

Function Description

Number Planning and Message Routing in Unite

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1 Introduction

This document describes how the number plan works and how messages can be routed to the Call IDs in the number plan.

The Unite Name Server (UNS) contains the number plan that translates Call IDs, used by users and applications, to destination addresses.

The Unite Connectivity Manager (Unite CM) supports messaging routing consisting of a set of rules that make it possible to do the following:

- Divert a message to other systems/users when for example the origin user is absent or out of range. It is also possible to set up work shifts and divert messages depending on active work shift. A user can have more than one diversion condition connected to the Call ID. This makes it possible for the user to be reached in many systems and minimises the risk of losing a message when being out of range in one system.
- Forward a message to a user located in another site if his/her Call ID is not found in the number plan that belongs to the site where the message was sent from.

NOTE: This rule is only supported by Unite CM.

1.1 Abbreviations and Glossary

A-bus	serial communication between modules in System 900
Call ID	A unique ID used to transmit messages within the Unite system.
Category	A system or application that can be addressed
DECT	Digital Enhanced Cordless Telecommunications: global standard for cordless telephony.
GSM	Global System for Mobile communication
GUI	Graphical User Interface: the interface between a user and computer application.
IMS3	Integrated Wireless Messaging and Services: Unite module that enables messaging, alarm handling and device management in a system.
LAN	Local Area Network: a group of computers and associated devices that share a common communication line.
System 900	generic term for telePROTECT, teleCOURIER, and CTS 900 systems.
Unite	generic term for messaging system that unites different systems, for example System 900, System 9d, and teleCARE M.
Unite CM	Unite Connectivity Manager: Unite module that enables messaging, alarm handling and device management in a system. It supports advanced event handling, message routing, centralised fault handling and logging. Unite CM also enables communication with customized applications.
UNS	Unite Name Server
VoWiFi	Voice over Wireless Fidelity: wireless version of VoIP that refers to IEEE 802.11a, 802.11b, 802.11g, or 802.11n network.

2 Technical Solution

2.1 Number Planning

In the number plan, every Call ID is converted into a destination address to which a message can be sent. All Call IDs are unique, and only one Call ID can be used per destination. A Call ID can either be numerical or a text string.

The destination address format is written as Number/Address → Category, where Number/Address is for example an extension number in a DECT system or an e-mail address in an e-mail system.

Category stands for an IP address with a carrier (such as DECT, VoWiFi, GSM), for example 172.23.9.151/DECT. In the example below, the "DECT handset" category is connected to the IP address 172.23.9.151 with the carrier "DECT".

The following list gives an example of a number planning table.

Call ID	Destination Address (number/address → category)
7123	9123 → DECT handset
8123	8123 → Pocket receiver
Lars	9401 → DECT handset
John mail	john.smith@company.com → e-mail

Figure 1. Example of a number planning table.

To set up a number planning table, all categories (that is, connected carrier systems) must first be defined, see Installation and Operation Manual for the Unite CM.

Individual Call IDs are then added to the defined category. If a Call ID is not defined in the number plan, the message can automatically be transferred to the Call ID in a default category¹.

Some Unite modules contain a very basic number plan, where all messages are transmitted to the defined IP address and service. All modules can be configured to forward the requests to the more powerful number plan in Unite CM. In case the Unite CM is lost in the system, the modules will fall back to their internal number plan.

In a multiple site system, it is possible to have a local number plan on each site where the sites can access each other number plans.

¹The default category function is not supported by Unite CM.

2.1.1 Number Planning with Prefix

NOTE: This feature is applicable for Unite CM only and can be used in a multi-site number plan solution.

A prefix should be used if you cannot guarantee that a Call ID is unique in a system having several number plans. By adding a prefix to each number plan makes each Call ID unique even though it exists in several number plans. This makes it possible to route a message to the correct Call ID in the system.

Example:

System	Prefix	Call ID
System A	03155	1234
System B	051355	1234

An application located in System A wants to send a message to the Call ID "1234" located in the same system. In this case, the Call ID is found in the number plan that belongs to System A and the message is sent to this user. If the local application uses the Call ID together with the prefix (that is "031551234"), the local UNS removes the prefix if a matching prefix is found before looking for the Call ID. If no matching Call ID is found, the UNS will forward the request to another UNS having the same prefix.

This makes it possible to have several Unite CMs with same prefix (for use when one site has divided its number plan into several Unite CMs). It is important that Call IDs do not overlap if same prefix is used by several Unite CMs.

Additionally, the application in System A wants to send another message to the Call ID located in System B. In this case, the application must add the prefix for System B to the Call ID meaning that the complete Call ID will be "0513551234".

NOTE: It is important that each assign prefix is used in a way that ensures that each Call ID is unique in the entire system. This means that a Call ID should never start with digits that match a prefix in another system. Additionally, if one UNS is using prefix, all other UNSs must also have prefix.

2.2 Message Routing

Messages can be routed to another Call ID using diversion, or routed to another site/number plan where the Call ID is registered if it is not found in the local number plan at the origin site.

2.2.1 Message Diversion

For example, if a handset in the DECT system is absent or out of range, a diversion condition may be set to divert the message to the same but another handset, or to another user.

The system uses the number plan for looking up destination addresses. It can also divert the message directly to a destination.

Three diversion conditions can be set:

- Absent
The user is absent, for example the handset is in the charging rack.
- Out of range
The user is out of coverage area.
- Not reachable
Covers all sending errors including the "Absent" and "Out of range" conditions.

Messages can also be diverted unconditionally or depending on active work shifts. The work shifts are set up with day of week and time. The work shift can be set to be continuously On or Off, which is useful for system test.

Example

In this example one user has two handsets; a DECT handset with Call ID "2462" and a pocket receiver with Call ID "1317". The primary destination address for 2462 is set to 2462 → DECT handset, that is all messages to 2462 are sent to the DECT system. Another user has a DECT handset with Call ID "9876". In the number plan the Call IDs are defined as shown in the table below:

Call ID	Destination Address
2462	2462 → DECT handset
1317	1317 → Pocket receiver
9876	9876 → DECT handset

Diversion conditions have also been set for Call ID "2462". If the user of Call ID "2462" cannot be reached in the DECT system, the message will be diverted to the user's pocket receiver, and if the pocket receiver is absent as well, the message will be diverted to another user in the DECT system (Call ID "9876") and to a GSM phone in parallel, see below:

Call ID	Conditions
2462	If 2462 is not reachable Forward to 1317 If 1317 is absent Forward 9876 Forward +46705876576

The messages will be diverted to given destinations, using the number plan for destination address look-ups. Diversion can also be done with direct addressing, which has been used for the GSM number in this example.

The advantage of using the number plan for destination address look-up is that the diversion conditions remain the same if a user, for example, goes from having a pocket receiver to a DECT handset, as long as the Call ID is kept.

Direct diversions without using the number plan have the advantage that it is not necessary to define Call IDs for every destination used in the set up diversions. The disadvantage is that, if the destination is changed, all set up diversions where the destination is included have to be updated.

2.2.2 Message Routing Options

The number planning has impact on how the UNS mode in Unite CM/IMS3 shall be set. The UNS mode determines if a local number plan, external number plan, or multiple number plans should be used.

NOTE: The UNS mode has nothing to do with message diversion.

Message Routing within one Number Plan

In this mode the local UNS can only access its own number plan. An external application/host that sends a message can send a look-up request to the UNS in order to find the wanted Call ID in the number plan. In this case, the application/host has not an own number plan and uses this UNS.

Message Routing to an External Number Plan

In this mode the local UNS forwards a look-up request to another specified UNS without searching in its own number plan. If the local UNS cannot forward the look-up request, it will use its own number plan until it can forward the request again.

Forwarding to another UNS directly is typically used when a site consists of several Elise modules. Number planning is then made in one module and the other modules forward their request to this one.

Message Routing in a Multiple Site Number Plan

NOTE: This feature is applicable for Unite CM (Elise3) only.

In this mode the local UNS can forward a look-up request to another UNS if the Call ID is not found in its own number plan. In a multiple site system, the request can be sent to a master UNS that in turn forwards the request to other UNSs in the system. When the master UNS forwards the look-up request to the other UNSs, only the UNS that matches the request responds to the master UNS that in turn forwards the response to the origin UNS. Now the origin UNS knows the destination of the message and sends it to the Call ID. Both the master UNS and the origin UNS cache the IP-address of the UNS holding the Call ID.

Next time a message is to be sent, the origin UNS first looks in its number plan to see if a matching Call ID is found, and if not, it looks in its cache memory. See [3.4 Example 4: Messaging routing in a multiple site number plan with one Master](#) on page 10

A UNS can act both as client and as master which means that it can forward its own look-up request to the other UNS in the multiple site system. In addition, a multiple site can have several master UNSs in a hierarchy configuration that can interact with each other. When setup multiple master UNSs in a system, the UNSs must be configured correctly to avoid

loops in the system, see [3.5 Example 5: Messaging routing in a multi-site number plan with several Unite CM Masters](#) on page 11.

The advantage with this solution is that each site has its own number plan simultaneously as the sites have access to each other number plan via the master UNS. That is, there is no need to have a centralized number plan.

3 System Outline

3.1 Example 1: Diversion in IP-DECT and Paging system

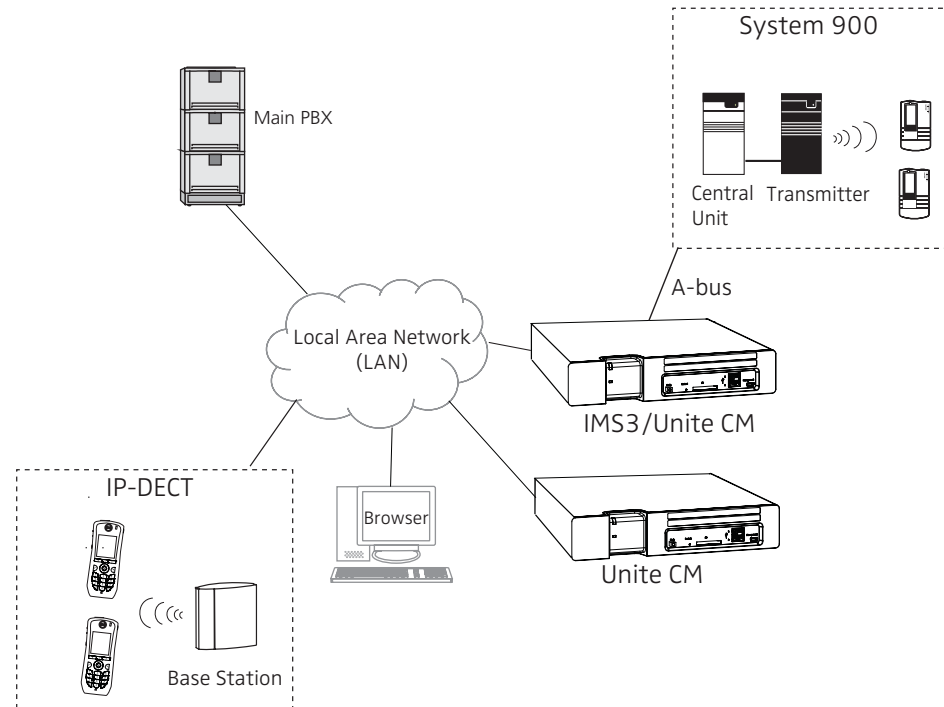


Figure 2. An industrial plant with an IP-DECT system and System 900.

This is an example of an industrial plant with an IP-DECT system covering the office departments and System 900 covering the whole site.

Personnel working in the office department use either IP-DECT handsets or pocket receivers or both. Personnel working in the other parts of the area use pocket receivers only.

A service technician (John) works in the whole area and has both an IP-DECT handset and a pocket receiver. When John is outside the office departments he will be out of range of the IP-DECT system but his messages are then diverted to his pocket receiver. He can then be certain of getting all his messages, independent of where he is on the premises.

The parameter settings for this example are described in [5.2.1 Parameter Settings in Example 1](#) on page 14.

3.2 Example 2: Diversion in a System with IP-DECT, Paging and connection to GSM and E-Mail

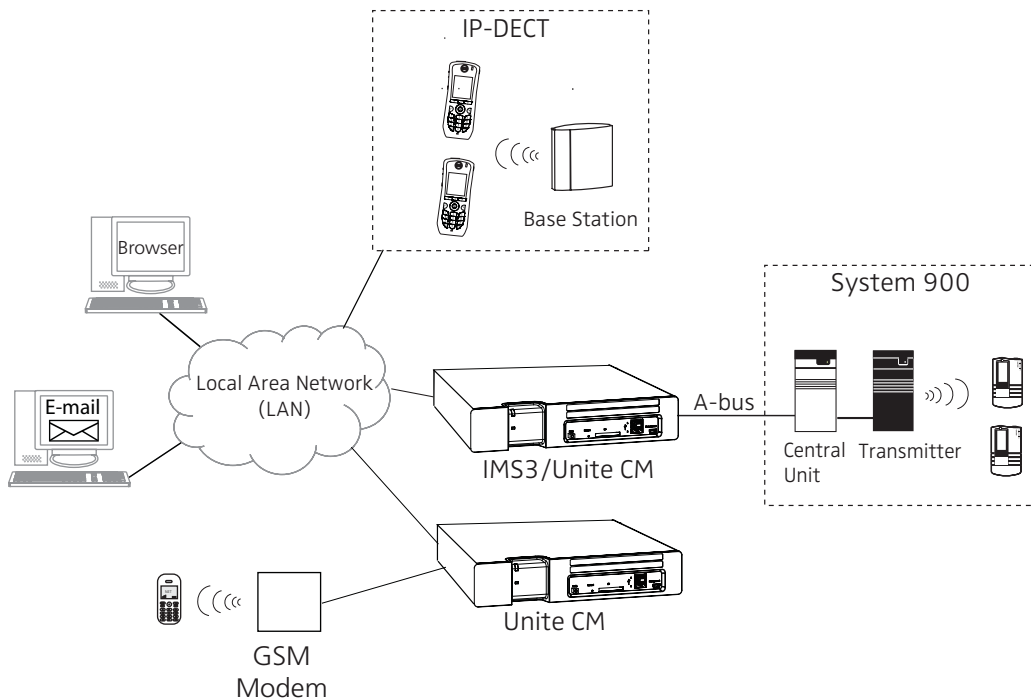


Figure 3. An industrial plant with a multi system installation.

This example shows the same industrial plant as in [3.1 Example 1: Diversion in IP-DECT and Paging system](#) on page 7, but it is extended with a GSM connection, and a mail connection.

A sales person (Jane) working in the company uses a IP-DECT handset when she is in the office. However, Jane spends a lot of her working time on the road, and she is then reached through her cellular phone via the GSM modem. She can also reach her mail remotely via a standard browser.

Through the message routing function Jane's messages are diverted from the IP-DECT handset to her GSM phone and an e-mail is also sent to her mailbox. The message is also diverted to her colleague Adam in the IP-DECT system. If Adam is out of range in the IP-DECT system, the message is diverted to his pocket receiver in System 900.

The parameter settings for this example are described in [5.2.2 Parameter Settings in Example 2](#) on page 17.

3.3 Example 3: Diversion between two DECT Systems Geographically Separated

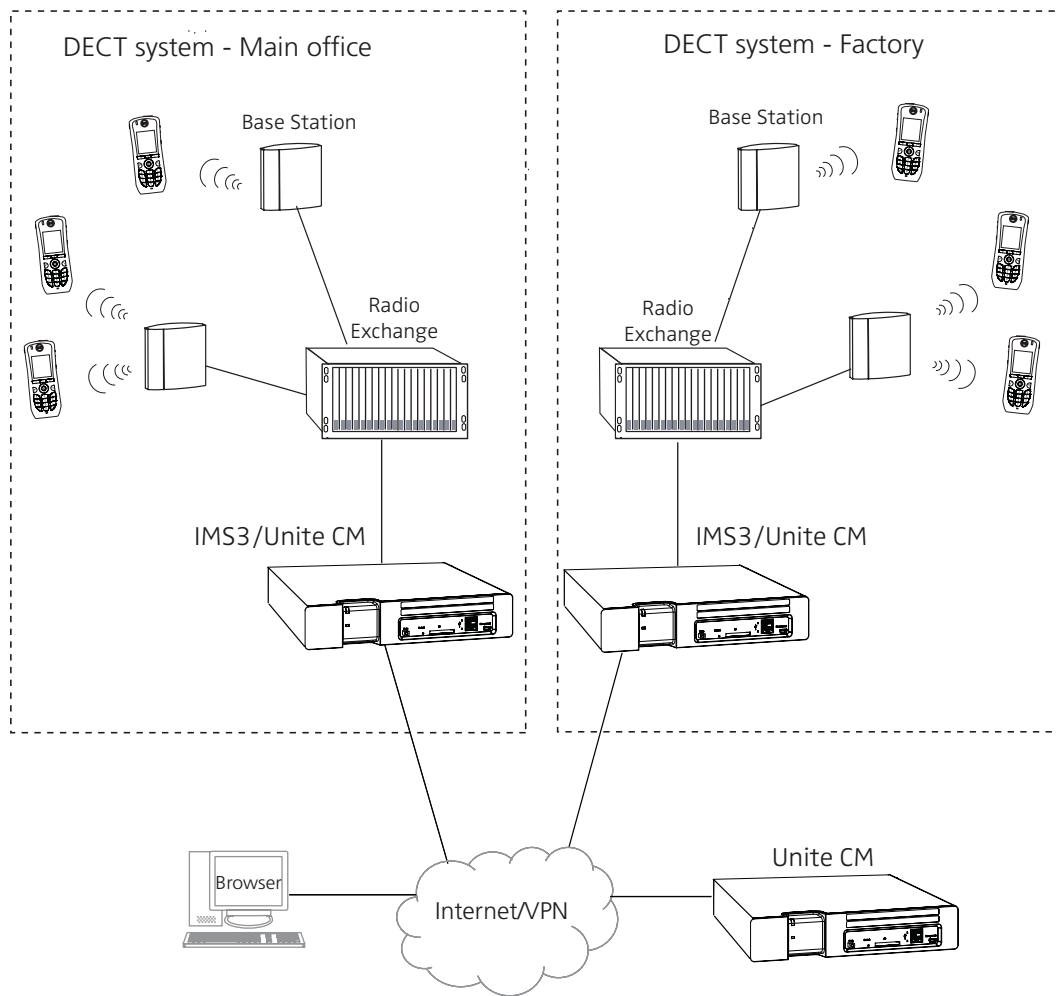


Figure 4. Two DECT systems geographically separated that using the same number plan.

This example shows a company with two sites, where the main office is in one city and the factory in another city. Each site has a DECT system that using a common number plan. If a person is out of range on one site, the message is automatically diverted to the other site.

3.4 Example 4: Messaging routing in a multiple site number plan with one Master

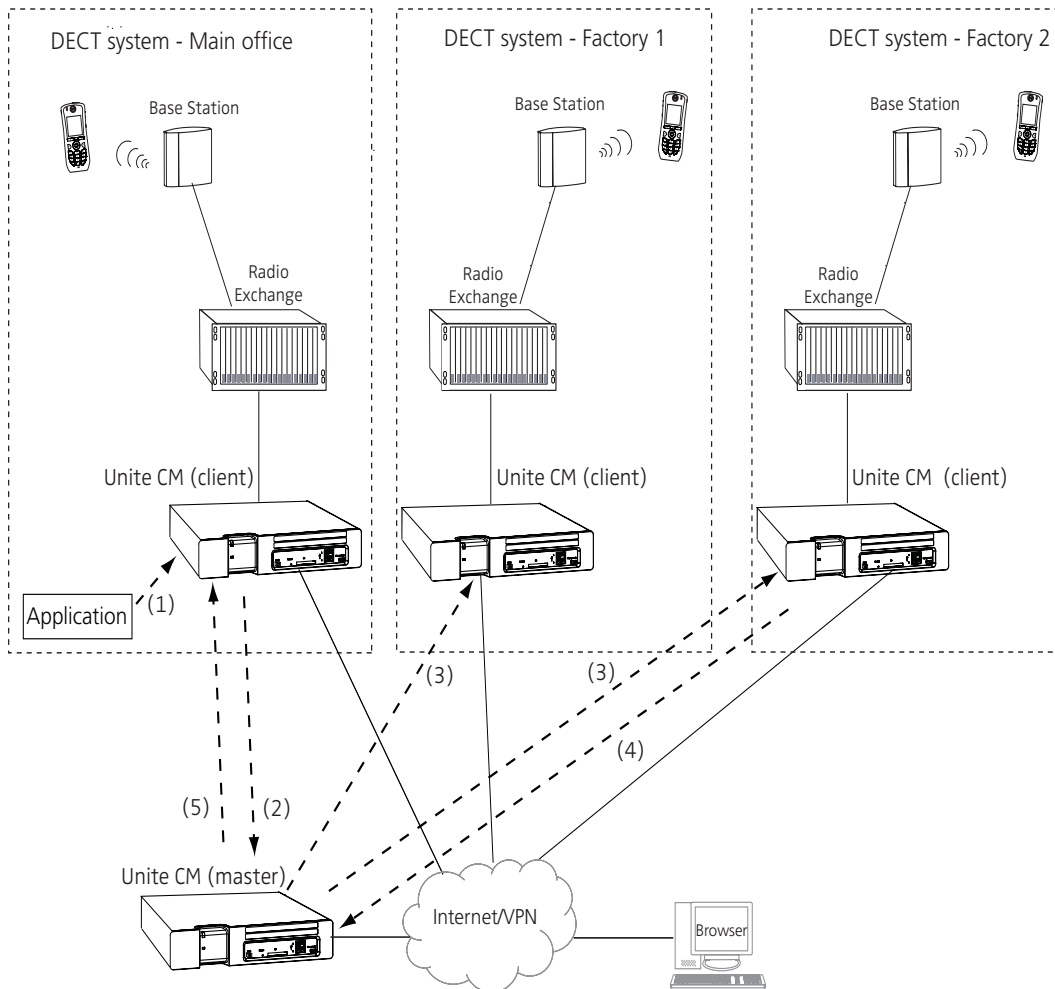


Figure 5. Messaging Routing in a Single Master System

This example shows a company with three sites, where the main office is in one site and the factories in the other sites. Each site has a DECT system and a Unite CM configured as a client. An application (1) on the Main Office site wants to send a message to a handset with Call ID "1234".

The Unite CM on this site searching for the Call ID in its number plan (UNS). In this case, the Call ID is not found and the Unite CM sends a look-up request to the Unite CM acting as a master (2).

The master forwards the request to the other Unite CMs in order to locate which site the handset with Call ID "1234" is registered (3).

The Unite CM on the Factory 2 site responds to the master that the Call ID is found in its number plan (4) and then the master forwards the response to the origin Unite CM (5). The origin Unite CM now know where to send the message.

The parameter settings for this example are described in [5.2.3 Parameter Settings in Example 4](#) on page 18.

3.5 Example 5: Messaging routing in a multi-site number plan with several Unite CM Masters

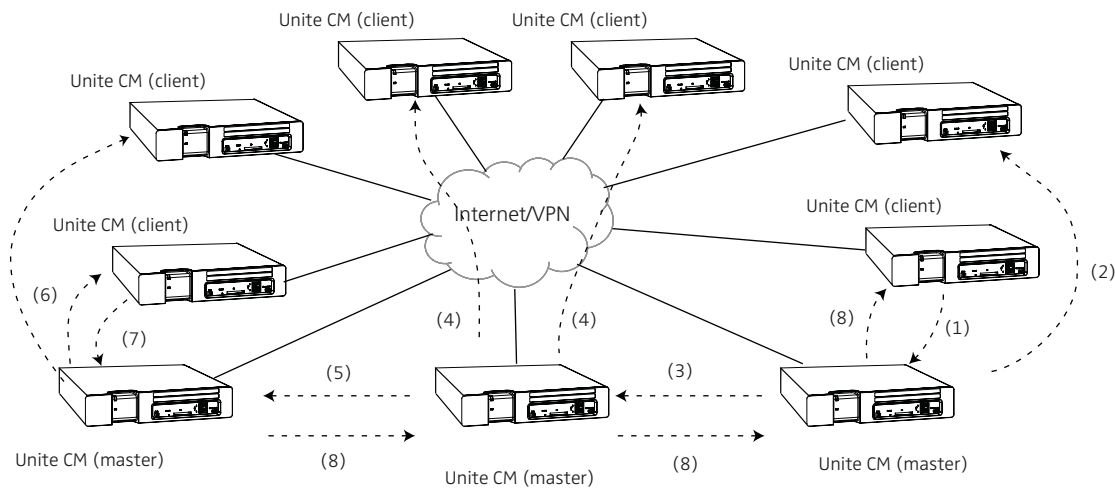


Figure 6. Messaging Routing in Multiple Master System

Large systems may require several Masters since each Master only can handle maximum 20 clients. In this case, the Masters can forward requests between each other if needed. A Master that already has received a request shall not receive the same request again from another Master in order to avoid loops. The solution is that each Master adds its own IP-address to a list when forwarding the look-up request to another Master, and then the receiving Master checks if its forwarding IP-address is in the list. If not, the Master forwards the request to the other Master (if needed).

In figure 6, a Client forwards a look-up request to a Master (1) which will search its number plan for a match. Since no result was found, the request together with its own IP-address is forwarded to the other Clients connected to that Master (2) and to another Master (3). The other Master will search its number plan before forwarding the look-up request to the clients connected to that Master (4). It will also forward to an additional Master but must first make sure that it has not received this request before by checking if its IP-address is found in the list. In this case, no matching IP-address is found and the request is forwarded (5). A client connected to the third Master responds since a matching result was found (7) and the result is sent the same way back as the requests were sent (8). Each Master that receives the result will store it in a cache. The origin Client will also cache the result. The origin Client sends the message to its destination.

3.6 Example 6: Work Shift

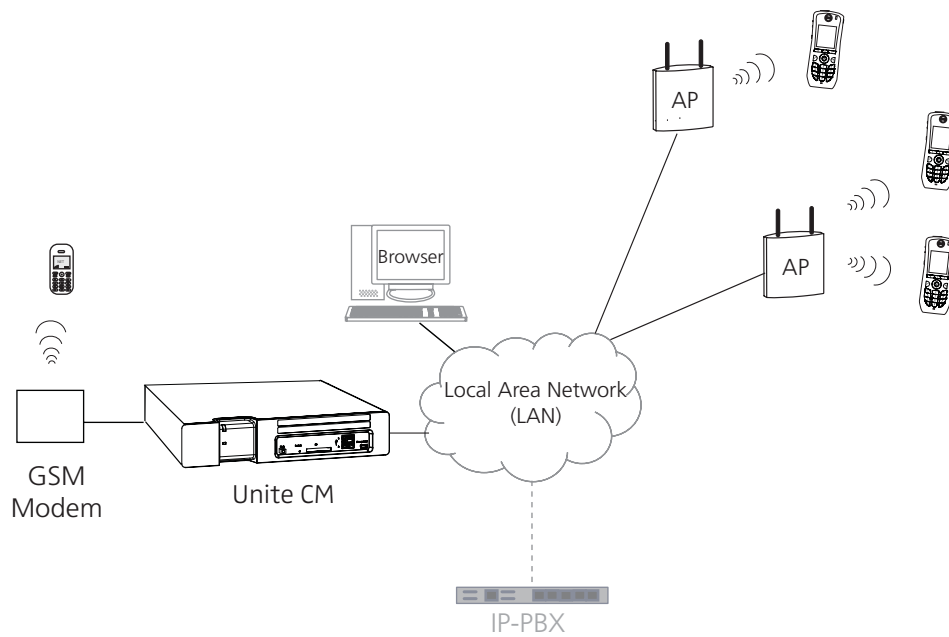


Figure 7. Message routing with active work shift.

This example shows an industrial plant with a Unite CM connected to a VoWiFi system and with a GSM connection. The VoWiFi handsets and the GSM phone are used by employees working in shifts. Through the message routing function, messages are diverted between the different systems.

Adam and Stephen have the same responsibility, but have different working hours. Depending on the active work shift, messages are sent either to Adam or to Stephen. During nights and weekends, on-call duty is handled with help of SMS to the GSM system.

The parameter settings for this example are described in [5.2.4 Parameter Settings in Example 6](#) on page 19.

4 Computer Requirements

Windows® Internet Explorer® 8.0 or later

Mozilla Firefox® 3.6 or later

See the product's Data Sheet for additional requirements.

5 System Installation

5.1 Physical Installation

The installation and configuration of the Unite Connectivity Manager (Unite CM) is described in the Installation Guide, Elise3, TD 92679GB and Installation and Operation Manual, Unite Connectivity Manager, TD 92735EN.

5.2 Parameter Settings

The configuration of messaging routing is done in the Unite CM web GUI. The GUI can be reached from the direct link <http://xxx.xxx.xxx.xxx> where xxx.xxx.xxx.xxx is the IP-address of the Unite CM.

In all following examples, it is assumed that IMS3/Unite CM on each site is configured to forward all number plan requests to the number plan in Unite CM. For more information on how to forward the requests, see Installation and Operation Manual for the IMS3 or Unite CM.

5.2.1 Parameter Settings in Example 1

It is assumed that the categories for DECT (DECT GBG) and System 900 already are defined in the Unite CM that has the number plan.

In this example, the user "John" has a DECT handset as his first choice for message delivery. If he is out of range in the DECT system, the message is diverted to his pocket receiver in System 900.

Adding a Call ID

The Call ID (in this example "john") must be defined in the number plan. This is done on the *Configuration* page under Messaging > Users.

Users

Last Name: Search

Users per page: 25 50 75 100

Last Name: Show all

User 1 - 2 of 2 Number of users: 2 / 100

Last Name	First Name	Call ID	Number/Address	Category	Divert to Number/Address	Category
Smith	John	5000	9875	System 900 Interface		
Smith	John	john	9878	DECT GBG		

Add Advanced Add Save

Figure 8. Add a Call ID.

Setting up an advanced diversion

The Call ID “john” is first located by searching for his Call ID (or Number/Address) under Messaging > Users on the *Configuration* page (on top of the page).

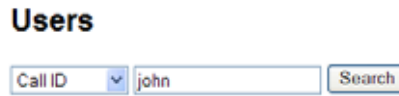


Figure 9. Search for the Call ID.

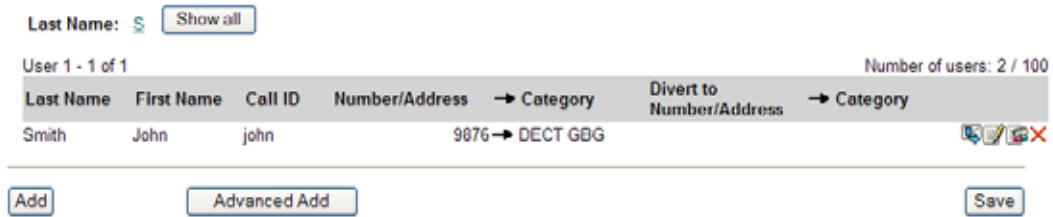



Figure 10. Result of a search.

An advanced diversion is set up by clicking the “” symbol to the right of the User row.

Setup diversion for john

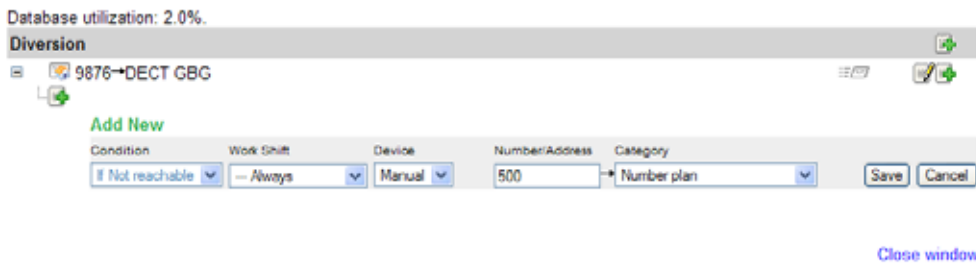


Figure 11. Set up a diversion.

In the “Diversion” page, a new diversion for John was added. The *Condition If Not reachable* was selected, the Call ID for the pocket receiver was entered, and the Category *Number plan* was selected.

The Unite CM looks up the Call ID in the number plan and diverts the message to John’s pocket receiver in System 900.

More information about how to add Call IDs and set up diversions is found in the Installation and Operation Manual, Unite Connectivity Manager, TD 92735EN.

Adding a Call ID and setting up a diversion

The Call ID and the diversion is set up in the Messaging User's "Users" page. The diversion for the DECT handset specifies the Call ID and the Category Number plan.

Users

Import users (.csv)

Click to obtain an [Import Template](#)

Number of users: 2 / 1000





Last Name	First Name	Call ID	Number/Address → Category	Divert to Number/Address → Category	
Smith	John	john	9876 → DECT	5000 → Paging	 
Smith	John	5000	9875 → Paging		 

Figure 12. Add a Call ID and set up a diversion.

More information about how to add Call IDs and set up diversions is found in the Installation and Operation Manual, Unite Connectivity Manager, TD 92735EN.

5.2.2 Parameter Settings in Example 2

It is assumed that the categories DECT system, GSM, System 900 and E-mail are defined in the number plan.

In this example, the user "Jane" has her DECT handset as her first choice for message delivery. If she is not reachable in the DECT system, the message is diverted to her cellular phone in the GSM system and an e-mail is sent to Jane's mailbox through Mailgate. The message is also diverted to a colleague (Adam) in the DECT system. If "Adam" is not reachable in the DECT system, the message is diverted to his pocket receiver in System 900.

All Call IDs are defined in the number plan (see figure below) except Jane's GSM number and her mail address. Direct diversion is used for these destinations.

Call ID	Destination Address
jane	4321 → DECT system
adam's pocket receiver	3214 → System 900
adam	9223 → DECT system

Figure 13. Call IDs in number plan.

Setup diversion for Jane

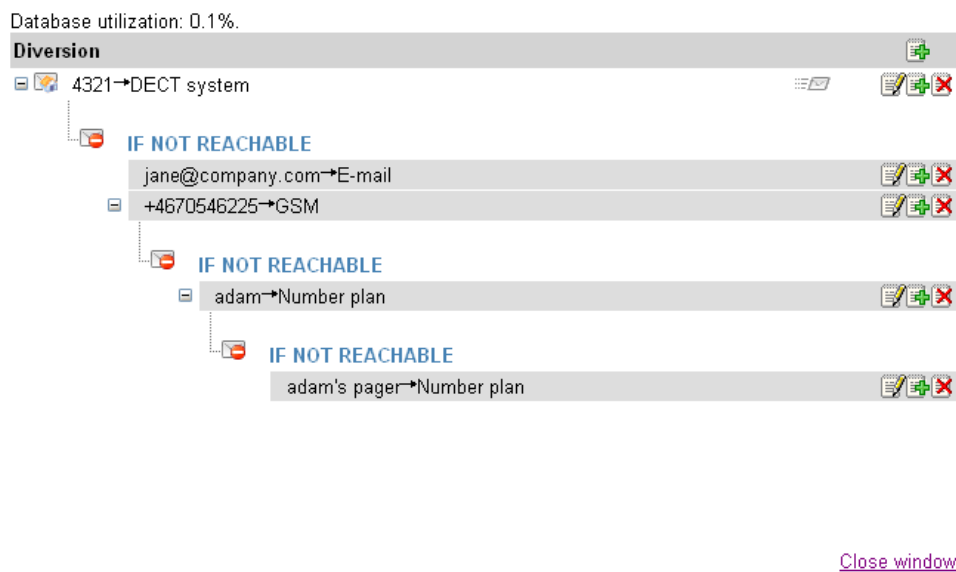


Figure 14. Diversion chain.

Diversions for Jane are set up in the same way as in 5.2.1 Parameter Settings in Example 1 on page 14.

5.2.3 Parameter Settings in Example 4

The Unite CMs (clients) have the following number plans configured:

Unite CM 1

Call ID	Destination Address
1101	172.10.20.1 → DECT system
1201	172.10.20.1 → DECT system

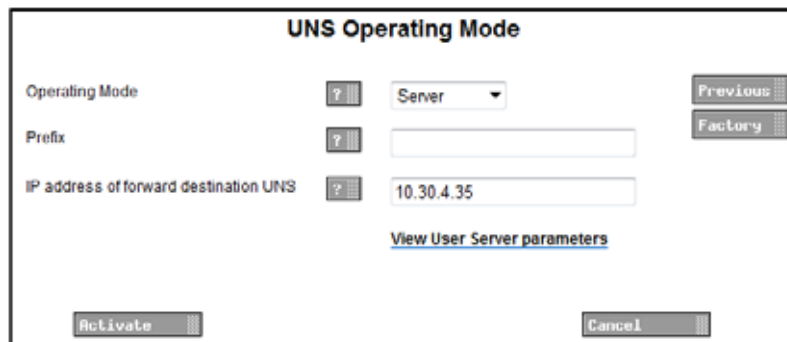
Unite CM 2

Call ID	Destination Address
2101	172.30.20.1 → DECT system
2203	172.30.20.1 → DECT system

Unite CM 3

Call ID	Destination Address
3201	172.50.20.1 → DECT system
3203	172.50.20.1 → DECT system

In addition, each client has also set the *UNS operating mode* to "Server" and the IP-address (for example 10.30.4.35) to the Unite CM (master). When activating this setting, each client sends its own IP-address to the master so it knows which clients that exist.



In this example, an application in Unite CM 1 wants to send a message to Call ID "3201" but cannot find the Call ID in the local number plan. The Unite CM 1 forwards the look-up request to the Unite CM (Master) that in turn forwards the request to Unite CM 2 and Unite CM 3. Since a matching result is found in Unite CM 3, it responds to the Master that in turn responds to the Unite CM 1. The message will now be delivered to the Call ID located in Unite CM 3.

5.2.4 Parameter Settings in Example 6

It is assumed that the categories VoWiFi system and GSM are defined in the number plan in the Unite CM.

In this example the users "Adam" and "Stephen" has a VoWiFi handset as their choice for message delivery.

Depending on work shift, messages are sent to either Adam or Stephen. When they are not working, the messages are sent to a cellular phone in the GSM system.

The Call IDs are defined in the number plan (see figure below) except the GSM number for which direct diversion is used.

Call ID	Destination Address
Adam	9223 → VoWiFi system
Stephen	9532 → VoWiFi system

Figure 15. Call ID in number plan.

The work shifts are set up in the "Work Shift" page.

Work Shifts
















Name	Days	Time	Mode	
Work shift 1	Mon,Tue,Wed,Thu,Fri	06.00-15.00	Time	 
Work shift 2	Mon,Tue,Wed,Thu,Fri	15.00-00.00	Time	 

Figure 16. Work shift set up.

Diversions are setup in the same way for both Adam and Stephen.

Setup diversion for Adam

Database utilization: 0.1%

Diversion		
 9223 → WLAN Messaging Interface [Work shift 1 only]		 
 +46705146115 → GSM [Between shifts]		 
 Stephen → Number plan [Work shift 2 only]		 

[Close window](#)

Figure 17. Diversion depending on shifts.

Top level diversion is used for diversions depending on shift. The diversion was done by clicking the "Add" symbol for top level diversion, see figure 17. One destination per work shift and one destination between shifts has been added.

More information about work shifts is found in the Installation and Operation Manual, Unite Connectivity Manager, TD 92735EN.

6 Related Documents

Data Sheet, Elise3	TD 92678EN	
Data Sheet, IMS3	TD 92779EN	
Data Sheet Unite CM	TD 92739EN	
Installation Guide, Elise3	TD 92679GB	
Data Sheet, Unite Connectivity Manager	TD 92739GB	
Installation and Operation Manual, Unite Connectivity Manager	TD 92735EN	
System Description, Unite	TD 92243GB	
System Planning, Unite	TD 92258GB	

7 Document History

For details in the latest version, see change bars in the document.

Version	Date	Description
A	22 September 2004	First version.
B	24 January 2006	Updated version.
C	23 January 2007	Updated version.
D	22 December 2010	<ul style="list-style-type: none">• Replaced IMS with IMS2 throughout.• Added Unite CM throughout.• Changed Example 4 into a VoWiFi example.
E	29 December 2011	Removed: Replaced ESS with Unite CM throughout. Chapter "Parameter Settings in Example 3 (ESS)" Chapter "Additional Software Requirements" Chapter "Unite Requirement" Updated/Added: See the change bars in the document.