A MITEL
PRODUCT
GUIDE

MiVoice MX-ONE

Administrator Guide - Operational Directions

Release 7.7
15431-ANF 90143 Uen H

May 2024

Mitel
Powering connections

Notices

The information contained in this document is believed to be accurate in all respects but is not warranted by **Mitel Networks Corporation (MITEL®).**The information is subject to change without notice and should not be construed in any way as a commitment by Mitel or any of its affiliates or subsidiaries. Mitel and its affiliates and subsidiaries assume no responsibility for any errors or omissions in this document. Revisions of this document or new editions of it may be issued to incorporate such changes. No part of this document can be reproduced or transmitted in any form or by any means - electronic or mechanical - for any purpose without written permission from Mitel Networks Corporation.

Trademarks

The trademarks, service marks, logos and graphics (collectively "Trademarks") appearing on Mitel's Internet sites or in its publications are registered and unregistered trademarks of Mitel Networks Corporation (MNC), its affiliates, parents, or subsidiaries (collectively "Mitel") or others. Use of the Trademarks is prohibited without the express consent from Mitel. Please contact our legal department at legal@mitel.com for additional information. For a list of the worldwide Mitel Networks Corporation registered trademarks, please refer to the website:http://www.mitel.com/trademarks.

®,™ Trademark of Mitel Networks Corporation

© Copyright 2024, Mitel Networks Corporation

All rights reserved

Contents

1 General 1
1.1 Managing MiVoice MX-ONE 1
1.2 Characteristics of Load Programs 2

2 Market 3

3 Backup and Restore 4
3.1 Data Backup 5
3.1.1 Initiate a Data Backup 6
3.1.2 Restore From a Data Backup 7
3.2 Perform Data Backup Often 7
3.2.1 Reload Data and System Database Data 7
3.2.2 Set Environment Variable 7
3.2.3 Data Backup Alarm 8
3.3 Mirror Configuration to MIVOICE MX-ONE SN 1 8
3.3.1 Create a Configuration Mirror 8
3.3.2 Restore a Configuration Mirror 9
3.4 Safety Backup 9
3.4.1 Create a Safety Backup 9
3.4.2 Restore From a Safety Backup 9
3.5 Schedule Automatic Backup 10

4 System Start, Restart, and Reload 13
4.1 Start 15
4.2 Restart 15
4.3 Reload 15
4.4 Program Unit Status 15
4.5 Program Unit Type 16
4.6 Subsystem Level (TypeExt) 17
4.7 Start and Restart System 18
4.8 Restart Program Unit 18
4.9 Reload System 18
4.10 Shut Down System 19
4.11 Reload Program Unit 19
4.12 Shut Down System 19

5 Using the Recovery Image 20
5.1 Create a Bootable USB Stick 20
5.2 Set Hardware Clock 21
5.3 Recovery Image for MiVoice MX-ONE Service Node 21

6 License Handling..... 23
6.1 Register and Receive a License File.....23
6.2 Install License File..... 26
6.3 Print License File..... 26
6.4 License Usage Reports.....26
6.4.1 Customer Group License Reports..... 27
6.5 SLS Heartbeat.....28
6.6 SLS License Download.....28

7 MLA or SWA Specific Licenses.....29

8 Add or Remove System Database Node..... 30

9 Media Gateway Unit.....31
9.1 Setup Media Gateway Ethernet Ports..... 31
9.2 Initiation of MGU..... 31
9.3 Virtual Boards.....31
9.4 Update and Upgrade of MGU Software..... 31
9.5 Start and Restart Media Gateway..... 32
9.6 LED Indications in the Media Gateway..... 32
9.7 MG Unit Resource Load Sharing Considerations.....32

10 Media Server.....33

11 Load-Balancing/Load-Sharing Principles in the ASP 113 System..... 34

12 Selection of an Alternative Media Server or MGU..... 35

13 Changing of Load-Sharing Load Levels.....36

14 Inter-Media Gateway RTP Communication.....37
14.1 Print RTP Resource Information.....37

15 MiVoice MX-ONE Service Node User Administration..... 38

16 Synchronization.....39

16.1 Define Synchronization Sources....39
16.2 Deactivate Synchronization Sources....39

17 Blocking and Deblocking....40
17.1 Block a Device....40
17.2 Deblock a Device....40
17.3 List Blocked or Disturbance Marked Devices....40

18 Alarm Handling and SNMP....41

19 Server Hardening....42

20 Fault Location....44
20.1 Trace Types....44
20.2 Perform a Trace....45

21 Swap and Repair....48

22 MiVoice MX-ONE Service Node File Structure....49
22.1 Installation and Upgrading Configuration Files....50
22.2 Active Configuration Files....51
22.3 Reload Data and System Backup Files....51
22.4 Transfer of PCRegen Files for Restoring Data....52

23 Hard Disk Maintenance....53

24 Active Directory Based Authentication for MX-ONE....54
24.1 General....54
24.2 Prerequisites....54

25 AD Configuration....56
25.1 Groups in Active Directory....56
25.2 Users in Active Directory....63

General 1

This chapter contains the following sections:

- Managing MiVoice MX-ONE
- Characteristics of Load Programs

This guide covers administrator tasks in the MX-ONE excluding telephony features. For information about telephony feature maintenance, see the documents in the CPI library folder Operation and Maintenance.

Glossary

For a complete list of abbreviations and glossary, see the description for ACRONYMS, ABBREVIATIONS AND GLOSSARY.

1.1 Managing MiVoice MX-ONE

The MX-ONE can be managed in different ways. The tasks described in this document are mainly managed from the command line on the Linux server (the MX-ONE Service Node).

The MX-ONE can also be managed and configured using the MX-ONE Service Node Manager, see the directions for use for *MX-ONE SERVICE NODE MANAGER USER GUIDE*.

Terminal Interface

The Linux operation system can be modified for local needs in a flexible way through localization. Environment variables determine language and country specific settings, like the format of date and time, how numbers are written, and what character encoding to use.

By locale settings the MX-ONE user can use the characters of their own language when entering local data, like users names, to the system.

To see how the localization is set, use the Linux `locale` command. It will list the variables on standard output, for example, as

LANG=en_US.UTF-8 LC_CTYPE=en_US.UTF-8 and so on.

The locale values have the form

```
language[_territory][.codeset]
```

where the language codes usually are the two-letter codes defined in ISO 639-1 and the country codes (in territory) the two-letter codes defined in ISO 3166-1. Use the command `locale -a` to find the available locales and `locale -m` for the available character encoding.

In Europe many languages can use the ISO8859-1 encoding, but UTF-8 is more complete.

When operating the system (remotely) over SSH, for example, using the puTTY terminal emulation program, it is vital that the same character encoding is used in both puTTY as in the connected system. (In puTTY the character encoding can be modified through “Translations” from the “Change Settings” menu).

Both parties must have the same settings for the communication to work.

1.2 Characteristics of Load Programs

The MX-ONE Service Node SW consists mainly of two types of load programs, the program units and the UNIX commands.

The characteristics of a program unit are:

- Identified with unique number and name
- Runs continuously in a working system
- Can be restarted (restart command)
- Can be reloaded (reload command)
- Communicates directly with other program units by sending and receiving messages

For a detailed information about the program units see the parameter description for UNIT, in the *Technical Reference Guide, MML parameters*.

The characteristics of a UNIX command are:

- Uses dynamic program numbers
- Communicates with other programs using the Application Message Proxy
- Runs only when the command is typed

Market 2

Market is selected during first time setup, see the installation instructions for *INSTALLING AND CONFIGURING MIVOICE MX-ONE*. If it is necessary to reconfigure the market parameters, see command description TECHNICAL REFERENCE GUIDE, MML COMMANDS (PARNUM parameters) and *TECHNICAL REFERENCE GUIDE, UNIX COMMANDS* for details.

Detailed market characteristics for each market can be found in the documents in the Market Characteristics folder.

Backup and Restore 3

This chapter contains the following sections:

- Data Backup
- Perform Data Backup Often
- Mirror Configuration to MIVOICE MX-ONE SN 1
- Safety Backup
- Schedule Automatic Backup

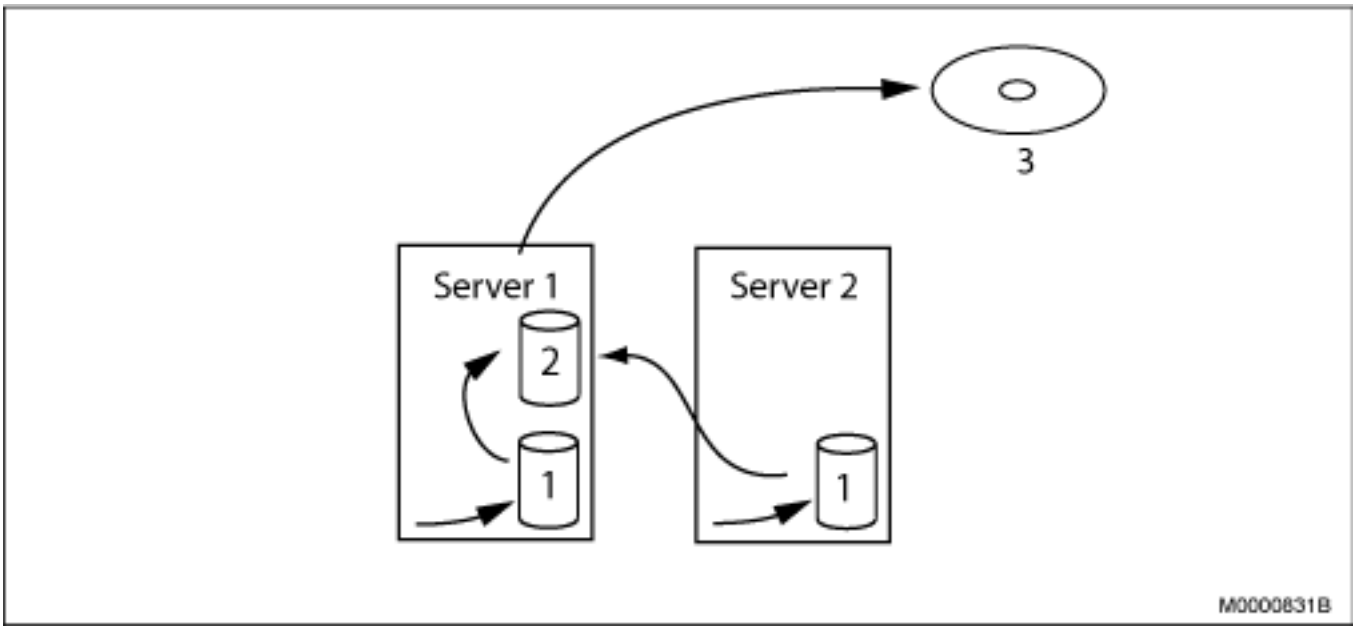
The backup procedure consists of two different steps:

1. Make a data backup. The backup of the exchange is stored on each MX-ONE Service Node and should be done often. See chapter *Perform Data Backup Often* for details.

   This backup is used for data reload by the system.
2. Create a configuration mirror on MX-ONE Service Node 1. Store the data backups and configuration information from MX-ONE System to MX-ONE Service Node 1. This backup contains all data for the system and can be used for repair of server. The `config_mirror` command provides an option to create a safety backup when creating the configuration mirror.
3. Copy the safety backup from MX-ONE Service Node 1 to another media.

This is an external backup of the complete system and can be used for repair of server or to restore a complete system when all hardware is lost.

Figure 1: The Backup Steps



The above steps do not have to be performed at the same time. Allows to make a data backup without creating a configuration mirror, and to create a configuration mirror without making a safety backup.

By using **crontab**, allows you to create automatic data backups and configuration mirrors including a safety backup.

When there is inconsistency in the exchange data in the system it is necessary to restore from a backup. The restore procedure consist of three corresponding steps:

1. Restore a safety backup. Restore the safety backup to MX-ONE Server Node 1.
2. Restore a configuration mirror from MX-ONE Server 1. Restore the data backups and configuration information from MX-ONE Server 1 to all servers in the MX-ONE System.
3. Restore a data backup. Restore the data backups on all MX-ONE Service Nodes.

As for the backup procedure, the three steps do not have to be performed at the same time. If there are inconsistencies in the exchange data, it may be sufficient to restore the last data backup.

3.1 Data Backup

At a data backup, the exchange data for program units is stored in the file system. When a program unit is reloaded, exchange data for all program units is restored to prevent exchange data inconsistency.

Restore of exchange data can result in loss of exchange data. However, the exchange data in the system is consistent after a complete data restore.

As part of certain error recovery routines, the exchange data will be restored from the backup in order to revert the system to the last known state with data consistency.

Exchange data includes:

- System configuration data
- Application data (for example, extensions and trunks). The application data are altered either by command (for example, adding extensions) or by extension procedure (for example, call diversion)

Exchange data should be saved to a backup regularly. The data should also be stored after:

- Loading the system initially
- Changing hardware configuration
- Upgrading a program unit
- Altering application data by command (for example, adding extensions)

A new directory is created for each backup in the directory: `/var/opt/eri_sn/<version>/xdata/` where <version> is the version of MX-ONE Service Node. The backup directory is named `xdata_y_z`, where y is MX-ONE Service Node number and z is a time stamp (date and time). A backup file for each program unit that has exchange data is created in the backup directory. Only program units that have exchange data have files in the backup directory. Cassandra CQL CSV files are also created in the backup directory. The CQL CSV file contains a snapshot of the exchange data in the system database at the time for the backup. The system database data is stored in Cassandra Query Language Format.

Information about valid backups are stored in the Cassandra Database. The three latest backups are stored. If more backups are made, the oldest backup is deleted.

At a data restore, the newest valid backup is used. Exchange data in the entire system is restored from the data backup and the start phase after data restore is executed in all program units in the system.

To succeed with a backup, all program units in the system must have status Started. A program unit must have status Alive, Half-started, or Started to restore any data.

Restore of exchange data can result in loss of exchange data. However, the exchange data in the system is consistent after a complete data restore.

As part of certain error recovery routines, the exchange data will be restored from the backup in order to revert the system to the last known state with data consistency.

Exchange data includes:

- System configuration data
- Application data (for example, extensions and trunks). The application data are altered either by command (for example, adding extensions) or by extension procedure (for example, call diversion)

Exchange data should be saved to backup regularly. The data should also be stored after:

- Loading the system initially
- Changing hardware configuration
- Upgrading a program unit
- Altering application data by command (for example, adding extensions)

A new directory is created for each backup in the directory `/var/opt/eri_sn/xdata/xdata_<version>` where <version> is the version of MX-ONE Service Node. The backup directory is named `xdata_y_z`, where y is MX-ONE Service Node number and z is a time stamp (date and time). A backup file for each program unit that has exchange data is created in the backup directory. Only program units that have exchange data have files in the backup directory. Cassandra CQL CSV files are also created in the backup directory. The CQL CSV file contains a snapshot of the exchange data in the system database at the time for the backup. The system database data is stored in Cassandra Query Language Format.

The latest backup directories are stored. If more backups are made, the oldest backup directory is deleted.

At a data restore, the newest valid backup file is used. Exchange data in the entire system is restored from the data backup and the start phase after data restore is executed in all program units in the system.

To succeed with a backup, all program units in the system must have status Started. A program unit must have status Alive, Half-started, or Started to restore any data.

3.1.1 Initiate a Data Backup

Use the command `data_backup` to initiate a backup. The command can be executed on any MX-ONE Service Node (not in stand-by server).

Restore from data backup is sometimes done automatically by the system.

3.1.2 Restore From a Data Backup

When there is inconsistency in the exchange data in the system it is necessary to restore from a data backup.

Use the command `data_restore` to restore exchange data. The command can be executed on any MX-ONE Service Node.

3.2 Perform Data Backup Often

The `data_backup` command is more light-weight, and the `data_restore` operation is heavier. The more un-committed changes there are, the heavier the `data_restore` operation will be.

The data in the CQL CSV files are compared to the data currently in the system database (Cassandra). It then uses the CQL write operations to write all the changes needed in the system database to make it match the data in the CQL CSV file. If there is much data that needs to be changed to make the system database match the CQL CSV file, the operation becomes very slow and heavy.

Make it a habit to always commit all configuration changes, by doing a `data_backup` at once. During peak traffic, it is not recommended to do any bigger configuration changes. At any time, when a bigger configuration changes is made (with respect to traffic disturbance), a `data_backup` should be made.

3.2.1 Reload Data and System Database Data

As exchange data configuration data is stored as a mix of reload data and system database data, and system actions are needed to make sure they are consistent with each other. Until these operations are completed, the system is in an inconsistent and unstable state. The duration of this inconsistent and unstable state must be kept as short as possible. To achieve this the differences between the current system database data and the most recent CQL CSV file must be kept small, by doing frequent data backups.

3.2.2 Set Environment Variable

To avoid getting dangerously large differences between the system database data and the most recent CQL CSV files, both **mdsh** and the new commands have logic to check this and remind the administrator. This behavior can be configured by using the $_MD_BACKUP_OPTION environment variable.

The environment variable $_MD_BACKUP_OPTION can be set to:

- **AUTO**—meaning that data_backup will be done automatically when needed for system stability. Manual data_backup is still needed to commit changes done after the automatic data_backup.
- **WARN-AUTO**—meaning that warnings will be printed when data_backup is needed for system stability. When critically needed for system stability, an automatic data_backup will be done. (Manual data_backup is still needed to commit changes done after the automatic data_backup.) (WARN-AUTO is the default if $_MD_BACKUP_OPTION is unset.)
- **WARN-BLOCK**—meaning that warnings will be printed when data_backup is needed for system stability. When data_backup is critically needed for system stability, data changes will be blocked until a manual data_backup is done.

- **UNSAFE-GDSX-MODE—get a functionality that is generally very stupid, but that is needed for some GDS-X tests. This mode jeopardizes system stability. Never use this mode except for some specific GDS-X tests. Never use this mode in production systems.**

3.2.3 Data Backup Alarm

The alarm code 1:37, Data backup needed, run `data_backup`, will be raised when the amount of uncommitted changes (the differences between the system database data and the most recent CQL CSV file) becomes dangerously large.

3.3 Mirror Configuration to MIVOICE MX-ONE SN 1

When creating a configuration mirror, all data backups and configuration files of each server in the MX-ONE System are stored on MX-ONE Service Node 1.

The command `config_mirror` creates a data storage in the directory */mxone/mirror* on MX-ONE Service Node 1. The data from MX-ONE Service Node 1 itself and all other data needed to reconfigure the system is also stored in this directory.

It is recommended to create a safety backup when creating the configuration mirror. For more information, see Safety Backup on page 9.

For each server in the MX-ONE System, there is a tar file on MX-ONE Server 1 containing all necessary configuration files together with data backup files.

The command `config_mirror` restores a configuration mirror by distributing the data backup files and the configuration files from MX-ONE Server 1 to all servers in the MX-ONE System (including MX-ONE Server 1 itself).

When done, the complete system can be restored by running the command `data_restore`.

3.3.1 Create a Configuration Mirror

Use the command `config_mirror` to create a configuration mirror on MX-ONE Server 1. See *config_mirror -help* for option to do a data backup and a safety backup as part of creating the configuration mirror. The command is executed on MX-ONE Server 1.

Note:

The command `config_mirror` is CPU and memory intensive and can easily lead to too slow responses on traffic events and result in MX-ONE Service Node calls throttled alarms. Ensure that command `config_mirror` is always run at low traffic times.

3.3.2 Restore a Configuration Mirror

When there is inconsistency in the exchange data in the system and in the data backup it may be necessary to restore from a configuration mirror.

Use the command `config_restore` to restore a configuration mirror from MX-ONE Server 1 to all servers in the MX-ONE System. The command is executed on MX-ONE Server 1.

See `config_mirror -help` for information about additional actions needed to complete the restore of the MX-ONE system.

3.4 Safety Backup

A safety backup can be done as part of creating the configuration mirror.

If there is an inconsistency in the MX-ONE Service Node data, the safety backup can be restored to MX-ONE Server 1. After restoring the configuration mirror to all servers, the MX-ONE Service Node data backup can be restored.

Note:
If possible ensure that memory intensive processes, such as safety backup, are always set to run at low traffic time.

3.4.1 Create a Safety Backup

Use the command `config_mirror` with option `--safetybackup` to create a configuration mirror on MX-ONE Server 1 (see `config_mirror --help`).

3.4.2 Restore From a Safety Backup

If there is an inconsistency in the MX-ONE Service Node data (for example, mismatch between exchange data and configuration files), or if the MX-ONE Service Node has reported a missing or faulty exchange data file or configuration file, it is necessary to restore from a safety backup.

It is recommended to restore all the files from the backup since only restoring a subset of files is likely to cause inconsistency. The safety backup should match the installed MX-ONE Service Node programs.

1. Make the safety backup to be used is available on MX-ONE Server 1.
2. See `config_restore --help` for procedure and actions needed to restore the system from the safety backup.

3.5 Schedule Automatic Backup

Include the backup commands (`data_backup` and/or `config_mirror`) in the table for scheduled commands on MX-ONE Service Node 1, **crontab**, to activate automatic backup of the MX-ONE system.

crontab uses the editor specified by certain environment variables. Use the command **man crontab** to find out which environment variables. To check the environment variables, use the command `echo $variablename`. If the editor is unfamiliar, it is possible to change it.

For more information, such as the format of the `crontab` command, see the online reference manual pages for **crontab**. Use the `man 5 crontab` command.

Use MX-ONE Service Node Administrator user (mxone_admin) when executing the `crontab` command.

Activate Automatic Backup

1. Enter the command **crontab -e** to open an editor.
2. Add lines containing when to run scheduled commands. The first 5 fields specify when to run the command and the remaining field what command to run (see examples below). It is recommended to allow at least 30 minutes between the different jobs.

   The fields must be separated by at least one space. Use a header line (starting with #) to make the information easier to read.
3. Save the file and close the editor. **Crontab** installs the new table for scheduled commands.

Example 1:

Make a data backup on every night at 01:30.

min	hour	day	month	weekday	command
30	01	*	*	*	`/opt/eri_sn/bin/mdsh -c data_backup`

Example 2:

Make a data backup on every night at 01:30 and generate an alarm if data backup fails.

min	hour	day	month	weekday	command
30	01	*	*	*	`/opt/eri_sn/bin/mdsh -c data_backup ; if [ $? != 0 ] ; then /opt/eri_sn/bin/alarm -i -C 1 -D 10000 --alarm-severity 3 --alarm-text "Automatic data backup failed" ; fi`

Example 3:

Make a data backup on every Thursday night (4th day of week) and Sunday night (7th day of week) at 00:45.

min	hour	day	month	weekday	command
45	00	*	*	4,7	`/opt/eri_sn/bin/mdsh -c data_backup`

Example 4:

Make a data backup every Monday (1st day of week) and Friday (5th day of week) at 22:00. Create a configuration mirror including a data backup every Friday at 23:00.

min	hour	day	month	weekday	command
00	22	*	*	1,5	`/opt/eri_sn/bin/mdsh -c data_backup`
00	23	*	*	5	`/opt/mxone_install/bin/config_mirror --databackup`

Example 5:

Make a data backup on every night at 02:00. Create a configuration mirror including a data backup and safety backup on every Sunday night (7th day of week) at 02:30.

min	hour	day	month	weekday	command
00	02	*	*	*	`/opt/eri_sn/bin/mdsh -c data_backup`
30	02	*	*	7	`/opt/mxone_install/bin/config_mirror --databackup --safetybackup`

Change Scheduled Automatic Backup

1. Enter the command `crontab -e` to open an editor.
2. Update the lines specifying when the commands are scheduled with new time and date.
3. Save the file and close the editor. **Crontab** installs the new table for scheduled commands.

Deactivate Automatic Backup

1. Enter the command `crontab -e` to open an editor.
2. Remove the lines containing scheduling of commands.
3. Save the file and close the editor. **Crontab** installs the new table for scheduled commands.

System Start, Restart, and Reload 4

This chapter contains the following sections:

- Start
- Restart
- Reload
- Program Unit Status
- Program Unit Type
- Subsystem Level (TypeExt)
- Start and Restart System
- Restart Program Unit
- Reload System
- Shut Down System
- Reload Program Unit
- Shut Down System

Note:
Do not mix up the system start/restart/reload with the Linux start/restart/reload.

Start/Restart phase 1

The system (or program unit) is cleared from traffic and the system information is cleared.

Start phase 1.3

System configuration data is updated.

Start phase 1.5

System information (other than system configuration data, for example, links between program units) are updated.

Start/restart phase 2

The system (or program unit) is prepared for traffic.

Start after data restore

The system updates data to match exchange data restored from backup (for example, an extension that was added after the last backup occasion is removed).

Event	Start Phase 1	Restart Phase 1	Start Phase 1.3	Start Phase 1.5	Start Phase 2	Restart Phase 2	Start After Data Restore
Initial start	1-All		2-All	3-All	4-All		
Data restore							1-All
Data backup							
Restart program unit		1-PU in question		2-All		3-PU in question	
(Restart MX-ONE Service Node)		(1-All PU in MX-ONE Service Node)		(2-All)		(3-All PU in MX-ONE Service Node)	
Restart system		1-All		2-All		3-All	
System start (also called coordination start)			1-All	2-All			
Reload program unit/ Program unit termination		1 - PU in question		2-All		3-PU in question	4-All
Recovery from Media Gateway error				3-All		2-All PU in MX-ONE Service Node	

Note:
A start after data restore is preceded by restore of exchange data from backup. The numbers (1/2/3/4) indicate the start phase sequence.

4.1 Start

A program unit must have status **Halfstarted** or **Started** to perform a start. A start does not affect the traffic.

4.2 Restart

A program unit must have status **Alive**, **Halfstarted**or **Started** to perform a restart. At a restart of one program unit, connections may be disrupted depending on the function of the program unit.

At a system restart (restart of all program units in the system), all traffic is stopped.

4.3 Reload

The program unit is terminated. The program unit is reloaded from the hard disk and the data for the program unit are restored from the backup. The program unit is restarted. Restore of data in the entire system and start after data restore follows.

4.4 Program Unit Status

Status	Meaning
Not loaded	There is no program unit loaded in the system with program unit number or name.
Terminated on purpose	The program unit was terminated due to a command initiated reload

Status	Meaning
Terminated	The program unit was terminated due to: • System action, for example, a program unit is executing a job too long and program unit is forced to terminate. • Program error, such as segmentation fault.
Alive	The program unit is loaded, but data have not been restored and start or restart is not executed.
Half started	The program unit has failed to restore data or complete one or several start phases or both.
Started	The program unit has completed all start phases and data from backup was successfully restored.

4.5 Program Unit Type

The characteristics of the program unit is specified in a 32-bit variable, the **Type** variable. Each bit indicates a certain characteristic. Every bit set indicates that the program unit has the characteristic. Only bits described in the table below are used by the system.

Type variable (hexadecimal value)	Characteristics
0x00000080	Alarm sending
0x00000100	Has cross address checking function
0x00000200	Necessary for the traffic in the system
0x00000400	Necessary supervision program unit which contains automatic fault recovery measures
0x00000800	Common function

Type variable (hexadecimal value)	Characteristics
0x00001000	Device handling program unit
0x00002000	Device handling program unit dealing with auto initiated device
0x00004000	Program unit requiring information whether the MX-ONE Service Node, where the program unit is located, is isolated
0x00008000	Program unit capable of handling external synchronization
0x00040000	Cannot be removed by command
0x00080000	Does not have exchange data

If the Type variable has the value 0x00000180, the program unit is alarm sending and has cross address checking function.

4.6 Subsystem Level (TypeExt)

The function of the program unit at subsystem level is specified in a 32-bits variable, the TypeExt variable. The TypeExt variable consists of the sub-variables described in the table below.

TypeExt sub-variable	Bit(s) in variable	Meaning
PCSUBSYST	B0-B3	Indicates which subsystem the program unit belongs to.
PCPUTYPE	B4-B8	Indicates if a device or unit belongs to a certain type. (Commonly used to mark the presence of optional programs or blocks.) The value of this sub-variable varies for the different subsystems.

TypeExt sub-variable	Bit(s) in variable	Meaning
PCHANDLERINTERFACE	B13	The program unit has an interface to a handler unit.
PCDISTRIBUTIONINTERFACE	B14	The program unit has an interface to a distribution unit.
PCHWINTERFACE	B15	The program unit has an interface to hardware (that is, it is a device board handling program unit).

4.7 Start and Restart System

To start the system, enter the command `start` and specify system.

start --system

To restart the system, enter the command `restart` and specify system.

restart --system

4.8 Restart Program Unit

To restart a program unit, enter the command `restart` and specify the program unit.

restart -u XAMPLE -l 1

restart --unit XAMPLE --Lim1

4.9 Reload System

All the program units in the system are reloaded. A valid backup must be available before attempting to reload.

To reload the system, enter the command `reload` and specify system.

reload --system

4.10 Shut Down System

1. Enter the command `media_gateway_start` and specify shutdown to shutdown the Media Gateway.
2. Enter the command `systemctl stop mxone_sn` to shutdown the MX-ONE Service Node.

> **Note**:
> Must be executed with root privileges.

4.11 Reload Program Unit

The program unit is terminated. The program unit is reloaded from the hard disk. Exchange data of the program unit is restored from the backup. The program unit is restarted. Restore of data in the entire system and start after data restore follows. A valid backup must be available before attempting to reload.

To reload a program unit, enter the command `reload` and specify the program unit.

reload -unit XAMPLE

4.12 Shut Down System

1. Enter the command `media_gateway_start` and specify shutdown to shutdown the Media Gateway.
2. Enter the command `systemctl stop mxone_sn` to shutdown the MX-ONE Service Node.

> **Note**:
> Must be executed with root privileges.

Using the Recovery Image 5

This chapter contains the following sections:

- Create a Bootable USB Stick
- Set Hardware Clock
- Recovery Image for MiVoice MX-ONE Service Node

In case you need to reinstall your system and restore data, follow the instructions below.

Note:
The Recovery Image procedure deletes everything on the server, including existing data backups. If you intend to reuse any files, such as configuration files and data backups that exist on the server that you are going to do a recovery on, then you must transfer these files and data backups to another location (for example, to a USB memory stick).

In the following instructions the phases of waiting for the system to boot and transfer files are skipped. In some steps an estimated time is given.

5.1 Create a Bootable USB Stick

To create a bootable USB stick:

Note:

- Do not use Rufus and other tools to create bootable USB sticks, the bootup will fail.
- Use only well-known brands of USB sticks.
- Only USB sticks with a maximum of 32GB size can be used.

1. Make sure that the USB stick is formatted with fat32 and has no hidden partitions.
2. On a Windows PC, open the ISO image in Windows 10 or a later version, right-click the ISO file and mount the ISO.
3. Copy the content (not the ISO image) from the RecoveryDVD to a USB stick.

4. Install the bootloader on the USB drive, from command prompt in Windows. (Make sure you are running the command prompt as administrator in Win 7 or later).

   X:syslinux.exe --directory `/boot/x86_64/loader --force --mbr --active X:`

   Replace X: with the drive letter the USB drive shows as (DO NOT USE C:). If it seems like nothing happened, it is usually done.

> **Note**:
> It is normal for a file named *ldlinux.sys* to appear on the USB drive, in the /boot/x86_64/loader directory.

   The USB stick should now be bootable, depending on the USB stick model.

   Check boot order setting in BIOS and make sure that HDD is before USB.To boot from the USB, press F7 or F11 (depending on the USB model) during boot to access the **Boot** Menu and select the USB.
5. A startup screen will show up. Type *install* to start the installation.

5.2 Set Hardware Clock

Before using the Recovery Image it is necessary to set the server hardware clock to a relatively accurate current time.

1. Enter BIOS mode.
2. Set the current date.
3. Save and exit.

> **Note**:
> If the clock is too far off the recovery will fail.

5.3 Recovery Image for MiVoice MX-ONE Service Node

One recovery image is provided for the recovery of a MX-ONE Service Node Mitel ASU Lite or Mitel ASU-II or Mitel ASU-III.

Note:
SW RAID 1 is used if Mitel ASU-II/ASU-III have two hard disc drives. SW RAID 1 is supported on ASU-II/ASU-III.

1. Boot the server from the USB.
2. Press F3-key to change display resolution to 800X600.
3. Select **Installation** from the menu. If no selection is made in the boot choice menu the default installation type is executed automatically, for example, boot from hard disk.

   The installation starts installing LINUX and the MX-ONE Service Node software during approximately 25-30 minutes. After installation is complete the message “Please Reboot System now” will be shown.
4. Logon as user root with password changeme, then type command `reboot` and press **Enter**. Wait for system to reboot.
5. The server is now in the same default status as it was when delivered from the factory (Turnkey).
6. Select **Yes** when the following message is displayed: *Welcome to MX-ONE. You have to configure your system before starting the MX-ONE. Do you want to configure your server now?*
7. Continue with installation and configuration of the system, see the installation instructions for *INSTALLING AND CONFIGURING MIVOICE MX-ONE* section NETWORK AND SYSTEM CONFIGURATION.

License Handling 6

This chapter contains the following sections:

- Register and Receive a License File
- Install License File
- Print License File
- License Usage Reports
- SLS Heartbeat
- SLS License Download

The MX-ONE is currently shipped with a 20 days trial license file. This means that the exchange can be set up fully functional during installation without any other license file.

Note:

If no commercial license file is installed within 20 days, the MX-ONE Service Node will not function. Contact your local dealer/distributor to get access to the Mitel License Center and register in the system to get a license file.

The MX-ONE Service Node contains a license server to prevent unauthorized use of system resources.

Each license consists of a license tag of up to 40 characters, the product number for licenses, the number of currently used licenses, and a maximum number of licenses. The maximum number of licenses must not be exceeded unless the trial period is activated. The trial period will allow an unlimited use of all licensed sales objects for a limited period.

The principle for license handling in the MX-ONE Service Node is that a unique MX-ONE Service Node hardware ID is checked towards an encrypted license file. If the license file does not include the correct hardware ID, it will not be possible to change customer data controlled by licenses.

6.1 Register and Receive a License File

Do as follows:

Note:
Contact your local dealer/distributor to get access to Aastra Connect.

1. Open **Mitel Connect, https://connect.mitel.com/connect**. The **Mitel Connect** is displayed.

2. Type your user name in the field **User Name**.
3. Type your password in the field **Password**.
4. Click **Login**. The welcome page is displayed.
5. Select **Licenses Services.**The **Mitel Licenses Services** page is displayed.
6. **Type or Paste** the **voucher number** you got via e-mail in the field **Voucher** under **Register voucher**.

> **Note**:
> You can search the voucher number if you do not know the voucher ID but have order information such as Mitel order number or partner order number.

7. Click **Register voucher**. The step **Voucher input** is displayed. Under **Voucher contents** you will see all information of your voucher registration.

> **Note**:
> The progress line on the top, guides you in the registration flow, green boxes indicate successful entering information.

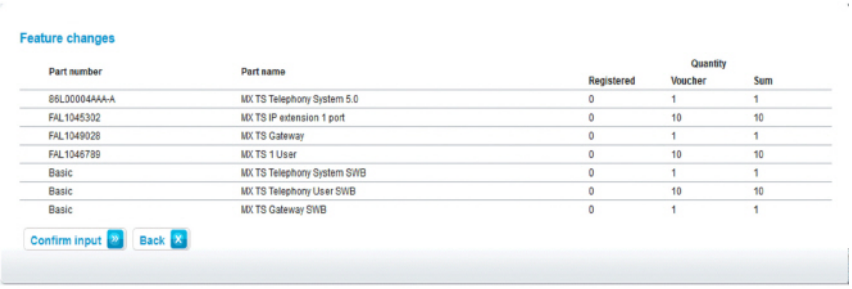
> **Note**:
> You can create more than one voucher at a time.

8. Click **Next**. The step **System data** is displayed.
9. Type the **license number (for MX-ONE, hwid=Hardware ID)** in the field **EID/Serial***, for example hwid 12345-12345-12345-12345-12345, 29 characters.

> **Note**:
> For a new system you need to type a new hwid, and for an add-on you have to type an already registered hwid.

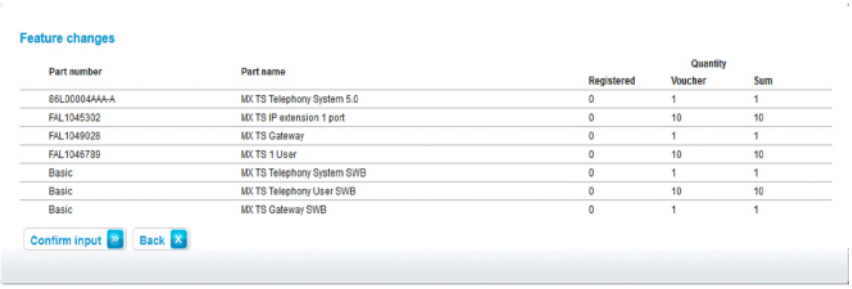
10. Check the information under **Ownership Information** and **Feature changes**.

Figure 2: The step Feature changes



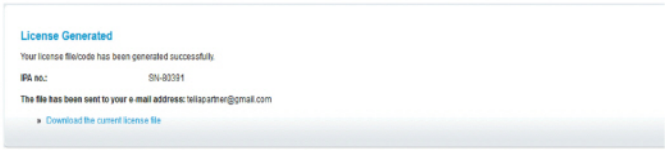
11. Click **Confirm input**. The step **Processing message** is displayed.

Figure 3: The step Confirm changes



12. Click **Confirm Generate License Key**. The **license file** generates and sends to you through **e-mail.**

Figure 4: Confirmation of generated License file



Note:
For more information of how you register, search and download license files, see help in Mitel Connect.

6.2 Install License File

1. Print the hardware ID of the MX-ONE Service Node by typing the command `license_status -s`.

   Format for the hardware ID is: 5 hexadecimal digits>-5 hexadecimaldigits>-5 hexadecimal digits>-5 hexadecimaldigits>-5 hexadecimal digits> (the format may change without prior notice in future releases).

> **Note**:
> The hardware ID is the same as the “Exchange” line in the license file.

2. Order and register a license file in Aastra Connect.
3. Transfer the license file to the MX-ONE Service Node’s file system. For example, `/local/home/mxone_admin/`
4. Key command `sudo -H /opt/mxone_install/bin/mxone_maintenance` to start MX-ONE Maintenance Utility.
5. Select option license and select install license file:

   - If the MX-ONE Service Node is running, the new license file is installed and activated
   - If the MX-ONE Service Node is not running, start the MX-ONE Service Node with the new license file by typing: `systemctl start mxone_sn`
6. Enter the command `license_status` to verify that the license file is activated correctly.

6.3 Print License File

Enter the command `license_print -file <full path + file name>` to print the encrypted license file to view the license information.

6.4 License Usage Reports

The purpose of the feature License Usage Reports is to enable an easy way to keep track of how licensed resources are utilized over time.

Daily peak values and snapshots of currently seized licenses are periodically taken and archived for future use.

The reports are generated at 10:00, 14:00 and periodically every programmed number of hours. The minimum interval is 1 hour, maximum 24 hours.

After midnight the previous day's peak value and reports are packed into a package of daily reports. The reports can be automatically mailed to one or more predefined mail addresses in intervals of 1 day or

longer. The mail interval starts at the beginning of, and ends at the end of, each month when a mail is also generated if an interval is programmed.

Reports can also be automatically erased after a programmable length of time.

Each report contains an encrypted authentication checksum to prevent manipulation.

Reports can be manually generated or erased at any time with command.

Reports are stored on the MX-ONE Service Node main server under directory `/var/opt/eri_sn/version>/usage_report`.

Note:

There are no alarms generated if reports are not possible to archive due to disk space shortage or other disk problems.

The command `license_report`is used to manage this function, see command description *TECHNICAL REFERENCE GUIDE, UNIX COMMANDS* for details.

The function is controlled by a license.

Set a license report mail address, with a report interval of 2 hours, and a mail interval of 14 days. If not set, a default time interval and Mitel mail address will be valid.

license_report -mail-address administrator@mitel.com -report-interval 2 -mail-interval 14

6.4.1 Customer Group License Reports

If the function usage report is active and the system have customer group data initiated, usage data for each such group will be generated.

Each time a license is seized the generation is done via command `customer_report`. The command will generate certain predefined licenses. These licenses are feature levels, terminals and groups. This command is not be used from command line.

The peak value license usage for each group will be kept and included in the daily package of reports.

If customer group is to be charged for license usage, an individual “finance ID” can be assigned per customer group.

6.5 SLS Heartbeat

If the “SLS-HEARTBEAT” function is turned on, the system will send a heartbeat request to SLS, with its own HW Identity and version. This is for statistical purposes.

At system startup, the first heartbeat request is sent, and then a request is sent every 30 days. If a request fails to get a response, another attempt is made after 1 hour. After three consecutive failed attempts, an alarm is raised.

When the alarm state is entered, a new attempt is made every 24 hours until a response is obtained.

The function is turned on by default at installation and can be turned on/off using the *license_sls* command.

6.6 SLS License Download

If the *SLS license download* function is turned on, MX-ONE attempts to download a new license every 30 days in conjunction with the *SLS heartbeat* function. If a new license exists, it will also attempt to replace the old one. If a license does not exist, it will wait 30 days for the next heartbeat. This function is off as default and can be turned on/off by using the `license_sls` command. This function requires that the *SLS heartbeat* function be turned on as well.

MLA or SWA Specific Licenses 7

If SWA or MLA license is present, the system functionality is licensed for a limited time. This license will raise a warning alarm 30 days before its expiry and another alarm upon expiry. Upon expiry of license, software upgrades or updates will be rejected.

In case of MLA license, these licenses will raise a warning alarm 30 days before its expiry and another alarm upon expiry. Upon expiry of license, software upgrades or updates will be rejected and even data changes that require a license get rejected. 60 days after expiration, external calls except those which go to an emergency destination will be barred.

Add or Remove System Database Node

8

The system database in the MX-ONE can be expanded or reduced; for example, can add or remove nodes. For description of the system database functions, see the *SYSTEM DATABASE (CASSANDRA) DESCRIPTION*.

To add or remove a node in the system database:

1. Key command `sudo -H /opt/mxone_install/bin/mxone_maintenance` to start MX-ONE Maintenance Utility.
2. Select the wanted option, for example *Add Cassandra node* or *Remove Cassandra node*, and follow the on-screen instructions.

Media Gateway Unit 9

This chapter contains the following sections:

- Setup Media Gateway Ethernet Ports
- Initiation of MGU
- Virtual Boards
- Update and Upgrade of MGU Software
- Start and Restart Media Gateway
- LED Indications in the Media Gateway
- MG Unit Resource Load Sharing Considerations

The Media Gateway Unit is a hardware based media gateway, see the *MGU DESCRIPTION and MGU2 DESCRIPTION*.

9.1 Setup Media Gateway Ethernet Ports

For more information, see the installation instructions for *INSTALLING AND CONFIGURING MIVOICE MX-ONE*.

9.2 Initiation of MGU

See the installation instructions for *INSTALLING AND CONFIGURING MIVOICE MX-ONE*.

9.3 Virtual Boards

For information on virtual boards, see the parameter description for *BRDID, in Technical Reference Guide, MML parameters*.

9.4 Update and Upgrade of MGU Software

The Media Gateway Unit comes fully functioning, with a bootable Linux Operating System and with an operable version of the MGU software, which will be started at power on. It may be necessary to upgrade the MGU to a newer version. This MGU firmware update/upgrade has to be initiated manually.

For more information, see the installation instructions for *INSTALLING AND CONFIGURING MIVOICE MX-ONE* or see the installation instructions for *UPGRADING AND UPDATING*.

When the firmware has been updated or upgraded, the Media Gateway is restarted automatically. After restart, the new firmware is installed on the Media Gateway.

9.5 Start and Restart Media Gateway

The Media Gateway Unit is automatically started and connected to the MX-ONE Service Node once it is powered on.

9.6 LED Indications in the Media Gateway

There is a LED indication on the Media Gateway Unit's front panel: green light indicates OK, and red light not OK. See the *MGU DESCRIPTION or MGU2 DESCRIPTION* for details.

9.7 MG Unit Resource Load Sharing Considerations

See the section, *Media Server resource load sharing considerations*.

Media Server 10

The Media Server is automatically started and connected to the MX-ONE Service Node once it is powered on.

Initiation of Media Server

See the installation instructions for *INSTALLING AND CONFIGURING MIVOICE MX-ONE*.

Update and Upgrade Software

The Media Server software is installed on the Service Node server or any server where the MS shall run, and is automatically started at startup of the operating system. Upgrading of the MS will be performed by upgrading or updating the MX-ONE Service Node through the mxone_maintenance tool.

For more information, see the installation instructions for *INSTALLING AND CONFIGURING MIVOICE MX-ONE* or see the installation instructions for *UPGRADING AND UPDATING*.

Start and Restart Media Server

The Media Server is a software based media gateway, with functionality similar to the MGU, see the *MEDIA SERVER DESCRIPTION*.

Media Server Resource Load Sharing Considerations

In larger systems, with several SN servers, and several Media Servers (or MGUs), there is a load sharing and load balancing functionality, which allows seizure of media resources in several alternative Media Servers or MGU, if the use case allows it, in up to 15 different MS within the same LIM/SN server, and in up to 10 different overflow LIMs/SN servers.

For this functionality to be feasible, the system should have only or almost only IP end-points, since TDM end-points could not allow selection of an alternative MS.

Load-Balancing/Load-Sharing Principles in the ASP 113 System

11

Load balancing (of MS or MGU resources) means the ability to spread the seizure of media resources (RTP) on several Media Servers or MGUs in an ASP 113 system. A Service Node in the system may reserve and use a media resource in any MS or MGU, in up to 10 overflow LIMs/SN servers. This is referred to as “Media Gateway Load-sharing”.

The algorithm for load sharing of media gateways in ASP113 is as follows:

First a list of LIMs and Media gateways is created, based on the possible choices (including own LIM). If overflow LIMs are programmed, only these LIMs (including own LIM) and media gateways will be on the list. Primarily a media gateway in own LIM is selected, but if resources are not available in own LIM’s media gateways, other LIMs can be searched for alternative media gateways.

Selection of an Alternative Media Server or MGU

12

The first LIM where a media gateway, that is below overflow limit threshold is found, will be selected. In a LIM, if more than one media gateway is below overflow limit threshold, the one with the lowest usage will be selected.

If a media gateway is above the overflow limit threshold, it will not be selected during overflow. It will be selected when the overflow returns to originating LIM. The overflow LIM sequence is based on round-robin, and decided in the originating LIM. If no selectable media gateway is found, the selection is returned to originating LIM.

If an overflow threshold is programmed and no overflow LIM is programmed, the overflow will take place according to the list of possible LIMs without a round-robin. If a LIM has no overflow limit, but contains a selectable media gateway, this media gateway is always selected.

Note that in many cases we are bound by previous call processing and types of involved end-points to select a certain gateway.

Thus, in ASP113 a general round-robin distribution is used for the selection, but combined with a "least connection load" selection, in order to seize RTP resources in the Media Server (or MGU) with the lowest load.

Changing of Load-Sharing Load Levels 13

The load sharing function has a default configuration, which can be adjusted using the `media_gateway_load_sharing` command.

Inter-Media Gateway RTP Communication

14

This chapter contains the following sections:

- Print RTP Resource Information

In an MX-ONE system with several Media Gateways with local MX-ONE Service Nodes, it is necessary to set up RTP resources for inter-Media gateway communication to be able to make calls between the Media Gateways without using IP trunks.

The `rtp_resource` handling commands can be used for viewing RTP resources for an MX-ONE. For more information, see *TECHNICAL REFERENCE GUIDE, UNIX COMMANDS* for details.

When connecting a TDM device to an IP device, the RTP resource will be booked in the same gateway where the TDM device is situated.

When connecting two IP devices with forced gateway, or of a auxiliary device towards a IP device, the order to try to book the RTP resources will be in the following order.

1. Media Server in the same IP domain as at least one of the IP devices
2. Any Media Server.
3. Media Gateway in the same IP domain as at least one of the IP devices.
4. Any Media Gateway.

At multiple choices the load will be distributed equally.

14.1 Print RTP Resource Information

Print RTP resource information for a MX-ONE Classic. Use the command `rtp_resource` **-lim 1,2** to print information for Media Gateway 1 and 2.

Print codec information for the MX-ONE Classic. Use the command `rtp_resource` **rtp_resource** to print information for Media Gateway 1 and 2.

Print busy RTP resources for a MX-ONE Classic. Use the command `rtp_resource` **-lim 3 -print busy** to print information for node 3.

MiVoice MX-ONE Service Node User Administration

15

After a first-time setup there is only one user on the MX-ONE Service Node and this user (root) has no restrictions. The commands in the MX-ONE Service Node are divided into eight levels, and it is recommended to analyze the need of several administrator levels on the server.

For more information about command levels, see the command description for *COMMANDS IN MX-ONE SERVICE NODE*.

For more information about user accounts on the Linux server, see the operational directions for *USER ACCOUNT MANAGEMENT*.

Synchronization 16

This chapter contains the following sections:

- Define Synchronization Sources
- Deactivate Synchronization Sources

The synchronization function is used to receive synchronization from an external source, give sync to the system, display the external sources and rate the preferred source with class and priority.

Perform a re-synchronization after the sources are defined. If no source is specified, the Media Gateway or the MX-ONE Classic is using the internal clock.

Use the command `trsp_synchronization` to display external synchronization sources, define the external synchronization sources and re-synchronization of external synchronization sources in the Media Gateway.

Class “a” represents the highest quality on a synchronization source and class “d” the lowest quality. Priority “1” is chosen first and “3” last. The chosen synchronization source is the source defined with the best class. If several sources are defined with same class, priority is used.

16.1 Define Synchronization Sources

1. Display the external synchronization sources for media gateway 2A.

   trsp_synchronization -mgw 2A
2. Rate the preferred sources with class and priority.

   trsp_synchronization -bpos 2A-0-00 -class b -prio 1
3. Re-synchronize after the sources are defined.

   trsp_synchronization -resync -mgw 2A

16.2 Deactivate Synchronization Sources

1. Reset not preferred synchronization sources.

   -class no and -priority no. trsp_synchronization -bpos 1B-0-00 -class no -prio no
2. Re-synchronize after the sources are defined.

   trsp_synchronization -resync -mgw 1B

Blocking and Deblocking 17

This chapter contains the following sections:

- Block a Device
- Deblock a Device
- List Blocked or Disturbance Marked Devices

The blocking function is used for repairing. Ongoing traffic is not terminated but no new traffic is permitted for the devices that are blocked.

An alarm is generated when a device is blocked.

The deblocking function is used to cancel (erase) manual blockings and all types of system generated blockings or fault markings.

17.1 Block a Device

To block a device, use the command `blocking`.

blocking -i --board-position 1A-2-20

17.2 Deblock a Device

To deblock a device, use the command `blocking` (-e).

blocking -e --board-position 1A-2-20

17.3 List Blocked or Disturbance Marked Devices

To list blocked and disturbance marked devices, use the command `blocking`.

blocking -p

Alarm Handling and SNMP 18

For more information, see the operational directions for ALARM HANDLING and see the operational directions for *MIVOICE MX-ONE SNMP SUPPORT, ALARM NOTIFICATION AND EMERGENCY CALL EVENTS.*

Server Hardening 19

The MX-ONE has been endowed with a set of configurations aiming to increase the system's security, reliability and resiliency to a number of malicious attacks.

IPTables

IPTables is a packet filter built into the Linux kernel. The filter has been configured to prevent that certain services running on the server for the MX-ONE Service Node, necessary for the server's correct functioning, can be reached from the corporate network (eth0). The following services have been blocked for incoming connections on eth0:

Additionally, ICMP echo reply messages (ping) are limited to one response per second.

To display the actual IPTables configuration, type **iptables -L**

To remove a rule, for instance the one blocking the daytime protocol on eth0, type **iptables -D INPUT -i eth0 -p udp -m udp -dport daytime -REJECT**

For more information about how to configure IPTables, refer to the IPTables manual pages, type **man iptables**.

- vat
- postgresql
- clvm-cfg
- kerberos
- nfs
- sunrpc
- rmiregistry
- daytime
- tftp

SSH Configuration

The MX-ONE is configured to not accept any SSH connection logging in as root. In case root privileges are required, it is necessary to log on as another user and then to use the command `su -`

The SSH configuration is saved in the `/etc/ssh/sshd_config` file.

Seccheck

Seccheck is a security tool used by the Suse Linux Enterprise Server Operating System. Seccheck comprises three scripts that are run respectively each day, each week and each month (as cron jobs). In case something is detected that might indicate a security breach, a mail is sent to the root user with a description of the problem.

The seccheck scripts are stored in the `/usr/lib/secchk` directory.

The seccheck script can also be run manually by typing:

- `/usr/lib/secchk/security-daily.shor`
- `/usr/lib/secchk/security-weekly.shor`
- `/usr/lib/secchk/security-mothly.sh`

The weekly and monthly seccheck scripts are very CPU and memory intensive and can easily lead to too slow responses on traffic events and result in **MX-ONE Service Node calls throttled** alarms. If possible ensure that these checks are always run at low traffic times. Check the settings in `/etc/cron.d/seccheck` on when the checks are executed. For operations where degrading of the telephony throughput is not acceptable or for other reasons the checks can be removed.

To remove the security check do the following:

Log-in as user mxone_admin, and key the command `sudo -H /opt/mxone_install/bin/mxone_maintenance` and select option **seccheck** and follow the instructions on screen.

Fault Location 20

This chapter contains the following sections:

- Trace Types
- Perform a Trace

For more information regarding fault location, see the fault locating instructions for *MIVOICE MX-ONE FAULT LOCATION*.

Trace Functionality

The Trace functions in the MX-ONE Service Node is an integrated part of the system. The function consist of the following parts.

- Commands to administer the function – **trace**
- Program unit running on the processor – **LOGGER**
- Components integrated into the signaling mechanisms
- Code components specified in design rules
- Code provided from the designer

The Trace functions make it possible for the administrator to analyze the system performance and trace error conditions. The Trace functions can be used when integrating the system to verify the intended functions or to find problems in a system with traffic.

20.1 Trace Types

The MX-ONE handles basically the following types of trace data:

- **Trace error log** This log is dedicated to trace individual 0. This trace individual is always active and will record any abnormality detected in the MX-ONE. The log is cyclic, that is, overwrites the oldest entries when the log becomes full, filters which signals to store (is set), and it is possible to alter the size of the storage (1 up to 5000 entries, default is 500). The error trace cannot be removed or stopped.
- **Unit trace** Can be initiated on the MX-ONE program units in one or all MX-ONE Service Nodes.

Exception:	LLP and dynamically loaded commands or daemons (for example, board_sw and snmpd). Unit trace is set up by command and has no restrictions on options like filter etc.

- **Sequence trace** Sequence trace can be initiated in several ways depending on what is known of the function that is to be analyzed. It is possible to start on a specific signal, with or without specific data and to start on a known directory number, or a known EQU position.

Exception:	The directory number must be associated to a terminal, that is, not a group number. EQU positions must be an interface, for example, trunk line interface, extension line interface or operator line interface, not auxiliary device interfaces.

Sequence trace is set up by command and has no restrictions on options like filter etc.

- **Hardware trace** Hardware trace is performed by copying all signals to or from hardware positions. The trace is started on a complete 32 group in the addressing range. It is possible to exclude individual in the 32 group from the trace by setting a mask. Each signal sent in the HW interface will be recorded twice, once in signal format and once in raw format. This is done to help the debugging of signaling to and from a new interface board. (Filtering can be used to omit the unwanted copy.)

Hardware trace is set up by command and has no restrictions on options like filter etc.

20.2 Perform a Trace

Initiation

1. Enter the command `trace -display` to check if there are free trace individuals.
2. Initiate the trace by using one of the commands below:

   - Trace started on a specific program unit. **trace -lim -unit**
   - Trace started on a specific signal number. **trace -lim -unit -signo [-byte]**
   - Trace started on a specific signal name. **trace -lim -unit -signam [-byte]**
   - Trace started on a directory number. **trace -dir**
   - Trace started in a equipment position. **trace -equ**
   - Trace started on a backplane 32 group. **trace -hwpos [-mask]**
   - Trace started on the switch specific functions (Media Gateway internal functions). **trace -hwpos -switch [-mask]**

Modification

It is possible to modify the behavior of the trace individual.

Note:
The change command can be used any number of times as long as the trace has not started.

The following can be changed:

- The trace individual
- The trace individual can stop when maximum copies are received or overwrite the oldest
- The size of the trace buffer
- The signals to include or omit in the trace
- The kind of text trace copies to include in the trace
- A stop signal that will stop the trace if included in the trace
- Stop conditions if an error signal is received
- An information text to the trace individual (reminder or message to other users)

Note:
Several trace individuals can use the same stop condition.

Start Trace

Enter the command `trace -start` to start the trace or traces.

Note:
Several traces can be started with the same command.

Stop Trace

Enter the command `trace -stop` to stop the traces.

Note:
Several traces can be stopped with the same command.

Display Trace Status

You can check the status of the traces at any time. Status information can be printed without stating a trace individual. This will give a print of all 16 trace individuals statuses. If only one trace individual is given, only that trace individual will be printed.

If there is no LIM parameter, all buffer counters of the MX-ONE Service Nodes are added and printed.
If there is a LIM parameter, the counter from that MX-ONE Service Node is printed. Depending on what

type of trace that is initiated, different layouts will be used. All parameters entered are presented. Some additional information like pointers and program units, where a directory number resides, are also printed to help the administrator to identify the right data in the trace printout.

Related command and parameters are. **trace -display [-lim]**

Print Trace Result

When a trace is stopped it is possible to print the trace result. In a multi Server system, the trace copies will be printed in chronological order. It is possible to print from a specific MX-ONE Service Node with the LIM parameter. It is also possible to print copies containing a certain signal number, or to print a range of copies. To change the printout format a show parameter can be given to omit the parts of the signal that are regarded as irrelevant in the printout format.

Related command and parameters are: **trace -print [-lim] [-from] [-to] [-signo] [-show]**

Note:
The trace information and status are always printed in the header before the actual trace information, so that the trace setup can be examined when analyzing the result.

Clear the Trace Buffer

Enter the command `trace -clear` to clear the content of the trace buffer.

Note:
Several traces can be cleared with the same command.

Remove a Trace Individual

If a trace individual is not needed any more, free the trace individual by removing the trace configuration and placing the trace individual in idle state. The related command and parameter is: **trace -remove**

Swap and Repair 21

Server

For replacement of the server, see the operational directions for *REPLACING MISCELLANEOUS HARDWARE* or see the operational directions for *REPLACING BOARDS IN MIVOICE MX-ONE MEDIA GATEWAYS* section *Replacing Mitel ASU Lite or Mitel ASU-II or Mitel ASU-III*.

Media Gateway

For replacement of the Media Gateway, see the operational directions for *REPLACING MISCELLANEOUS HARDWARE* section REPLACING MEDIA GATEWAY or see the operational directions for *REPLACING BOARDS IN MIVOICE MX-ONE MEDIA GATEWAYS*.

MiVoice MX-ONE Service Node File Structure

22

This chapter contains the following sections:

- Installation and Upgrading Configuration Files
- Active Configuration Files
- Reload Data and System Backup Files
- Transfer of PCRegen Files for Restoring Data

Folders

MX-ONE Service Node follows the typical structure of a Linux directory tree:

Table 1: Application executable files, static configuration files and configuration file templates

/opt/eri_sn/bin /opt/eri_sn/etc /opt/eri_sn/install /opt/eri_sn/lib /opt/eri_sn/sbin /opt/eri_sn/upgrade

Table 2: Install packages, scripts, and utilities

/opt/mxone_install/bin /opt/mxone_install/install_sw /opt/mxone_install/target

Table 3: Active configuration files

/etc/opt/eri_sn

Table 4: Configuration files for the system database

/usr/share/cassandra/conf/cassandra.yaml /usr/share/cassandra/conf/cassandra-env.sh /usr/share/cassandra/conf/cassandra-rackdc.properties /usr/share/cassandra/conf/cassandra-topology.properties /usr/share/cassandra/conf/vm.options

Table 5: Install configuration file

/etc/opt/mxone_install

Table 6: Reload data and system backup files

/var/opt/eri_sn/call_logging /var/opt/eri_sn/traffic_recording /var/opt/eri_sn/usage_reports /var/opt/eri_sn/xdata

Table 7: System database data and log files

/var/opt/cassandra/data /var/opt/cassandra/commit

Table 8: Miscellaneous log files

/var/log/mxone

Table 9: Configuration files saved at uninstall

/tmp/mxone/mxone_install/savedAtUninstall

The directory `/opt/eri_sn` and the sub directories are write protected. The directories `/etc/opt/eri_sn` and `/var/opt/eri_sn` are write enabled.

Configuration Files Templates

The following configuration files are located in the directory `/opt/eri_sn/etc`:

- alarm_severity.conf
- alarm_text.conf
- awdb.conf
- board_characteristics.conf
- market.conf
- start_order.conf
- sudaem.conf
- swdb.conf

22.1 Installation and Upgrading Configuration Files

The following files are located in the directory `/etc/opt/mxone_install`:

- `/etc/opt/mxone_install/serverData.conf`contains configuration data for servers that is needed by the installation and upgrade. It is changed indirectly by the *mxone_maintenance* functions.
- `/etc/opt/mxone_install/config_mirror.conf`

Note:
This serverData file should not be updated manually.

22.2 Active Configuration Files

The following files are located in the directory /etc/opt/eri_sn:

- /etc/opt/eri_sn/version>/mitelSIPphones/
- /etc/opt/eri_sn/<version>/sip_user_agents/
- /etc/opt/eri_sn/version>/certs/
- /etc/opt/eri_sn/version>/cqlLogin.conf
- /etc/opt/eri_sn/version>/dls.conf
- /etc/opt/eri_sn/version>/ip_telephony.conf
- /etc/opt/eri_sn/version>/lic.dat
- /etc/opt/eri_sn/version>/lic_feature_based.dat
- /etc/opt/eri_sn/version>/lic_traditional.dat
- /etc/opt/eri_sn/version>/llsp_unit.conf
- /etc/opt/eri_sn/version>/mdsh.conf
- /etc/opt/eri_sn/version>/mdsh.rc
- /etc/opt/eri_sn/version>/omCqlLogin.conf
- /etc/opt/eri_sn/version>/sip_trunk_profiles/
- /etc/opt/eri_sn/version>/sip_user_agents/
- /etc/opt/eri_sn/version>/snmp/
- /etc/opt/eri_sn/version>/status.conf
- /etc/opt/eri_sn/version>/tls_telephony.conf

Note:
<version> is the version of MX-ONE Service Node.

22.3 Reload Data and System Backup Files

The following files and directories are located in the directory `/var/opt/eri_sn/version>/xdata/:`

- `var/opt/eri_sn/version>/xdata/xdata_z_yyyymmddhhmmss/`

Backup directory where yyyy = year, mm = month, dd = day, hh = hour, mm = minute and ss = second when backup was executed. z is the MX-ONE Service Node number.

Note:
version> is the version of MX-ONE Service Node.

22.4 Transfer of PCRegen Files for Restoring Data

To get correct Restore Data, copy the files using text mode for transfer. Do not ZIP the Print files.

Hard Disk Maintenance 23

The service node software takes a bit more than 1 GB disk space. When the service node is to be upgraded disk space is needed for the current software, which might need to be restored in a roll back procedure. Disk space is also needed for the new software and during the upgrade procedure disk space is needed for temporary files.

In all **5 GB** of free disk space must be available on the root partition in each **MX-ONE Service Node** before a new version of the service node can be installed. When more disk memory is needed manually remove possible core dump files and unused service node versions.

To remove unused files or packages use the maintenance script:

1. Package handling
2. Remove

Active Directory Based Authentication for MX-ONE 24

This chapter contains the following sections:

- General
- Prerequisites

24.1 General

This chapter describes the login authentication procedure by which the users can be authenticated via the corporate Active Directory (AD) system. This procedure is applicable only to users defined in the AD domain.

Local MX-ONE admin users accounts (for example, *root*, *mxone_admin*, or *mxone_user*) is not affected by AD authentication.

The AD authentication is joining all existing servers in an MX-ONE system to the AD domain. Thus, makes it possible to log on to any server in the MX-ONE system with same AD-credentials.

To configure AD authentication, it should be run from mxone_maintenance utility.

To check, add or remove AD authentication:

Run command `sudo -H /opt/mxone_install/bin/mxone_maintenance` to start MX-ONE Maintenance Utility and then select **more_configuration**> **ad_settings**.

24.2 Prerequisites

WINDOWS AD Information

The user must have the following information:

- Domain Name
- AD Computer Server Name (Optional)
- AD Administrator User Account
- AD Administrator Password

Note:

The usage of Windows Server Name is dependent on the corporate DNS setup and is outside the scope of this document.

DNS

A working DNS is vital for a Windows domain.

Configure the client machine to use a DNS server that can forward DNS requests to the Active Directory DNS server. Alternatively, configure the machine to use the Active Directory DNS server as the name service data source.

NTP

Similarly to DNS, a correct NTP configuration is very important in a Windows domain.

To succeed with Kerberos authentication, the client must have its time set accurately. It is highly recommended to use a central NTP time server for this purpose (this can also be the NTP server running on your AD domain controller). If the clock skew between your Linux host and the domain controller exceeds a certain limit, Kerberos authentication fails.

Firewalls

Make sure either any firewalls is disabled or make sure that following ports are open between the MX-ONE servers and the corporate DNS server and domain controller:

- Port 88 (KRB5)
- Port 389 (LDAP)
- Port 53 (DNS)
- port 445 (SMB2)

Active Directory Account

It is not possible log in to an Active Directory domain unless the Active Directory administrator has provided you with a valid user account for that domain. Use the AD username and password to log in to the Active Directory domain from your Linux client.

AD Configuration 25

This chapter contains the following sections:

- Groups in Active Directory
- Users in Active Directory

25.1 Groups in Active Directory

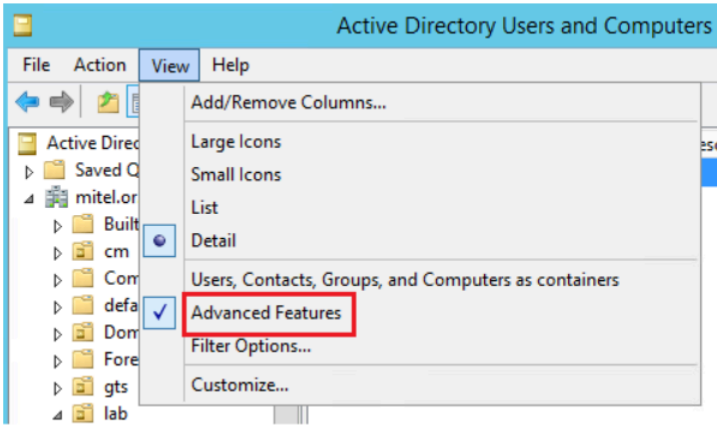
To reflect the local Linux groups defined for MX-ONE, the following groups must be defined in the AD.

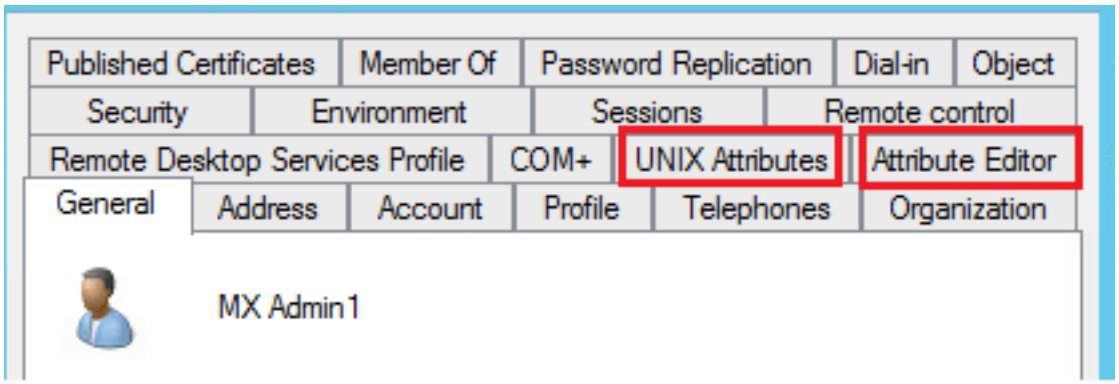
Each group has the attributes listed in the following tables.

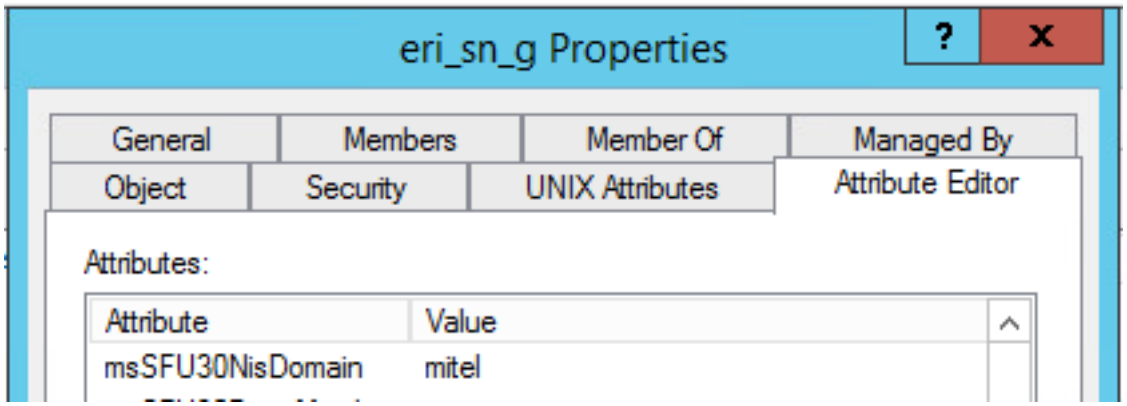
Note:

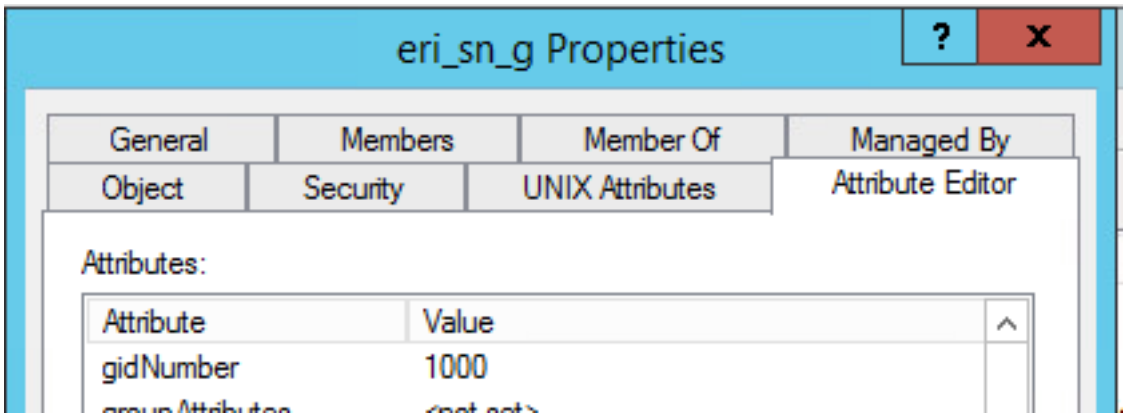
The field **Unix Attributes** tab is deprecated from Windows Server 2016 and onwards. On Windows Server 2008 R2, 2012 and 2012 R2, the **Unix Attributes** tab might be missing if Identity Management for UNIX Components is not installed. On those servers, the Active Directory Attribute can also be modified in **Attribute Editor** tab, which will be visible if **Advanced Features** option is selected in **View** menu.

The following figures show the modification that can be made as per above mentioned Note.




Published Certificates
Member Of
Password Replication
Dial-in
Object
Security
Environment
Sessions
Remote control
Remote Desktop Services Profile
COM+
UNIX Attributes
Attribute Editor
General
Address
Account
Profile
Telephones
Organization
MX Admin1


eri_sn_g Properties
General
Members
Member Of
Managed By
Object
Security
UNIX Attributes
Attribute Editor
Attributes:
Attribute
Value
msSFU30NisDomain
mitel


eri_sn_g Properties
General
Members
Member Of
Managed By
Object
Security
UNIX Attributes
Attribute Editor
Attributes:
Attribute
Value
gidNumber
1000

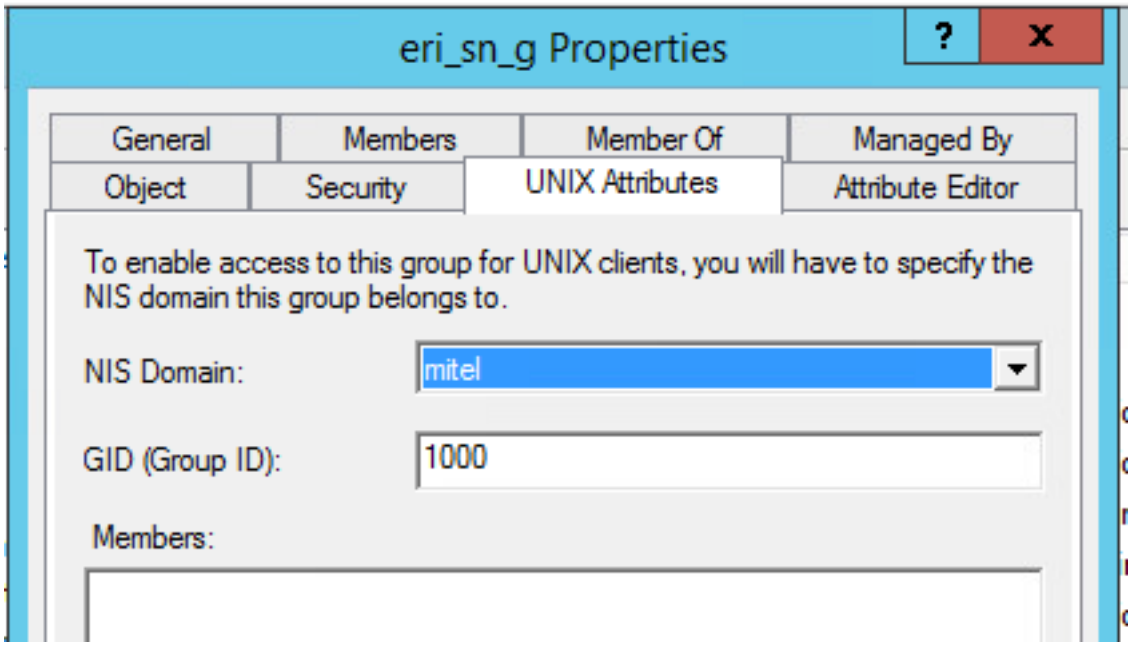


Table 10: Attribute for 'eri_sn_g'

Field on the Unix Attributes Tab	Active Directory Attribute	Example Value
NIS Domain	msSFU30NisDomain	<domain name>
GID (Group ID)	gidNumber	1000

Table 11: Attribute for 'mxone_cmd_g'

Field on the Unix Attributes Tab	Active Directory Attribute	Example Value
NIS Domain	msSFU30NisDomain	<domain name>
GID (Group ID)	gidNumber	1012

Table 12: Attribute for 'mxone_g'

Field on the Unix Attributes Tab	Active Directory Attribute	Example Value
NIS Domain	msSFU30NisDomain	<domain name>
GID (Group ID)	gidNumber	1013

Table 13: Attribute for 'mxone_db_g'

Field on the Unix Attributes Tab	Active Directory Attribute	Example Value
NIS Domain	msSFU30NisDomain	<domain name>
GID (Group ID)	gidNumber	1015

Table 14: Attribute for 'mxone_ms_g'

Field on the Unix Attributes Tab	Active Directory Attribute	Example Value
NIS Domain	msSFU30NisDomain	<domain name>
GID (Group ID)	gidNumber	1016

Table 15: Attribute for 'mxone_om_g'

Field on the Unix Attributes Tab	Active Directory Attribute	Example Value
NIS Domain	msSFU30NisDomain	<domain name>
GID (Group ID)	gidNumber	1014

Table 16: Attribute for 'sby_server_g'

Field on the Unix Attributes Tab	Active Directory Attribute	Example Value
NIS Domain	msSFU30NisDomain	<domain name>
GID (Group ID)	gidNumber	1011

Table 17: Attribute for 'Snlev0'

Field on the Unix Attributes Tab	Active Directory Attribute	Example Value
NIS Domain	msSFU30NisDomain	<domain name>
GID (Group ID)	gidNumber	1003

Table 18: Attribute for 'Snlev1'

Field on the Unix Attributes Tab	Active Directory Attribute	Example Value8q1
NIS Domain	msSFU30NisDomain	<domain name>
GID (Group ID)	gidNumber	1004

Table 19: Attribute for 'Snlev2'

Field on the Unix Attributes Tab	Active Directory Attribute	Example Value
NIS Domain	msSFU30NisDomain	<domain name>
GID (Group ID)	gidNumber	1005

Table 20: Attribute for 'Snlev3'

Field on the Unix Attributes Tab	Active Directory Attribute	Example Value
NIS Domain	msSFU30NisDomain	<domain name>
GID (Group ID)	gidNumber	1006

Table 21: Attribute for 'Snlev4'

Field on the Unix Attributes Tab	Active Directory Attribute	Example Value
NIS Domain	msSFU30NisDomain	<domain name>
GID (Group ID)	gidNumber	1007

Table 22: Attribute for 'Snlev5'

Field on the Unix Attributes Tab	Active Directory Attribute	Example Value
NIS Domain	msSFU30NisDomain	<domain name>
GID (Group ID)	gidNumber	1008

Table 23: Attribute for 'Snlev6'

Field on the Unix Attributes Tab	Active Directory Attribute	Example Value
NIS Domain	msSFU30NisDomain	<domain name>
GID (Group ID)	gidNumber	1009

Table 24: Attribute for 'Snlev7'

Field on the Unix Attributes Tab	Active Directory Attribute	Example Value
NIS Domain	msSFU30NisDomain	<domain name>
GID (Group ID)	gidNumber	1010

Table 25: Attribute for 'named'

Field on the Unix Attributes Tab	Active Directory Attribute	Example Value
NIS Domain	msSFU30NisDomain	<domain name>
GID (Group ID)	gidNumber	44

Table 26: Attribute for 'dialout'

Field on the Unix Attributes Tab	Active Directory Attribute	Example Value
NIS Domain	msSFU30NisDomain	<domain name>
GID (Group ID)	gidNumber	16

Table 27: Attribute for 'lock'

Field on the Unix Attributes Tab	Active Directory Attribute	Example Value
NIS Domain	msSFU30NisDomain	<domain name>
GID (Group ID)	gidNumber	54

Table 28: Attribute for 'systemd-journal'

Field on the Unix Attributes Tab	Active Directory Attribute	Example Value
NIS Domain	msSFU30NisDomain	<domain name>
GID (Group ID)	gidNumber	493

25.2 Users in Active Directory

Two different type of users can be defined for an MX-ONE type account.

MXONE_Admin Account

The *mxone_admin* type of account is used when installing and upgrading MX-ONE.

Note:

This type of account always has the highest authority level, that is, authority level is according to 'snlev7'.

Note:

The field **Unix Attributes** tab is deprecated from Windows Server 2016 and onwards.

Table 29: Attribute for 'mxone_admin' type of account

Field on the Unix Attributes Tab	Active Directory Attribute	Example Value
NIS Domain	msSFU30NisDomain	<domain name>
UID	uidNumber	1100 < UID > 20000
Logon Shell	loginShell	/opt/eri_sn/bin/mdsh (for server with Service Node installed) /bin/bash (for standalone server (server without Service Node installed) like Provisioning Manager, Media Server, Cassandra DB)
Home Directory	unixHomeDirectory	/home//<domain name>/<user_name>
GID (Group ID)	gidNumber	1000 (GID for eri_sn_g)

To create an account such as the *mxone_admin* type of account in AD, the user must be a member of the following groups.

- eri_sn_g (**set as primary group**)
- named
- systemd-journal
- sby_server_g
- mxone_cmd_g
- mxone_g
- mxone_om_g
- mxone_db_g
- mxone_ms_g
- snlev7

Note:

It is important to set the 'eri_sn_g' group as primary group for an *mxone_admin* type of account.

MXONE_User Account

The *mxone_user* account is used for normal day-to-day usage by administrative personnel.

Authority levels for MX-ONE are set using the *snlev* setting (snlev0-snlev7, where snlev7 has the highest, for a detailed description of authority levels. For more information on **Authority Levels**, see the *MiVoice MX-ONE Commands in MX-ONE Service Node Command Description* document.

Table 30: Attribute for 'mxone_user' type of account

Field on the Unix Attributes Tab	Active Directory Attribute	Example Value
NIS Domain	msSFU30NisDomain	<domain name>
UID	uidNumber	1100 < UID > 20000
Logon Shell	loginShell	/opt/eri_sn/bin/mdsh (for server with Service Node installed) /bin/bash (for standalone server (server without Service Node installed) like Provisioning Manager, Media Server, Cassandra DB)
Home Directory	unixHomeDirectory	/home//<domain name>/<user_name>
GID (Group ID)	gidNumber	1012 (GID for mxone_cmd_g)

To create an account such as the *mxone_user* type of account in AD, the user must be a member of the following groups.

- mxone_cmd_g (**set as primary group**)
- mxone_g
- snlev0-snlev7 (depending on the role)

Note:

It is important to set the 'mxone_cmd_g' group as primary group for an *mxone_user* type of account.

Mitel
Powering connections
mitel.com

Copyright 2024, Mitel Networks Corporation. All Rights Reserved. The Mitel word and logo are trademarks of Mitel Networks Corporation, including itself and subsidiaries and authorized entities. Any reference to third party trademarks are for reference only and Mitel makes no representation of ownership of these marks.