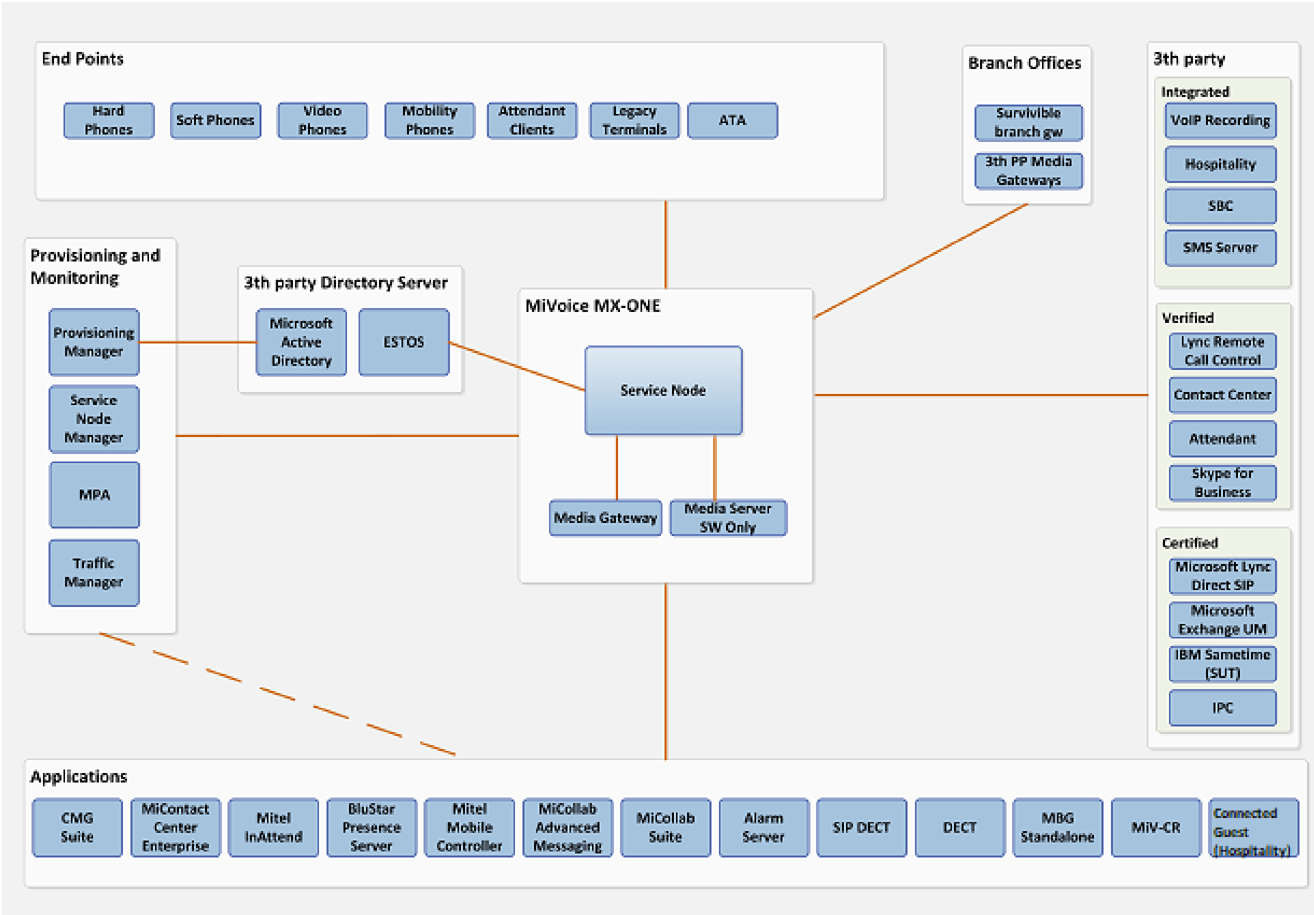
**NOTE:** Re-branding to Mitel names was done in the MiVoice MX-ONE 6.x, but some Aastra related names are still used for specific legacy products, so a few such names may exist later in this document.

# System Architecture

## General System Overview

An overview of the components that comprise the MiVoice MX-ONE System is given in .

**Figure 1.1:** System architecture brief overview




## MX-ONE Communication System Components

The MiVoice MX-ONE communication system is comprised of the following three main components:

- The call server component that takes care of the signaling is called **MX-ONE Service Node** (former Telephony Server), which is a Linux based call control software that can either be installed in a private cloud as a instance or reside in a standard Intel based server.
- The second component is a software based Media Server with DSP resources for handling tone detection, multi-party conferencing and packet switching between different IP end-points (SIP only environment), when direct media is not possible. In SIP only installations, there is no need for dedicated media gateway hardware. The Media Server has a load-sharing/load-balancing functionality for such installations. The media server can reside in the same Linux machine as the Service Node call server, thus reducing the customer footprint, but can also reside on a separate server.
- As a complement, one or several hardware based Media Gateways can be added to the configuration, to provide the physical interfaces towards TDM subscribers, public networks and Auxiliary devices. It also houses DSP resources for handling tones, conferencing, packet switching towards IP Phones (SIP and H.323) and to convert media between different protocols. Any combination media servers and media gateways up to a limit of 15 can be connected to the same server.

## Other MX-ONE System Components

Mitel MiCollab portfolio, is designed to provide business with effective multi-media collaboration amongst its employees, partners and customers. The portfolio includes:

- Mitel MiCollab Application Server, the core component of the Mitel MiCollab system, providing directory, presence and calendar integration for end users. The MiCollab application Server also provides a homogeneous environment for deployment and operation of the MiCollab environment and integrated with MX-ONE for smooth and consistent user population and configuration.
- Mitel MiCollab clients comprises a Unified Communications SIP soft phone/call control client application for PC as well as mobile apps for IPad/iPhone, Windows mobile and Android that enable corporate users to make and receive voice and video calls over MX-ONE via SIP and to interact with other users and MiContactCenter Enterprise agents through IM (Instant Messaging), e-mail, voice and video.
- MiCollab Audio, Web, Video (AWV) is a powerful meeting point and conference server for various forms of collaboration.
- MiTeam, a set of work-stream communications and collaboration tools that provide a highly collaborative, persistent workspace for team-based meetings, conversations, content collaboration and project management.
- Mitel NuPoint Unified Messaging (UM)
- MiVoice Border Gateway (MBG)

MiVoice Conference and Video Phone, is a compact audio and video conference room unit offering an HD quality user experience. It integrates fully with the MiCollab AWV conferencing suite for voice, video and content sharing. Additionally, it can host a 4-way video conference and inter-operates with Mitel MiCollab end-points and Mitel BluStar Client end-points.

MiCollab Advanced Messaging (former OneBox) provides a powerful suite of Unified Communications applications including advanced call processing, Auto-Attendant, voice mail, e-mail integration, personal assistant, fax, speech driven services, notifications, etc.

MiContact Center Enterprise (former Solidus eCare), a suite of applications and services for server-based contact centers.

MiContact Center Business, a suite of applications and services for server-based contact centers, which is an alternative to MiCCEnterprise for SIP only systems.

MiCC Enterprise offers an enterprise-wide contact center solution with IP and mobility across multiple sites. This enables distributed customer service organizations to behave as one single unit.

Mitel Collaboration Management Suite (CMG)

- Mitel BluStar CMG Web is a set of services that enables business users to manage their day-to-day activities. With the Mitel BluStar CMG Web, users can do “smart-search” directory services, click-to-dial, manage activity timeline and their call-routing preferences based on their calendar/activities. The integration with the BluStar Server presence engine enables users to see in real-time their colleagues’ rich presence information, including BluStar clients presence status, calendar activity and line state from all available sources provided by the BluStar Server.
- Mitel Virtual Reception - Automated speech and reception services.
  Mitel Virtual Reception is a set of automated self-services that significantly reduce wait time and attendant workload, increasing at the same time customers’ flexibility and efficiency.

MiVoice Call Recording and Mitel Interaction Recording (former ASC) are applications for recording of VoIP calls.

MX-ONE end-points supporting all various types of extension interfaces (SIP, H.323, analog, digital, DECT, Wi-Fi and others).

Mitel Border Gateway (MBG), for secure remote access from MiCollab clients. Additionally the MBG can provide security for SIP trunks to public networks or remote application servers, and facilitate VoIP recording from the gateway in cases where the other end-point does not support recording.

MX-ONE Management applications, with MX-ONE Service Node Manager, MX-ONE Provisioning Manager, and Mitel Performance Analytics (MPA). See *Single-point-of-entry Management*.

For information about the different components/applications, see their respective descriptions.

## System Architecture

The long proven scalable and flexible architecture of MX-ONE, allows a customer to tailor make an optional solution for the customer's specific needs. An MX-ONE solution can be built as a single central system with multiple servers, a distributed system database, and multiple gateways, but it also allows distribution of the system components over a Wide Area Network. Multiple MX-ONE systems can be networked with intelligent signaling systems in order to support several hundred thousand users within a global voice network.

Scalability - MX-ONE allows organizations to easily expand its capacity, add functionalities, modules, gateways, and easily upgrade the servers. A single MX-ONE can scale from 50 users up to several hundred thousand users using a mixture of IP/SIP, mobile, digital, analog, and cordless extensions, organizations can benefit on the expand-as-you-grow principle of adding users in the system.

Flexible deployment - MX-ONE is a highly flexible solution that supports a completely distributed model for deployment and design; Servers and Media gateways within a system can be spread over a wide area network in order to create solutions for small and large customers across geographical locations or as a centralized system with the servers on a central location.

## Cloud Architecture

With the advent of cloud computing technology, the cost to provide high availability, voice and data application hosting, content storage and service delivery will be significantly reduced.

Cloud Computing broadens the horizons across organizational boundaries of "re-usability of IT capabilities" which is the very fundamental principle in cloud computing. To realize this computing paradigm, MX-ONE has taken the bold steps in realization with its ability to deploy virtualization.

With MX-ONE it is now possible to run the MX-ONE Service Node and its UC applications as virtual machines in a customer VMware environment. Thus, this capability has taken advantage of integrating real time communications as a service in the cloud environment. More importantly with MX-ONE using VMware Virtual Appliance, virtualization is supported and provides an alternative to MX-ONE's native Resiliency and High Availability options.

Furthermore, MX-ONE can optionally be installed as a Soft-switch without any hardware based media gateways for pure IP environments. In a virtualized environment, both the call server and media server reside in the same virtual machine and can benefit for VMware's High Availability options.

# High Availability

## Redundancy Functions

MX-ONE offers high availability by supporting different types of redundancy to cater to different types and requirements of the Enterprises.

MX-ONE offers far-reaching alternatives for High Availability.

Server redundancy delivering high availability:

- Home Location Register (HLR) redundancy. In this case, you are deploying IP/SIP phones and have more than one server sharing the load. The user data is synchronized between the servers. Should one of the servers fail, the IP/SIP phones will re-register to one of the secondary servers (using a temporary guest/backup-HLR) and recover most of their features. When the primary server comes back, they will re-register to their primary HLR server.
- 1+1 server redundancy and network redundancy. This is a scenario where a primary server and a dedicated back-up server are configured in a redundancy cluster. Should the primary server fail, the back-up server will take over. This is a warm stand-by setup.
- N+1 server redundancy and network redundancy. This scenario is similar to the 1+1 scenario, except you have several servers in the same location in a redundancy cluster with a dedicated back-up server that will take over if one of the primary servers fails. This is a warm stand-by setup.
- High Availability provided via virtualization software (e.g. VMware HA/FT). The MX-ONE Service Node fully supports VMware HA scenarios - both High Availability (Warm Standby) and Fault tolerance (Hot Standby) options. It assumes the proper virtualization infrastructure is put in place according to VMware specifications.

Network Redundancy with Bonding/Link failover is supported for the media gateways. Dual sub-net is no longer supported.

## Branch Office Survivability

For Branch office situations where there are requirements for local PSTN access and survivability for IP/SIP terminals, sites can be equipped with a remote server and media gateway combination - known as a Survivable Branch Node (SBN).

The SBN bundles include the necessary trunk, tie-line and user licenses as well as necessary HW, depending on the options or package selected. As it is using standard MX-ONE Service Node software, it can be configured and managed centrally from the MX-ONE Management suite as a remote networked node.

Mitel EX /GX Controllers provide communication service access to branch offices, as if they were on the same site as MX-ONE and UCC application servers. The Mitel EX/GX Controller ensures service continuity by establishing external calls through the local PSTN and by routing internal calls when the primary central site network is temporarily unavailable.

# True Mobility

Mobility is a concept and a way of working, not just a method to forward your calls to your mobile device.

Mitel offers true mobility where a user is provided with the same services, the same access to corporate resources from any telephone, anywhere, connected to any network.

A user has one telephone number, one mailbox and is handled as one individual, irrespective of which terminal (or terminals) he is presently known to use by the system.

True mobility allows the user to log-on to any authorized telephone whether it is a local or remote IP device, an analog telephone connected to any network or a terminal on a DECT or WLAN infrastructure on the corporate premises or in public hot spots. True mobility is a native solution of the MX-ONE and no external servers or applications are required.

## SIP - The basis for Unified Communications and Collaboration

Session Initiation Protocol, SIP, has become the signaling protocol for establishing real-time multimedia communications. SIP is key to accelerating the transition to Unified Communications in a modern organization.

MX-ONE provides a high level of functionality with both SIP extension and SIP trunk with support for more than 45 RFCs. Mitel will continue to develop this architecture in order to provide our customers a natural migration path towards Unified Communications and Collaboration. As an example, MX-ONE SIP extensions now offers a higher level of functionality than what was previously offered with proprietary digital phones.

These same standards are also the basis for integration with 3rd party UC applications and an organizations business processes as well as the connection to the outside world with SIP trunks as an alternative to traditional PSTN networks.

### Native SIP implementations in MX-ONE

**SIP-based endpoints** - MX-ONE supports a comprehensive portfolio of IP/SIP terminals. The portfolio consists of desk-phones, soft-clients, and cordless SIP-DECT. Mitel SIP terminals offer a high level of functionality and scope for design, utilizing embedded XML, which enables a customer to integrate the SIP terminal into applications and or the clients IT network.

**Extension User licensing** - Maximizing value of the software and ensuring reliable access to the system in MX-ONE 7.x has taken the leap to introduce a new SIP user-licensing model, with multi-device support and multimedia licensing. The extension user licenses are linked to users rather than to devices, making it far more flexible and cost efficient. Multiple SIP end-points means that a business user can have one directory number with four active (simultaneously registered) multi-media SIP end-points.

**SIP trunking** - MX-ONE is certified for a number of SIP network providers and conforms to the SIP Connect 1.1 standard. MX-ONE's SIP trunking interface is also the basis for integration with 3rd party systems, such as Microsoft Lync 2013/Skype-for-Business, IBM Sametime SUT and other platforms to enable federation between different communications platforms.

Furthermore, with MX-ONE 7.x, a SIP tie-line with full network services is supported (introduced in MX-ONE 6.0), enabling feature transparency between MX-ONE nodes and certain applications, such as Mitel InAttend.

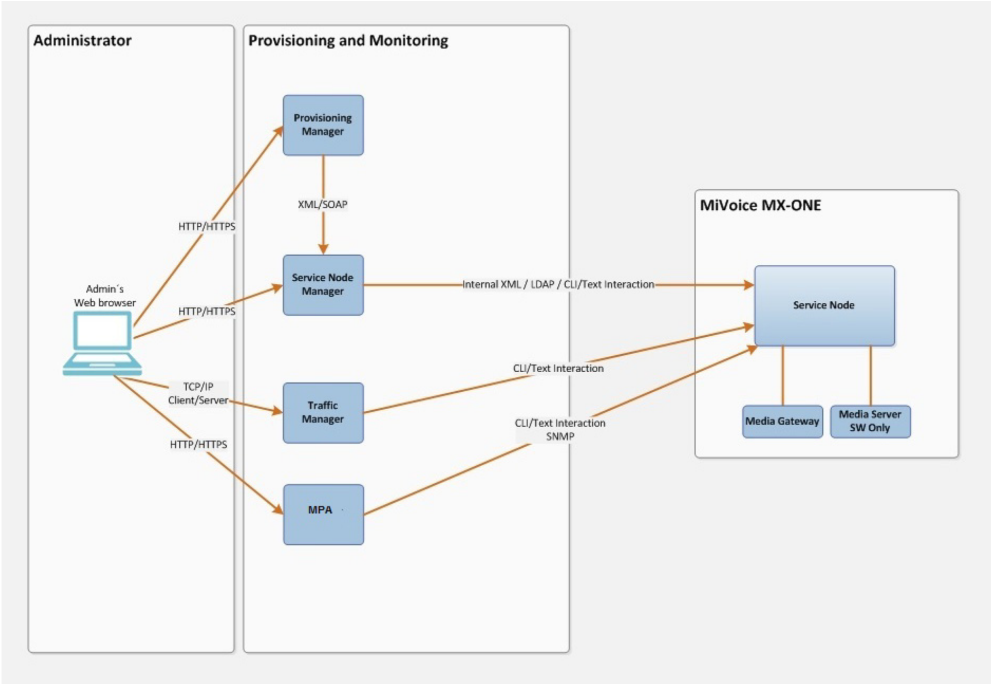
## Single-point-of-entry Management

Dealing with complexity in today's dynamic communication infrastructures is one the many challenges faced by IT managers and support staff.

Increased reliance on communication solutions to drive profitability and achieve business goals has broadened the scope of IT and communication support issues while expanding the need for more reliable infrastructures and management tools. The recognition of the issues has amplified the way MX-ONE management system works nowadays.

The single-point-of-entry management approach integrates well with today's IT management platforms and offers full control over your MX-ONE communication networks.

**Figure 1.2:** System Management architecture overview




MX-ONE offers the following web-based managers to fulfill the administrative, provisioning and performance monitoring on the same place for MX-ONE, UC applications and terminals.

- MiVoice MX-ONE Service Node Manager
- MiVoice MX-ONE Provisioning Manager
- Mitel Performance Analytics (MPA)

The Manager's functionalities are carefully developed and expanded to even further simplify and improve support for a greater portion of today's complex communication infrastructures. Enterprises can more effectively improve the value of their investments and better achieve their business goals and requirements.

Mitel Performance Analytics (MPA), provides fault and performance management for multiple enterprise VoIP systems and associated network infrastructure, both LAN and WAN. MPA supports monitoring and remote access both for private networks, such as enterprise LANs and VPNs, and for public network or Internet-reachable devices, such as access routers.

# Telephony Features

This section describes a few prominent features supported by MX-ONE.

For more information about the many telephony features and their capacities, see *MIVOICE MX-ONE FEATURE LIST* and *CAPACITIES*, but also specific descriptions for the features.

# Extension Features

## Multiple terminal services (Forking, Parallel ringing)

The Forking service, available for generic extension types (IP, DECT and mobile extensions), provides the user with one single number simultaneous ring signal on two to four predefined answering positions for an incoming call to the user. When the user answers the call, the call is directed to the terminal where it has been answered.

The Parallel Ringing service provides the user with simultaneous ring signal on up to three predefined answering positions for an incoming call to the user. When the user answers the call, the call is directed to the extension where it has been answered.

However, the terminals might not ring at the same time depending on their type.

Parallel ringing supports analog, digital, CAS, cordless, IP, IP DECT, WiFi and remote extensions (emergency extension and group number are not permitted). Any combination of the extension types may be used to define a parallel ringing list, but it is only possible to define one remote extension per list at any position.

Note that the terminals in a parallel ring list must have different extension numbers, a main number which belongs to the user, and secondary numbers for the additional devices. The user's main number is the number that is used (in the directory) and seen by others, irrespective of which terminal that is used for a call.

For more information, see the operational directions for *MULTI-TERMINAL SERVICE*.

## One Directory Number - Multiple SIP Terminals

An extension user can log on to the same extension number on several SIP terminals, that is, forking with a maximum of 4 active terminals. From a licensing perspective, there is only one IP/SIP extension license per user, including support for one device. Several SIP devices can be connected to a user's extension number, If a user would like more SIP devices on his/her extension number, then "device" licenses for the extra terminals can be added.

Supported end user terminals, any choice up to a total of four:

- Mitel 6900/6800/6700 desktop SIP terminal
- MiCollab client for PC, and for mobile phones
- Remote extension over SIP, that is, mobile (with or without FMCC)
- SIP DECT

Additionally, the enhanced multiple terminal service makes it possible to have a combination of SIP end-points and generic devices, such as mobile extension and integrated DECT, with up to four devices registered to only one directory number. As an example, it would be possible to have one directory number with three SIP end-points and one mobile extension assigned. From the licensing perspective, the user would need one SIP user license. Number with three SIP end-points and one mobile extension assigned. From the licensing perspective, the user would need one user license per type of terminal, that is, one for the three SIP extensions and one for the Remote/Mobile extension.

## Take call on another terminal

From MX-ONE 6.0 there is a new feature for users of multiple SIP terminals registered on the same number; the "Take call on other phone", which is a procedure to pick an ongoing call over to another of the own terminals. The ordinary group call pickup procedure (e.g. *8#) is used.

## Extension Monitoring, Shared Call Appearance

Extension monitoring is an important feature for two main applications, Manager-Secretary and Team-working (key-system emulation).

The ability for a secretary to monitor the phones of one or more managers or for members of a team to monitor all members is enabled with the monitoring feature (MNS). It is possible to assign specific monitoring keys on IP phones and digital phones where the secretary and the manager can see the status (free, ringing, parked, or busy) of each other's phones, indicated by a Light Emitting Diode (LED).

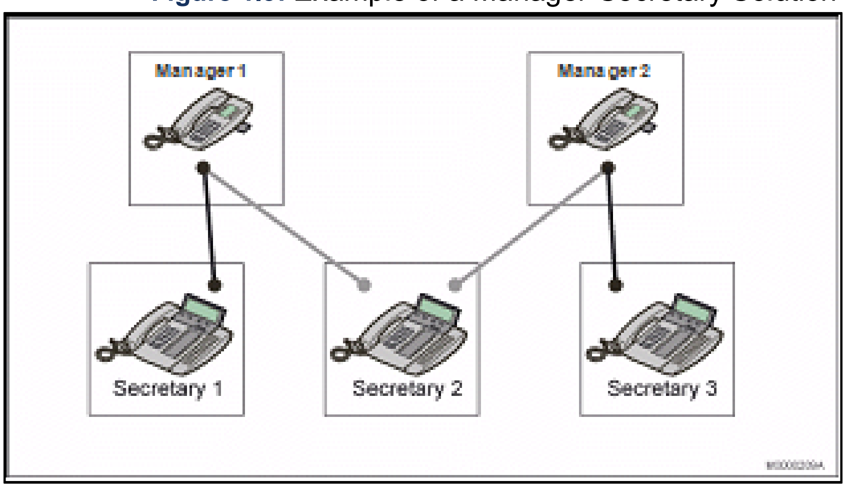
The manager or secretary can also use the programmed monitoring key to call the monitored party. Many configurations can be formed where individual secretaries can monitor the phones of one or more managers, as described in the figure below. In this example, the phone of Manager 1 is monitored by the phones of Secretaries 1 and 2, whereas Secretaries 2 and 3 are monitoring Manager 2. Secretary 2 then acts as backup to the other two secretaries.

The monitoring keys for Secretary 2 can have delayed ringing, giving time for the other secretaries to answer the call.

For SIP terminals the Shared Call Appearance (SCA) feature is supported as a monitoring service alternative to the MNS.

For more information, see the description for *SHARED CALL APPEARANCE* and the operational directions for *BOSS-SECRETARY*.

**Figure 1.3:** Example of a Manager-Secretary Solution




## Personal Number

A Personal Number is an extension directory number with a terminal of any type (not ISDN S0) assigned, providing system users (voice extensions) with different possible answering positions for the incoming calls. Every personal number can have up to five lists where each list can contain up to ten different answering positions. The answering positions are selected depending on the settings for the user, for example, the user can be set to be at the office or to be at home. The settings of the personal number can be done manually by the user or automatically depending on calender and location information stored for the user.

A CTI group number can be stored as a number in the personal number list.

For more information, see the description for *PERSONAL NUMBER/CALL LIST*.

## Boss-secretary Configurations Using Personal Number List

Both the manager and the secretary can configure the diversion of incoming calls to the manager. While the feature is active, the calls to the manager is deflected to the secretary's phone, and a LED associated to a key on both the manager’s and secretary’s phones indicates that the service is active.

The service can be activated and deactivated by both managers and secretaries by pressing the previously defined key. When the service is active, the LED associated to a key is turned on at both the manager and the secretary phones (digital and IP phones are supported but cannot be mixed, meaning that the manager and the secretary must both have digital phones or both have IP phones). When the service is inactive, the LED associated to a key is turned off at both the manager and the secretary phones (digital and IP phones are supported but cannot be mixed). The service can be directly deactivated by pressing the previously active key or indirectly deactivated by activating another personal number list.

For more information, see the description for *PERSONAL NUMBER/CALL LIST* and the operational directions for *BOSS-SECRETARY*.

## Attendant Features

In MX-ONE, the attendant can handle all types of calls and assist users to activate and deactivate features. The attendant terminal is normally the Mitel InAttend application but older types, e.g. NOW from the Contact Management (CMG) application suite and hard consoles (OPIs) can still be used.

Calls are distributed among the active attendants. If there are no free attendants available, the calls are placed in queue. A queued call is distributed as soon as an attendant is available.

The attendant functionality is provided by a separate server, the Application Connectivity Server (ACS). The ACS is connected with SIP to the MX-ONE. The ACS provides queuing and call distribution. The use of ACS and SIP connection makes it possible to offer Mitel InAttend also to customers with PBXs from different vendors, who still want a uniform attendant functionality.

As of MX-ONE V.4.1 SP4, the SIP connection towards ACS was changed to a SIP trunk connection, rather than using a remote SIP extension, as was the case previously. This change also applied to MX-ONE 5.0. Furthermore, with MX-ONE 5.0 some net services were made available for this SIP trunk connection between MX-ONE and ACS to enable certain feature interactions between MX-ONE and the Mitel InAttend attendant suite. In MX-ONE 7.x additional services are supported, and service profiles are used.

Configuration changes to the SIP trunk setting must be done in both MX-ONE 7.x and ACS to enable enhanced feature interaction.

For more information about NOW and ACS/InAttend, see the respective user manual for *InAttend/ACS* and *NOW*.

## Group Features

Users can be grouped into different types of work groups. The users connected to a specific work group can use a number of group related features, such as the ability to pick up calls to other extensions in the group or use a common number.

For more information, see the description for *EXTENSION GROUPS*.

### Group Call Pick-Up

The feature group call pick-up makes it possible for a member of a predefined group to pick up a call to any other member in the group when an incoming call is made to that member's extension.

Calls to one extension in a group can be answered by any group member. Each group can have four alternative answering groups and, if there are no calls to members in the group, calls to the alternative groups are answered with the same procedure.

SIP terminals that are group call pick-up members, can also support display of caller information for waiting group call pickup calls, and get a simpler pick-up procedure.

## Group Hunting

It is possible to form groups of users that work with similar tasks like help desks, information centers, and so on. Such groups are called with a common number. Incoming calls are routed to a free extension in the group, either with sequential selection, with evenly distributed selection, or with parallel ringing (cascade ringing) on a limited number of members.

If there are no free extensions, the call is queued to the group.

All extensions in a group keep their own private number and class of service. An extension can be a member of several hunting groups. An extension can temporarily withdraw from the group by activating Follow-me to its own phone, or by using a dedicated log-off procedure.

There are service procedures for a member’s login/logout of the group (also valid for cascade ring groups). For members with SIP phones, there is also group member status indications.

Calls to a group from which all members have excluded themselves are diverted to the group's diverted position.

## Cascade Ring Group

From MX-ONE 6.0 there is support for a new variant of hunt group, with ringing in parallel on up to 16 extensions per group. All extension types supported in ordinary hunt groups are also supported in cascade groups. ADN and EDN numbers are not allowed as group members. Nor is MNS or MDN features allowed on a cascade ring group member.

There are service procedures for a member’s login/logout of the group (also valid for ordinary hunt groups). For members with SIP phones, there is also group member status indications.

## Group Do Not Disturb

It is possible to form groups of users that during certain periods must not be disturbed. The group do not disturb feature allows a specially categorized extension (master extension or extension with Group Do Not Disturb programming category set) to mark an extension group as group do not disturb, that is, calls made to extensions in the group are not signaled on the phone.

If any extension has any diversion activated or an individual diverted position, the call is diverted. The diversion feature has a higher priority than the group do not disturb feature. If the extension has no diversion and the incoming call is a Direct In-Dialing call that has a category permitting rerouting, the call is rerouted to an attendant. If the extension has no diversion, and the incoming call is not a Direct In-Dialing call then, it shall be forwarded to an answering position defined for the group.

## Call Center (CTI) Group

The Call Center Group (CTI group) is a class of service for the Automatic Call Distribution (ACD).

Extensions can be members in a call center group. In this case, the incoming calls to the group, both external and internal, are routed to an external contact center application using the Computer Supported Telecommunications Application (CSTA) interface and protocol. The contact center application selects a free extension, or if there are no free extensions, places the call in a queue. When there is a free extension, the call is routed to the selected extension.

Outbound call center traffic is also supported.

### Private Network Features

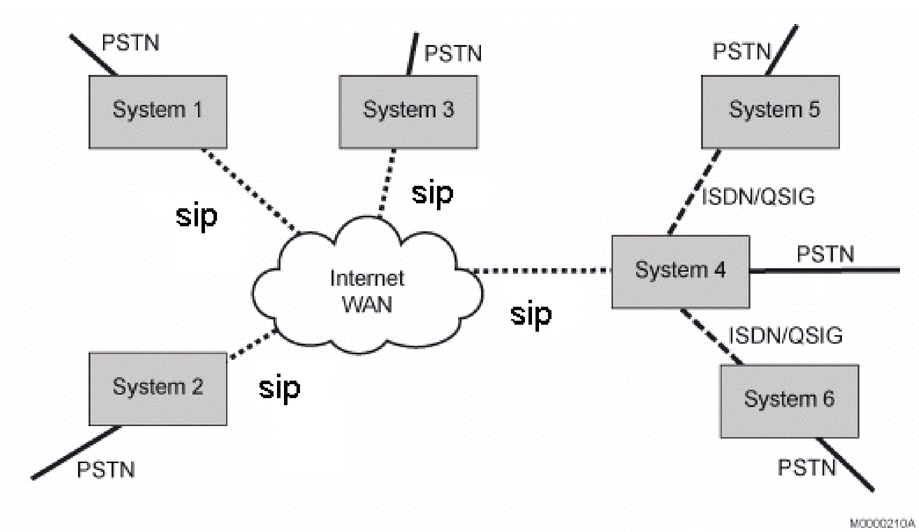
MX-ONE can be included in a private network with other MX-ONE systems or Mitel TSW/MD110 systems or even systems from other vendors.

To use network services between all parties within a private network, the network must be homogeneous, which means that the connections between the exchanges use the same signaling system as the network services are not supported in a gateway scenario with transition from one signaling system to another.

Connections using ISDN and H.323 signaling systems are considered a homogeneous network.

Systems 1 to 4 in the below figure are connected to each other using IP networking (SIP with additional proprietary signaling). Systems 5 and 6 are connected to the network through leased lines using ISDN with QSIG signaling. All systems can have their own incoming and outgoing external lines to the PSTN.

**Figure 1.4:** Private Network Features




The following documents include more information:

- Description for *SIP PRIVATE NETWORKING*
- Description for *SDN, H.323 AND DPNSS NETWORKING*

## Network Features

In MX-ONE, a number of common network features are supported.

Typical network features are Diversion, Callback, Intrusion, Call Waiting (call offer) and Bypass diversion. To use the network features fully, it is necessary to have a signaling system that can convey the necessary information.

Two groups of common network features are distinguishable, that is, system and user features (covering both extension and attendant features). The system features are used by exchanges to route calls in a controlled, rapid manner to the called destinations. A user can only request/affect user features, not system features.

For connections with SIP tie-line, system features as well as user features are applicable.

For connections with H.323 IP signaling, system features as well as user features are applicable.

For connections with ISDN, system features as well as user features are applicable.

The network features for ISDN are divided in those using standard QSIG signaling and others using proprietary signaling.

Other types of network signaling are also supported, for example DPNSS.

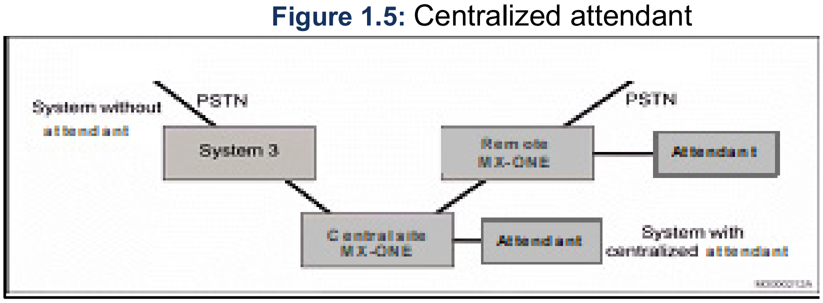
When MX-ONE is connected to a Mitel TSW/MD 110, all features are available for DPNSS, ISDN and H.323 signaling, but SIP is not supported.

## Centralized Attendant

Both local and centralized attendants can be used in a networked scenario. A centralized attendant is an attendant shared by several PBX systems. The advantage is that when the total traffic in a network is low, all traffic can be routed to a central point, thus minimizing the number of attendants. The feature can also be used in a global enterprise where all calls are routed depending of the local time of day to those systems where attendants are working.

In the example below there are three systems. System 1 has a full time attendant, system 2 has a local part time attendant whereas system 3 does not have any local attendant. Incoming manual calls in system 3 are always routed to the centralized attendant in system 1. Incoming manual calls in system 2 are when the local part time attendant is night switched, routed to the centralized attendant in system 1 whereas, when the attendant is day switched, the calls go to this local attendant.

**Figure 1.5:** Centralized attendant




For more information, see the operational directions for *CENTRALIZED ANSWER POSITION*.

## Least Cost Routing

The Least Cost Routing (LCR) feature enables MX-ONE to select the most economical route for an outgoing public call. The system checks the dialed number to see if the private network can be used, and if that is the case, the call is routed to a PBX within the private network as close to the public destination as possible.

The following four situations can occur:

1. The dialed destination shall be routed directly to the public network.
2. The dialed destination is an extension within the own system (i.e. off-net to on-net routing).
3. The dialed destination is in the private network and can be reached completely through the private network (off-net to on-net routing).
4. The dialed destination can be reached partly through the private network (tail- or best-end hop-off).

The user first has to dial an LCR access code to activate the LCR. The system is then ready to analyze the dialed number.

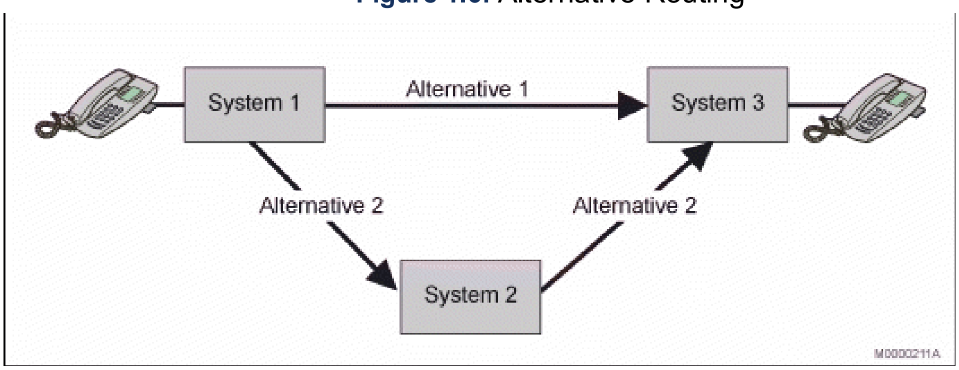
## Alternative Routing

The alternative routing feature makes it possible to reach an external destination through different routes. A primary choice route can have up to seven alternative routes to reach the external destination.

If the primary route is not available, or if a class of service does not permit the call on this route, the system tries to use the first alternative route and so on. If necessary, the system modifies the dialed number (add pre-digits or delete dialed digits or both) to suite the number to the numbering plan used in the exchange at the other end of the alternative route.

For an example where a user in system 1 wants to call a user in system 3, the system first tries to find the direct route (alternative 1), but if all connections in that route are unavailable, the system tries to connect to system 3 through system 2 (alternative 2).

**Figure 1.6:** Alternative Routing




## Multi-tenant functions, native and virtual solutions

From MX-ONE 6.0 Multi Tenanting is supported, both in a native variant, and in a virtualized variant using VMWare Virtualization, see *Virtualization*.

The functionality utilizes features like:

- Independent number plans per tenant
- License usage reports (for billing)
- Feature packaging with license control
- Capacity enhancements for certain features, like number of customers, hunt groups, recorded announcements, conferences, MNS keys, SCA keys.
- Enhanced and new extension group functions
- Remote provisioning of end user clients and phones

- Modified Call Discrimination (that can block inter-tenant traffic)
- New/modified Management functions supporting multi-tenant and different authority levels

# Customer Group

## General

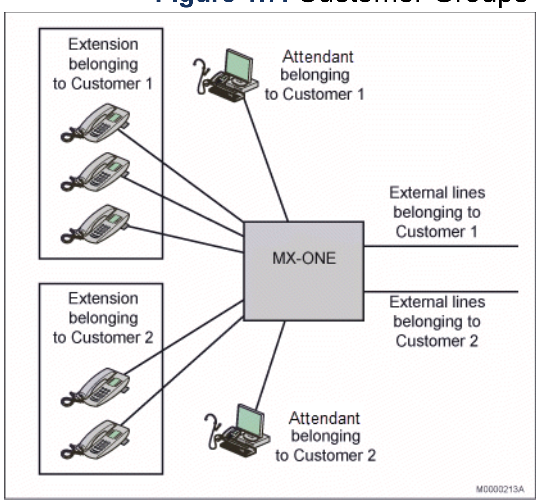
The customer group feature is used for two significantly different applications; for departments within one enterprise, or for different enterprises/customers, i.e. tenants, sharing one system. Note that the terminology has been changed in this revision of the system description.

### *Functionality*

An MX-ONE can serve end users belonging to different departments within an enterprise, or basic hosting customers, that can be completely separated regarding certain services. For example Call Discrimination can force the extensions to use routes/trunks to reach a user in another department (customer).

Departments (customers) have their own resources, such as routes, recorded announcements, and attendant groups, but also have features for using certain common resources within the system.

**Figure 1.7:** Customer Groups




A department (customer) can be assigned to a group of attendants, a day or night service answering position, outgoing routes, and incoming routes.

The department (customer) group feature makes it possible for the users in a department (customer) group to, for example, reach the affiliated attendant group, by dialing a common attendant number. This feature enables subdivisions within an enterprise or enterprises to use MX-ONE independent of each other.

The department (customer) group feature includes the following major functions:

- Customer-dependent selection of attendant group for calls to the customer group's common attendant number
- Customer-dependent selection of centralized attendant, that is, customer centralized attendant, for rerouted calls and calls to attendant group
- Customer-dependent day and night service position
- Customer-dependent route selection
- Common diversion positions

- Recorded announcements

## Hospitality

The special Hospitality functions are provided for the Hospitality industry. The functions are provided within the following areas: guest check-in, guest rooms and Service quarters.

The complete MX-ONE solution is based on MiVoice MX-ONE, with the Hospitality license. combined with either Mitel's Hospitality offer (ConnectedGuest suite of applications), or an external Hospitality Middleware certified to work with MX-ONE.

For guest check-in the following functions are provided:

- Information about the guest can be entered. The information can be language, VIP-status, credit card information, room number, and so on.
- The guest can choose if name presentation will be allowed or restricted for inter-room calls.

For guest rooms, the following functions are provided:

- The rooms can be either vacant or occupied.
- The rooms can be equipped with various types of terminals.

For Service quarters the following functions are provided:

- The guest's name presentation restriction will never be taken into consideration when the Service quarter is in contact with a guest, that is, the name of the guest will always be displayed at the Service Quarter Terminal.
- The information that is entered when a guest checks in will be displayed at the Service Quarter Terminal.
- To obtain the specific Service Quarter functionality, the SQ phone must be Digital.
  If a SIP phone is used in the Service Quarter, the same functionality is obtained, except that the extra guest information is not shown.

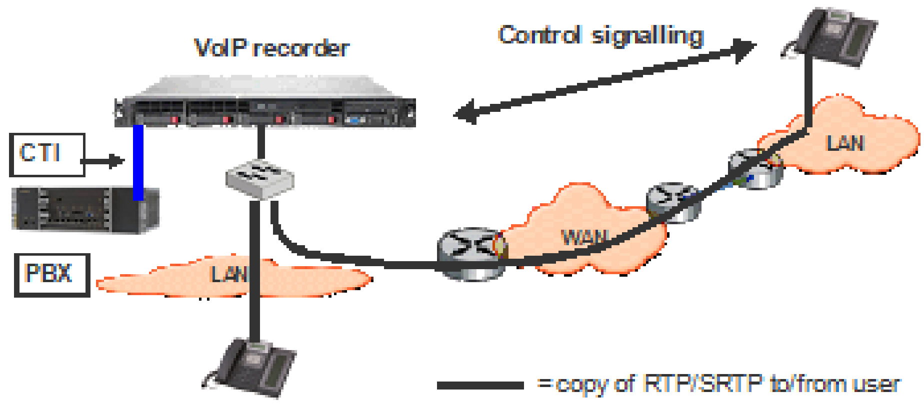
For more information, see the description for *HOSPITALITY APPLICATION*.

## VoIP Recording

With active VoIP recording, either third-party recording applications, or the MiVoice Call Recording application, or the Mitel Interaction Recording application, the recording system will order the terminal to make copies of received and sent RTP or SRTP packets and forward those to the recorder, preferably as two logical streams where received and sent packets are separated. Certain features of advanced VoIP recording systems are dependent on the receipt of two separate voice streams.

Recording policies are defined in the recording systems, i.e. record all calls (Total recording), selective recording based on e.g. call origin and record on demand based on user input.

**Figure 1.8:** Active IP recording




Active VoIP recording relies on integration with the PBX as the recording system must know the actual IP address of the users terminal when ordering a terminal to start recording. Furthermore, if encryption is used, the recording system must get the encryption keys. The integration is normally using SIP between the recorder and the terminal and CTI between PBX and recorder.

MX-ONE supports Active/Record-on-Demand recording of encrypted calls in combination with 6900/6800/6700 SIP phones and 7400/MiVoice 4400 H.323 phones. Encryption key handling is supported over TR87/CSTA3 and CSTA1 via Application Link.

Trunk side recording is also supported, for certain TDM E1/ISDN trunks (with additional HW) and for SIP trunks.

The Mitel Branch Gateway, MBG, can also be used, for VoIP recording on the gateway side, in case the other end-point (phone or soft-client) does not support recording.

## Recorded Voice Announcement

The Recorded Voice Announcement (RVA) feature allows recorded voice announcements to be provided to a calling or connected party to inform of the status of the call in various traffic cases, for example when:

- the call is diverted
- the call is in queue
- the call is parked
- the call is answered by a PBX-operator

The types of calling or connected parties that receive RVAs are, generally speaking, external lines and extensions, with some exceptions. For example, for diversion, group hunting, Automatic Call Distribution (ACD), call to an operator or to an extension, voice announcement can be provided when the call has originated from an extension, from a public trunk line, or from a tie line.

Vocal guidance is a service that can be provided for analog (ATS), digital (DTS), cordless (CXN), and certain mobile (RXN) extensions, a recorded voice announcement can be played when the user encounters certain traffic cases e.g. External Follow Me (ECF). Music on Hold can be provided for certain call cases towards group hunting and ACD groups.

There are several supported implementations and configurations of the RVA feature, either with wav files stored in HW (MGU based) or with media streaming via Media Server (SW based).

## Name and Progress Presentation

On terminals (telephones) equipped with display, name information and progress (status) information is displayed. The MX-ONE uses Unicode (ISO 10646-UCS-4) for both name and progress information.

Currently progress information can be presented in most Latin alphabet languages as well as in Russian, Chinese, Arabic, and Korean, if the terminal/client also supports the language. The language to use can be configured for the system, but also for individual extensions and attendants.

For calls from public subscribers, where a calling party number is available, there are optional functions for access of public subscriber names. The MX-ONE will query external databases for a name, based on the number, and (if found) display the name on the called extension's display.

## Blacklisting of Calling Public Subscribers

For calls from public subscribers, where a calling party number is available, there is an optional function for blacklisting, i.e. blocking the caller from making calls to any user in the PBX. The MX-ONE may provide a voice announcement (a vocal guidance), but will then disconnect the call, or possibly, if configured, re-direct the call to a predefined destination.

## Streaming on Idle Extension

For Mitel 6900/6800 SIP terminals there is a feature for streaming of voice media to the phone, when it is idle, i.e. not involved in a call or otherwise in use.

The feature requires a Media Server specifically configured as a streaming server supporting a SIP/MSCML protocol (according to RFC 5022). It also requires a dedicated key on the SIP phone, which provides a menu for the Streaming on idle service.

# MiVoice MX-ONE Service Node Software

This chapter describes the MX-ONE Service Node software.

## General

The same Service Node software is used on any server.

The software consists of the following parts:

- Linux operating system
- Service system
- Software acting as an interface between the telephony applications and the operating system. For more information, see *Service System*.
- Telephony applications
- MX-ONE Service Node Manager (*MX-ONE Service Node Manager*).
- MX-ONE Provisioning Manager (*MX-ONE Provisioning Manager*)
- MX-ONE Media Server

## Operating System

The operating system is Novell SUSE® Linux Enterprise Server (SLES) version 12.

From MX-ONE 7.0, the 64-bit SLES 12 Linux Operating System version is used in the MX-ONE Service Node and in the Management applications. The SLES 12 provides some enhancements of redundancy, installation and upgrades.

## Virtualization

The MX-ONE supports larger customer multi-server environments, which offer hardware consolidation and enhanced resiliency options, and is aimed at customers who have a company-wide virtualization strategy for all IS/IT based applications.

The focus for virtualization with the MX-ONE solution is to consolidate the number of servers and to limit the number of physical servers necessary for the complete MX-ONE solution, including the MX-ONE call manager and all UCC application servers.

The integration focuses on VMware as the hypervisor technology and supports VMware value added features such as High Availability (HA) and Fault Tolerance (FT). It also supports Hyper-V virtualization.

MX-ONE Service Node 7.x also supports this, and can run in a virtualized environment, formally named Virtualization. Currently MX-ONE relies on VMware's vSphere 5.x software suite as part of its virtualization solution. For details, see *VIRTUALIZATION DESCRIPTION* and *MX-ONE SERVICE NODE VIRTUALIZATION DESCRIPTION*.

MX-ONE Service Node 7.x also supports MS Azure, and can run in its virtualized environment, primarily for public cloud use. For details, see the *MIVOICE MX-ONE VIRTUALIZATION AND PUBLIC CLOUD - Description* and the *MiVoice MX-ONE MX-ONE AZURE INSTALLATION* document.

## Native Support of IPv6

From MX-ONE 6.0, the system supports IPv6 addresses, in addition to IPv4 addresses.

The MX-ONE Service Node call manager and gateway components can operate in a native IPv6 network. It assumes the platform HW and OS software is able to operate using IPv4/IPv6 "dual stack" interfaces to the IP network. The alternatives are IPv4/IPv6 dual stack or IPv4 only.

The software components of the MX-ONE elements (call manager and gateways) can be configured to perform and interwork using standard IPv6 addressing from a signaling and media perspective.

The inter-server communication will if IPv4/IPv6 “dual stack” is installed, always use IPv6.

The entire system (all servers) must use the same IP version.

For SIP terminals, client and trunks, both IPv6 and IPv4 are supported. For H.323 terminals, client and trunks, only IPv4 is supported. If one terminal only supports IPv4, and another terminal only supports IPv6, a call between these two terminals will have to be a gateway connection.

The MGU and Media Server support both IPv4 and IPv6, but for the MGU, IPv6 only if security (signaling encryption) is not used. Older media gateways only support IPv4.

## Telephony Applications

Software that executes the call handling functions and has full control of all ongoing calls as well as resources in the media gateway.

For more information, see the description for *MIVOICE MX-ONE FEATURE LIST*.

## Service System

The service system includes a number of functions used to support the telephony applications like service functions, system configuration change, functional change, start and restart of MX-ONE, data backup, license handling, system supervision, alarm handling, and automatic fault administration.

A program unit as described in this document is the telephony term equivalent to the computing term "process", which is a running instance of a program, including all variables and other states. From this point on, only the term "program unit" will be used.

A common function is a program unit that is centrally located and can be used by all program units in all servers. Regional functions are program units that exists in several or all servers, executing independent of each other.

For more information about task procedures, see operational directions for *ADMINISTRATOR USER'S GUIDE*.

### Service Functions

The service functions are a collection of general-purpose functions and is used by the telephony application system and by the service system for the following:

- System status monitoring
- Server configuration
- Server status
- Program unit configuration
- Hardware configuration

### System Status Monitoring

The system status monitoring function is used to monitor the system status at any given time to deal with special conditions, such as load, dump or restart.

System status monitoring includes the following actions:

- Prevent any change of reload data through commands during load, dump, or restart of any part of the system
- Prevent any change of reload data through programming from voice terminals during load or dump

The reload data changes are not prevented in the entire system at the same time, but in one server at a time during the action in this specific server.

### Server/Gateway Configuration

The server configuration function is used to keep and provide status information regarding one server. It can also display information about the total number of servers that exists in the system, including their server numbers.

## Server Status

The server status function is used to keep and provide status information about all blocked or isolated servers.

- Blocked server
  A server can be blocked manually from traffic or blocked by the system, if the server is faulty. Information about blocked servers is obtained by requesting status information for one or several servers. By using a subscription feature, the information is obtained every time a server is blocked or deblocked.
- Isolated server
  When a server becomes isolated from the rest of the system due to, for example, a network failure, the application programs in the isolated server will obtain information about the current status.

## Program Unit Configuration

Every program unit has a name and a unique program unit number and is also assigned a set of characteristics. This set of characteristics defines the program unit type, for example, such characteristics can be whether or not the program unit handles device boards, or if the program unit is issuing alarms.

The purpose of the program unit configuration function is to keep and provide information about the program unit types, including the assigned characteristics sets.

The following information can be obtained from the system:

- Configuration of common function - information about the servers in which a common function program unit is loaded
- Configuration within the server - information about whether or not a program unit is loaded in a selected server
- Program unit type - information about the selected program unit type
  It is also possible to obtain information about the program units in which certain types or characteristics belong.
- Program unit identification - information about program unit number, name, and revision

## Hardware Configuration

The hardware configuration function is used to give the following information relevant to device boards:

- Hardware position
- Board type
- Controlling program unit (if the board is initiated)
- Pointer to the controlling program unit
- Number of hardware individuals on the board (for example, number of supported extensions)
- Whether or not the board is blocked

There are two types of device boards: physical and virtual. The hardware configuration function is valid for both physical and virtual device boards. MX-ONE Classic, MX-ONE Lite and MX-ONE Slim have both physical and virtual device boards.

On request, non-initiated hardware individuals on device boards of a certain board type can be obtained, or the selected hardware individual can be translated to a hardware position by the system. The hardware position can, in the same way, be translated to a selected individual.

On request, general media gateway information, such as revision information, can be obtained. There is also a possibility to set or get information about a certain resource in the gateway. Examples of resources are virtual device boards, auxiliary devices, as well as the gateway itself.

### System Configuration Change

The purpose of the system configuration change function is to adapt the system to the actual requirements of the customer and the environment.

It is possible to reconfigure the following objects in the system:

- Physical units
  - MX-ONE - Service Node (for example adding a new server to an existing system)
  - MX-ONE - Media Server (soft media gateway)
  - MX-ONE - Media Gateway “1U”
  - MX-ONE - Media Gateway Lite (“3U”)
  - MX-ONE Classic (“7U” with MGU)

  From MX-ONE 6.0, it is possible to have MX-ONE with a new version of the Media Server, which has higher capacity, and can be mixed with HW based Media Gateways. Codecs G.729 annex a&b are supported by the Media Server.
- Logical units
  - Program unit

### Start and Restart of MiVoice MX-ONE

### System Start

The purpose of the system start function is to set the system into operation after an update, upgrade or boot procedure.

System start comprises two main functions:

- Initial loading, which means that program units are loaded into memory.
- Initial start, which means that values are assigned to variables to activate the system functions and to link together the system logically.

### Initial Load and Start

The initial load and start function comprises the following steps:

- Load all program units into memory.
- Assign values to variables of all program units.
- Start the program units.

### Manual Restart

The purpose of the manual restart function is to recover manually from any kind of system fault.

The following can be manually restarted:

- The system
  All program units are restarted. All traffic in the exchange is stopped and for example, IP phones are unregistered.
- Servers

All program units in the selected servers are restarted.

- Program units
  Selected program units are restarted.
- Device boards
  The restart is carried out by an activation request from the device-handling program to the stated board.
- Media Gateway
  Selected media gateway is restarted, and all gateway calls will be stopped in the server.

A manual restart is initiated by a command. It is not possible to change reload data, using commands during the restart phase.

## Backup

The purpose of the data backup function is to backup and restore exchange data. Data backup is initiated by a command or done periodically. If the backup fails, an alarm is sent.

The system can store five backup versions. If five versions already exist when a new backup is created, the oldest version is deleted.

The purpose of the safety backup function is to create a data backup stored on a different media, or stored at a different location, for example, in a safe.

It is possible to specify the data that should be included in the safety backup and also what device to which the safety backup should be written. The system administrator decides how often a safety backup should be performed and how data should be stored.

If there is an inconsistency in the Service Node data, the safety backup can be restored to the master server. After having restored the master server, the configuration mirror can be distributed to all servers.

Exchange data of the entire system is restored from a backup. It is only the latest backup that can be restored. To restore an older version, a file has to be modified manually. After a data restore, the system is started. It is not possible to change exchange data during restoration.

## License Handling

The license handling in the MiVoice MX-ONE is primarily that licenses are required for all types of end-point resources, like extensions, attendants and trunks. For example, extensions and trunks have separate licenses, feature package licenses can be used (or must be used in MLA (Managed Service License Agreement) systems), and specific licenses exist for group function and other optional service related entities. There are individual licenses (per user or resource) and system licenses (per system).

A license usage report function, which can periodically report the number of used licenses, is also supported.

Server number 1 of a multi-Server configuration always hosts the license server.

The purpose of the license server function is to prevent unauthorized use of system resources. The license server can be used in two ways, to check if a service is available, and to seize and release licenses.

The license file is delivered to a site in encrypted form and will be installed into the license server in encrypted mode. There are two types of license files, trial license (time limited) and real license files. From MX-ONE 7.0 there is a new version of encryption of the license file.

The following two license types exist:

- Individual license
  The individual license is used for ports, for example, the SIP extension or analog extension. Each individual license is defined with a maximum number of allowed licenses.
  Any object that requires licensing seizes a license when the object is initiated (via O&M). The license is released when the object is removed from the system.
- System license
  The system license is used for optional system facilities, such as network services. A system license can have two values: service available or service not available.
  The license information is stored and later checked when the optional system facility is initiated.

## System Supervision

The system supervision function has the following purposes:

- Control the performance of the supervised objects, such as servers, gateways, boards, and alarms
- Fault detection
- Initiate fault correction measures
- Isolate faults

## Supervisory Functions on System Level

### *Server/Gateway Supervision*

The server/gateway supervision function has the following purposes:

- Supervise the start state and communication capabilities
  This is done to make sure that all servers start up correctly and that inter-server communication is working.
- Build up, distribute, and maintain system tables
  This includes the Common Function Table (CFT). The CFT specifies the server in which the different common function programs are running.

### *Cross Address Check*

For some applications within the system, connections between data areas in different program units are built up. If the system consists of several servers, it is most likely that these connections are set up between program units in different servers.

A distributed system solution implies that if a server fails, no traffic except traffic through this server will be disturbed. To avoid disturbances, no data lock up in other server should occur due to the faulty server.

If a software connection between two servers is released only at one end, data areas will remain locked as long as the linkage to the area is lost. This can lead to a congestion situation. To handle this lock up problem, each application program creating a mutual connection with data areas in other program units are instructed periodically to check the validity of assumed connections.

The check is administrated by the service system and is spread in time to avoid congestion.

### *Program Configuration*

The purpose of the program configuration supervision function is to check that a common function unit only exists in two servers in the system.

Any conflict in the configuration causes an alarm.

### *System Backup*

The purpose of the system backup supervision function is to check that a valid system backup is always accessible.

## Supervisory Functions on Media Gateway Level

### *Test of Hardware before Loading*

The purpose of the test of hardware before loading function is to validate that the hardware is functional.

All tests are done by the running operating system and BIOS functions.

### *Supervision of Voltage*

The purpose of the supervision of voltage function is to check the voltage of +5 V, -5 V, +12 V, -12 V, -48 V.

If a fault occurs, an alarm is raised containing information about the relevant voltage and the location of the missing voltage.

### *Device Boards*

The purpose of the device board supervision function is to test the device boards' communication abilities by sending a periodical test signal to the device processor. An immediate answer is expected.

The answer signal contains the identity and the number of individuals of the device board. The data is compared with the current board table to find any conflict in the device board configuration, that is, a newly inserted board can hide the signaling from a previous board, which will result in that the previous board is out of order.

This function is applicable for a Media Gateway Classic, MX-ONE Lite and MX-ONE Slim configurations.

### *Program Execution*

The purpose of the program execution supervision function is to supervise the following:

- Execution times of a program unit
  If a program unit is looping more than the allowed time due to programming faults or incorrect data, it will be interrupted, and the job discarded.
- Address control
  Situations can arise when the linkage between data areas has become faulty. To protect data areas from being accessed by other, unauthorized applications, an address control value is added to the pointer pointing out the data area. The address control value is a random value unique for the current linkage. The value is only valid as long as both areas agree in the linkage.
- Signal routing control
  All signals exchanged between and within program units are checked in the following way before they are allowed to start execution in a program unit:
  - Receiving server number corresponds to the server number address in the signal
  - Addressed program unit exists
  - Signal entry in addressed program unit exists for the sent signal

– Address control value correct

If any fault is found, the signal is not executed, and the job is discarded. The signal that caused any of the above errors is stored for manual fault investigation.

### *Server/Gateway Disturbance Counter*

Each Server (Service Node) has a disturbance counter that reflects the quality of the program execution in the Server. The counter is incremented a number of steps each time a fault occurs. The number of steps depends on the severity of the disturbance.

An alarm is sent when the first execution fault after start or restart occurs and when the counter exceeds the maximal allowed value. The counter is periodically decremented to avoid exceeding the value.

## Alarm Handling

Alarm handling is handled by the service system. For more information about the alarm handling function, see *Fault Management*.

## Automatic Fault Administration

Automatic fault administration is handled by the service system. For more information about the automatic fault administration function, see *Fault Management*.

## Signal Tracing

The signal tracing function implements both the trace error log and the general trace function. The function implies that signals or text items are copied and preserved as the program execution is handling an activity so that the function can be analyzed later on.

The first trace individual is used by the error log function and is therefore always enabled in all servers.

Up to fifteen signal traces can be specified simultaneously.

The following four types of signal traces exist:

- Error log
  Error log is always enabled and stores information about error situations in the software.
- Sequential tracing
  Sequential tracing is used for tracing an activity. Through the sequential trace, the signals can be followed in their logical and chronological order and thus the chain of events that led to the fault. Sequential tracing should be used when the user has an idea of the activity that went wrong and wants to locate the break in the sequence.
- Interface tracing
  Interface tracing is used to trace all signals to and from a program unit or a hardware equipment position. This form of tracing is used, for example, when the unit where the fault occurs is already known or suspected, but the process that caused the fault is not known (for example, when a faulty signal in a unit has been received).
- Hardware position tracing
  Hardware tracing is used when the problem is related to a hardware board where only the signaling to and from the board is wanted. This function is especially useful when several program units are

cooperating to the same hardware position. For tracing on MGU/MGU2, see also the *MGU COMMAND AND FAULT LOCATION GUIDE* on *Mitel Knowledge Base*.

# Integrated Components/Applications

The following functions are separate products that are integrated with the MiVoice MX-ONE 7.x system. The listed applications are just examples, not a complete list.

## Micollab Portfolio

The MiCollab portfolio contains the following entites:

- **Mitel MiCollab** client comprises a Unified Communications SIP soft phone/call control client application for PC as well as mobile apps for IPad/iPhone, Windows mobile and Android that enable corporate users to make and receive voice and video calls over MX-ONE via SIP and to interact with other users and MiCallCenter agents through IM (Instant Messaging), e-mail, voice and video (MiTeam Meeting).
  - Support for both Ad-hoc and scheduled conferences
  - Audio Conferencing – up to 300 users in one conference
  - Web client for conference host and remote/guest participants
  - Desktop sharing from PC
  - Multi-party video
  - Integration with MiVoice Conference phone for collaboration and video sharing
- **Mitel Application Server (MAS)** is the core of the MiCollab suite. The MAS handles the clients, contacts, presence as well as control of, and signaling between, the MiCollab components and the MX-ONE system. All user-provisioning is handled through the MX-ONE Provisioning Manager and automatically executed via the MAS server.
- **Mitel MiCollab (7.x) AWV (audio, web and video)** is a meeting point and conferencing component of Mitel's Unified Communications and Collaboration (UCC) portfolio, MiCollab, that is designed to provide businesses with effective collaboration amongst its employees, partners and customers. The MiCollab Conferencing AWV is an integral part of the MX-ONE solution offer. AWV provides a dynamic, real-time environment for the sharing of ideas and information. It allows employees throughout the business to connect with people, both inside and outside of the business, no matter where they might be located, providing the ability to quickly and easy share, discuss, and collaborate on documents, presentations and ultimately make more informed and timely decisions.
- **Mitel NuPoint Unified Messaging (UM)**, from basic voice mail to advanced unified messaging, Mitel NuPoint Unified Messaging™ (UM) satisfies the diverse messaging needs of your entire user population.
- **MiVoice Border Gateway (MBG)** is a platform for secure communication with remote Tele Workers. It provides secure deployment of multiple network connectivity services in a number of network edge scenarios.

For further information, refer to the product documentation and release notes on *MiCollab (7.x)* available on the *Mitel Knowledge Base*.

## Mitel BluStar Server

A presence engine, the Mitel BluStar Server, is an integral part of the MX-ONE 7.x Solution. MX-ONE 7.x provides full integration for line state monitoring using CSTA3 between MX-ONE and BSS.

The Mitel BluStar server ensures that directory/contact data and rich presence information, including Blustar Presence, MX-ONE Line state and Calendar integration, is aggregated towards Mitel BluStar Ecosystem clients and terminals as well as towards Mitel BluStar CMG Web 8.0 web users, Mitel InAttend users and FMC users.

For further information, refer to the product documentation and release notes on *BluStar Server* available on the *Mitel Knowledge Base*.

## Mitel MiCollab and CMG BluStar Web Applications

Mitel MiCollab Web and CMG Web applications is a part of the UC suite for MX-ONE 7.x Solution. The CMG product portfolio provides a mix of communication tools for attendants and office users, including advanced call handling, activity and availability management as well as speech services. MiCollab Web Client provides access to several MiCollab Client features from a web browser.

For further information, refer to the product documentation and release notes on *Mitel CMG BluStar Web* and *MiCollab* available on the *Mitel Knowledge Base*.

## Mitel InAttend

The Mitel InAttend 2.6 is a scalable attendant console based on open standards. It is the core application in Mitel's attendant offering and an essential part of the Mitel UC suite.

In addition to advanced call handling, Mitel InAttend offers powerful search options, calendar integration, Microsoft Lync/Skype-for-Business and IBM Lotus Sametime presence integration and all necessary information for efficient call handling.

Mitel InAttend integrates with BluStar Server, i.e. is part of the BluStar collaboration suite.

Mitel InAttend uses the SIP trunk interface for media and call signaling, and the CSTA Phase 3 interface for certain call control services towards the MX-ONE Service Node.

For further information, refer to the product documentation and release notes on *Mitel InAttend* available on the *Mitel Knowledge Base*.

## Mitel Dialer

From MX-ONE 6.0 the Mitel Dialer PC client is supported.

The Mitel Dialer is a PC based dialer for making call setups via PC from a predefined SIP telephone. Integrates with MX-ONE via the CSTA phase 3 interface.

For further information, refer to the product documentation and release notes on *Mitel Dialer* available on the *Mitel Knowledge Base*.

## MiCollab Fixed Mobile Conversion (FMC)

The following functions are supported in MX-ONE 7.x (and 6.x):

- Introduction of the MiCollab FMC Controller.
- Provisioning of MiCollab FMC users and controller configuration handled centrally from MX-ONE Provisioning Manager.
- BluStar Server based presence integration enabling the user to read and set status information. Supported by Android and iOS.

For further information, refer to the product documentation and release notes on *Mitel Mobile Client* available on the *Mitel Knowledge Base*.

## MiContact Center Enterprise

MiContact Center Enterprise (former Solidus eCare or MiCC Solidus) is a Contact Center application which is integrated with the MX-ONE system, but can also be used with many other call managers.

MiContact Center Enterprise is an all-in-one, adaptive and flexible platform for Unified Communications and Collaboration (UCC), mobility, contact center, business process automation, analytics and reporting, as well as service and database integration. InAttend can also be a contact center agent.

Added functionality in MiContact Center Enterprise (9.x) with MX-ONE 7.x are for example:

- Mobile applications for the agent and supervisor.
- Social media connection for handling Facebook and Twitter messages.
- BluStar Agent enhancements.
- Integration with Applications Connectivity Server (ACS) for switch independence

For further information, refer to the product documentation and release notes on *MITEL MICONTACT CENTER ENTERPRISE* available on the *Mitel Knowledge Base*.

## MiContact Center Business

MiContact Center Business (9.x SIP integration) is a Contact Center application which is an alternative to MiCC Enterprise, and is integrated with the MX-ONE system, but can also be used with many other call managers. Primarily for smaller systems.

Provides SIP based interoperability between MiCC-Business 9.3 and MX-ONE 7.3 or later. This will be SIP trunk side interoperability with MiCC-Business 9.x, with the understanding that it acts in a similar way as the TAS interface with MICC-Enterprise, e.g. all the queues and media handling is provided and controlled by MiCC-B via the Free-switch Media Server/SIP call control.

For further information, refer to the product documentation and release notes on the *MITEL MICONTACT CENTER BUSINESS* available on the *Mitel Knowledge Base.*

# Interfaces and Protocols

This section lists the external interfaces and protocols used in MX-ONE.

**Figure 1.9:** Protocols - high level view

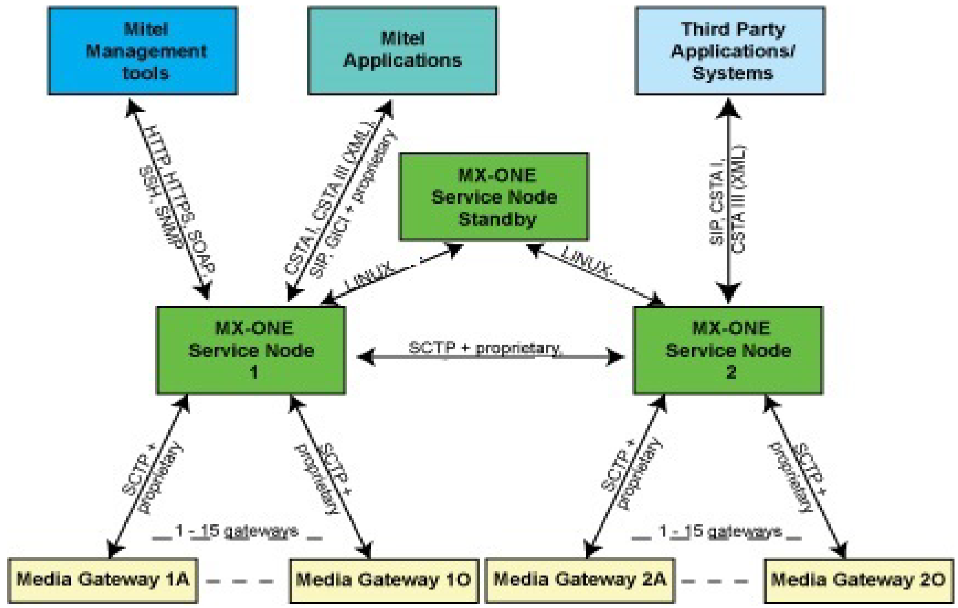



**Figure 1.10:** Protocols - detail level view

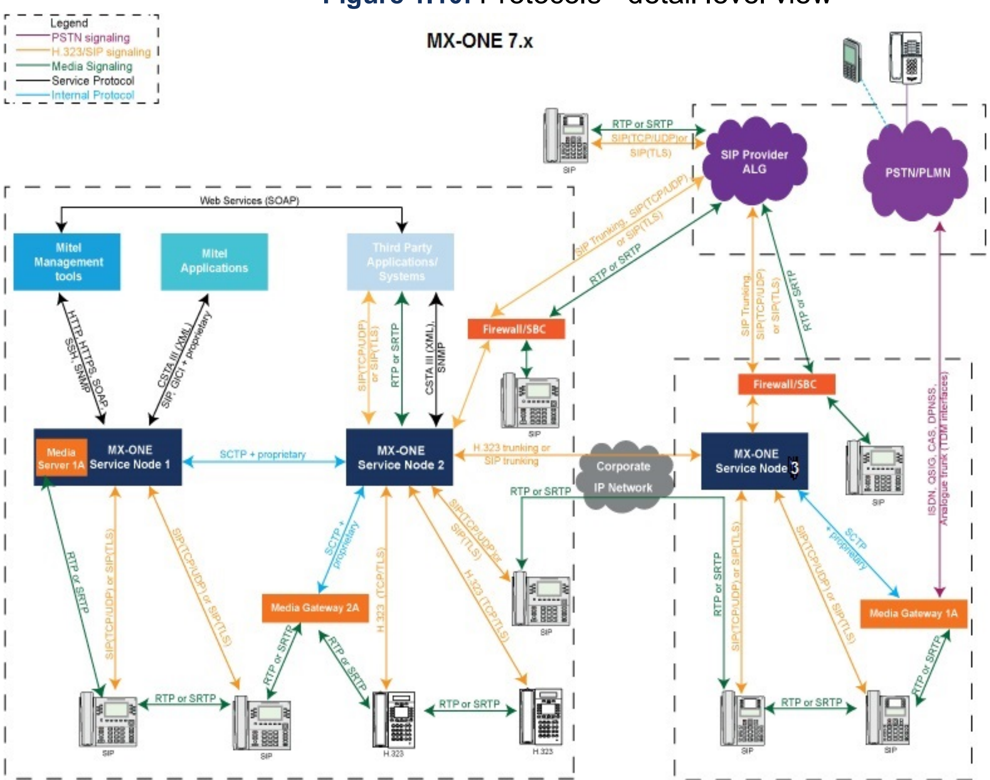


**Figure 1.11:** Interfaces and protocols in MX-ONE and MX-ONE Manager

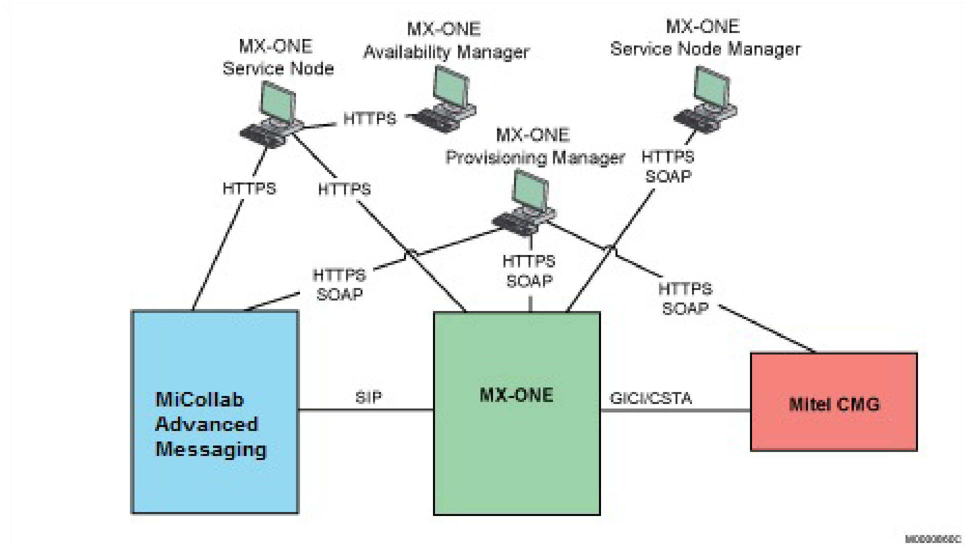
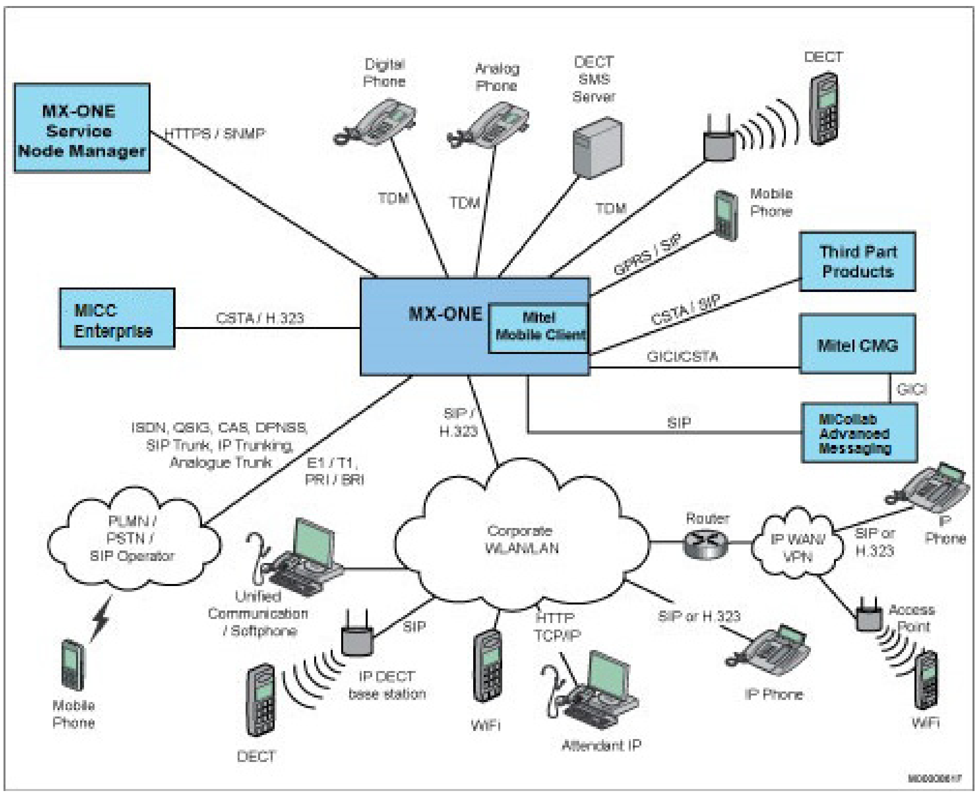



**Figure 1.12:** Interfaces and protocols in MX-ONE




The following interfaces and protocols are available for MX-ONE:

- Private networking by means of SIP tie-line.
- Private networking by means of H.323 tie-line (transporting ISDN QSIG or proprietary ISDN signaling).
- Private networking by means of ISDN QSIG over E1 (30B+D) and T1 (23B+D), the latter only in MGU.
- Private networking by means of ISDN tie line over E1 (30B+D) and T1 (23B+D) using proprietary signaling
- MFC

- CAS
- DASS2
- CCS7 (Simplified TUP for China)
- Private networking by means of DPNSS and CAS over E1 (30B+D) and T1 (23B+D)
- Public SIP trunk (with various network operator profiles)
- Public ISDN over E1 (30B+D), T1 (23B+D) and BRI (2B+D)
- H.323 extension
- SIP extension (also used for IP DECT, SIP DECT, WiFi, Terminal Adapter and MiCollab Advanced Messaging client)
- SNMP
- Secure Shell (SSH v.2)
- HTTP(S)
- Interfaces to an accounting system (for CIL data)
- DECT (TDM, integrated)
- DASL (DTS)

The following interfaces and protocols are available for CTI:

- TSAPI (Novell)
- CSTA Phase 3 with XML and WebServices
- TR87 (CSTA Phase 3 XML via SIP)
- CSTA Phase 1 using Application Link

The following interfaces and protocols are available for CMG:

- GICI
- Attendant Interface
- LDIF
- Voicemail Systems Interface (VSI)
- HTTP/HTTPS for web applications
- HTTP Calendar Interface
- CMG Web services Interface
- Time-entry System Interface (TSI)

The following interfaces and protocols are available for MiCollab Advanced Messaging:

- SIP
- H.323
- SNMP
- VSI
- Internet Message Access Protocol (IMAP) v4
- Messaging Applications Programming Interface (MAPI)

The following interfaces and protocols are available for MX-ONE Provisioning Manager:

- Web Services (SOAP)
- XML
- HTTP
- HTTPS

For detailed information about the different external interfaces and supported standards, see the description for *MX-ONE SYSTEM PLANNING*.

# Migration

MX-ONE supports migration of MD110/Telephony Switch to a MiVoice MX-ONE 7.x system. The major steps of the migration procedure that uses MX-ONE Classic magazines include:

1. Install the servers needed after migration.
2. Install MX-ONE version 7.x and configure the system.
3. Make a version 7.x backup of each server.
4. Stop the MD110/Telephony Switch and replace a limited number of boards.
5. Connect the media gateways to the servers.
6. Start the MX-ONE 7.x.

For detailed information, see installation instructions for *MIGRATING MITEL TSW/MD110 TO MX-ONE 7.x*.

MX-ONE supports Smooth migration. The Smooth Migration can be used for customers who want to migrate a large system in stages (or ‘merge’ a network of systems) and at the same time do a complete hardware refresh, e.g. when moving from MITEL TSW/MD110(s) to a new MX-ONE.

For detailed information, see operational directions for *Smooth Migration*.

In MX-ONE 7.x there is functionality that makes it possible to migrate TDM extensions to SIP or Mobile Extensions by commands. This is initiated by purchasing appropriate Extension Migration licenses.

# Operation and Maintenance

## General

Operation and maintenance in MX-ONE complies with the concept of Fault, Configuration, Accounting, Performance, and Security Management (FCAPS) for network management and consists of functions to supervise, administer, and manage the system.

This chapter describes operation and maintenance in MX-ONE from an FCAPS perspective.

## Fault Management

MX-ONE provides basic fault management.

### MiVoice MX-ONE

#### *Alarms*

The alarm feature is used to store information on faults and disturbances in- or outside a system and to bring the attention of service personnel to these faults and disturbances.

### *Alarm classes*

Each alarm is assigned one of the following alarm classes:

| Severity | Description |
|---|---|
| 4 | Critical |
| 3 | Alert |
| 2 | Warning |
| 1 | Information |
| 0 | Cleared |

The alarm class 0 (cleared) is special. When the alarm sender notices that an alarm condition no longer exists, the sender will clear the alarm and the alarm class changes to 0.

### *Alarm Generation*

The alarm classes (except alarm class 4) are assigned a limit for incremental alarm. This means that an incremental alarm is generated when a predetermined number of alarms with a certain alarm class have been stored in the alarm log. The incremental alarm is then assigned the next higher alarm class. The limits for incremental alarms are specified in a configuration file.

An alarm is also generated when the alarm log risks becoming full.

### *Alarm Actions*

Alarm actions can be configured to run when an alarm is stored in the alarm log, or when an alarm changes severity, for example, is cleared.

The alarm action can be any program or script running on Linux. Examples of actions that can be taken are:

- Sending e-mail or SMS with alarm information
- Updating web pages

### *Alarm Presentation*

Alarms can be presented in the following ways:

- As an alarm log printout (can be in any of eight available formats)
- As continuous alarm log view
- As e-mail or SMS
- On a network management center/workstation

### *Alarm Clearing*

When the system detects that an alarm condition (fault) no longer exists, the alarm log is informed and the alarm is cleared.

A cleared alarm has the alarm class 0 but information on the old class is kept.

### *Alarm Noticed*

When an alarm is noticed and the correction work has started, the alarm is marked as noticed. It is possible to add a comment when entering the notice command. The comment is stored with the alarm in the alarm log.

### *Alarm Input/Output*

The system can monitor external alarms via MGU or ALU board. With the use of this hardware external alarms (like fire alarms) can be reported in the alarm log of MX-ONE. Alarms in MX-ONE can also be connected to alarm outputs (that for instance can ring an alarm bell).

### *Alarm Log*

If the alarm log becomes full, the alarms with the lowest alarm classes are removed from the log. A configuration parameter determines which alarms are least important.

### *System Availability*

Alarms are not lost when the system is restarted. However, they are lost when the alarm feature is reloaded. After a reload, the feature will request are send of all alarms from the alarm sender.

### *SNMP*

The Service Node has an alarm, device status event and emergency call handling function. An SNMP-interface exposes standard MIB II information and alarms generated in the Service Node can be sent as SNMP traps. A separate optional MIB for Emergency calls can generate an event and alarm when an emergency call is made.

When alarms are cleared in the system, alarm cleared traps are sent to the connected SNMP Managers.

In addition to alarms, events are stored in the Linux syslog. These events are usually not critical for the operation of the system, but they might provide useful information on the behavior of the software, or when troubleshooting.

### *Automatic Fault Administration*

The automatic fault administration function is used for the following when faults occur:

- Decide and carry out recovery actions to minimize the consequences for the system.
- Inform the system administrator about the faults and the results from the measures taken.

## CMG

The CMG Server hosts a number of different applications that send events to the Windows Event Log.

## MiCollab Advanced Messaging

The MiCollab Advanced Messaging hosts a number of different applications that send events to the Windows Event Log.

The Windows SNMP Agent allows external SNMP Managers access to standard MIB II information.

# Configuration Management

This chapter describes how the MX-ONE components are used to configure MX-ONE.

Data in MX-ONE can be divided into the following data types:

- Telephony system data
- User and extension data
- Application specific data.

Telephony system data is managed using MX-ONE Service Node Manager and comprises data regarding, for example, server configurations, media gateways, number plans, and routes.

User and extension data is divided into common and application specific data. Common data is managed using MX-ONE Provisioning Manager and comprises data that is used by two or more components, for example user data (used by MX-ONE Provisioning Manager and CMG), extension data (used by all components), and department data (used by MX-ONE Provisioning Manager and CMG).

Application specific data is managed using the management tool of the specific application, for example, CMG's Directory Manager.

## MX-ONE Service Node Manager

MX-ONE Service Node Manager is used to manage telephony system data, for example:

- MX-ONE Service Node Server configurations
- Number plans
- Common service profiles
- Groups
- Routes and trunks
- Media Gateways
- IP/SIP phone and client provisioning

Initial configuration of MX-ONE, including, for example, setting IP addresses of interfaces, is made during the software installation.

For detailed information, see the user guide for *MX-ONE SERVICE NODE MANAGER*.

## MX-ONE Provisioning Manager

MX-ONE Provisioning Manager (PM) is used to manage common user and extension data in MX-ONE, for example:

- Adding, changing and removing users
  When managing user data in Provisioning Manager the corresponding user data is automatically updated in the CMG SIP DECT and MX-ONE databases. User account administration, e.g. unlocking users. Including certain group member administration.
- Adding, changing and removing extensions
  When managing extension data in Provisioning Manager, the corresponding user data is automatically updated in the CMG, SIP DECT and MX-ONE databases.
- Adding, changing and removing administrators with multiple access levels, security profiles, service groups, departments, locations, and subsystems.
- Managing mailbox services

When managing mailbox services in Provisioning Manager, the corresponding data is automatically updated in the MiCollab Advanced Messaging database.

- Managing MiCollab users, FMC users and SIP DECT user services
  When managing these services in Provisioning Manager, the corresponding data is automatically updated in the MiCollab Advanced Messaging database.
- Importing user and extension data
  Data can be imported from CMG, DNA, or using CSV files. The import function is used when, for example, performing a new installation of Provisioning Manager in an existing MX-ONE installation.
- Exporting user and extension data
  Data can be exported from Provisioning Manager to XML or CSV files.
- End User self-service
- Multi Tenanting
  Multi Tenanting (customer groups) can be handled, with extension feature levels, and also different management authority levels.

### Active Directory and Mapping of User-Defined Fields for PM

Since previously, MX-ONE Provisioning Manager, can automatically import user records from Active Directory. Values of user attributes in Active Directory are copied to the MX-ONE Provisioning Manager user records.

It has also since previously been possible to define so-called user-defined fields in MX-ONE Provisioning Manager.

With this release, it is possible to configure MX-ONE Provisioning Manager to map its user-defined fields to attributes of Active Directory. The automatic user data import from Active Directory will include the mapped attributes accordingly. Other news in this release is AD for Log-on and failure feed back.

MS Active Directory Authentication of Linux users can optionally be done, and is configured in PM. Login authentication process for the MX-ONE Admin (Shell) Linux users has until now been done locally in the Linux server, where the user logged in without a centralized validation authentication process. From MX-ONE 7.3, a method has been implemented to allow these users to be authenticated via the corporate AD system instead. The AD authentication applies to MX-ONE admin users created by the Master Admin/Root account.

## Mitel Performance Analytics

Mitel Performance Analytics (MPA) is an application, which is a part of the MX-ONE Management Suite. It provides simplified measurement and analysis of performance data from MX-ONE. MPA also gives the MX-ONE administrator information about the overall performance of trunks, routes, operators, individual extensions and common system resources.

## CMG Server

CMG Server is used to manage CMG specific data, for example:

- CMG specific user data, such as time zone settings. (Common user data is managed using MX-ONE Provisioning Manager.)
- Field name settings (all languages)

- Search layout settings for NOW
- Search layout settings for Office Web
- Settings of Activity codes
- Settings for system Contact Profiles including forwarding number
- Telephony connection settings
- Message Delivery Systems settings
- Settings of other system parameters
- Personal log-in
- Language settings
- Settings of other system parameters.

For further information, refer to the product documentation and release notes on *CMG Server* available on the *Knowledge Base*.

## MiCollab Advanced Messaging - Unified Messaging

The following are some examples of data that is configurable for MiCollab Advanced Messaging 7.0 Fax Mail:

- Settings for fax support on the Service Node
- Global fax settings
- Inbound fax routing
- Notifications about document processing and server status

For detailed information, see the getting started guide for *Captaris RightFax* and administrator's guide for *Captaris RightFax*.

The following are some examples of data that is configurable for MiCollab Advanced Messaging 7.0 Voice Mail:

- Unified messaging settings
- SMS message notification settings
- Settings for networking Voice Mail Servers
- Settings for connecting the voice mail system to the telephony system

With the release of MX-ONE 5.0 SP4, integration with MiCollab Advanced Messaging (former OneBox) 5.1 was introduced. This version is a dot release package and brings some enhancements primarily in the MiCollab Advanced Messaging mobile client side. Please refer to the MiCollab Advanced Messaging CPI documentation for a list of enhancements.

There will be continued support for the existing MiCollab Advanced Messaging SP3 SU3, which is a correction package for MiCollab Advanced Messaging 5.0 SP3. There are no new features included with this correction package.

Customers with active Software Assurance have the possibility to upgrade their MiCollab Advanced Messaging (former OneBox) 4.2 or 5.x system to MiCollab Advanced Messaging version 9.0 or later. A new license file will be delivered by the Mitel License Center with the equivalent license entitlements when requesting a version upgrade to the latest MiCollab Advanced Messaging version.

For further information, refer to the product documentation and release notes on *Mitel MiCollab Advanced Messaging* available on the *Knowledge Base*.

## SIP DECT

Configuration of the SIP DECT system and radio network is made via the Open Mobility Manager (OMM) that is part of the SIP DECT package.

The following are some examples of data that is configurable for SIP DECT:

- Connections to MX-ONE IP extensions
- Redundancy and load-share configurations
- Configurations of RFP's in the system
- Synchronization settings for the DECT air synchronization
- Configuration of Locating sunction

For detailed information, see the description for *SIP DECT*.

## BluStar Server

The BluStar Server (BSS) is a common application server for all BluStar end-points. The following are some examples of data that is configurable for BSS:

- Configuration of CSTA link to MX-ONE
- Configuration of connection to calendar system and to directory system
- Presence handling
- Integration for presence federation with Lync/Skype-for-Business

For detailed information, see the description for *BLUSTAR SERVER*.

## Accounting Management

Accounting Management comprises the services provided by MX-ONE that can be used for billing purposes.

MX-ONE generates customized Call Information Logging (CIL) records. Each record contains data for one call.

The CIL records can be configured to have several output formats, such as comma separated, Structured Query Language (SQL), or Extensible Markup Language (XML). Each Service Node generates its own CIL records that can be sent to up to 10 target locations. It is also possible to configure a single location and format for all CIL records.

The information provided by the CILs can be matched with user-specific information to get a complete picture of how each user uses the system.

For detailed information, see the description for *CALL INFORMATION LOGGING, QUALITY OF SERVICE LOGGING*.

## Quality of Service

VoIP quality of service information can be logged per call. Delay, jitter, used codec and packet loss rate can be logged. The data can be presented in Service Node Manager or through Call Information Logging output.

For more information, see the description for *QUALITY OF SERVICE*.

# Performance Management

MX-ONE provides the following level of Performance Management:

- Basic Performance Management (always included)

## Basic Performance Management

The MX-ONE applications include SNMP agents as well as extensive embedded Performance Management functionality. Some of these functions rely on standard operating system components such as the Windows SNMP Agent, while other functions are embedded in the MX-ONE applications.

For a short summary of the basic monitoring and performance management capabilities of the MX-ONE servers and applications, see *MiVoice MX-ONE* and *MiCollab Advanced Messaging*.

## MiVoice MX-ONE

MX-ONE provides the following monitoring and performance management functions:

- Congestion on routes
  The rate of congestion on routes is a critical resource in the Service Node and is continuously monitored. When the congestion rate reaches a certain threshold, alarms are generated.
- Traffic Measurements
  Traffic measurements provide statistical information about the telephony traffic in the Service Node. Examples of such measurements are:
  – Outgoing calls on a certain route
  – Total number of incoming calls

Traffic measurements need to be configured and started manually and data will be collected based on a number of different criteria (configurable).

## MiCollab Advanced Messaging

The following three different tools are available for configuration in MiCollab Advanced Messaging:

- Support Messaging System Management (a suite of Windows-based tools)
- Service Node Diagnostics
- Line Status & Reports

**NOTE:** The Service Node Diagnostics tool does not specifically refer to the component Service Node in MX-ONE and the tool is not part of MX-ONE.

# Security Management

For detailed information, see *Security*, the description for *SECURITY*, and *SECURITY GUIDELINES*.

## User Management

In MX-ONE it is possible to define the users that are allowed to use the Command Line Interface and the access privilege for each of them.

### Audit and Security Trail

The different components of MX-ONE log all activities that are relevant from the security point of view, such as access attempts, O&M operations, and so on.

This information is necessary in case of a security incident to be able to determine what caused the event.

### Protection of VoIP

MX-ONE supports the use of secure real-time transport protocol (SRTP).

MX-ONE supports Transport Layer Security (TLS), which provides secure access to IP phones and web services and secure signaling between IP phones and MX-ONE Service Nodes.

# Security

Attention to the security aspects of an IP telephony infrastructure is increasingly growing by corporate Chief Information Officers (CIOs), IT administrators, and users. Voice over IP traffic (both signaling and media) must be protected from a number of attacks, for example, media streams eavesdropping, toll-fraud attacks, and signaling modification. For this reason, it is necessary to protect both the VoIP signaling messages as well as the media streams.

The following security measures are supported in MX-ONE:

- Secure RTP (SRTP) to protect media streams
  MX-ONE supports the use of SRTP for media encryption in the IP phones and in MGU/MS based gateways.
- Transport Layer Security (TLS) to protect signaling messages
  TLS guarantees the signaling privacy when the SRTP keys are interchanged between the parties.
- Support for a number of flexible security policies, in order to support environment with different security requirements
  The main principle for the security policy is that it directs if an extension is allowed to register to the system or not. Once the extension is registered, the calls to any other party is allowed from a security perspective.

SIP terminals have to authenticate themselves using HTTP digest authentication. If a PIN code is assigned to the user, the authentication will also be done together with SIP request as the INVITE.

The servers are MX-ONE running on operating systems that have been hardened to resist the most common network attacks. Known vulnerable services are shut down and file integrity is checked periodically. Additionally, customers are recommended to implement security policies that cover patch management and anti-virus software updates. It is recommended to use some type of anti-virus software and to have automatic updates, of the security patches, activated. To overcome the VLAN separation, server farms should be protected by fire walls and Intrusion Detection Systems (IDS) that are able to block attacks.

All management interfaces towards MX-ONE servers can be run over secure protocols, such as SSH and HTTPS. Management operations and access to such interfaces are logged to have maximum control. Users and administrators always have to authenticate themselves before being able to access the system. Additionally, an access control mechanism is available to assign users and administrators different roles and privileges.

From MX-ONE 6.0 the VoIP security keys have been modified to be compliant with the EU legislation 388/2012 (former 1232/2011). A VoIP security key is only allowed to work in one installation.

For detailed information about security, see the description for *SECURITY*.

# Capacity

## MiVoice MX-ONE

For information about the capacity and minimum environment requirements of MX-ONE configurations, see the description for *CAPACITIES (for devices) and MX-ONE FEATURE MATRIX (for features/services)*.

The minimum environment requirements differ for virtualized and non-virtualized environments.

For more information about MX-ONE in a virtualized environment, see *MX-ONE VIRTUALIZATION DESCRIPTION*.

## Mitel MiCollab portfolio

For information on MiCollab UCC capacities, refer to the product documentation on *MICOLLAB*.

## Mitel BluStar Server

For information on BluStar Server capacities, refer to the description for *BLUESTAR SERVER*, and the product documentation and release notes on CMG BluStar Server available on the *Knowledge Base*.

## Mitel InAttend

For information on Mitel InAttend capacities, refer to the product documentation and release notes on Mitel InAttend available on the Knowledge Base and Info Channel.

## MiCollab Advanced Messaging

For information on MiCollab Advanced Messaging capacities, refer to the product documentation and release notes on MiCollab Advanced Messaging available on the Knowledge Base.

## SIP DECT

For information on SIP DECT capacities, see *the description for SIP DECT*.

## MiContact Center Enterprise

For information on MiContact Center Enterprise capacities, refer to the product documentation and release notes on MiContact Center Enterprise available on the Knowledge Base.

### MiContact Center Business

For information on MiContact Center Business capacities, refer to the *Product documentation* and release notes on the *MiContact Center Business available on the Knowledge Base*.

## Environmental Conditions

### General

MX-ONE consists of different components as well as commercial server-based products.

MX-ONE is designed to operate in and comply with regulations in force for enterprise (light industry) locations. Special measures may be required if MX-ONE is installed in other locations or if the environmental parameters deviate from the values described in this document or in other referenced documents.

For information on climatic environment requirements, see *MX-ONE SITE PLANNING ENVIRONMENTAL SPECIFICATION*.

### EMC, Safety and Telecom Compliance

For Aastra/Mitel branded products, when needed, contact your nearest Mitel office for support.

For safety related information, please read *SAFETY INFORMATION*.

For other products delivered with Aastra/Mitel branded products, when needed, refer to documentation delivered with the products or contact manufacturers for details.

## References

The following IETF RFCs are supported by the MX-ONE.

E = SIP Extension interface, T = SIP Trunk interface, - = other interface.

| RFC | Description | E | T |
|---|---|---|---|
| 2246 | Transport Layer Security (TLS) | x | x |
| (2327) | SDP; Session Description Protocol (replaced by 4566) | x | x |
| 2617 | HTTP Authentication. Basic and Digest Access Authentication | x | x |
| 2782 | A DNS RR for specifying the location of services (DNS SRV) | x | x |
| (2833) | RTP Payload for DTMF Digits, Telephony Tones and Telephony Signals (Replaced by 4733) | x | x |
| 2976 | The SIP INFO method | x | x |
| 3003 | The Audio/MPEG Media Type | - | - |
| 3261 | SIP, Session Initiation Protocol | x | x |

| | | | |
|---|---|---|---|
| 3262 | Reliability of Provisional Responses in SIP (PRACK method) | x | x |
| 3263 | Locating SIP Servers | x | x |
| 3264 | Offer/answer method (SDP usage) | x | x |
| 3265 | SIP specific event notification | x | x |
| 3266 | Support for IPv6 in Session Description Protocol (SDP) | x | x |
| 3280 | Internet X.509 Public Key Infrastructure CRL Profile | x | x |
| 3310 | Digest Authentication | x | x |
| 3311 | SIP UPDATE method | x | x |
| 3323 | Privacy mechanism for SIP | | x |
| 3325 | Private Extensions to SIP for Asserted Identity within Trusted Networks | | x |
| 3326 | The Reason header field for SIP | x | x |
| 3398 | ISDN User Part (ISUP) to SIP mapping | x | x |
| 3407 | SDP Simple Capability Description | x | x |
| 3420 | Internet Media Type Message/sipfrag | x | x |
| 3428 | Extension for Instant Message method | x | |
| 3515 | SIP Refer method | x | x |
| 3550 | Real Time Transport Protocol | x | x |
| 3551 | RTP Profiles for Audio and Video Conferences with minimal control | x | x |
| 3581 | Symmetric response routing | | x |
| 3665 | SIP Basic Call Flow Examples | x | x |
| 3680 | SIP Event package for Registration | x | |
| 3711 | The Secure Real-time Transport Protocol (SRTP) | x | x |
| 3725 | Third party call control in SIP | x | |
| 3824 | Using E.164 numbers with Session Initiation Protocol | | x |
| 3842 | Message waiting indication event package for SIP | x | |
| 3890 | A Transport Independent Bandwidth Modifier for the Session Description Protocol (SDP) | x | x |
| 3891 | The SIP 'Replaces' header | x | x |
| 3892 | SIP Referred-by mechanism | x | x |
| 3911 | The SIP Join header | | x |

| | | | |
|---|---|---|---|
| 3960 | Describes how to manage early media in SIP using two models: the gateway model and the application server model. The Service Node supports the gateway model. | x | x |
| 3966 | The Tel URI for telephone numbers | | x |
| 3986 | Uniform Resource Identifiers (URIs) | x | x |
| 4028 | Session timers in SIP | x | x |
| 4040 | RTP Payload Format for 64 kbit/s Transparent Calls | x | x |
| 4235 | Dialog event package | x | x |
| 4244 | An extension to SIP for Request History Information | | x |
| 4320 | Actions addressing identified issues with the SIP non-Invite transaction | x | |
| 4346 | Transport Layered Security (TLS) 1.1 and SRTP | x | x |
| 4497 | Interworking between SIP and ISDN QSIG | x | x |
| 4566 | Session Description Protocol (replacing RFC 2327) | x | x |
| 4568 | SDP Security Descriptions for media streams (SDES) | x | x |
| 4733 | RTP payload format for DTMF digits, Telephony Tones and Telephony Signals (Replacing RFC 2833). | x | x |
| 4904 | Representing Trunk groups in tel/sip URIs | | x |
| 4975 | The Message Session Relay Protocol (MSRP) | x | x |
| 5022 | Media Server Control Markup Language and Protocol | x | x |
| 5116 | An interface and algorithms for Authenticated Encryption (AEAD) | x | x |
| 5168 | XML schema for media control | x | |
| 5246 | Transport Layered Security (TLS) version 1.2 | x | x |
| 5282 | Using Authenticated Encryption Algorithms with the Encrypted Payload of the Internet Key Exchange version 2 (IKEv2) Protocol (AES-128/256 in GCM mode in secure RTP) | x | x |
| 5334 | Ogg encapsulation, interface for external streaming sources | x | |
| 5626 | Managing Client-initiated connections in SIP | x | |
| 5627 | Obtaining and using globally routable User Agent URIs (GRUU) in the SIP | x | |
| 5806 | Diversion information in SIP | x | x |
| 5850 | A call control and multi-party usage framework for the SIP | | x |
| 6116 | The E.164 number to Uniform Resource Identifiers (URI) Dynamic Delegation Discovery System (DDDS) Application (ENUM) | | x |
| 6140 | Registration of Multiple Phone Numbers in SIP | | x |

| | | | |
|---|---|---|---|
| 6188 | The use of AES-192 and AES-256 in secure RTP | x | x |
| 6337 | Usage of the Offer/Answer Model | x | x |
| 6910 | Call Completion for SIP | | x |
| 7315 | Private Header Extensions for SIP for the 3GPP (PANI for Emergency calls) | | x |

The following IP standards are also supported by the MX-ONE:

| | |
|---|---|
| ITU-T Recommendation | Relevant G-series recommendations (G.107, G.108, G.109, G.111, G.114, G.131, G.168, G.175) |
| ITU-T Recommendation | Relevant P-series recommendations (P.800, P.862) |
| ITU-T Recommendation Y.1541 | Network performance objectives for IP-based services |
| ETSI ES 202 020 | Speech Processing, Transmission and Quality Aspects (STQ); Harmonized Pan-European/North-American approach to loss and level planning for voice gateways to IP based networks |
| TSB 122-A | TIA/EIA Telecommunications Systems Bulletin Voice Gateway Loss and Level Plan Guideline |

# MiVoice MX-ONE System Description

This chapter provides a high-level description of the MX-ONE solution. It includes a brief description of the system components, the network architecture, and external interfaces together with general feature descriptions for MX-ONE.

In this context, the term user is defined as an end-user within the enterprise that uses MX-ONE for daily communication. The user can access MX-ONE through several different terminals or applications.

Throughout this document, there will be references to other documents that provide more detailed information about different subjects.

## Introduction

### General Introduction to MiVoice MX-ONE

MiVoice MX-ONE is a complete communications solution that is highly flexible and designed to address the business communication needs in different vertical segments and sizes, scaling from 100 to over 100.000 users in a single system.

The MX-ONE architectural design gives the possibility to deploy the system in a centralized communications server / media server configuration or as a distributed system with several communications servers and media servers or media gateways spread out in multiple locations. This flexible design makes it possible to achieve an excellent total cost of ownership without compromising performance or functionality, regardless if you are a large multi-national company with many locations, a regional company with a main site and a few smaller sites, a branch offices or a single site company.

MiVoice MX-ONE also supports a monthly subscription-based licensing model, where the partner / customer pays for actual used licenses on monthly basis. This commercial option is called MiVoice MX-ONE MLA (Managed Service License Agreement) and is offered by qualified Mitel partners.

The MiVoice MX-ONE Managed Service License Agreement deployment option is provided by Mitel partners that are offering managed services or Private Cloud services to their customers. The commercial set up for the solution offers the possibility to modify the number of users and user profile licenses used on a monthly basis if minimum agreed limits and subscription periods are maintained. The MiVoice MX-ONE MLA system will automatically report the license usage for a given period, for auditing and billing purposes. Each tenant customer will have their own MX-ONE system and application instances in a virtualized or Private/Public Cloud environment (Premise-based or partner based data center, or alternatively in Azure based Public Cloud environments.

Not only does MX-ONE provide excellent voice and video communications with a comprehensive set of telephony features, but it also comes with a complete set of applications to provide true mobility, Unified Collaborative Communications and Contact Centers. The combined solution addresses Enterprise communications need for all types of businesses in over 100 countries worldwide.

MX-ONE supports high-security standards and provides a range of options for achieving the desired level of redundancy on a per customer and site basis. To care for personal safety, the MX-ONE solution has built-in support for Emergency Notification/911/999/112 - functionality. To further address safety/security and customer support demands the MX-ONE solution includes Mitel's MiVoice Call Recording or Mitel Interaction Recording and support for Mitel Revolution. MiVoice Call Recording and Mitel Interaction

Recording are systems for professional voice documentation, recording of audio and complementary metadata, paired with a powerful user interface for managing and using the stored media in an efficient manner.

## Standards-Based Approach

MiVoice MX-ONE is designed for use in an open standards-based software and hardware environment, using industry-standard servers with LINUX SUSE & Windows server operating systems. Furthermore, together with strong support for open standards, such as SIP, CSTAIII / TR87, and Web services, it comes with support for a full range of network and user side interfaces, enabling connection to a variety of public networks as well as 3rd party systems and applications. MX-ONE also provides a strong migration capability, where existing Mitel TSW customers and even old MD110 customers can maintain a portion of already made investments and migrate to new technology and services at their own pace.

Additionally, the management solution of MX-ONE is based on industry standards that IT departments are familiar with, making it easy to integrate into the corporate IT infrastructure.

## Unified Communication and Collaboration

Mitel's MiCollab Unified Communication and Collaboration (UCC) portfolio is designed to provide business with effective collaboration amongst colleagues and between employees and business partners or customers. MiCollab aligns with Mitel's MiVoice MX-ONE to bring together voice, video, chat, messaging, web conferencing and team collaboration tools, all within a single solution, so that all employees within the organization can have access to a rich set of communications and collaboration tools that empowers them to spend less time trying to connect with others and more time engaged in productive communications.

MiCollab is designed using a mobile-first design philosophy to provide users with a single point of access to communications and connectivity tools, from both desktop (PC & Mac) and mobile devices (Android & iOS), that align with how employees prefer to communicate and address today's mobile, fast-paced workplace. With a focus on providing a consistent and unified user-experience regardless of the device used, MiCollab helps users work together more efficiently and effectively (e.g. on-the-fly communications escalation and virtual workspaces where teams working on the same project can easily exchange ideas and share content).

Together with Mitel MiTeam, MiCollab offers users access to team collaboration services that enable the ability to create and access virtual workspaces where teams of any size can post messages, share content, assign tasks, and start instant group conferences. With MiTeam, all posted information (and uploaded files) are stored in a persistent way, securely in the cloud, enabling users to access their information from anyplace, at any time.

Through MiTeam Meeting, the MX-ONE users can establish various forms of web-based high-quality audio, video and collaboration meetings with persons within the company and with persons outside of the company. Through the cloud-based Mitel collaboration engine, the capacity is adjusted to the needs and can scale from small systems up to very large systems. Furthermore, MiCollab's portfolio of UCC services includes integrated Audio, Web, and Video conferencing services enable employees to connect and collaborate with colleagues, business partners, and customers through highly interactive online meetings, including large-scale audio-only services, web-based desktop sharing and 8-party desktop video conferencing. Its web-based conference administration portal allows users to set up and manage all aspects of their conferences from a single interface or create meetings on the go from within their Outlook calendar via a MiCollab plug-in for Outlook.

Mitel's UCC portfolio can be enhanced with a range of SIP end-points, including the Mitel Conference & Video phone, HD quality SIP desktop phones, and wireless terminals. In addition, MiCollab users can access their conferences directly from their Mitel 6900 series phone via a simplified application (Meeting Center) located on their phone screen.

In keeping with Mitel's strategy of openness, MiCollab uses open and standardized interfaces to address integrations with 3rd party applications. Microsoft Teams users have a number of alternative interworking options, and for customers who have adopted Microsoft (MS) Skype for Business (SfB) as their IM/Presence solution. MiCollab provides a plug-in for SfB that enables SfB users to direct all voice-centric interactions through their Mitel MX-ONE end-points directly from the SfB client. Furthermore, MiCollab integration with MS Exchange allows click-to-dial and click-to-chat capabilities directly from the Outlook contact cards.

## Collaboration Management

Another aspect to consider is collaboration management, or the possibility to manage how calls are routed based on a user's current presence state or availability. The Mitel CMG offers solutions to fully automate this process by integrating into a company's calendar system and setting diversions or personal number routing profiles for a user, based on their calendar activities. The system comes with a web-based self-service portal (Mitel CMG Web) that allows users to set these call routing options based on their preferences. Once they are set up, the user no longer has to worry about whether or not their diversions are set and if calls from customers are being handled in their absence.

In fact, in the case where something urgent that was not planned for occurs, users can even change them on the fly through a simple press of a button. The Mitel CMG Web portal also offers users access to other key services, such as directory search, presence, line state, and click-to-call. Since it was designed using responsive web technology, it can be accessed and used on any device - PC, mobile or tablet - regardless of location. This means that even when out of the office, Mitel CMG users have access to their services on any device that a Web browser. Additionally, Mitel CMG can be integrated with MiCollab as an embedded link on MiCollab Desktop clients for PC.

The Mitel Virtual Reception option provides auto-attendant, voice mail (VM) and reception/visitor services. These are value-add services that complement the collaboration management suite to provide users with a complete suite of services that provide enhanced customer services. If Virtual Reception is included with the Mitel CMG deployment, Mitel CMG Web users will also have access to extra capabilities in the self-service web portal, including management of their personal IVR settings, visual VM and visitor management services. Note that Mitel CMG is mainly introduced in Nordic countries.

## Attendant Services

When professional attendant services are needed with MX-ONE, Mitel InAttend is the platform of choice. It is a Windows-based client-server architecture that integrates with a customer's AD and calendar systems. Attendants have a full-featured PC-based client that offers all the expected features for a professional attendant, including SIP softphone (or hard-phone) with advanced attendant call handling features (keyboard or mouse), multiple queues, A/B panels, advanced directory search, view users' presence, line state and calendar activities, messaging, etc. In other words, everything attendant needs to provide fast and efficient service to customers.

The Mitel presence engine is embedded in the solution enabling the attendants to get real-time presence and line state. It uses industry standards-based interfaces, such as SIP/simple, CSTAIII, and UCMA to provide rich presence information from different systems, including MX-ONE, Cisco and MS Skype for Business. This makes sure the attendants have federation to all relevant status information in one place, regardless of the system users connected to it. The key benefits are efficiency and better customer service.

Furthermore, Mitel InAttend has tight integration with Mitel CMG, enabling attendants to see and even manage user presence/activities and diversions. Mitel InAttend is a scalable solution that can start with as little as one attendant for medium-sized companies, yet scale to large organizations with 100 or more attendant consoles.

## Mobile Users

Supporting mobility is a matter of supporting the communication needs of a user with a mobile behavior. Different users will have different needs, and the news may differ over time. Therefore, MiVoice MX-ONE offers a wide range of products and components that together provide solutions to support mobile user's communication needs. Access via wireless technologies is an important part of the mobility solution.

### *Fixed Mobile Convergence*

Today's users are expecting to have all types of communication services combined and integrated into the same application GUI, on the device of their choice, whether in the office or when they are on the move.

MX-ONE sets the standard for Fixed Mobile Convergence (FMC) with its mobile extension feature, whereby mobile phones are integrated as an integral part of the office communications system with access to the complete feature set.

Together with the MiCollab mobile client, MX-ONE takes Unified Communications a step further by adding true user mobility. Designed using a mobile-first design philosophy, MiCollab provides mobile users with a single point of access to communications enabling them to choose how and where to perform their duties irrespective of geographical location. This includes:

- Enabling employees to communicate using their preferred communications type – chat, voice, or point-to-point video - the one that is best suited for the current situation.
- Through the Terminal Selection Service (TSS) in MX-ONE and the corresponding functionality in the MiCollab clients, the users have the freedom to on-the-fly chose which terminals/applications should ring and be used. TSS can be extended also to include public destinations/numbers.
- Improving team-based work with access to persistent, virtual workspaces.
- Reducing communications latency and organizational silos by providing access to connectivity tools that promote the sharing of information across groups enabling employees to make better informed, higher quality business decisions.

### *On-site Mobility*

For organizations with many users rowing around the companies' facility and/or where high-quality telephony services are critical the Mitel SIP DECT technology offers powerful and flexible solutions. With controlled radio spectrum, the coverage and capacity can be tailored for the needs. Through the integration of Mitel's alarm and messaging applications with other business critical systems, customer, and user unique solutions and tools can be provided.

## One Product Solution Addressing Different Business Models

The MX-ONE design and license models are built to work either as Customer Premises (CPE) deployment or as Cloud or hybrid Cloud deployment. Its license model is built up to enable support for either a traditional Capital Expenditure (CAPEX) model or Operating Expense (OPEX)-based subscription models. The license reporting software embedded in the system allows accurate and secure license usage monitoring needed for a subscription-based licensing model. The system license usage information is reported on a monthly basis, enabling a "pay for what you use" model.

The MX-ONE Private Cloud offering provides customers the same user-experience as a traditional premises-based deployment and only differs in the license delivery model. The main highlights:

- Monthly subscription-based licensing options for private cloud & managed service deployments (Managed Service License Agreement, MLA).
- Virtualized, software-only, tenants for straight deployment in the cloud.
- Focus on SIP end-points for advanced functionality and cost-efficient provisioning / deployment.
- Provides a migration path for existing CPE-based Mitel TSW/MD110 customers towards cloud or hybrid Cloud solution.

## Total Cost of Ownership

MX-ONE is continuously evolving to meet today's user requirements and to be on par with IT infrastructure evolutions. The MX-ONE communications server platform used a 64-bit OS architecture and supports IPv6, enabling customers to evolve when the time comes. Whether the customers decide to build their own infrastructure or choose an outsourced private cloud deployment, the underlying solution provides the same level of enterprise-class services.

MX-ONE is a native SIP soft-switch offering multi-media UCC support addressing the needs of today's communication market, whether on-premise or in the cloud. But, not all customers are ready to transition straight away to a fully SIP-based architecture and prefer a stepwise approach towards IP and UCC-based communications. For this reason, we have always maintained support for the most common legacy protocols using media gateways for both subscriber and trunk side connectivity. This capability is partly thanks to its heritage from the Mitel TSW and MD110 platforms, where hundreds of features were developed over the years and carried through to the next generation products. It is one of the reasons that the MX-ONE offers our existing legacy installed base arguably the best migration path on the market today, allowing customers to build on their already made licensing investments. Furthermore, the user-based licensing approach introduced with MX-ONE allows customers to reuse existing licenses to migrate legacy end-points to SIP and Unified Communications when it makes sense for their business. This approach enables customers to keep the Total Cost of Ownership (TCO) under control and instead to focus investments on new value-add applications and services.

## Software Assurance

Mitel's Software Assurance program complements your provider's service offers, giving you the security of staying current with the latest functionality and innovations delivered for the MiVoice MX-ONE solutions. Software Assurance provides access to the latest software releases and vendor support via your Mitel trained and authorized partner. Mitel Software Assurance is available for the complete MiVoice system as well as other related Mitel products, such as MiCollab and MiContact Center, and so on.

### *Entitlement to Software Releases*

Keeping your systems current ensures you can maximize your business value by using the latest features, integration updates to your applications and business processes, and a very importantly reduce security vulnerabilities.

### *Mitel Technical Support*

When you have critical or major issues that can't be resolved, or your Mitel trained and authorized partner can't solve on his own, they can contact Mitel technical support experts to drive issues to resolution. These experts apply deep technical knowledge to collect system data, replicate and isolate faults in a lab environment, validate configuration changes, point out third-party product integration challenges, or engage Mitel product development when needed.

### *Coverage*

Mitel Software Assurance is offered via Mitel trained and authorized Partners and is initially purchased along with the new Mitel software products for a minimum period of one year. There are two different options for Mitel Software Assurance that offer different levels of support:

### *Software Assurance Standard*

Software Assurance Standard is the simplest software assurance program that includes technical support, with access at 8x5 hours, as well as software corrections, updates, and entitlement to major software releases.

### *Software Assurance Premium*

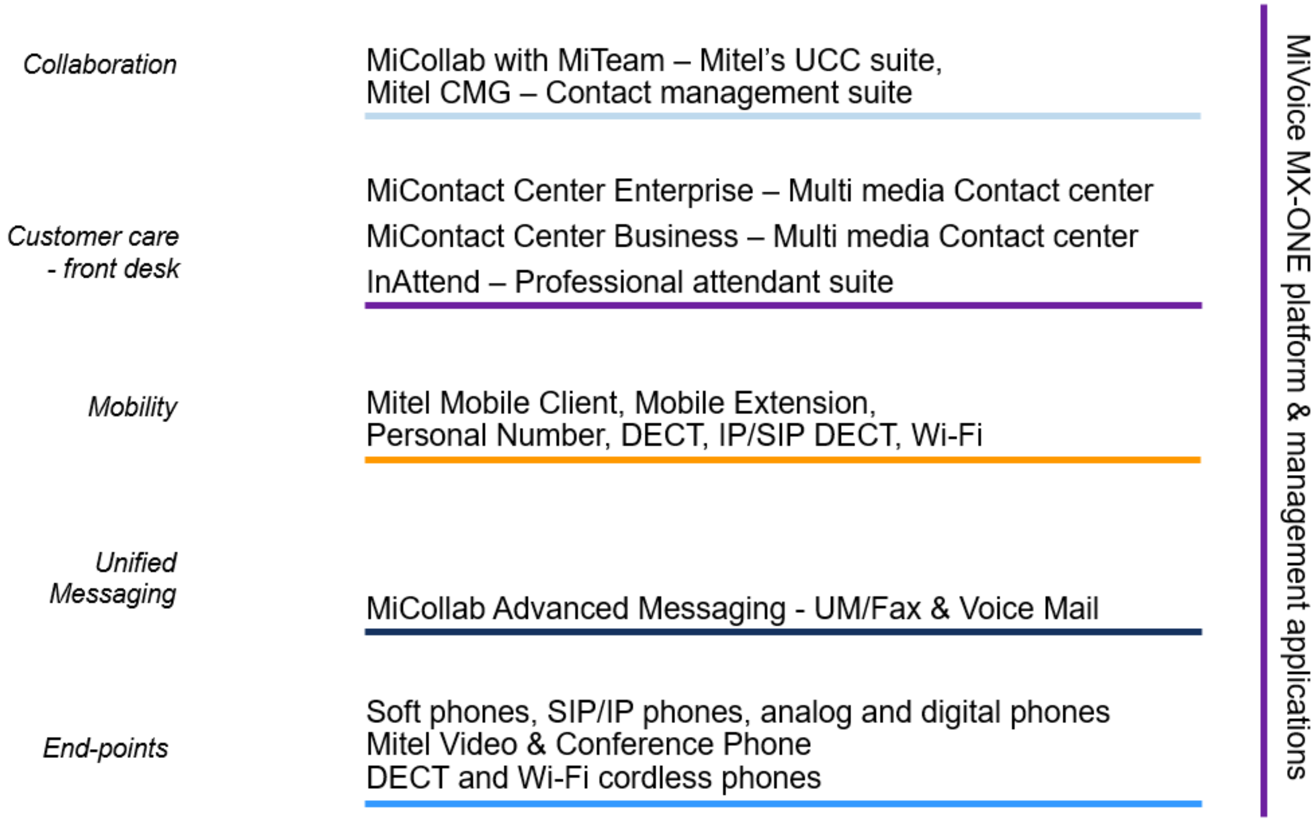
In addition to everything in the Standard subscription, the Premium subscription includes 24x7 technical support. It also includes Mitel Performance Analytics (MPA), a software tool helping to pro-actively monitor and analyze the system to continuously maintain optimal performance.

# System Overview

This chapter gives a high-level description of the MiVoice MX-ONE solution.

## General Solution Overview

The MX-ONE solution consists of a set of integrated modules, forming a complete communication solution for enterprises communication needs.




The MiVoice MX-ONE portfolio is comprised of the following components:

- MiVoice MX-ONE
  - MX-ONE Service Node, the IP-based communication server is the foundation and the core building block. For SIP-only deployments, the required media server functionality is provided purely in software, i.e. no hardware-based Media Gateway is needed for an "all SIP" MX-ONE. A part of the Service Node is the System Database Node. The Database Node can be installed together with the Service Node or on a separate server, depending on the needs of the deployment.
  - MX-ONE Gateways: MX-ONE solution offer bout software-based media GW called Media Server for SIP only deployments and hardware-based gateway for legacy access (E1/T1/BRI/PSTN) including solutions for remote GW survivability.
  - MX-ONE Service Node Manager is a web-based application for configuring and managing telephony functions in MX-ONE. It is also used for creating and storing of configuration files used for IP/SIP terminals and end-points.
  - MX-ONE Provisioning Manager, a web-based application for managing users and extensions in MX-ONE. MX-ONE Provisioning Manager provides a single point of entry for managing user and extension data in the MX-ONE Service Node (Telephony Server), MiCollab, Mitel MiCollab Advanced Messaging, CMG, as well as SIP DECT users.
  - Mitel Performance Analytics (MPA) is a fault & performance management software for the MiVoice MX-ONE, Mitel applications and other 3rd party systems on the customer's communications network. Partners and IT administrators can deliver proactive service-quality to customers,

increasing customer satisfaction while reducing costs with tools that resolve problems faster. MPA can be deployed as an on-premises or a cloud-based solution, it can be used to support standard single system installations and it can be used to support multiple customer networks from a single instance.

- MiCollab provides a complete set of advanced unified communications and collaboration applications through a single stream of software to enable people to connect and collaborate more easily and effectively, no matter where they are. It includes:
  – Mitel MiCollab Application Server, the core component of the Mitel MiCollab system, providing directory, presence and calendar integration for end users. The MiCollab Application Server also provides a homogenous environment for deployment and operation of the MiCollab environment and integrated with MX-ONE for smooth and consistent user population and configuration.
  – MiTeam Meetings, the portal for video and collaboration meetings.
  – MiCollab Audio, Web, Video is a powerful audio and web conference server for various forms of collaboration.
  – Unified messaging and voice mail is provided natively in the MiCollab NuPoint engine.
  – Mitel MiCollab clients enable a single point of access for communications and connectivity, presence and availability, and a SIP softphone for desktop and mobile use. UC clients are available for PC, Mac, Web, and mobile (iOS and Android devices) to enable users to make and receive voice calls and interact with other MiCollab users through IM (Instant Messaging), e-mail, voice, and point-to-point video. Additionally, the MiVoice plug-in for Skype for Business provides complementary routes towards MiCollab UCC.
  – In addition to traditional clients, the MiCollab solution provides a powerful web-based user interface to the UCC portfolio. Using web browsers supporting Web RTC MiCollab provides softphone functionality through Web RTC for users inside as well as outside the organization's network.
  – MiTeam’s team-based collaboration tool provides a virtual place where teams can post messages, assign tasks, share files, send and receive instant messages, and start conference calls, all within a single location. Instead of getting bogged down in lengthy email threads, teams can be more nimble and productive, no matter their location.
- Mitel MiCollab Advanced Messaging provides features for voice mail and fax mail, including Unified Messaging. MiCollab Advanced Messaging can be used as an alternative to NuPoint in MiCollab deployments, or independently of MiCollab deployments.
  – With Mitel MiCollab Advanced Messaging, you turn your Mitel communications system into a productivity tool. Users can communicate more efficiently, respond more quickly and increase productivity. Mitel MiCollab Advanced Messaging delivers a powerful suite of Unified Communications applications including advanced call processing, auto-attendant, voice mail, e-mail integration, personal assistant, fax, speech-driven services, notifications, and so on.

    MiCollab Advance Messaging also tags into the MiCollab clients providing a homogeneous user interface.
- Mitel CMG Suite
  – Mitel CMG Web is a set of services that enables business users to manage their day-to-day activities. With the CMG Web, users can do “smart-search” directory services, click-to-dial, manage activity timeline and their call-routing preferences based on their calendar/activities. Integration with the Mitel presence engine enables users to see in real-time their colleagues’ rich presence information, including Mitel CMG client presence status, calendar activity and line state from all available sources provided by the Mitel BluStar (BS) Server.

  - Mitel Virtual Reception - Automated speech and reception services.Virtual Reception is a set of automated self-services that significantly reduce wait time and attendant workload, increasing at the same time customers’ flexibility and efficiency.

- Mitel‘s MiContact Center Enterprise and MiContact Center Business are applications and services for server-based contact centers.
  - MiContact Center Enterprise/Business offers an enterprise-wide contact center solution with IP and mobility across multiple sites. This enables distributed customer service organizations to behave as one single unit. MiContact Center Enterprise/Business is the power that enables people to be provided with the best contacts. Empowered with Mobile Extension, MiContact Center Enterprise/Business also enables remote or roaming connectivity. Customers are guaranteed access to the most appropriate agent – wherever they are located and on whichever communications medium they prefer to use (i.e. voice, chat, e-mail, SMS, Facebook, Twitter or fax). MiContact Center Enterprise/Business provides skills-based routing across these media types, a single point of management and an integrated management information system across the contact center. The solution consists of software applications focused on the agent, management, and customer self-service functions.
- MiVoice Conference and Video Phones are compact audio and video conference room devices that offer an HD quality voice experience. It integrates fully with MiCollab’s conferencing suite for voice, video and content sharing. Additionally, it can host a 4-way video conference and interoperates with Mitel MiCollab clients.
- MX-ONE end-points supporting all various types of extension interfaces (SIP, IP, analog, digital, Mobile Extension, DECT, and Wi-Fi).
- Mitel MiVoice Border Gateway (MBG), for secure remote Teleworker access from MiCollab clients or Mitel 6900/6800 SIP phones. Additionally, the MBG can provide security for SIP trunks to public networks or remote application servers. MBG can also interconnect with recording systems in order to record the extension traffic routed over it, internal as well as external traffic can be recorded.
- MiVoice Call Recording/Interaction Recording, our voice documentation and professional interaction management solutions, records, stores and organizes telephone conversations in a central, secure network repository for easy retrieval and playback. Quality Management (QM) deliver advanced Contact Center management and quality assurance tools as well as collaboration and information transfer capabilities.
- InAttend, a professional attendant console offering powerful directory search, calendar integration, rich presence integration for fast and efficient call handling.
- Hospitality solution
  - Tiger TMS and InnLine is a suite of applications primarily for the hospitality industry; hotels, cruise ships, hospitals etc.

    The different parts perform different tasks:

    i. iCharge is the application that connects the other parts and external applications and products like the PBX, the hotel’s front office system, smart TV etc. It also handles the call charging.

    ii. InnLine is a voice mail system specially designed for hospitality. In addition to hospitality voice mail, it also handles wake-up and service- and housekeeping codes.

    iii. iConnect makes it possible for the guest to use the smart phone as a guest room extension. This is used together with:

    iv. IP Guest Services that is a smart phone app and a server application that give the guest access to hotel services like hotel information, room service ordering, phone directory etc., all defined by the hotel.

v. IP Connect is handling High-Speed Internet Access, mgmt. & billing
vi. HotelMGR is a Service ticket management system.

iCharge is mandatory and InnLine is used in virtually all hotels. IP Connect and HotelMGR are not involved in the MX-ONE integration.

# MiVoice MX-ONE System Overview

## MX-ONE Communication System Components

The MiVoice MX-ONE communications system is divided into three main components. The call server component that takes care of the signaling is called MX-ONE Service Node, which is a Linux-based call control software that can either be installed as virtual machine instance in an Azure environment, in a private cloud as a virtual machine instance on VMware or KVM or Hyper-V, or it can reside in a standard Intel-based server or on a dedicated Mitel Server Unit. The second component is a software-based Media Server with DSP resources for handling tone detection, multi-party conferencing and packet switching between different IP end-points (for example, SIP and H.323) when direct media is not possible. In IP-only installations there is no need for additional and dedicated media gateway hardware, the media server can reside in the same Linux machine as the call manager, thus reducing the customer footprint.

As a complementing component, one or several hardware-based Media Gateways can be added to the configuration, to provide the physical interfaces towards TDM subscribers, public networks, and auxiliary devices. It also houses DSP resources for handling tones, conferencing, packet-switching towards IP phones (SIP and H.323) and to convert media between different protocols. Any combination of media servers and media gateways, up to a limit of 15, can be connected to the same call server.

## System Architecture

The long-proven scalability and flexibility architecture of MX-ONE allows customers to tailor the solution to fit their specific needs. An MX-ONE communication system can be built as a centralized system with multiple servers, media servers and media gateways in one place or these components can be distributed over multiple locations. In either case, the system is seen as a single logical system with a 100% feature transparency and a common numbering plan.

### *Scalability*

MiVoice MX-ONE allows organizations to easily expand its capacity, add functionalities, modules, gateways, and easily upgrade the servers. A single MX-ONE can scale from 100 users up to well over a hundred thousand users, using any mixture of end-point types, enabling organizations to benefit from the expand-as-you-grow principle of adding users in the system. Multiple MX-ONE systems can be networked with ISDN/QSIG or SIP tie-lines with network services in order to support several hundred thousand users within a global voice network. For users in large and distributed organizations, MX-ONE support corporate log-on whereby the end-user can log on to a phone anywhere in the network and automatically have it configured and set-up as the desk phone in his regular office.

### *Flexible Deployment*

MX-ONE is a highly flexible solution that supports a variety of deployment options. Multiple instances of servers with media servers and/or media gateways, seen as a single logical system, can be spread over a wide area network to create solutions for small and large customers across geographical dispersed locations or collapsed as a centralized system with the servers in a central location.

Remote users can be connected to the central system as teleworkers, or via remote gateways, or through remote nodes (server plus gateway).

## Cloud Architecture

With the advent of cloud computing technology, the cost to provide high availability, voice and data application hosting, content storage and service delivery will be significantly reduced.

Cloud Computing broadens the horizons across organizational boundaries for "reusability of IT capabilities", which is the very fundamental principle in cloud computing. To realize this computing paradigm, MX-ONE has taken the bold steps in realization with its ability to deploy virtualization.

With MX-ONE it is possible to run MX-ONE Service Node and its UCC applications as virtual machines in a customers VMware, KVM, Hyper-V environment. Thus, this capability has taken advantage of integrating real-time communications as a service in the cloud environment. More importantly with MX-ONE using VMware, KVM or a Hyper-V Virtual Appliance, virtualization is supported and provides an alternative to MX-ONE's Native Resiliency and High Availability options.

Furthermore, MX-ONE can be installed as a soft switch without any hardware-based media gateways for pure IP environments. In a virtualized environment, both the communications server and media server reside on the same virtual machine and can benefit from VMware's High Availability options.

To further support different customers IT strategies, the MX-ONE system can also be installed in customers Azure, public cloud, environments.

## MX-ONE MLA - for Subscription Based Licensing

The MiVoice MX-ONE MLA (Managed Service License Agreement) deployment option is targeting Mitel partners that are offering managed services or Private Cloud services to their customers. The commercial set up for this solution offers the possibility to modify the number of users and user profile licenses used on a month by month basis if minimum agreed limits and subscription periods are maintained. The MiVoice MX-ONE MLA system will automatically report the license usage for a given period, for auditing and billing purposes. Each tenant customer will have their own MX-ONE system and application instances in a virtualized Private Cloud environment (partner data center or premise-based).

From a usability and functionality perspective, the customer will not see any difference from a premises-based solution, as it is the same software used in both offerings. The only difference is the licensing model and commercial setup.

MX-ONE MLA has today two UCC licenses package options:

1. Option 1: MX-ONE MLA with MiCollab
2. Option 2: MX-ONE MLA with CMG Suite

MiVoice MX-ONE MLA is using the same OVA’s as the CAPEX MX-ONE & UCC offering. The only difference is the licenses file that is used to set the MX-ONE and the UCC application into subscription mode. The MX-ONE MLA bundle is a MX-ONE solution package including UCC & UC applications with Feature Bundled user-licensing and OPEX/usage reporting for subscription-based business. The following applications are part of the package:

Option 1:

- MiVoice MX-ONE Service Node and Media Server
- MX-ONE Provisioning Manager & Service Node Manager
- MiCollab UCC suite
- InAttend & BS Server (Presence)

Option 2:

- MiVoice MX-ONE Service Node and Media Server
- MX-ONE Provisioning Manager & Service Node Manager
- Mitel InAttend & BluStar Server (Presence)
- Mitel CMG Web
- Mitel Virtual Reception

### *MX-ONE MLA - License Usage Reporting*

MX-ONE sends a usage report twice a month as an attachment to an e-mail to pre-determined destinations at Mitel and at the sales partner / service provider. The attachment is a file containing actual license usage data that is configured in the system.

An Excel-based "usage report" tool can be used to imports the files and create license usage reports on a per customer/system basis. The report is broken down per customer-system and shows per customer average totals per user profile types as well as used system options during the billing period. For more information about the current feature packages see the chapter about Feature Based licensing structure.

## High Availability

MX-ONE offers High Availability by supporting different types of redundancy options to cater to different customer requirements. The option or options chosen are based on the deployment scenario e.g. centralized or distributed server architecture, HW server architecture vs. virtualization (Private Cloud), choice of end-points (TDM vs. SIP), a main site with branch offices, etc.

### *Server Redundancy Options for Delivering High Availability*

- Home Location Register redundancy (HLR) - In this case, you are deploying IP/SIP phones and have more than one server with load balancing enabled to share the load between servers. The user data is synchronized between the servers. Should one of the servers fail, the IP/SIP phones will re-register to one of the secondary servers (using a guest/backup HLR) automatically and recover most of their features. When the primary server comes back, they will re-register to their primary HLR server. Each server in an HLR redundancy setup can handle up to 15,000 “visitors” IP/SIP end-points.
- 1+1 server redundancy. This is a scenario where a primary server and a dedicated backup server are configured in a redundancy cluster. Should the primary server fail, the backup server will take over the service within less than a minute (in a Pre-Loaded Server deployment). This is an active standby setup. There can be a 1+1 redundancy cluster for each server in a MX-ONE logical system.
- N+1 server redundancy. This scenario is similar to the 1+1 scenario, except you have several servers in one location in the same redundancy cluster with a dedicated backup server that will take over if any one of the primary servers in the cluster fails. The recovery process in an N+1 configuration will take 2-3 minutes as the backup server must first reconfigure itself with the failed primary server configuration. This is a warm standby setup. Up to 10 servers can be in a single redundancy cluster. There is no limit to the number of redundancy clusters in a single logical system.
- High Availability provided via virtualization software (e.g. VMware HA/FT). The MX-ONE Service Node fully support VMware HA scenarios - both High Availability (Warm Standby) and Fault tolerance (Hot Standby) options. It assumes the proper virtualization infrastructure is put in place according to VMware specifications.

### *Network Redundancy*

MX-ONE servers and Media Gateways support network redundancy using built-in NIC Bonding or Link failover mechanisms. MX-ONE Servers (ASU Series) come with 2 LAN 100/1GB LAN ports that can be configured for network bonding/failover based 802.3 AD to provide network redundancy. Additionally, the MGU based media gateways (Slim, Lite, and Classic) have 2 LAN100/1GB LAN ports that can be configured for network redundancy using a link failover mechanism.

### *Branch Office Survivability*

For Branch office situations where there are requirements for local PSTN access and survivability for IP/SIP terminals, sites can be equipped with a remote server and media gateway combination - known as a Survivable Branch Node (SBN). The SBN bundles include the necessary trunk, tie-line, and user licenses as well as necessary HW depending on the options or package selected. As it is using standard MX-ONE Service Node software, it can be configured and managed centrally from the MX-ONE Management suite as a remote networked node. The SBN software runs either in a standard 3U lite gateway or alternatively in a compact 1U server/gateway appliance called the EX Controller.

Alternatively, small remote sites or branch offices can be equipped with a small cost-effective survivability gateway (GX Gateway) appliance for SIP and analogue phones, offering local public trunk access. This appliance is completely self-sufficient and in case of a loss of connectivity to the main site call manager, the GX gateway will take over the call control of the local phones and provide basic call phone services and local PSTN access until the connection to the central MX-ONE system is re-established.

## True Mobility

Mobility is a way of working, not just a method to forward your calls to your mobile device.

Mitel offers true mobility where a user is provided with similar services and access to corporate resources from any telephone/device, anywhere, connected to any network.

A user has one telephone number, one mailbox and is handled as one individual, irrespective of which terminal (or terminals) he is presently using.

True mobile access allows the user to log-on to any authorized telephone whether it is a local or remote IP device, an analog telephone connected to any network or a terminal on a DECT or WLAN infrastructure on the corporate premises or in public hot spots.

True mobile access is a native solution of the MiVoice MX-ONE.

## SIP - The Basis for Unified Communications and Collaboration

SIP is the signaling protocol for establishing real-time multimedia communications. SIP is key to accelerating the transition to Unified Communications in a modern organization. MX-ONE provides a high level of functionality with both SIP extension and SIP trunk with support for more than 45 RFCs. Mitel continues to develop this architecture in order to provide our customers with a natural migration path towards Unified Communications and Collaboration. As an example, MX-ONE SIP extensions now offers a higher level of functionality than what was previously offered with proprietary digital phones.

These same standards are also the basis for integration with 3rd party UC applications and an organizations business processes as well as the connection to the outside world with SIP trunks as an alternative to traditional PSTN networks.

### *Native SIP Implementations with MX-ONE*

SIP-based endpoints - MX-ONE supports a comprehensive portfolio of IP/SIP terminals for audio and video communication including collaboration. The portfolio consists of desk-phones, conference phones, soft-clients, and cordless SIP-DECT. Mitel SIP terminals offer a high level of functionality and scope for design, utilizing embedded XML, which enables a customer to integrate the SIP terminal into purpose-built applications.

SIP users and licensing - Maximizing the value of the software and ensuring reliable access to the system in MX-ONE has taken the leap to introduce a SIP related multi-device licensing model, with multi-device supported and including multimedia licensing. The SIP devices are linked to MX-ONE users licenses rather than to devices licenses, making it far more flexible and cost efficient compared to the traditional licensing approach. "Multiple SIP end-points" means that a business user can have one directory number with up to four active (simultaneously registered) multi-media SIP end-points. The standards based SIP Extension interface, complemented with a 3rd party Device license, provides connectivity for 3rd party SIP end-points and applications such as Microsoft Teams.

SIP trunking - MX-ONE is certified for a number of SIP network providers and conforms to the SIP Connect 1.1 standard. MX-ONE's SIP trunking interface is also the basis for integration with 3rd party systems, such as Microsoft TEAMS/ Lync /Skype for Business, IBM, and other platforms to enable federation between different communications platforms. Furthermore, MX-ONE provides, a SIP tie-line with full network services enabling feature transparency between MX-ONE nodes and certain applications, such as InAttend.

## TCO to Business Flexibility

For the organizations and businesses that are still using conventional telephony systems, the rising costs and lack of flexibility increasingly drives them to look for new and more productive / cost-effective ways of communicating. The deployment of converged network communication, delivering Voice over IP (VoIP) and UC applications on the corporate IT network, is a natural and logical evolution. MX-ONE technology responds quickly to changing marketplaces and rapidly adopts technologies that improve business operations and processes for an organization to have a distinct competitive advantage.

Simplified network infrastructure - reduces costs by connecting IP/SIP extensions with IP/SIP phones or SIP clients over the WAN, seamlessly extending features to multiple sites through IP connectivity. SIP trunking, instead of leased TDM circuits, enables a business to optimize network bandwidth and reduce network costs.

Open server architecture - MX-ONE runs on off-the-shelf operating systems and commercially available hardware servers.

Alternatively, run your MX-ONE system as virtualized components in your general data center. Or, if you are going Azure, upload your MX-ONE system to the Azure cloud together with your other IT applications.

Business class telephony features - MX-ONE with the most complete telephony feature offering for medium and large enterprises. No business has to make compromises on how to process critical customer calls.

## Single-point-of-entry Management Approach

Dealing with complexity in today's dynamic communication infrastructures is one of the many challenges faced by IT managers and support staff.

Increased reliance on communication solutions to drive profitability and achieve business goals has broadened the scope of IT and communication support issues while expanding the need for more reliable infrastructures and management tools. The recognition of the issues has amplified the way MX-ONE management system works nowadays.

The single-point-of-entry management approach integrates well with today's IT management platforms and offers full control over your MX-ONE communication networks. MX-ONE offers the following web-based managers to fulfill administration, provisioning and performance monitoring from one place for the MX-ONE communication systems, the UC applications and the end-points:

- Service Node Manager
- Provisioning Manager
- Mitel Performance Analytics

The management application functionality is carefully developed and expanded to even further simplify and improve support for today's communication infrastructures. Enterprises can more effectively improve the value of their investments and better achieve their business goals and requirements.

## Unified Multimedia Communications

### Mitel MiCollab UCC

MiCollab is the flexible, affordable unified communications and collaboration solution designed to provide users with a single point of access to communications and connectivity tools to enable faster and more effective business communications. MiCollab was designed using a mobile-first design philosophy to align with how employees prefer to communicate and address today’s mobile and fast-paced workplace.

MiCollab aligns with Mitel’s MiVoice communications platforms to bring together voice, video, chat, messaging, web conferencing and team collaboration tools, all within a single solution, so that all employees within the organization can have access to a rich set of communications and collaboration tools that empowers them to spend less time trying to connect with others and more time engaged in productive communications that foster new ideas and resolve problems quickly – translating to better business performance and increase revenue.

Together with Mitel MiTeam, MiCollab offers users a virtual workspace where teams of any size can post messages, share content, assign tasks, and start instant group conferences. With MiTeam, all posted information (and uploaded files) are stored in a persistent way, securely in the cloud, enabling users to access their information from anyplace, at any time.

MiCollab is ideal for many different employee types – including customer facing, mobile workers, project-based teams, knowledge workers, field services and more - found within organizations, of any size. It can help:

- Increase collaboration and productivity of employees by reducing communications latency, managing workflows, and eliminating device and media dependencies.
- Improve team collaboration work and drive towards a project-centric way of working.
- Allow employees to communicate using their preferred communications type – chat, voice, or point-to-point video - or one that is best suited for the current situation.
- Reduce the total cost of ownership across the solution lifecycle.
- Reduce organizational silos, promoting the sharing of information across groups enabling them to make better informed, higher quality business decisions.

The MiCollab UCC licensing model is formed to make it easy moving into the UCC world and stimulate a widespread usage of Mitel’s collaboration tools through two tiers of UCC bundles and a MiTeam Collaboration Uplift option.

MiCollab easily scales to the diverse business and supports needs from customers ranging from basic softphone to full-featured UC users. A single MiCollab deployment can support up to 5,000 collaboration users per server and be peered with up to 8 servers in order to support up to 40,000 users.

| UC Client Capabilities | Basic Web Client | UCC Entry | UCC Standard | MiTeam |
|---|---|---|---|---|
| PC, Mac, & Web Client | Web Client only | ● | ● | ● |
| CTI Call | ● | ● | ● | ● |
| Click to Call from UC Contacts | ● | ● | ● | ● |
| Do Not Disturb | ● | ● | ● | ● |
| Call Forwarding | ● | ● | ● | ● |
| Visual Voicemail | ● | ● | ● | ● |
| External Contacts (e.g. Outlook, Google) | ● | ● | ● | ● |
| Incoming Call Notification | ● | ● | ● | ● |
| IM / Chat | ● | ● | ● | ● |
| Call History (Filters/Sorting) | All Calls/Missed | All/Missed/Dialed/ Answered | All/Missed/Dialed/ Answered | All/Missed/Dialed/ Answered |
| Click to Call (Office, Hotkey, URL) | | ● | ● | ● |
| Presence – IM & Voice | | ● | ● | ● |
| Dynamic Status | | ● | ● | ● |
| Calendar Integration (Google, Exchange) | | ● | ● | ● |
| Mobile Client (Android / iOS / Win Phone) | | ○ | ● | ● |
| Ad-hoc Meeting / Collaboration | | | ● | ● |
| MiTeam – (Persistent chat / Team collaboration) | | | | ● |

UCC deployments can be supported across industry standard servers and Virtual environments (VMware or Hyper-V). Consult the MiCollab engineering guidelines for the specific server and virtual machine resource requirements and user dimensioning.

### *MiCollab Client*

The MiCollab UC client provides users with a single access point for all their business communication and collaboration needs. It converges the call control capabilities of the MiVoice MX-ONE communications platforms with contact management, presence status and collaboration applications, to simplify and enhance real-time communications. With access to presence and availability details of everyone within the organization (on or off the premises) employees are able to quickly determine if the person they need to connect with are available for a quick chat or live interaction, helping make each and every interaction as productive as possible.

Plus, at any point during the interaction employees utilizing desktop-based MiCollab UC clients can escalate to a full web collaboration session with a push of a button (selection of an Icon).

Users of both desktop-based and mobile-based clients can access team collaboration services via the embedded MiTeam service offering users access to virtual workspaces where they can post messages, share content, assign tasks, and start instant group conferences. MiTeam is an optional subscription-based service that is available via the MiTeam Uplift option.

**Desktop Softphone, Web Portal, and Mobile Client Support**

**PC Softphone:**provides users with access to MiVoice MX-ONE features from a stationary PC, a remote PC or laptop, or smart phone. When remotely connected to a MiVoice MX-ONE platform within the office or via a secure network connection, users can make and receive calls, audio, video as though they were on the corporate network.

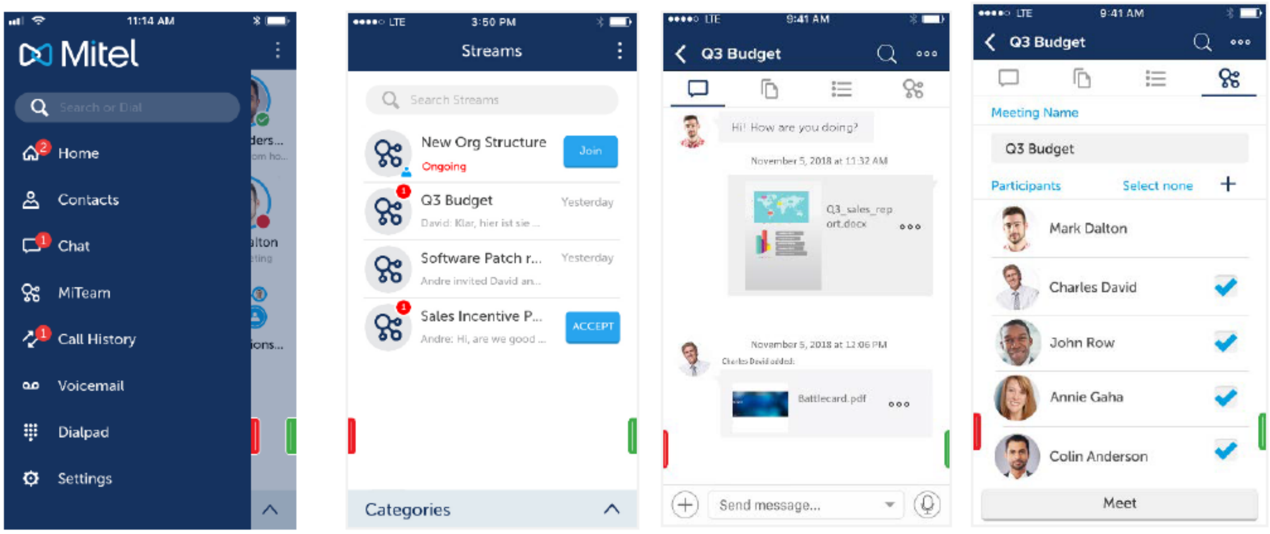
**Web Portal:**provides a web-based interface to a key subset of client features, perfect for users who are remote from the office. Through the support of WebRTC web users can also benefit from true softphone services, similar to what is provided via the traditional clients, from inside as well as from outside the company network.

**Mobile Clients:**available for iPhone and Android phones provide users with access to core UC functions and mid-call control features, such as hold, transfer & conference on PBX anchored calls when deployed with the MiVoice MX-ONE call manager.

**Key Features and Functionality**

- Simplified Call Management and Logging: The MiCollab client provides users with the advanced call management features of the MiVoice MX-ONE communications platform. The server logs incoming calls for the MiCollab clients, even when the MiCollab client software is not running. When a MiCollab client is restarted, the server updates the client with all the cached call log information since the last session. It also stores frequently dialed phone numbers and allows users to call these numbers from a drop-down menu.
- Presence and Availability: This feature informs you of a person’s availability – whether they are on the phone, away from their desk, or available for a secure instant chat.
- Contact Grouping: Corporate, Personal and Contact groups are unified into a single portal enabling users to quickly access all corporate contacts and personal contacts from their mobile device or personal Outlook contact directories, and those they have deemed as favorites. Organizations have the capacity to create additional groups including the ability to import corporate contacts, who are not equipped with a Mitel telephony solution, directly from Active Directory.
- Through Off-board LDAP: support users can be given access to extended directories as suited for the individual company’s needs. In addition, this DB can be used to provide name presentation for external calls coming in.
- Dynamic Status: Provides the user with an easy method of specifying IM, presence, and call routing options when showing a specific Dynamic Status. The status can be changed from within MiCollab UC client or it can be automatically updated based on the user’s Microsoft Outlook calendar information.
- Visual Voice Mail: Users are provided with an intuitive interface to view and listen to Mitel NuPoint Unified Messaging™ (UM) voice mail messages. Alternatively, MiCollab Advanced Messaging can be set-up to offer the corresponding functionality.
- Corporate Chat/IM: Facilitates secure instant messaging between colleagues through single or multi-party chat.
- MiTeam: Provides virtual (persistent) workspaces for team-based projects to meet and discuss all details associated with the project, including the ability to share content, annotate shared content, conduct collaborative meetings, and assign and track tasks associated with project activities and milestones. MiTeam team collaboration capabilities are integrated into the different MiCollab UC clients – mobile, Web, PC, and Mac.

- Guest access to MiTeam streams can be provided to internal as well as to external users.




**Supported Integrations**

- Integration with Mitel Teleworker Solution: Teleworker allows users to access their corporate voice network through the MiCollab SIP softphone, from home or on the road, without the need for a virtual private network (VPN) connection. Mitel's MBG provides security via its session border control services.
- Integration with multi-device ring groups on MiVoice MX-ONE. A MiCollab client user who also has multi-device support can answer an incoming call directed to their desk phone or on a device of their choice – for example, on a cell phone, SIP softphone or home phone. When the call is answered, the MiCollab client application changes the user's telephony presence to "off-hook." This enables MiCollab client to display the correct telephony status for a user, regardless of whether the call was answered on a user's desk phone, softphone, or mobile device.
- Integration with MiCollab (Audio, Web, and Video) Conferencing: integration with this service enables users to escalate a call or chat to a full collaboration session with the click of a button.
- Integration with Business Applications: integrates with popular communications and productivity tools such as Outlook and Microsoft Office. Users can dial from their Outlook contact list, integrate their Dynamic Status with their Outlook calendar, and click-to-dial within Outlook contact cards.

### *MiTeam Meeting*

This is Mitel's new generation audio/video and web collaboration and conferencing offer. MiTeam Meting is offered as a service with the conference engine located in a Mitel cloud node. Through this architecture, the system can scale to match practically any capacity and performance needs with regards to number of conferences, number of users per conference, and so on, while at the same time providing integrity and security as demanded from advanced customers today.

### *MiCollab Audio Web and Video Conferencing*

MiCollab (Audio, Web, and Video) Conferencing is a Mitel core component allowing users to schedule and create audio and/or web conferences via the MiColllab Web portal or on-the-fly from within the MiCollab client's Ad-Hoc Meeting button.

A web-based interface (MiCollab administrator or end-user portal) is used to schedule, create, and view reoccurring or future conferences. All interfaces are directly accessed through the secure HTTPS protocol (with authorization and authentication allowing only valid users to access the services). Secure Sockets Layer (SSL) encryption for secured messages and server-side digital certificates are used to meet the highest security requirements.

MiCollab (Audio, Web, and Video) Conferencing provides users with the following capabilities:

- Instant (flexible) collaboration escalation: Initiate an instantaneous 2-party session from directly within an active call or chat or create an ad-hoc conference with multiple parties, including external participants from directly within MiCollab desktop-based UC clients.
- Create meetings from within Outlook's calendar functions with MiCollab Conferencing services automatically created and added to the meeting invite with a push of a button via the MiCollab a plug-in for Outlook.
- For users of the Mitel 6900 SIP phones, MiCollab can be set up to present all upcoming MiCollab-based meetings within a 12 hour period via their phones display with a dynamic softkey for a "one-click connect" to easily join the conference call.
- Complete conference control and management for the conference leader including the ability to add and drop participants, as well as mute selected or all participants.
- Cost-effective conferencing services for up to 300 participants in a single conference session.
- During an active session, participants can easily share their entire desktop, a region of their desktop, or a specific application / document, allowing for spontaneous content sharing at any point whether connected via a MiCollab conferencing desktop client or web-based connection.
- Mobile and external participants do not require any client software loaded on their desktop to participate in a session. Participants can choose to call into the session or use a standard web browser to stream the session's audio, view the shared content, and interact by raising their hand to ask a question or express their opinion with a thumbs up or down. If they need to share, a simple browser extension enables desktop participants to share their desktop or specific content to the other participants.
- Each session can be recorded, saved and easily distributed to session participants, whether it's a conference call or collaboration session. Recordings are saved in industry-standard formats and optimized for a small file size. Playback supports bookmarks and a flexible progress slider that lets users start, stop or resume playback at any point.

### *NuPoint Unified Messaging*

NuPoint Unified Messaging (part of MiCollab) is a powerful, voice processing application that provides users with access to Unified Messaging (voice, fax and email messages in a single location) services including.

- Basic UM provides voice and fax messaging functionality with access to messages using Telephone User Interface (TUI) or through Web View, the web browser interface. Voice messages can also be forwarded to virtually any email client including hosted email services using SMTP forwarding.
- Standard UM provides voice mail and fax access from virtually any email client including those on hosted email services. Standard UM provides ultimate flexibility in delivering voice messages to email and includes key features such as the ability to turn the MWI off on the user's telephone when a voice message has been accessed from the email client.
- Advanced UM provides full synchronization between a user's email server and the NuPoint UM system. Each voice message has a matching email. When one is deleted, the other is also automatically deleted. Advanced UM integration is available for Gmail, Exchange and Office 365.

### *MiCollab Advanced Messaging*

MiCollab Advanced Messaging could be used as a more feature-rich and scalable alternative UM solution to the built-in NuPoint UM solution. (See Chapter 2.8 Unified Messaging Suite).

### *MiVoice Border Gateway*

MiVoice Border Gateway (MBG) is a software-based multi-service solution that provides the following Session Border Controller functionality for Mitel users and systems:

- Teleworker service, for MiCollab softphone clients
- A Web proxy blade that provides a secure method for MiCollab web browser users to connect with their LAN-based applications
- Secure remote SIP access for SIP trunking to external third-party SIP providers
- Remote access for Mitel 6900 and 6800 SIP phones (requires a dedicated MBG)
- Interface for centralized recording of SIP-based end-points

**Teleworker Service**

To deploy Teleworker service you must:

- Install MiCollab in Network Edge mode or
- Install MiCollab in LAN mode and install a separate MBG server in the Demilitarized Zone (DMZ) to support the teleworker services

The Teleworker service connects remote MiCollab clients and softphones to the corporate voice network providing full access to voice mail, collaboration tools, and all the other features of the office phone system. When configured for teleworker use, the remote SIP end-point has the following capabilities:

- A SIP Teleworker phone is a SIP-based remote extension of the MX-ONE
- Encryption to provide a secure voice path between the phone and the system across the Internet
- Adaptive jitter buffering and other software enhancements to improve voice quality over Internet
- G.729 compression to reduce bandwidth requirements
- Operates in the same manner as any other phone connected to the network
- Operates over any broadband LAN connection that provides connectivity back to the corporate office where the MiCollab is located
- Directly accesses the corporate office systems (for example, voice mail and collaboration tools)
- Support for the SIP protocol for the MiCollab desktop and Mobile SIP softphones
- MiVoice Border Gateway scales teleworker functionality for large enterprise.

**Web Proxy Service**

An MBG server with web proxy installed in the Demilitarized Zone (DMZ) protects the MiCollab server in the LAN from Internet exposure. In a DMZ configuration, the firewall is the gateway for all IP traffic with the internet. The Web Proxy blade acts as a reverse proxy providing a secure method for remote web browser users, such as web conferencing users, to connect with a MiCollab server located on the corporate LAN. It also provides internet-based clients (for example MiCollab clients, not softphone) with access to a MiCollab system located on the LAN. Remote web browser users and clients connect to MiCollab in the LAN through the Web Proxy blade that is installed on a separate MBG server in the DMZ. The Web Proxy also restricts access to only those URLs that belong to the end-user web interfaces for these applications.

**Remote SIP Phone**

The MBG supports remote access from Mitel 6900/6800 SIP phones.

**SIP Trunk Service**

The MBG application on the MiCollab server supports SIP trunk proxy service. You can use SIP trunks provided by an Internet Telephony Service Provider to connect your MX-ONE platform to the traditional PSTN network. Three components are required to successfully deploy SIP trunks:

- Mitel MX-ONE communications platform with SIP-enabled trunk side
- Internet telephony or SIP Trunking service provider
- MiCollab with MBG SIP Trunk proxy service to connect the service provider to the ICP on the LAN. The MBG SIP Trunk Proxy service on MiCollab also serves as a SIP-aware firewall and eliminates the need for 3rd party firewalls, simplifying configuration and deployment.

A "SIP trunk" in the context of the MBG blade is simply a pair of endpoints, defined by their IP addresses and signaling ports. One of the endpoints is usually your ICP, and the other is your SIP provider's firewall or SBC. A trunk can have any number of "channels," each of which corresponds to an active media stream. A channel license is required for each active channel, so you will need enough channel licenses to cover the maximum number of active calls. As an analogy, a North American ISDN PRI link contains 23 B channels for audio and one D channel for signaling and can carry a maximum of 23 simultaneous calls. This would be equivalent to a SIP trunk with 23 channel licenses. For SIP Trunking support, you require one SIP Trunking Channel license for each of the maximum number of simultaneous calls you estimate to make. No extra licenses are required for SIP device support.

**Secure Recording Connector (SRC)**

Via the recording connector a centralized recording system, such as the MiVoice Call Recorder, can be configured to receive RTP/SRTP audio streams from defined SIP end-points through the MBG.

**NOTE:** Mitel 68xx/69xx phones do not support MIKEY key management system.

### *MiVoice for Skype for Business / Lync Plug-in*

The Mitel integration for Microsoft Skype for Business is designed to support customers that have decided to deploy Skype for Business clients as a general contact management and IM clients for the enterprise and require a cost-effective enterprise voice solution.

The MiVoice Skype for Business plug-in seamlessly embeds Mitel’s comprehensive and feature-rich enterprise-quality voice capabilities into the Skype for Business client enabling users to gain access to MiVoice MX-ONE’s rich telephony capabilities. The integration allows Skype for Business users in the office or on the move to access Mitel’s voice features including the selection of desk phone mode or PC phone mode, click-to-call, answer, hang-up, Do-No-Disturb, and In-call capabilities such as Forward, Transfer, and (embedded) Conferencing, as well as mobility features to address the ever-increasing use of mobile platforms and smart mobile devices.

MiCollab server running in Integrated Mode with Skype for Business keeps the User and Services database and client database synchronized so they function like a single database on the MiCollab server.

## Mitel BluStar Server – Presence Engine

Mitel presence and directory engine, the Mitel BluStar Server is an integral part of the MX-ONE Solution and together they provide full integration for line-state monitoring using CSTA3 between the MX-ONE and the Mitel BluStar Server.

The Mitel BluStar Server ensures that directory/contact data and rich presence information, including Mitel BluStar Presence, MX-ONE Line state and Calendar integration, is aggregated towards Mitel InAttend users, CMG Web and FMC users.

It also provides a UMCA connector toward Skype for Business to allow federation of SfB Line State/presence with MX-ONE Line State. This is particularly relevant in a hybrid environment when both SfB and MX-ONE are used for voice and sharing common applications such as InAttend. Attendants have immediate visibility of the status of users in both systems enabling them to handle inbound call traffic in an efficient and effective manner. It also allows users in either system to search for a user in the corporate directory and have line state visibility regardless of which system they are based in.

## Mitel CMG

Mitel CMG is a part of the UCC suite for MX-ONE and is mainly used in Nordics. The Mitel CMG suite addresses different business communication needs in the enterprise with a focus on presence and activity based call routing powered by advanced directory and attendant console functionality. Mitel CMG enables users to manage and make sure that they are reached in the most satiable way at a given time. Basically, any time a call is not connected to the end user by MX-ONE, Mitel CMG will take care of the call, routing it to other user destinations (mobile or home office phone), to the attendant or to the Mitel CMG Speech Services (IVR and Voice Mail).

Mitel CMG is tailored to fit various user profiles, yet flexible enough to integrate with a wide variety of corporate environments including most standard calendar and presence systems. It provides a mix of tools for attendants and office users, including advanced call handling, activity and availability management as well as automated speech and conference services.

The suite is developed from a user perspective and is a user-friendly activity management application, available from any device, very well integrated with MX-ONE. It is a scalable system that can have virtually an unlimited number of users and attendants. Using SIP and other open standards, it can connect to several systems at the same time, either centrally or distributed over several sites.

Mitel CMG is a complete collaboration solution contributing to both business users and attendants with benefits for both target groups.

Mitel CMG Application Suite consists of several end-user collaboration management applications used in an MX-ONE Solution environment.

The Mitel CMG suite is comprised of the following product areas:

- Advanced Attendant Console
- Presence and Availability Management
- Web-based user interface available in any device
- Calendar connection for integration with company calendar (Exchange, etc.…)
- Visitor management
- Speech Office Services: IVR and Voice Mail
- InConference meet-me conference solution

For more information on Mitel CMG, see the relevant Mitel CMG documentation.

## Mitel CMG Web

The main components of this offer consist of an HTML5 based user interface and the Mitel CMG call routing and directory services have been modernized. It also offers full integration with the Mitel BluStar Server to offer rich presence services to Mitel CMG Web users.

Mitel CMG Web is a set of services that enables a business user to manage day-to-day activities. With the Mitel CMG Web, users can do “Smart-search” directory services, click-to-dial, and activity timeline management; also, manage their call-routing preferences based on the calendar/activities. The integration with Mitel's BluStar Server, enables users to see, in real-time, their colleagues’ rich presence information, including Mitel BluStar user presence status, calendar activity and line state from all available sources provided by the Mitel BluStar Server.

Mitel CMG Web users can set calendar activities to define how to be reached and route their calls, depending on the situation. As an example, a user can set-up their profile so that when they go into a meeting, Mitel CMG Web will automatically reroute their calls to e.g. an attendant, voice mail or to their assistant. If the user then leaves the office, Mitel CMG Web will route the calls to their mobile or personal number.

As the Mitel CMG Web interface is developed using responsive web technology, the web pages will automatically adjust the content presentation to fit any screen size. This means the web user interface is accessible from any device (PCs, smart phones & tablets) catering to different business user profiles. This offers significant benefit for users, as it avoids the need for different mobile "apps" per OS type, thus assuring a consistent user experience for any user, regardless of the device they are using and their location.

Mitel CMG Web highlights:

- A modern, web-based user interface
- Use on any device – PC, smart phones, tablets – real-time responsive web technology
- Progressive directory search with click-to-dial
- Real-time presence info from different sources - including line state
- Activity timeline management - including diversion services
- Quick application for one-click activity management
- Calendar integration
- MS Lync/SFB ready via Mitel BluStar Server integration
- License model harmonized with Mitel’s standard licensing system

Please refer to Mitel CMG CPI documentation for further information

## Mitel Virtual Reception

Mitel Virtual Reception is a set of automated speech and reception services. The automated self-services significantly reduce wait time and attendant workload, increasing at the same time customers’ flexibility and efficiency.

The Mitel Virtual Reception consists of Mitel CMG Speech Office (Interactive Voice Response (IVR) and voicemail), Mitel CMG Speech Attendant and Mitel CMG Visit. The applications share the same communication server - the Mitel CMG Server – and use the same Mitel Web user interface.

The Mitel Virtual Reception highlights are:

- Multi-language IVR and voice mail services
- Optional speech-driven auto attendant services (ASR)

- An optional personal conference bridge for CMG users – (InConference)
- New web interface for visual voice mail - accessible from the Mitel CMG Web portal
- New web interface for visitor management - accessible from the Mitel CMG Web portal
- Wizard-based installation and upgrade

## Mitel InAttend - Professional Attendant Services

Mitel InAttend is a multi-featured scalable attendant console based on open standards. It is the core application in Mitel's attendant offering for the MiVoice MX-ONE and an essential part of the Mitel's UCC suite.

In addition to advanced queue and call handling, InAttend offers powerful corporate directory search options, calendar integration, rich presence integration and all necessary information for efficient attendant call handling.

InAttend can be used stand-alone together with LDAP directory sources, preferably the Mitel BluStar Server directory, or together with Mitel CMG, or share directory with MiCollab. Together with Mitel CMG Mitel InAttend is enhanced with extra functionality such as activity management, advanced organization search including support for phonetic name search with nicknames and titles etc. as well as visitor management and extra message channels.

InAttend integrates with Mitel BluStar Server.

InAttend Highlights:

- A future-proof and scalable solution based on open standards
- Professional attendant services
  - Multiple internal and external queues
  - Efficient handling high volumes of calls
  - Advanced call control capability
  - Real-time information on availability and activity status for all employees including rich presence information
  - User-friendly design – user interface defined by attendants' preferences and adjustable to users' needs
  - SIP integration with multiple communication server environments
  - Integration with MiCollab, providing presence including line state, and MiCollab IM
- Mitel BluStar Server presence & CTI services built-in
  - Line state and presence information for MX-ONE and MiCollab
  - Presence and line state information from Microsoft SfB and Cisco systems
  - Calendar information (Microsoft Exchange)
  - LDAP integration with AD
- Tight integration with the Mitel CMG suite
  - Advanced directory search options
  - Calendar information (Microsoft Exchange, Lotus Domino, Novell GroupWise)
  - Diversion/activity-based routing information

For further information, refer to the product documentation and release notes available on the Mitel knowledge base.

## Contact Center Suite

MiContact Center Enterprise is an all-in-one, adaptive and flexible platform for UCC, mobility, contact center, Business Process Automation, analytics, and reporting, as well as service and database integration. With the MiContact Center Enterprise Mitel is continuing to build on supporting customers to transform their telephony-oriented call centers to true, two-way, multi-modal interaction hubs. This transformation provides customers with a choice of interaction methods by implementing multi-channel access capabilities, as well as more sophisticated APIs for business integrations.

MiCC Enterprise is empowered with Mobile Extension to equip remote or roaming agents. Customers can be guaranteed access to the most appropriate agent - wherever they are located and on whichever communications medium (i.e., voice, chat, e-mail, SMS, or fax) they prefer to use.

MiCC Enterprise provides skills-based routing across these media, a single point of management and an integrated management information system across the contact center. The solution consists of software applications focused on the agent, management, and customer self-service functions.

MiContact Center Business is the alternative for smaller and mid-sized contact centers where advanced services are needed, including AI solutions powered by Google Cloud's artificial intelligence technologies.

AI enabled contact center solutions can create a more personalized customer experience, as virtual agents can handle a wider range of inquiries, without human intervention.

Virtual assist guides human agents in real time by providing coaching to improve interactions and delivering relevant information. The result: agents built with contact center artificial intelligence respond to customers more quickly and effectively.

## Unified Messaging Suite

Mitel MiCollab Advanced Messaging provides features and applications for voice mail system that is fully integrated with the MX-ONE via a SIP interface to be sure no calls are lost. Besides the MWI on the user telephones, extra notifications can be sent by e-mail or SMS to one or several devices per users.

The base platform comes with a multi-level auto-attendant functionality to allow inbound caller management as well as end-user voice mailbox management. The system provides a web-based user portal for managing voice messages and user preferences. Additionally, optional mobile apps for iOS and Android enable users to get visual VM services where ever they are. Optional features can be added to enable full integration with a customer's back-office applications:

- An optional UM feature enabling full integration with major e-mail systems (Outlook, Lotus Notes and Groupwise) with advanced plug-ins for VM management.
- A voice intercept messaging (VIM) option which allows integration with the MX-ONE message diversion feature as well as the Mitel CMG activity setting function.
- A TTS (text-to-speech) option that allows users to listen to their e-mails directly over the phone.
- A fax mail option using T.38 FoIP protocols enables integration with e-mail systems.
- As a complement to the auto-attendant feature, an ASR (Automated Speech Recognition) option can be added to allow inbound callers to say a user's name or ask for a department or service. Additionally, it can be used by internal users to manage their VM box via speech commands.

The MiCollab Unified Messaging platform is particularly strong in large system deployment, environments with a mixture of different call server brands, multinational/language support.

**NOTE:** Some of the features mentioned above are optional and not licensed with the basic Mitel MiVoice Advanced Messaging VM product. Activation of these optional features is accomplished by simply adding these features to the license file. Others, like Mitel MiVoice Advanced Messaging fax-mail or ARS, may require installing additional software, which is residing on the media kit delivered with the system.

## Broad End-Point Portfolio

The end-point portfolio for MX-ONE consists of several terminal families to fulfill all various user demands while in parallel also addressing various technologies and implementation conditions. SIP, being the dominating technology, provides for various forms of soft-phones and clients plus a wide range of desk phones including conference phone.

SIP is also the main extension interface for mobility by providing for cellular phone integration as well as for SIP DECT and Wi-Fi-based cordless phones to connect directly with the MX-ONE system. In “all IP” environments analog end-points and applications (fax, modem) can be connected locally or remotely via Mitel’s TA7100 Terminal Adapters. In addition to the SIP-based products the portfolio also includes a full range of analog terminals, digital terminals, IP/H.323 terminals and integrated DECT products for various customer needs. For installations where wiring in the facilities is a barrier to IP/SIP deployments due to practical and/or cost related aspects i.e. heritage buildings or isolated locations like a warehouse / factory floor, remote campus buildings, or cruise ships, Mitel's StreamLine cabling system may be used.

Mitel StreamLine is a unique data network switch delivering Ethernet and Power over Ethernet (PoE) on a single pair of telephony grade wire with up to four times the reach of traditional data switches, along with speeds of 10 MBits/s Full Duplex to the endpoints. In this way, StreamLine transforms the existing voice infrastructure into a data connection with power delivery, ideal for IP Telephony. The StreamLine products support Mitel SIP and H.323 phones as well as SIP DECT base stations, and yes, the second Ethernet port on the IP phones can be used for a PC connection.

## Professional Recording Solution

Mitel is offering two alternative recoding systems for usage in the MX-ONE solution. MiVoice Call Recording is the standard while Mitel Interaction Recording is an even more powerful system suitable in large and distributed environments.

MiVoice Call Recording can be deployed in several different configurations depending on the customer’s needs, but all configurations leverage the MiVoice MX-ONE’s rich CTI (Computer Telephony Interface) interface (CSTA) and MiCC Enterprise/MiCC Business contact center (if available) to provide detailed metadata for the calls which can be used for recording rules, access controls, and search criteria. In addition, MiVoice Call Recording allows users to attach additional metadata to calls to support business-specific needs (e.g. annotations, reason codes, etc.). MiVoice Call Recording combines the metadata with the recorded audio into a proprietary patented file format for later retrieval.

One of the key deployment considerations is how the audio will be captured for recording. There are several options with advantages and disadvantages that are described in the Engineering Guidelines.

In addition to above the Mitel Interaction Recording system can be expanded to address larger systems and multiple sites and tenants. To manage these more demanding installations Mitel Interaction Recording has a set of interfaces and API's for enhanced integration in customers IT environments.

MiVoice Call Recording and Mitel Interactive Recording supports the following audio capture options with MiVoice MX-ONE solutions:

### Trunk-side Recording:

- TDM E1/ISDN Trunks (legacy trunk interfaces such as T1/E1/PRI) use a physical hardware-based audio “tap” board (Mitel or AudioCodes) inserted “in-line” with the trunk wiring to collect the audio. This is a passive, listening only mode connection.
- SIP Trunks are more commonly being adopted by today’s customers. The recording tap remains passive but the collection of the call audio is usually accomplished through a software connection. This method uses a capability of Ethernet switches known as “port mirroring” in which a copy of the data on an Ethernet port can be sent to another port.

### Station-side Recording:

- Mitel 69xx, 68xx and 67xx SIP “Active Terminal” Phones
- Mobile Extension users over SIP trunks
- Mitel Secure Recording Connector (SRC)
  - SIP Softphones
  - Mitel SIP DECT Phones
  - Mitel 69xx, 68xx and 67xx SIP Phones
- Mitel 74xx and 44xx H.323/IP “Active Terminal” sets
- Passive IP Recording (port mirroring)

Mitel Secure Recording Connector (SRC) -- Mitel SRC is a software solution that facilitates the recording of Mitel voice streams by call recording equipment. SRC is positioned on the LAN between the Mitel call manager and the IP phones to be recorded. It accepts requests from authorized call recorder to establish taps in the voice stream. These taps are separate (mirrored) streams from the SRC to the recorder. In this model, the requirement for port mirroring and static addresses are eliminated.

**NOTE:** Mitel SRC is a licensing option of the Mitel Border Gateway (MBG) which is required to support this recording configuration. SRC licenses are included with each MiVoice Call Recording port license, however, the partner is responsible for server/licensing requirements supporting the MBG base configuration.

Active IP station-side recording relies on the platform or station set’s ability to stream audio from a device to the call recording server. In this model, the requirement for port mirroring and static addresses are eliminated.

- Mitel 6xxx SIP “Active Terminal” Phones - Mitel’s 6xxx Series SIP Phones support a capability known as “Active VoIP Recording”. This ability allows the Mitel SIP phone to directly establish a second audio stream from the station set to the call recorder.
- Mitel 74xx and 44xx IP “Active Terminal” Phones - These H.323/IP terminals support a capability known as “Active VoIP Recording” like what is done with the SIP sets. This ability allows the Mitel 74xx and 44xx IP phone to directly establish a second audio stream from the station set to the call recorder.

Passive IP station-side recording entails port mirroring of the RTP (audio) traffic. This method requires stations to have static IP (fixed) or MAC addresses and requires appropriate network configuration; this is typically not preferred. Should always look toward a trunk-side or “active” station-side recording method as the first choice.

### Limitations related to Recording

InAttend Console - Station-side recording is not currently supported, not via SRC nor via active terminal. However, InAttend has a built-in recording function as complement / alternative to trunk side recording.

# MX-ONE Management Applications

## MX-ONE Provisioning Manager

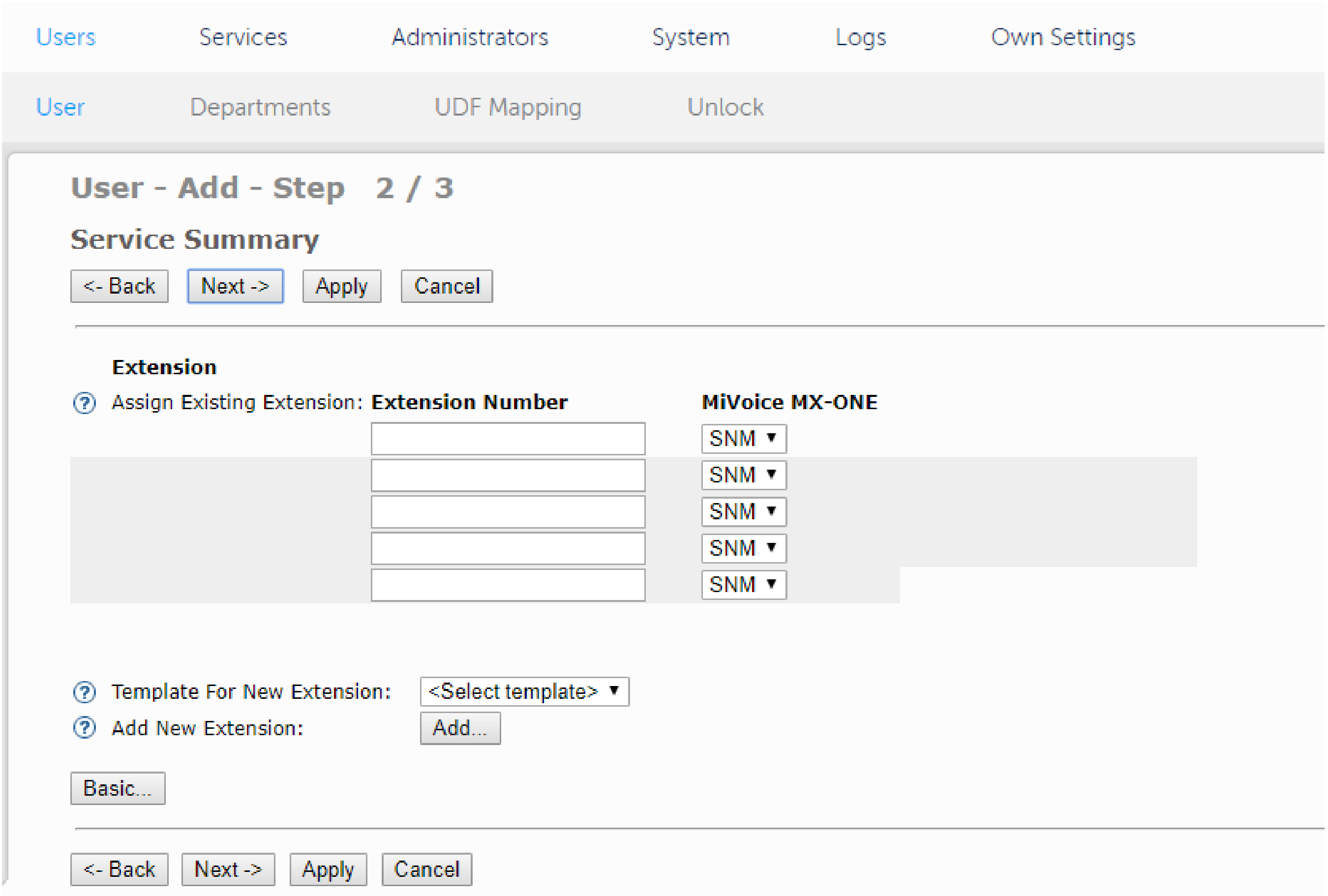
MX-ONE Provisioning Manager (PM) is an IT-friendly web-based interface for the complete management of the MX-ONE solution. It is a single point of access for the IT administrator for the provisioning of users, extension services, and associated applications. It connects into the other components of the solution (MiCollab, Mitel CMG, Mitel MiVoice Advanced Messaging, etc.) via a web services interface to allow users to be provisioned centrally in the Provisioning Manager system and ensure that the information propagated to the other applications. It also can be integrated with an organization's Active Directory system to allow IT managers to enter user data in the AD system and enable it to be synchronized with the Provisioning Manager user data automatically. This further simplifies the process and minimizes the number of management interfaces.

It is tightly integrated to the MX-ONE Service Node Manager with direct pass-through to facilitate Service Node management tasks.

Besides the above-mentioned features, MX-ONE Provisioning Manager also provides the following additional functionality:

- Managing administrator accounts with multiple access levels
- Access to subsystems, for example, MX-ONE Service Nodes, MiCollab, MiCollab Advanced Messaging and Mitel CMG servers, SIP DECT OMM and MOM.
- Configuration management of MiCollab users, Advanced Messaging users and SIP DECT user services
- Management access to networked MX-ONE systems or SBNs (one PM can interwork with several SNM for large installations)
- Managing customer groups / tenants
- Installation wizards to simply initial setup
- Importing and exporting user and extension data
- Performing a backup of user and extension data
- User account administration, for example, unlocking users.
- End-user self-service.

**Figure 2.1:** Provisioning Manager



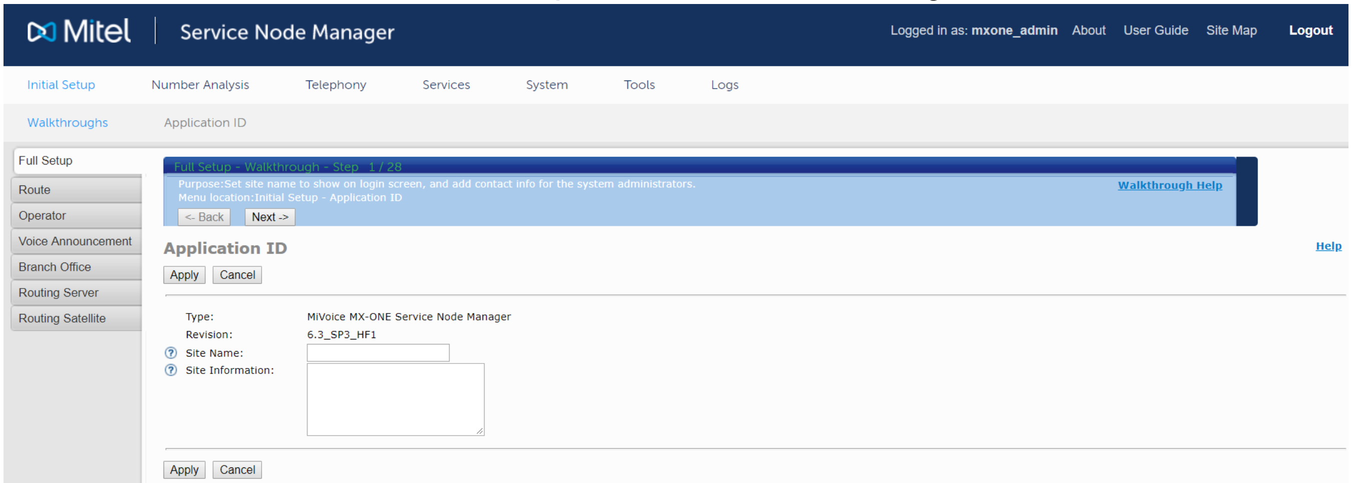

For more details, see the description for MX-ONE PROVISIONING MANAGER.

## MX-ONE Service Node Manager

MX-ONE Service Node Manager (SNM) is a task-oriented web-based application providing functions for configuring and operating MX-ONE, for example:

- Performing setup of the MX-ONE Service Node
- Managing media gateways
- Managing trunks and routes
- Managing groups, number plans, common categories, and service profiles
- IP/SIP phone and SIP client provisioning

**Figure 2.2:** Service Node Manager




Normally, the MX-ONE Service Node Manager is used together with the MX-ONE Provisioning Manager. If the administrator is logged into the Provisioning Manager, they can access the Service Node Manager as a subsystem directly from the same interface enabling a single point of access for management of the MX-ONE communications system.

For more details, see the description for MX-ONE SERVICE NODE MANAGER

## Mitel Performance Analytics

Mitel Performance Analytics (MPA) is a fault & performance management software for the Mitel MiVoice MX-ONE and other Mitel/third-party systems on the business communications network. Channel partners and service providers can deliver proactive service quality to customers, increasing contract renewal rates and revenues, while reducing costs with tools that resolve problems faster. MPA can be deployed as an on-premises or cloud-based solution and can support multiple customer networks from a single instance.

As a tool for preventive maintenance, the Mitel Performance Analytics is uniquely provided as part of Mitel's advanced software maintenance offer, SWA Premium.

### *Performance and Availability Monitoring*

- MiVoice MX-ONE system information, including user & device license inventory, availability, Simple Network Management Protocol (SNMP) traps and alarms.
- Trap-directed polling for instant identification of critical events.
- MiVoice MX-ONE and UM/UC application servers (Windows/Linux) availability monitoring:
- Performance metrics: CPU and memory utilization, disk usage, file system and interface statistics, ping latency, packet loss
- Performance management threshold alarms
- Windows services activity monitoring (installation and operating status (running & non-running), with configurable alarm levels.

### *Real-time alerts*

MPA issues real-time alerts when problems are detected, speeding problem resolution. Advanced management identifies the most important alerts easily, with customizable alert method (email, SMS, Twitter DM), alert severity (minor, major, critical), as well as the ability to filter alerts and create multiple alert profiles.

Alerts include:

- MiVoice MX-ONE system alarms
- Device availability & reachability
- Device interface availability & utilization
- Windows service status (non-running)

### *Secure Remote Access*

MPA delivers single-click access to any monitored device, with no need for a VPN. This access is authenticated and encrypted with SSL, SSH, and HTTPS. An audit log tracks all remote access sessions.

### *Testing Tools*

MPA offers rapid access to testing and diagnostics tools used every day by IT professionals: Ping, Traceroute, DNS, MTR, and iftop.

### *Reports*

Performance and status reports can be generated on a monthly or on-demand basis, allowing channel partners to demonstrate Service Level Agreement (SLA) assurance to customers. Pre-configured queries provide critical data (i.e.: contact info, license inventory) quickly.

### *Dashboard*

Optimized for viewing on mobile devices or PCs, the MPA dashboard can be accessed using a standard web browser. Critical data such as color-coded alarms and a geographic map are displayed for quick detection of important activities. Container-based design provides a customized view for service providers, channel partners, and end users. Dashboards can be branded with a partner logo.

### *Third-party Device Support*

MPA supports a basic level of management for all IP network devices. For devices that support SNMP, MPA provides advanced management. Additional advanced capabilities are delivered using SNMP and vendor-specific interfaces for a specified list of devices that include servers and routers.

### *User and Device Inventory and Reporting*

MPA can report license usage as well as telephony user and device details. Inventory views can be customized to show data relevant to the administrators. All inventory data can be reported on by email.

### *Traffic reporting (for IP/SIP routes and IP/SIP phones)*

MPA can report on route utilization (inbound, outbound, overflow and congested) as well as the gateway utilizations per set type (IP Set Calls, IP Set CongestedCalls, Legacy Set Calls...)

### *MX-ONE Backup through MPA*

Administrators can schedule MX-ONE backups or run them on-demand, the backups can be stored in on the MPA system or an external FTP server.

# MX-ONE Application Integrations

## Native CSTA III Interface for Application Integration

MX-ONE supports a native Computer Supported Telecommunications Applications Version 3 or CSTA III/XML interface offering CTI call control and monitoring with applications such as MiCC Enterprise, MiCC Business, Mitel MiCollab, Mitel InAttend and 3rd party applications.

### *MiContact Center Enterprise*

In the case of MiContact Center Enterprise, the CSTA III protocol is used to enable complete cradle to grave handling of call center traffic transiting via the MX-ONE. The MX-ONE provides queue services for inbound MiCC Enterprise traffic using CTI groups. MiCC Enterprise can then pick calls from the queues and distribute them to agents that are registered as extensions on the MX-ONE. Agents can also invoke in-call features using CSTA III to transfer calls to other users or agents in the system.

### *MiContact Center Business*

In the case of MiContact Center Business, the integration is made through SIP trunk between the MX-ONE system and the MiCC Business server. Calls to and from the contact center is routed through the MX-ONE system to the queue handling services in the MiCC Business system.

### *Mitel UCC*

For integration with the Mitel MiCollab, a CSTA III interface is established between MX-ONE and the Mitel UCC server (presence/CTI engine). This ensures that Mitel UCC users get real-time line information as part of the presence information displayed on the Mitel UCC clients. It is also used to enable CTI call control between a Mitel MiCollab PC user and their monitored MX-ONE extension.

In MX-ONE the CTI feature is designed to align with the SIP principles allowing call control for users with Multiple Terminal Service. The directory number is complemented with a terminal identity in all relevant CSTA events and service requests. MX-ONE provides the application with a list of the users presently registered terminals, allowing the application/user to decide which terminal that shall be used for call control purposes (advanced client functionality). Any application that does not support this terminal identity cannot exercise call control for users of multiple terminals.

### *Mitel InAttend*

The MX-ONE CSTA III interface is used for communication with the Mitel InAttend attendant suite (via the Mitel BluStar Server presence engine) for getting real-time line state information as part of the presence information presented to the attendants, If the Mitel CMG suite is included with the attendant solution, then the Mitel BluStar web users will also benefit for this interface to get real-time line state information when doing directory searches, for example.

The CSTA III is also an interface that is used for integration of 3rd party applications, such as CTI applications or call centers. Integration with 3rd party applications is ensured via Mitel's third-party certification program.

## Microsoft® Skype for Business / Lync Server™ 2013/2015/2019

MX-ONE is fully validated with Microsoft Skype for Business (SfB) / Lync Server 2013/2015/2019 server via a SIP trunk integration. The SIP trunk connection between the systems can be deployed with or without encryption. MiVoice MX-ONE supports TLS for signaling and SRTP for media encryption when connected with Mediation Server.

The integration is done between MiVoice MX-ONE and SfB / Lync Server 2013/2015/2019 through Direct SIP to offer the functionality required by the Microsoft UC Open Interoperability Program for enterprise telephony services and infrastructure.

#### *Lync Direct SIP Integration*

In Direct SIP integration, referred to by Microsoft as Enterprise Voice, SfB users will have dedicated phone numbers that differs from those used in the MX-ONE.

This enables the Skype for Business client to make and receive external calls through a PC. The calls are routed from the Skype for Business / Lync Server 2013/2015/2019 server through the SIP trunk to the MX-ONE and further to the PSTN and vice-versa. MX-ONE and Microsoft SfB / Lync Server 2013/2015/2019 will behave as networked PBX’s, as is typically the case when connecting systems through trunks in the MX-ONE.

### Microsoft® Lync RCC Integration with TR-87

Mitel has internally done successful validation of the RCC solution, via TR87 towards MS Lync 2013. Microsoft RCC feature, as used in the Lync Client, is available on an “as is” basis from Microsoft and therefore not officially supported. For this reason, it is no longer possible to get an official Microsoft certification with MS Lync 2013.

It should also be noted that this type of integration (e.g. RCC) is no longer supported by Microsoft with Skype for Business/Lync 2015. We, therefore, recommend the Skype for Business Plug-in that is part of the MiCollab suite that offers equivalent functionality. That capability is described in section 2.4.1.6, MiCollab Plug-in to Lync/Skype for Business. Also, refer to the MiCollab technical documentation - e.g. MiCollab 7.x Engineering Guide, etc. - for more details around this integration.

### Call2Teams

Mitel also offers integration with the Microsoft world through the 3rd party application Call2Teams. Through Call2Teams, the MX-ONE environment and the Microsoft environment are linked together. The Microsoft Teams client integrates to MX-ONE through a direct SIP Extension and will appear in the MX-ONE system as a remote SIP device. Teams users can then make and receive calls and communicate with people within the organization and outside the organization through the Teams application. All call handling is managed in the MX-ONE as for any other internal end-point in the system.

## Licensing Models in MX-ONE

The licensing structure in MX-ONE is constantly evolving as the demand is changing. While the system has transformed into a SIP-based software system, complemented by a wide range of hardware options, alternative licensing and business models are needed.

## Capital Expenditure (Capex) Based Business Model

Á-la-carte configuration and licensing is the classic model. Through this model, the system can be tailor-made in order to fulfill the various needs for complex or specific system deployments. Á-la-carte is the model to be used for systems migrating from earlier versions towards MX-ONE 7.x.

To address the demand for a simplified structure, and to align with expectations pure IP-based systems MX-ONE also offers the Feature Bundle based licensing model. Through this model competitive user-bundles are offered, including both the MX-ONE user functionality and a range of matching UCC features in MiCollab. The different "feature-level" profiles or pre-set user profiles are:

- Basic user
- Entry UC user
- Standard UC user

For more information about the MX-ONE licensing see New sales & Add-on or Feature-based ordering information document for MX-ONE and Mitel CPQ tool.

## Operating Expenditure (Opex) Based Business Model

Furthermore, MX-ONE supports customers and partners who are looking forward towards new business models. In addition to the classic á-la-carte configuration model and the Feature-Based configuration model are both offered with a Capital Expenditure (CAPEX) based business model, the MiVoice MX-ONE also offers native support for cloud-based deployments and an Operating Expenditure (OPEX) based business model. This subscription-based business model is based on the Feature-Based configuration model and is offered by partners who qualify for delivering and charging for the MLA/OPEX model where customers are charged for actual license usage on monthly basis.

Each MLA licensed MX-ONE system will automatically send monthly license usage reports as the basis for all invoicing. The license usage information for each MX-ONE MLA system is sent in the form of an e-mail with a CSV attachment to pre-determined recipients at the Partner and Mitel, which is imported into the MX-ONE license reporting tool for usage-based invoicing.

For more information about the MX-ONE MLA licensing see ordering information document for MX-ONE and Mitel CPQ tool.

## Unified Communication and Collaboration via MiCollab

MiCollab user licenses are delivered in the form of feature-based bundles together with MiVoice MX-ONE, both in the classic and in the Feature-Based license models. The bundles have a tiered structure similar to the MX-ONE Feature Based packages. To minimize complexity, UCC is offered as 3 different license bundles available with pre-defined clients and user functionality provided to the end-users. The MiCollab UCC offer is natively included in the MX-ONE Feature Based licensing model. For the MX-ONE “á-la-carte” licensing model the MiCollab UCC offered as an option, as any other end-point or application. Whenever MiCollab license bundles or options are ordered in the á-la-carte model, the appropriate MX-ONE á-la-carte licenses are automatically included to simplify the ordering process.

For more information about the MiCollab with MX-ONE licensing see ordering guide document for MiCollab and Mitel CPQ tool.

# References

For more information see **www.mitel.com**, Customer Product Information & Mitel On-Line as well as Mitel InfoChannel.