SIP-DECT Phone Synchronization

ENGINEERING GUIDELINES

RELEASE 6.1

NOTICE

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) or its 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.

SIP-DECT Phone Synchronization Engineering Guidelines
Release 6.1 – November 2015

®,™ Trademark of Mitel Networks Corporation
© Copyright 2015 Mitel Networks Corporation
All rights reserved

CONTENTS

1 About this document 1

1.1 Overview 1
1.2 Changes 1
1.3 Abbreviations 1

2 DECT phone synchronization 2

2.1 Principle of operation 2
2.1.1 Topology 2
2.1.2 Synchronized Data 3
2.1.3 Local Survivability 3
2.1.4 Roaming 3
2.1.5 Offline Modifications 4
2.2 Design and Requirements 5
2.2.1 OMM platform 5
2.2.2 Software 5
2.2.3 System Configuration 5
2.2.4 Licenses 6
2.2.5 SIP connection 6
2.2.6 Applications 6
2.2.7 User Provisioning 7
2.2.8 Network Load 7
2.2.9 Firewall 8
2.2.10 Network Time Protocol (NTP) 8
2.2.11 DECT Phones 9
2.2.12 DECT Radio 9
2.3 Deployment 10
2.3.1 New System setup with Synchronization 10
2.3.2 Migration of SIP-DECT systems without Synchronization 12
2.3.3 Update scenarios with deployed DECT Phone synchronization 13
2.3.4 DECT Phone subscriptions 13
2.3.5 Backup and Restore 13
2.4 References 15

1 ABOUT THIS DOCUMENT

1.1 OVERVIEW

This document provides guidelines for the planning and operation of the "DECT phones synchronization" feature introduced with SIP-DECT 6.1.

This feature is also referred to as dual homing in relation to deployment scenarios with multiple geographically distributed call servers in one system.

The audience for this document is technically oriented staff that are familiar with the Mitel SIP-DECT solution.

1.2 CHANGES

DATE	AUTHOR	VERSION	CHANGES
10/2015	Carsten Lange / Julian Zelina	1.0	Initial Version

1.3 ABBREVIATIONS

CoA	Configuration over Air
DECT	Digital Enhances Cordless Telecommunications
OMM	OpenMobility Manager
SARI	Secondary Access Rights Identifier
PARI	Primary Access Rights Identifier
PARK	Portable Access Rights Key
PLI	PARK Length Indicator
SIP	Session Initiation Protocol
EPR	External Provisioning

2 DECT PHONE SYNCHRONIZATION

The DECT phone synchronization feature allows multiple OMM installations in different locations to share the same user and device (DECT phone) data. This means that users and devices can roam between different sites, and also allows for central user and device management among all connected OMMs.

DECT phone synchronization also enables local survivability of telephony services in case of network drop-outs, where the connectivity between two OMMs, the central OMM and one or more remote OMMs, is affected.

In addition to the synchronization of user / device data between OMMs, each OMM performs local operations as in a regular installation.

All OMMs share a common DECT identity (SARI) which allows DECT phones to connect to the system independent of the local PARK.

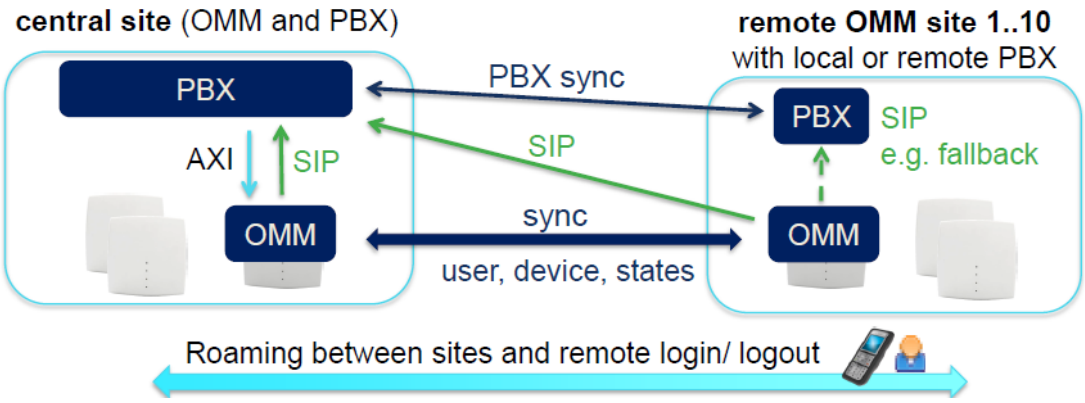
2.1 PRINCIPLE OF OPERATION

2.1.1 TOPOLOGY

An installation using DECT phone synchronization consists of a central OMM and up to 10 remote OMMs that connect to the central OMM in a star-shaped topology.

The OMMs at each site, no matter whether central OMM or remote OMM, may be set up as a redundant OMM system using the OMM Standby feature. Remote OMMs and central OMM exchange data using the OM AXI protocol.

All OMMs must use the same hardware platform. Either all OMMs run on a DECT base station, or on a Linux server platform. A hardware platform mixture is not supported.



2.1.2 SYNCHRONIZED DATA

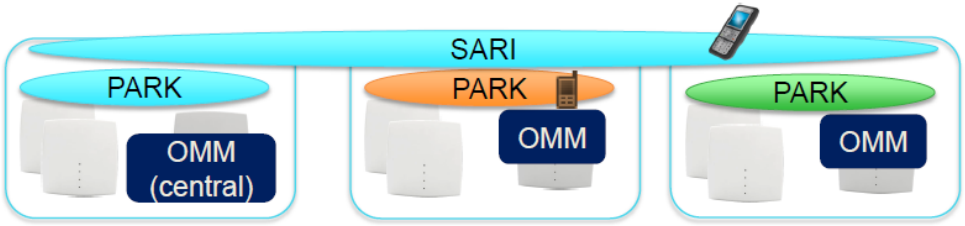
2.1.2.1 DECT Identity (PARK / PARI / SARI)

Each OMM must have an individial PARK which is usually deployed with the license. This PARK is automatically used as the PARI (Primary Access Rights Identity).

In addition, remote OMMs learn a SARI (Secondary Access Rights Identity) from the central OMM on initial synchronization. The SARI is used as a common DECT identity that DECT Phones can subscribe to. The SARI is configured once on the central OMM and cannot be changed after it is set.

The PARK type (PLI) must be the same on all OMMs in the system:

- standard PARK for up to 256 DECT base stations
- XXL PARK for up to 4096 DECT base stations



2.1.2.2 DECT phones, user data and Configuration over Air (CoA) profiles

Any change on DECT phones, user data and Configuration over Air (CoA) profiles (e.g., create, update, delete) is immediately synchronized with all other OMMs in the system.

Changes on a remote OMM are propagated to the central OMM and then synchronized to all remote OMMs. Changes on the central OMM are synchronized to all remote OMMs.

As all users and devices are synchronized to the databases of the connected OMMs, a common system limit applies on all OMMs for user-related configuration parameters such as:

- total number of users and devices
- licensed features bound to the user settings (OM Locating)
- visibility check user for Standby OMM
- user monitoring

2.1.3 LOCAL SURVIVABILITY

Sites with a local OMM that lose WAN connectivity to the central OMM and the central PBX still support telephony services when a secondary or a tertiary SIP proxy is available and reachable.

2.1.4 ROAMING

The SARI configured in the central OMM is distributed to all remote OMMs. DECT phones that are subscribed to the SARI (default setting), can roam between different sites.

2.1.4.1 Roaming with stable DECT phone synchronisation link

If a device or a user roams to a new OMM, a SIP registration is immediately initiated from the new OMM and all other OMM sites are notified that the user is roaming.

When the former OMM receives this notification, the OMM stops any active SIP registrations for this device or user and sends a confirmation to the other OMMs.

On reception, the new OMM renews the SIP registration again to avoid race conditions.

2.1.4.2 Roaming with disrupted DECT phone synchronization link

If a device or a user roams to a new OMM, a SIP registration is immediately initiated from the new OMM and all other OMM sites are notified that the user is roaming. However, a broken network connection may prevent the former OMM from receiving notification of the roaming event.

The lack of confirmation from the former OMM results in a SIP registration renewal after a timeout. The former OMM continues SIP registrations according to its configuration. After up to 2.5 hours, a DECT timeout (missing locating registration) is detected and the SIP user is deregistered from this OMM.

Depending on how the network issue influences the deployment, this may result in a temporary degradation of service for this single user, as two OMMs may initiate SIP registrations for the same user.

2.1.4.3 Missing DECT location registration

Mitel 600 / 142 DECT phones are configured to send a DECT location registration at least every 2 hours. If this location registration is not received within 2.5 hours, the SIP registartion is stopped automatically by the OMM.

2.1.5 OFFLINE MODIFICATIONS

In the event that the DECT phone synchronisation link is down (e.g., due to a network failure or software upgrade), modifications performed on one OMM are synchronized with other OMMs at a later time. Once the link recovers, the data is automatically synchronized.

If any conflicts are detected, the entry with the latest timestamp is used.

When data is deleted while the link is offline, the data may be automatically restored by the synchronization process. As this can cause a conflict with new configurations, offline create and delete operations must be avoided.

2.2 DESIGN AND REQUIREMENTS

2.2.1 OMM PLATFORM

The OpenMobility Manager platform used for OMM hosting (either DECT base station or Linux server) must be the same across the different sites. A mixture of OMM platforms is not supported.

A Standby OMM may be deployed per site for local redundancy reasons.

System capacities:

- RFP OMMs: 256 DECT base stations per OMM, 512 DECT phones in total
- PC OMMs: 4096 DECT base stations per OMM, 10000 DECT phones in total

2.2.2 SOFTWARE

All sites should run the same software version.

A software update may temporarily result in a system running different software version. Such a software update phase should always be of short duration.

If the AXI version between two OMMs differs, the DECT phone synchronization link stops and resumes once the AXI versions match.

Consult the release notes for specfic instructions or tips when you plan a software update. Keep compatibility of connected applications in mind when performing software updates.

2.2.3 SYSTEM CONFIGURATION

As DECT phone synchronization does not include a complete system configuration synchronization, each OMM system must be configured individually (except users, devices, CoA, and SARI).

OMM configuration should have a common feature set for all users. Otherwise, the user will experience different system behaviors when roaming.

In particular, consider the following features for consistency in configuration:

- enhanced DECT security (enabled or disabled)
- corporate directory access (availability)
- XML applications (availability and order)
- user login type (by number or ID)
- supplementary services (local forward, dial editor, start up text, branding, etc)

2.2.4 LICENSES

Make sure that licenses are available and installed on all sites in the system. Otherwise, licensed features may or may not work depending on the DECT phones or user location.

When using licenses that are related to the user configuration (e.g., DECT locating), a valid license for all affected users is required in all sites as the data are synchronized.

Consider that all connected OMMs must use the same type of PARK or XXL PARK (PLI). This also affects the license generation process when using license files.

2.2.5 SIP CONNECTION

SIP connectivity must be configured at each site.

As all users are synchronized to all OMMs, they must be unique. Two different DECT users can not use the same phone number (SIP-id).

System design determines whether a central or local SIP server is configured as the primary SIP contact in an OMM. The DECT phone synchronization feature must be validated with the call server platform to use a recommended design.

The call server platform must be able to accommodate special handling of the following features:

- SIP registrations during roaming
- SIP failover keep alive
- Standby OMM visibility check user

2.2.6 APPLICATIONS

XML terminal applications should be configured identically throughout the system to ensure correct operation, even after user/device roaming.

Applications that connect using OM AXI (e.g., Alarm Server) cannot communicate with DECT phones in a remote OMM when only connected to a local OMM.

Whether applications can connect to multiple OMMs or whether they must be deployed per site depends on the application capabilities and design.

In general, applications can work locally per site as in a simple OMM deployment.

2.2.6.1 User Monitoring (UMON)

The SIP-DECT User Monitoring feature monitors the availability of users.

When a user with this feature enabled roams to another site, user monitoring is performed on each OMM locally. Roaming might result in unwanted escalation of events resulting from absence of a device/user at an OMM.

2.2.6.2 OM Management Portal (OMP)

The OMP can be used to setup DECT phone synchronization. The OMP can also be used to configure user and device data which is automatically distributed to other connected OMMs through the OMM DECT phone synchronization mechanism.

The OMP also displays all user and data configuration data, however, the status view for remote devices is limited as not all states are synchronized between the OMMs.

To view detailed status of a specific phone, use the OMP to check for the last known OMM system that the user or phone was connected to, and then connect to this system via the OMP.

The SIP registration state is only visible in the local OMM system.

2.2.7 USER PROVISIONING

There are several mechanisms available for provisioning user data:

- OM AXI applications (PBX systems and applications)
- ipdect.cfg (PBX systems, provisioning servers)
- user.cfg (User Provisioning files / EPR)

Make sure that the provisioning never conflicts between different OMM sites. Provisioning of user data on the central OMM is usually the best approach.

2.2.7.1 External Provisioning of User Data (EPR)

When using the OMM User data import feature (EPR / user.cfg), all OMMs must be configured the same way so that each OMM can access identical EPR data.

This configuration must be done on all OMMs.

External users are deleted when EPR is disabled and when the server reports ”file not found” for a user.

2.2.8 NETWORK LOAD

Updates (create, update and delete) on user and device data are synchronized as soon as they occur as long the DECT phone synchronization links are established.

Whenever a DECT phone synchronization link from a remote OMM to the central OMM is established or reconnected, the user and device data are downloaded by the remote OMM(s) and then synchronized with the local database.

A full synchronization usually happens on:

- initial setup
- software updates or OMM restarts
- network outages (e.g., when a broken WAN connection becomes available again)

The amount of data synchronized depends on the number of users and devices in the central OMM database, and also on changes that are uploaded by the remote OMM (and therefore synchronized to all other connected OMMs by the central OMM).

1000 user/device entries result in approximately 3 MB of data, transferred in one direction.
10.000 user/device entries result in 30 MB of data.

The data transfered after an outage in the central network can be estimated by

- number of user/devices in the central OMM per OMM connection
  (max: 30MB x 10 OMMs = 300MB)
- number of updated user and device data entries in a remote OMM
  (e.g. all users and devices located at this OMM system)

As the availabity of users depends on the synchronization, it is vital that this happens within a short time frame. A minimal guaranteed bandwitdh per OMM connection is required to guarantee that the synchronization is performed in a timely manner.

We recommend that the initial synchronization process (e.g., after the link was interrupted) should be performed within a timeframe of 5 minutes at most.

Number of User/devices in DB	Initial download per remote OMM	Required bandwitdh per OMM connection (max. 10)
500	1,5 MB	50 Kbps
1000	3 MB	100 Kbps
10.000	30 MB	1000 Kbps

2.2.9 FIREWALL

DECT phone synchronization uses the AXI protocol. A TCP connection is set up from the remote OMM to the central OMM on port 12622.

Depending on the call server setup and redundancy settings, a SIP signalling and (direct) media connection must be available to the endpoints involved (e.g., local and remote SIP servers, media gateways, and IP terminals).

2.2.10 NETWORK TIME PROTOCOL (NTP)

The synchronization of data depends on timestamps. Therefore, all OMMs must have a synchronized time, which can be accomplished through NTP.

The system internal time is UTC, so different time zones can be used in the setup.

2.2.11 DECT PHONES

For DECT phones to become operational, a subscription to the DECT system is required.

This subscription usually involves the following parameters

- subscription to be allowed by the DECT system
- DECT phone configuration (fixed) or autocreate on subscription (dynamic)
- authentication using a configured DECT Access Code (AC)
- DECT identity of the DECT System (PARK) or auto search (no PARK given)

The subscription is usually performed to the Primary Access Rights Identifier (PARI) which is the equivalent of the PARK code in a normal SIP-DECT deployment.

Once DECT phone synchronization is deployed, the DECT phone subscribes to the common DECT identity Secondary Access Rights Identifier (SARI) by default. The SARI is broadcast by all DECT base stations in addition to the local Identity PARI. Once a phone is subscribed to the SARI, it can roam between synchronized OMM systems.

The identifier entered on the DECT phone during the subscription process (PARK, SARI, none) does not matter. The OMM informs the DECT phone of the identity to which it is subscribed during the subscription process.

For specific DECT phones, it is possible to limit the subscription to the PARI only. This can be configured when a fixed user/device configuration is performed. DECT phones subscribed to the PARI only cannot roam between OMM sites in the system.

When performing a migration to DECT phone synchronization, the DECT phones subscribed in the central OMM system resume operation without a new subscription, as the SARI is derived from the PARK of the central OMM.

2.2.11.1 GAP Phones

GAP phones may be operational in a scenario with DECT phone synchronization. As the support for SARI and PARI, as well as roaming, cannot be guaranteed for such phones, the interoperability of specific GAP phones must be validated if required. The use of SARI may also influence the GAP phone handling even if no roaming to other OMM systems is needed.

2.2.12 DECT RADIO

DECT clusters are configured and deployed per OMM installation. You must ensure that DECT clusters of the same OMM do not overlap.

Similarly, the DECT networks of OMMs connected by DECT phone synchronization must not overlap.

For a campus environment (one area with multiple buildings) we recommend building a single DECT cluster rather than setting up of multiple clusters or multiple OMM systems.

2.3 DEPLOYMENT

2.3.1 NEW SYSTEM SETUP WITH SYNCHRONIZATION

This section describes the setup of a new system with DECT phone synchronization. For upgrade scenarios of existing OMMs with user and device data, please also read the upgrade and migration instructions in the next section before proceeding.

Set up all OMM systems with the same software version and perform a basic configuration as required for the known normal operation. This includes:

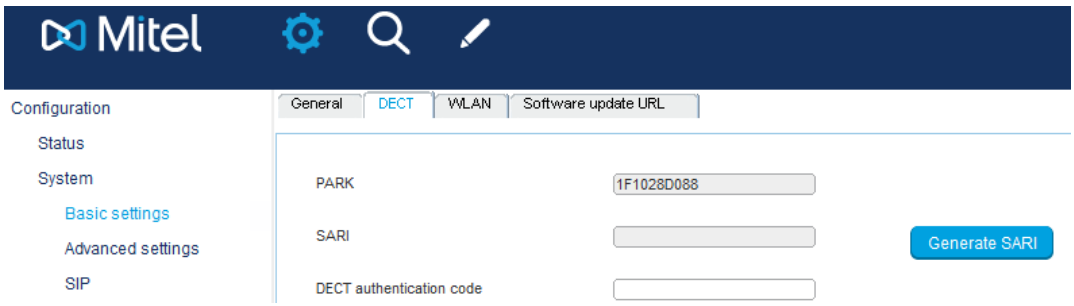
- Regulatory, DECT access code, PARK, licenses, DECT base stations, SIP settings, XML applications, NTP servers, Backup, etc.
- All systems must run the same software that supports dual homing.
- The configuration of system parameters should be identical for the phone (e.g., enhanced security settings, supplementary services, etc).
- SIP Settings should be adapted to accommodate local redundancy requirements.

2.3.1.1 Central OMM

The following taks must be performed on the central OMM system only.

Generate a SARI in the central OMM system.

1. Connect to the OMM using OMP.
2. Go to **System** > **Basic Settings** in the navigation menu and select the **DECT** tab.
3. Click on **Generate SARI** to generate a SARI.
   The OMM reboots automatically.



2.3.1.2 Remote OMMs

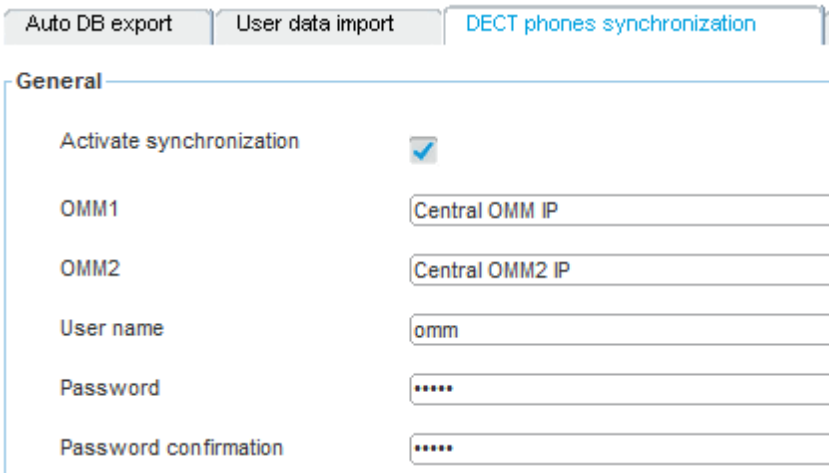
The following tasks must be performed on the remote OMM system(s) only. For each system:

1. Login to the remote OMM system via the OMP.
2. Verify that no user or device data are configured in the OMM.

   Go to the **DECT phones** > **Users** menu and the **DECT phones** > **Devices** menu. If there are users or devices in the database, delete all users and devices before proceeding!
3. Configure the DECT phone synchronization link to the central OMM system.

   Go to the **System** > **Data management** menu and select the **DECT phones synchronization** tab and configure the following parameters:

   - Activate synchronization: enabled
   - OMM1: Central OMM IP address
   - OMM2: Central 2nd OMM IP address (if a Standby OMM is configured)
   - User name: OM AXI user to login into the central OMM system (e.g. omm)
   - Password: Password for the OM AXI user account.



   The OMM reboots once synchronization is configured.
4. Verify that the SARI, user and phone data are imported by the OMM.

   Switch to the OMP Monitoring view and check the following pages:

   - **Status**: DECT phones synchronization heath state
   - **System** > **Basic** > **DECT** (SARI)
   - **DECT phones** > **Overview** and **Devices** (Phones and Users)

   Once the synchronization is performed as expected, proceed to the next OMM system.

2.3.2 MIGRATION OF SIP-DECT SYSTEMS WITHOUT SYNCHRONIZATION

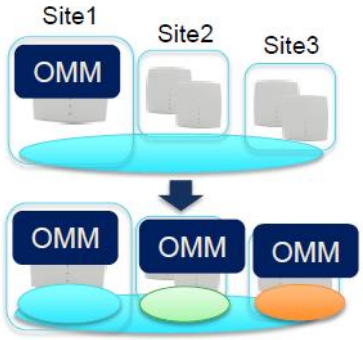
In addition to new installations, the migration of existing systems to use DECT phone synchronization is also available. The following two migration scenarios are supported.

Prerequisites:

- All OMM system(s) must be updated to the same software version which supports DECT phone synchronization.
- Manual database backups must be performed before initiating synchronization or major changes.

Scenario 1: Split one system into multiple systems

One OMM system located across multiple sites is migrated to multiple OMMs for local redundancy.



1. Setup SARI in the deployed OMM (central)
2. Setup new remote OMM system(s) (site by site)
3. Setup synchronization between the systems.
4. Redirect DECT base stations to connect to the (new) local OMMs instead of the central OMM to use the new system.

Scenario 2: Merge multiple systems

Merge multiple OMM systems to allow roaming. As this operation requires deletion of user and device data, consider the additional effort and downtime.

1. Select the system with the most users/devices to be the new central OMM and set up the SARI.
2. Delete all user and device data from the other OMM system(s).
3. Set up synchronization between the OMM systems.
4. Subscribe the DECT phones that were deleted. Remember to change the master download system to the new subscription.

2.3.3 UPDATE SCENARIOS WITH DEPLOYED DECT PHONE SYNCHRONIZATION

When performing updates with UDS already deployed, review the release notes first.

In general an update on the central OMM should be performed first, than an update of the remote OMMs.

If the AXI protocol version between the OMMs has changed, the DECT phone synchronization link is stopped until the versions match again.

As an unsynchronized state causes restrictions, the timeframe within which all OMMs are updated must be limited. Be aware when performing configuration changes in this stage that they will be synchronized at a later time and do not instantly apply to all OMMs.

When performing upgrades, keep in mind that user/device data timestamps are also updated once data changes as a result of the OMM upgrade (e.g. when loading changed provisioning files).

2.3.4 DECT PHONE SUBSCRIPTIONS

Once DECT phone synchronization is configured, new DECT phones are automatically subscribed to the common DECT Identity (SARI).

DECT Subscription and Access codes must to be configured per OMM.

The subscription of new phones can be performed at each OMM once new subscriptions are allowed in the local OMM.

When migrating DECT phones that were subscribed to the central OMM, normal operations resume as the common DECT Identity (SARI) is derived from the PARK used by the OMM before enabling synchronization.

2.3.4.1 Subscribe to PARI only

By default, new subscriptions are performed to the common DECT identity (SARI).

For special cases (e.g., GAP phones) it is possible to subscribe DECT phones to the local PARK of a OMM system. This does not apply to the central OMM.

To perform a subscription to the local OMM only, configure a new fixed user (via OMP, go to **DECT phones** > **Overview** > **Create**).

Complete the configuration and enable the **Subscribe to PARI only** parameter in the DECT section.

Auto-create during subscription is not supported in this case.

2.3.5 BACKUP AND RESTORE

When performing database backup and restore operations, consider the following guidelines.

Once a Backup is restored to an OMM that is deployed in a synchronized system, items are synchronized based on the timestamps in the database.

If the backup includes users who are no longer present in the current synchronized database, the users are deployed again.

The following scenarios provide an example of how to proceed.

Scenario 1:

The OMM RFP at a remote site is down, and no standby OMM was configured.
This OMM must now be replaced by a new RFP OMM.

1. Setup the new DECT base station with the IP address of the non-functional OMM RFP, but do not connect this DECT base station to the customer network at this time!
2. Update the OMM to the correct software version.
3. Login to the OMM using OMP and:
    - Configure login credentials for the OMM (Full access user)
    - Back up the database
    - Delete all user and device data from the OMM configuration
4. Connect the OMM to the network to become operational.

When possible we recommend a Standby OMM per OMM system.This improves redundancy and facilitates restoration of broken OMM RFPs.

Scenario 2:

The Administrator needs to revert to an older version of the user and device database.

1. Login to the central OMM using OMP.
    - Delete all users in **DECT phones** > **Overview**.
    - Delete all remaining devices in **DECT phones** > **Devices**.
2. Check that the operation was synchronized to all remote OMMs and that no user / device data are present any longer. If a remote OMM is not connected at this time, make sure user / device data are deleted before this OMM becomes operational again.
3. Enable the **Preserve user device relations at DB restore** parameter under **System** > **Basic settings** > **DECT** if you want to restore dynamic user relations to the time the backup was performed. Otherwise, all dynamic users will be logged out.
4. Restore the Backup snapshot you want to apply on the **System** > **Data management** > **Manual DB import** page.

2.4 REFERENCES

Please read the SIP-DECT OM System Manual and Release Notes for further information.

Mitel
Powering connections

Mitel.com

© Copyright 2015, Mitel Networks Corporation. All Rights Reserved. The Mitel word and logo are trademarks of Mitel Networks Corporation. Any reference to third party trademarks are for reference only and Mitel makes no representation of ownership of these marks.