Installation and Operation Manual

IP-DECT Base Station and IP-DECT Gateway (software version 7.2.X)

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Contents

1 Introduction

This document describes commissioning and administration of the following equipment:

- IPBS [1]
- IPBL [2]

The document is intended as a guide for the System administrators:

For information on the IP-DECT system, see the System Description documentation for IP-DECT.

For information about supported PBXs contact your supplier.

1.In previous documentation, *IPBS Base Station* (or *IPBS*) was sometimes referred to as *IP-DECT Base Station*.
2.In previous documentation, *IPBL* was sometimes referred to as *IP-DECT Gateway*.

1.1 Abbreviations and Glossary

Base Station	Common name for IPBS, DECT Base Station (BS3x0) and TDM-DECT Base Station.
DECT	Digital Enhanced Cordless Telecommunications: global standard for cordless telecommunication.
DECT Base Station	Another name for *BS3x0*
TDM-DECT Base Station	Another name for DB1.
DHCP	Dynamic Host Configuration Protocol
DTMF	Dual Tone Multiple-Frequency
FER	Frame Error Rate
GUI	Graphical User Interface
ICP	Interception Computer Protocol
IP	Internet Protocol: global standard that defines how to send data from one computer to another through the Internet
IPBL	Previously called *IP-DECT Gateway* or, more commonly, as "the Blade"
IPBS	Also referred to as *IPBS Base Station*. Previously called *IP-DECT Base Station*
LAN	Local Area Network: a group of computers and associated devices that share a common communication line.
LDAP	Lightweight Directory Access Protocol
LLDP	Link Layer Discovery Protocol: is a vendor-neutral link layer protocol used by network devices for advertising their identity, capabilities, and neighbours on an IEEE 802 local area network.
PBX	Private Branch Exchange: telephone system within an enterprise that switches calls between local lines and allows all users to share a certain number of external lines.
PSCN	Primary receiver Scan Carrier Number: defines the RF carrier on which one receiver will be listening on the next frame.
RFP	Radio Fixed Part. DECT base Station part of the DECT Infrastructure.
RFPI	Radio Fixed Part Identity
RSSI	Radio Signal Strength Information
RSTP	Rapid Spanning Tree Protocol
RTP	Real-Time Transport Protocol
SST	Site Survey Tool
ToS	Type of Service
VLAN	Virtual Local Area Network

2 IP Security

2.1 IP Security Terminology

2.1.1 TLS (former SSL)

Note: Secure Socket Layer (SSL) has been renamed Transport Layer Security (TLS). TLS 1.0 is based on SSL 3.0/3.1. This document hereafter uses the term TLS.

TLS is a security mechanism based on cryptography (see *2.1.3 Cryptography*) and is used for encrypting communications between users and TLS-based Websites. The encryption prevents eavesdropping and tampering with any transmitted data.

TLS operates on the OSI Model Level 5 and uses PKI (see *2.1.2 Public Key Infrastructure*).

2.1.2 Public Key Infrastructure

Public Key Infrastructure (PKI) is a component of Public Key Cryptography (PKC) that uses:

- Public Key Certificates, see *Public Key Certificates (Digital Certificates)*
- Certificate Authorities, see *Certificate Authorities*

Public Key Certificates (Digital Certificates)

Public Key Certificates are used for key exchange and authentication. They are simply electronic documents (files) that incorporate a digital *signature* to bind together a *public key* with an *identity* (information such as the name or a person or organization, their address, and so forth).

The signature may be signed by a trusted entity called a Certificate Authority (CA), see *Certificate Authorities*.

The most common use of public key certificates is for TLS certificates (https websites).

Certificate Authorities

A Certificate Authority or Certification Authority (CA) is a trusted entity which issues public key certificates. The certificates contain a public key and the identity of the owner. The CA asserts that the public key belongs to the owner, so that users and relying parties can trust the information in the certificate.

Certificate Signing Request (CSR) or **Certification Request** is a message that is generated and sent to a CA in order to apply for a TLS certificate. Before the CSR is created a key pair is generated, the private key kept secret. The CSR will contain the corresponding public key and information identifying the applicant (such as distinguished name). The private key is not part of the CSR but is used to digitally sign the entire request. Other credentials may accompany the CSR.

If the request is successful, the CA will send back an identity certificate that has been digitally signed with the CA's private key.

A CSR is valid for the server where the certificate will be installed.

2.1.3 Cryptography

Cryptography is the encoding of messages to render them unreadable by anyone other than their intended recipient(s). Modern cryptography uses complex algorithms implemented on modern computer systems.

Cryptography tasks can be divided into the two general categories Encryption and Authentication.

Encryption

Encryption is the scrambling of information so that the original message cannot be determined by unauthorized recipients by applying an *encryption algoritm* to the message *plaintext* producing *ciphertext* (appearently random bits). A *decryption algoritm*, if given the correct key, converts the ciphertext back into plaintext. Public key algoritms use paired keys, one for encryption and another for decryption.

Authentication

Authentication is the verification of a message's sender. This requires the message to be protected so it cannot be altered, usually by generating a *digital signature* formed by a hash of the message. Only the correct key can generate a valid signature.

2.2 Introduction to IP Security in IP-DECT

A secure system requires more planning than an unsecured system.

2.2.1 Secure Web Access (https)

For IP-DECT devices

- https access should be enabled
- http access should preferably be disabled

For more information see 4.8.3 *Configure the HTTP settings* on page 78 .

2.2.2 TLS Certificates

Security in Web-based applications rely on cryptography. Cryptographical systems are only as secure as their *keys.* This makes *Key Management* a critical and often neglected concern. *TLS Certificates* have emerged as a clever way of managing large scale key distribution.

Two certificate management tasks are needed for TLS:

1 Trust relationships when the device must know which third parties (e.g. IP-PBX) it shall trust in, see *1. Trust Relationships*.

2 Device certificates to authenticate the device against third parties, see *2. Certificate Handling Options with Device Certificates*.

1. Trust Relationships

Trust relationships are defined by a trust list in the device. The list contains the certificates to be accepted by the device for TLS secured connections (e.g. HTTPS, SIPS).

For more information see *Trust List* on page 39.

2. Certificate Handling Options with Device Certificates

There are three certificate handling options:

- Default Device certificate
  The default certificate is supplied with the device. It is a self-signed certificate. Self-signed certificates provide only encryption, not authentication.

  For more information see *Default Device Certificate* on page 41.

- Self-signed certificates
  This option is for customers not planning on having their certificates signed by public or private CAs. Self-signed certificates provide encryption but do in most cases not provide authentication.

  For more information see *Self-signed Certificates* on page 41.

- Certificates signed by a Certificate Authority (CA).
  Two options are possible:
  - **A)** Certificates signed by the customer's own CA. Customers possessing the knowledge and infrastructure to house their own CA could build an internal

enterprise CA, enabling them to sign (approve) their own certificate requests. This would make the customer a private CA.

- **B)** Certificates signed by a trusted public third party entity/organization. There are only about a dozen issuers who have the authority to sign certificates for servers worldwide. An example is VeriSign. To use a public CA for certificate approvals the IP-DECT system would in most cases need to be connected to the Internet and hold a fully qualified domain name. For more information see *Certificate Signing Request (CSR)* on page 42.

2.3 IP-DECT Administrative Functions

2.3.1 Configuration - HTTP

The HTTP tab is used to configure the type of web access that should be allowed for the device, includes a field for configuring https access.

For more information see 4.8.3 *Configure the HTTP settings* on page 78.

2.3.2 Configuration - Certificates

The *Certificates* tab lists the certificate used by web browsers to authenticate the identity of the device (Web server).

For more information see 4.1.5 *Certificates* on page 38.

2.3.3 Configuration - SIPS

SIP Secure (SIPS) is used to encrypt the signalling communication between the IPBS and the IP-PBX. SIPS uses the TLS protocol for encryption. The signalling between the IPBSs is also encrypted by default and there is no possibility to disable it.

For more information see 4.5.20 *Configure Gatekeeper* on page 63.

2.3.4 Configuration - Secure RTP

Secure RTP (SRTP) is used to encrypt the voice communication between the end user equipments.

For more information see 4.5.14 *Secure RTP* on page 59.

3 Configuration

This section describes how to configure the IPBS and IPBL using the web interface. The recommended order to configure the equipment in the IP-DECT system is as follows:

1 Configure the Mobility Master, see 3.4 *Configure the Mobility Master* on page 16.

2 Configure the Standby Mobility Master, see 3.5 *Configure the Standby Mobility Master* on page 16.

3 Configure the Pari Master, see 3.6 *Configure the Pari Master* on page 17.

4 Configure the Standby Pari Master, see 3.7 *Configure the Standby Pari Master* on page 18.

5 Configure the Master, see 3.8 *Configure the Master* on page 18.

6 Configure the Standby Master, see 3.9 *Configure the Standby Master* on page 19.

7 Configure the Radios, see 3.11 *Configure the Radio* on page 20.

Note: When the IPBS/IPBL is reconfigured to another role (for example from being a Standby Master to becoming a Master), a factory reset should be done. See 4.28 *Reset Using the Reset Button* on page 119.

3.1 Requirements

The following is required in order to configure the IP-DECT system:

- PC
- 10/100base-T Ethernet connection

3.1.1 Web Browser Requirements

To use the interface properly, the web browser has to meet the following requirements:

- HTTP 1.1 protocol
- HTML 4.0 protocol
- XML/XSL Version 1.0

3.2 Access the GUI

Note: To access the GUI for an IPBS/IPBL using secure web access (https), the certificate for the IPBS/IPBL can be installed in the web browser to avoid getting certificate error messages. See Appendix F: *Install Certificate in the Web Browser* on page 156.

The GUI interface is accessed through a standard web browser. It is possible to use the name, ipbs-xx-xx-xx (IPBS1), ipbs2-xx-xx-xx (IPBS2) and ipbl-xx-xx-xx (IPBL), where xx-xx-xx is the end of the MAC address.

Note: The IPBL name is always ipbl-xx-xx-xx regardless if LAN1 (MAC xx-xx-xx-xx-xx) or LAN2 (MAC yy-yy-yy-yy-yy) is used.

It is also accessed by entering http://xxx.xxx.xxx.xxx. In this address, *xxx.xxx.xxx.xxx* should be replaced with the IP address determined in 3.2.1 *Determine the IP Address* on page 9.

Access the GUI and change the default password as described in 3.2.2 *Change the Default Password* on page 10.

Note: If the GUI cannot be accessed with Internet Explorer 8 or newer, check that the TLS 1.0 option is activated in the web browser under menu Tools > Internet Option > Advanced > Use TLS 1.0.

3.2.1 Determine the IP Address

The factory setting of the DHCP mode for the LAN1 port is "automatic", at first power up it will act as a DHCP client. If the network has a DHCP server, it will assign an IP address to the IPBS/IPBL. If there is no DHCP server in the network, the IPBS/IPBL can be assigned a predefined IP address. The factory setting of the DHCP mode is to the fixed IP address 192.168.0.1, see 8.2.1 Set 4.2.1 *Set DHCP Mode* on page 44.

Note: After the first startup the DHCP mode should be changed from "automatic" to either "client" or "off", see 4.2.1 *Set DHCP Mode* on page 44.

This section describes how to determine the dynamically allocated IP address. The address is used to access the IPBS/IPBL using a web browser. Two methods are described:

- *In a Network without a DHCP Server* on page 9.
- *In a Network with a DHCP Server* on page 9.

In a Network without a DHCP Server

If the network does not have a DHCP server, and the DHCP mode is set to "automatic" (factory default), follow the steps below.

Note: If the IPBS/IPBL has been used before, it must be restored to factory default settings by performing a long hardware reset, see 4.28 *Reset Using the Reset Button* on page 119.

1 Connect an Ethernet cable between the IPBS/IPBL and the computer.

NOTE: For IPBS, a power adapter must be used.
NOTE: For IPBL, make sure to use the LAN1 port.

2 Ensure that the computer has an IP address within the same IP address range as the IPBS/IPBL (192.168.0.1).

3 Perform a hardware reset by shortly pressing the reset button.
The IPBS/IPBL will be assigned the IP address 192.168.0.1 and the netmask 255.255.255.0.

4 Enter http://192.168.0.1 in the browser to access the IPBS/IPBL GUI.

5 After the first startup, do the following:
On the IPBS: Select LAN1 > DHCP
On the IPBL: Select LAN1 > DHCP

6 In *Mode* drop-down list, change the DHCP mode from "automatic" to "disabled".

In a Network with a DHCP Server

If the network has a DHCP server the IP address is determined following the steps below.

The IPBS's MAC address can be found on the label on the box and on the label on the backside. The IPBL's MAC address can be found on the label on the box. The hexadecimal numbers (xx-xx-xx-xx-xx-xx) represent the MAC address.

Note: Make sure to use the LAN1 port for the IPBL.

Note: In order to determine the IP address it is necessary that the computer is connected to the same LAN (broadcast domain) as the IPBS/IPBL.

Determine the IP address following the steps below:

Note: If the IPBS/IPBL has been used before, it must be restored to factory default settings by performing a long hardware reset, see *4.28 Reset Using the Reset Button* on page 119. Then remove the power supply cable and connect it again.

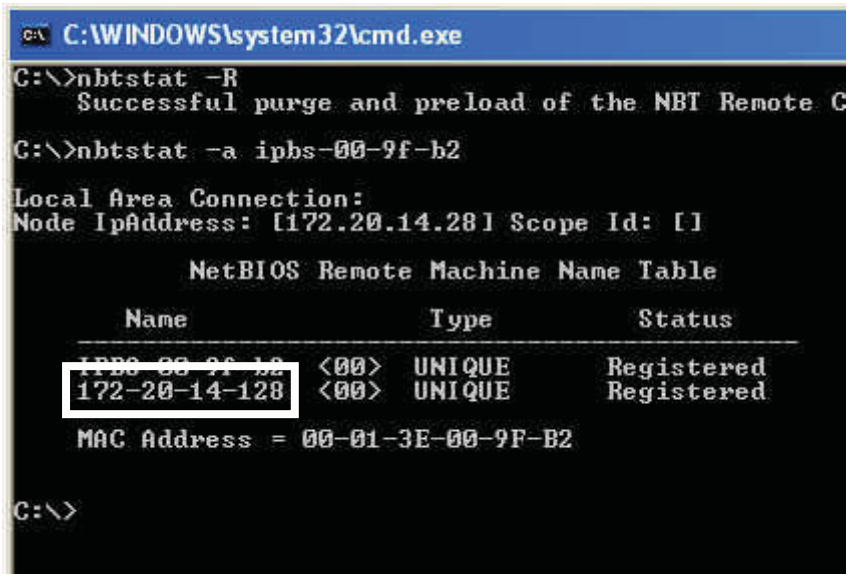
1 Open a command window in windows by selecting Start > Run and enter "cmd" in the *Open:* text field.

2 Enter the following commands:

C:\>nbtstat -R
For IPBS1: **C:\>nbtstat -a ipbs-xx-xx-xx**
For IPBS2: **C:\>nbtstat -a ipbs2-xx-xx-xx**
For IPBL: **C:\>nbtstat -a ipbl-xx-xx-xx**

Where xx-xx-xx should be replaced with the last 6 hexadecimal digits of the MAC-address.

3 The IP address is displayed in the command window, see the white frame in figure below.



4 Enter http://xxx.xxx.xxx.xxx (where *xxx.xxx.xxx.xxx* is the determined IP address) in the browser to access the GUI.

5 After the first startup of the IPBS/IPBL do the following:
On the IPBS: Select LAN1 > DHCP
On the IPBL: Select LAN1 > DHCP

6 In *Mode* drop-down list, change the DHCP mode from "automatic" to "client" or "disabled".

3.2.2 Change the Default Password

1 Enter the IP address determined in *3.2.1 Determine the IP Address* in the web browser address field.

2 Select General > Admin.

3 Enter user name and password in the dialog box.
Default user name is: admin.
Default password is: changeme.

4 Enter a user name in the *User Name* text field.

5 Enter a password in the *Password* text field. Repeat the password in the second text field.

6 Click "OK".

3.3 GUI Web Access

3.3.1 Login Page

When accessing IPBS/IPBL through a web browser the initial page is the login page. This page has two hyperlinks: *System Administration* and *User Administration*.

NOTE: Logging out of the IPBS/IPBL application is done by closing the web browser, to be completely logged out.

3.3.2 Access Levels

Three types of web users (or *Access Levels*) are authorized to access IPBS/IPBL:

- Auditors
- User Administrators
- System Administrators

The different types of access levels are described in the following table.

Access Level	Authorization	Login hyperlink on login page [a]	Described in section
Auditors	• Read access to device parameter settings • Can generate Service Reports	System Administration	*3.3.3 Auditors*
User Administrators	• Add, update and remove users	User Administration	3.3.4 *User Administrators* on page 12
System Administrators	• Write access to all device parameter settings (for example IP addresses, software upgrades) • Assign and modify access to other System Administrator and User Administrator account settings • Add, update and remove users	System Administration	3.3.5 *System Administrators* on page 13

a.Different users should use the hyperlink related to their access level. The system does not allow login by a link not related to the user's access level.

3.3.3 Auditors

Auditors have read access to device parameter settings but are not authorized to update those settings. Auditors are also allowed to generate Service Reports (Administration > Diagnostics > Service Reports).

The login steps for an auditor follow the steps of a normal system administrator login. See 3.3.5 *System Administrators* on page 13 for more information.

3.3.4 User Administrators

IPBS/IPBL is not supplied with preinstalled user administration accounts. Therefore, the first user administration account must be created by a system administrator (see 3.3.5 *System Administrators* on page 13). If additional user administration accounts are needed they must also be created by a system administrator, see *Managing User Administrators* on page 15.

User administrators can only administer users. They can view but not create or manage other user administrator accounts.

Login as User Administrator

To login as a user administrator:

1 Follow 3.2 *Access the GUI* on page 8 and access the device using a web browser.

2 Click the link labelled *User Administration.*

A login window is opened.

3 Enter user name and password for a user administrator.

4 Click "OK" to login.

5 Click the "Show" link.

6 The User Administration page is displayed.

See the figure below for a sample.

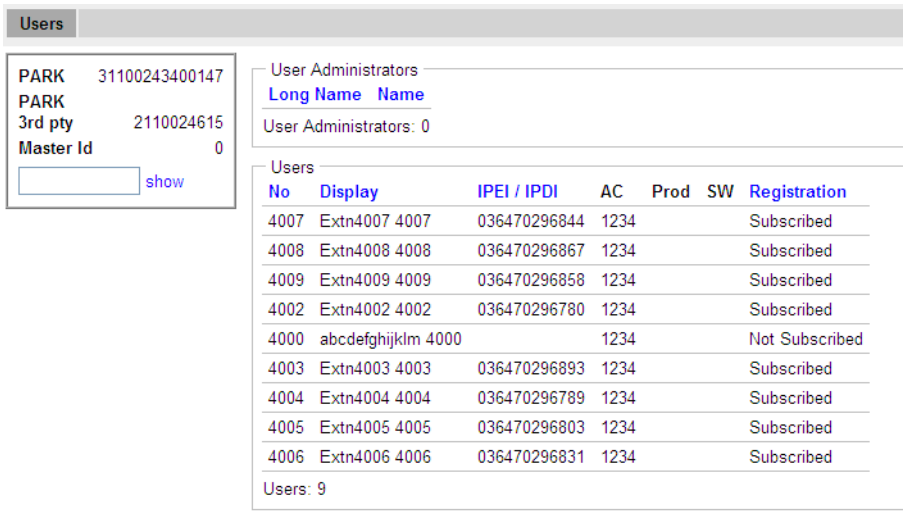


Figure 1. User Administration Sample.

The right side of the page consists of two list sections:

- *User Administrators* in the upper right section. **Note:** this section is read-only since a user administrator cannot manage other user administrators. See *Managing User Administrators* on page 15.
- *Users* in the lower right section. Refer to 3.13 *Add Users* on page 21.

3.3.5 System Administrators

IPBS/IPBL devices are factory delivered with a default system administrator account.

Log in as System Administrator

To login as a system administrator:

1 Follow 3.2 *Access the GUI* on page 8 and access the device using a web browser.

2 Click the link labelled *System Administration.*

A login window is opened.

3 Enter user name and password for a system administrator.

4 Click "OK" to login.

Following tasks can be done:

- Managing the default system administrator account, see *The Default System Administrator Account* on page 14.
- Managing additional system administrator accounts, see *Additional Administrator Accounts* on page 14.

The Default System Administrator Account

The default system administrator account can be modified but cannot be deleted. To modify the default system administrator account, do as follows:

1 Login as system administrator (see *Log in as System Administrator*).

2 Select General > Admin.

3 Select/Enter the following settings:

Field name	Description
Device Name	Enter a description for the device.
User Name	Enter a login user name.
Password	Enter a password.
Confirm Password	Confirm the password.

Note: Only changing the password will not result in the settings being saved. For the settings to be saved, both user name and password must be updated at the same time!

4 Click "OK".

Additional Administrator Accounts

Note: To create additional administrator accounts, Kerberos must have been configured (see 4.1.3 *Centralized Management of Administrator and Auditor Accounts Using Kerberos* on page 28).

To create an additional administrator account, do as follows:

1 Log in as system administrator (see *Log in as System Administrator* on page 13).

2 Select General > Kerberos

3 On the next free account row in the Users section:

- Enter User Name
- Enter Password
- Enter Password again
- Select *Administrator* (for System Administrator) or *Auditor* in the drop-down list (See 3.3.2 *Access Levels* on page 12 for a description of access levels.)

4 Click "OK".

The account row is created.

To modify an additional administrator account, do as follows:

1 Log in as system administrator (see *Log in as System Administrator* on page 13).

2 Select General > Kerberos

3 On an existing account row in the Users section:

- Enter a new user name
- Enter a new password
- Enter the password again
- Select *Administrator* (for System Administrator) or *Auditor* in the drop-down list (See 3.3.2 *Access Levels* on page 12 for a description of access levels.)

4 Click "OK".

The account row is updated.

To delete an additional administrator account, do as follows:

1 Login as system administrator (see *Log in as System Administrator* on page 13).

2 Select General > Kerberos

3 On the row to be deleted, select the *Delete* check box.

4 Click "OK".

The account row is deleted.

Managing User Administrators

Create a User Administrator

IPBS/IPBL is not supplied with preinstalled user administration accounts. Therefore, the first user administration account must be created by a system administrator. If additional user administration accounts are needed they must also be created by a system administrator.

1 Log in as System Administrator (see *Log in as System Administrator* on page 13).

2 Select "Users".

3 Click "show".

The *User Administration* page (see figure 1 on page 13 for a sample) is displayed.

4 Click "new".

5 Select the "User Administrator" radio box. The window layout transforms.

6 Enter a long name.

7 Enter a name (NOTE: This field is used for login).

8 Enter a password.

9 Confirm the password.

10 Click "OK".

View and Modify a User Administrator

1 Login as System Administrator (see 3.3.5 *System Administrators* on page 13).

2 Select "Users".

3 Click "show".

A two-part list page is displayed. At the top are the user administrator accounts and below the user administrators are the user accounts, both listed in alphabetical order.

4 In the *User Administrators* section, click the hyperlink to be edited below the *Long Name* heading. An *Edit User* window is opened.

5 Select/Edit any of the following settings:

- Long Name
- Name (NOTE: This field is used for login)
- Password
- Confirm Password

6 Click "OK".

Delete a User Administrator

1 Login as System Administrator (see 3.3.5 *System Administrators* on page 13).

2 Select "Users".

3 Click "show".

4 In the *User Administrators* section, click the hyperlink to be deleted below the *Long Name* heading. An *Edit User* window is opened.

5 Click "Delete".

The User Administrator is deleted and the windows is closed.

3.4 Configure the Mobility Master

In a system with two or more Masters (Multiple Master system), a Mobility Master must be configured. For more information on Multiple Master Systems, see the applicable System Planning documentation for IP-DECT.

This section describes how to configure the Mobility Master. Each configuration step is briefly described in the step list below. For more detailed information see the corresponding subsection in 4 *Operation* on page 27.

1 Determine the address and access the GUI, see 3.2 *Access the GUI* on page 8.

2 Change the default password, see 3.2.2 *Change the Default Password* on page 10.

3 Set a static IP address and set DHCP to off, see 4.2.2 *Set a Static IP Address* on page 44.

4 Set the mode to Mobility Master, see 4.5.24 *Select Mobility Master Mode* on page 67.

5 Write a login name and enter a password, see 4.5.24 *Select Mobility Master Mode* on page 67.

6 Connect to other Mobility Master(s), see 4.5.25 *Connect Mobility Master to other Mobility Master(s)* on page 68.

7 Enter the Time Server address, see 4.1.4 *Configure the NTP Settings* on page 37.

3.5 Configure the Standby Mobility Master

It is recommended to have a Standby Mobilty Master in a Multiple Master IP-DECT system. This section describes how to configure the Standby Mobility Master. Each configuration step is briefly described in the step list below. For more detailed information see the corresponding subsection in 4 *Operation* on page 27.

1 Determine the address and access the GUI, see 3.2 *Access the GUI* on page 8.

2 Change the default password, see 3.2.2 *Change the Default Password* on page 10.

3 Set a static IP address and set DHCP to off, see 4.2.2 *Set a Static IP Address* on page 44.

4 Set the mode to Standby Mobility Master, see 4.5.24 *Select Mobility Master Mode* on page 67.

5 Enter the Primary Mobility Master IP address, see 4.5.24 *Select Mobility Master Mode* on page 67.

6 Enter a login name and enter a password, this must be the same as in the Primary Mobility Master. See 4.5.24 *Select Mobility Master Mode* on page 67.

7 Connect to other Mobility Master(s). This should be the same Mobility Master(s) as in the Primary Mobility Master, see 4.5.25 *Connect Mobility Master to other Mobility Master(s)* on page 68.

8 Enter the Time Server address, see 4.1.4 *Configure the NTP Settings* on page 37.

3.6 Configure the Pari Master

This section describes how to configure the Pari Master. Each configuration step is briefly described in the step list below. For more detailed information see the corresponding subsection in 4 *Operation* on page 27.

1 Determine the address and access the GUI, see 3.2 *Access the GUI* on page 8.

2 Change the default password, see 3.2.2 *Change the Default Password* on page 10.

3 *Note: This step is not needed if the Pari Master is configured as Mirror. In that case, jump to the next step.*
Configure LDAP user name and password, select the *Write Access* check box, see 4.4.1 *Configure LDAP Server* on page 48.

4 Set a static IP address and set DHCP to off, see 4.2.2 *Set a Static IP Address* on page 44.

5 Set the mode to Active or Mirror, see 4.5.16 *Select Mode* on page 62.

6 Perform a reset to restart the IPBS/IPBL in Active or Mirror mode, see 4.27 *Reset* on page 118.

7 Select system name and password, see 4.5.1 *Change System Name and Password* on page 55.

8 Change subscription method, see 4.5.2 *Set Subscription Method* on page 55.

9 Configure authentication code, see 4.5.3 *Configure Authentication Code* on page 55.

10 Select tones, see 4.5.4 *Select Tones* on page 56.

11 Set default language, see 4.5.5 *Set Default Language* on page 56.

12 Set frequency band, see 4.5.6 *Set Frequency Band* on page 56.

13 Enable carriers, see 4.5.7 *Enable Carriers* on page 56.

14 Enable local R-key handling, see 4.5.8 *Local R-Key Handling* on page 57.

15 Enable No transfer on hangup, see 4.5.9 *No Transfer on Hangup* on page 57.

16 Configure coder, see 4.5.13 *Configure Coder* on page 59.

17 Select supplementary services, see 4.5.15 *Configure Supplementary Services* on page 59.

18 Set Master Id, see 4.5.17 *Set Master Id* on page 63.

19 Enable Pari function, see 4.5.18 *Enable PARI Function* on page 63.

20 Enter gatekeeper IP address or ID, see 4.5.20 *Configure Gatekeeper* on page 63.

21 Connect to a Mobility Master, see 4.5.28 *Connect Master to a Mobility Master* on page 69.

22 Assign PARI, see 4.5.32 *PARI* on page 70.

23 Enter SARI, see 4.5.33 *SARI* on page 70.

24 Enter IMS3/Unite CM IP address, see 4.7.1 *Configure Messaging* on page 73.

25 Enter the Time Server address, see 4.1.4 *Configure the NTP Settings* on page 37.

26 Reset in order to make the configuration changes take effect, see 4.27 *Reset* on page 118.

3.7 Configure the Standby Pari Master

It is recommended to have a Standby Pari Master in the IP-DECT system. This section describes how to configure a Standby Pari Master. Each configuration step is briefly described in the step list below, for more detailed information see the corresponding subsection in 4 *Operation* on page 27.

1 Determine the address and access the GUI, see 3.2 *Access the GUI* on page 8

2 Change the default password, see 3.2.2 *Change the Default Password* on page 10.

3 *Note: This step is not needed if the Standby Pari Master is configured as Mirror. In that case, jump to the next step.*
Configure LDAP replicator, enter the IP address, user name and password to the LDAP server (Pari Master). Alternative LDAP server must not be entered. Select the *Enable* check box, see 4.4.3 *Configure LDAP Replicator* on page 48.

4 Set a static IP address and set DHCP to off, see 4.2.2 *Set a Static IP Address* on page 44.

5 Set the mode to Standby or Mirror, see 4.5.16 *Select Mode* on page 62.

6 Perform a reset to restart the IPBS/IPBL in Standby or Mirror mode, see 4.27 *Reset* on page 118.

7 Enter system name and password, this should be the same system name and password as in the Pari Master, see 4.5.1 *Change System Name and Password* on page 55.

8 Select supplementary services, see 4.5.15 *Configure Supplementary Services* on page 59.

9 Set Master Id, see 4.5.17 *Set Master Id* on page 63.

10 Enable Pari function, see 4.5.18 *Enable PARI Function* on page 63.

11 Enter gatekeeper address, see 4.5.20 *Configure Gatekeeper* on page 63.

12 Connect to a Mobility Master, see 4.5.28 *Connect Master to a Mobility Master* on page 69.

13 Enter IMS3/Unite CM IP address, see 4.7.1 *Configure Messaging* on page 73.

14 Enter the Time Server address, see 4.1.4 *Configure the NTP Settings* on page 37.

15 Reset in order to make the configuration changes take effect, 4.27 *Reset* on page 118.

3.8 Configure the Master

This section describes how to configure the Master. Each configuration step is briefly described in the step list below. For more detailed information see the corresponding subsection in 4 *Operation* on page 27.

1 Determine the address and access the GUI, see 3.2 *Access the GUI* on page 8.

2 Change the default password, see 3.2.2 *Change the Default Password* on page 10.

3 *Note: This step is not needed if the Master is configured as Mirror. In that case, jump to the next step.*
Configure LDAP user name and password, select the *Write Access* check box, see 4.4.1 *Configure LDAP Server* on page 48.

4 Set a static IP address and set DHCP to off, see 4.2.2 *Set a Static IP Address* on page 44.

5 Set the mode to Active or Mirror, see 4.5.16 *Select Mode* on page 62.

6 Perform a reset to restart the IPBS/IPBL in Active or Mirror mode, see 4.27 *Reset* on page 118.

7 Select system name and password, see 4.5.1 *Change System Name and Password* on page 55.

8 Set default language, see 4.5.5 *Set Default Language* on page 56.

9 Select supplementary services, see 4.5.15 *Configure Supplementary Services* on page 59.

10 Set Master id, see 4.5.17 *Set Master Id* on page 63.

11 Enter gatekeeper IP address or ID, see 4.5.20 *Configure Gatekeeper* on page 63.

12 Connect to a Mobility Master, see 4.5.28 *Connect Master to a Mobility Master* on page 69.

13 Enter IMS3/Unite CM IP address, see 4.7.1 *Configure Messaging* on page 73.

14 Enter the Time Server address, see 4.1.4 *Configure the NTP Settings* on page 37.

15 Reset in order to make the configuration changes take effect, see 4.27 *Reset* on page 118.

3.9 Configure the Standby Master

It is recommended to have a Standby Master in the IP-DECT system. This section describes how to configure a Standby Master. Each configuration step is briefly described in the step list below, for more detailed information see the corresponding subsection in 4 *Operation* on page 27.

1 Determine the address and access the GUI, see 3.2 *Access the GUI* on page 8.

2 Change the default password, see 3.2.2 *Change the Default Password* on page 10.

3 *Note: This step is not needed if the Standby Master is configured as Mirror. In that case, jump to the next step.*
Configure LDAP replicator, enter the IP address, user name and password to the LDAP server. Alternative LDAP server must not be entered. Select the *Enable* check box, see 4.4.3 *Configure LDAP Replicator* on page 48.

4 Set a static IP address and set DHCP to off, see 4.2.2 *Set a Static IP Address* on page 44.

5 Set the mode to Standby or Mirror, see 4.5.16 *Select Mode* on page 62.

6 Perform a reset to restart the IPBS/IPBL in Standby or Mirror mode, see 4.27 *Reset* on page 118.

7 Enter system name and password, this should be the same system name and password as in the Master. See 4.5.1 *Change System Name and Password* on page 55.

8 Select supplementary services, see 4.5.15 *Configure Supplementary Services* on page 59.

9 Set Master Id, see 4.5.17 *Set Master Id* on page 63.

10 Enter gatekeeper address, see 4.5.20 *Configure Gatekeeper* on page 63.

11 Connect to a Mobility Master, see 4.5.28 *Connect Master to a Mobility Master* on page 69.

12 Enter IMS3/Unite CM IP address, see 4.7.1 *Configure Messaging* on page 73.

13 Enter the Time Server address, see 4.1.4 *Configure the NTP Settings* on page 37.

14 Reset in order to make the configuration changes take effect, see 4.27 *Reset* on page 118.

3.10 Plug and Play Configuration

Radios can be configured from the relevant Pari Master. When a new Radio is connected to the system, it automatically registers itself as an uninitialized registration to all Pari Masters in the system. It is possible to assign the Radio to one Pari Master. See *Add Radios* on page 85.

3.11 Configure the Radio

This section describes how to configure the Radio. Each configuration step is briefly described in the step list below, for more detailed information see the corresponding subsection in 4 *Operation* on page 27.

Note: When one Radio is configured, the configuration can be saved and uploaded to the other Radios in the system.

1 Determine the address and access the GUI, see 3.2 *Access the GUI* on page 8.

2 Change the default password, see 3.2.2 *Change the Default Password* on page 10.

3 Set DHCP mode to "Client", see 4.2.3 *Dynamic IP address via DHCP* on page 45.

4 Enable the Radio in the IPBS/IPBL, see 4.5.29 *Enable the Radio* on page 69.

5 Select system name and password, see 4.5.1 *Change System Name and Password* on page 55.

6 Enter Pari Master and Alternative Pari Master IP addresses, see 4.5.30 *Enter IP Address to the PARI Master and the Standby PARI Master* on page 69.

7 Configure air synchronization, see 4.5.34 *Configure Air Synchronization* on page 71.

8 Enter the Time Server address, see 4.1.4 *Configure the NTP Settings* on page 37.

9 Reset in order to make the configuration changes take effect, see 4.27 *Reset* on page 118.

10 Save the configuration of the Radio, see 4.14 *Backup* on page 105.

Configure the rest of the IPBSs/IPBLs following the steps below:

Note: Uploading the same configuration to all Radios can only be done if the DHCP is set to client.

1 Determine the address.

2 Select Update > Config and browse to the previously saved configuration. Click "OK".

3 Reset in order to make the configuration changes take effect, see 4.27 *Reset* on page 118.

4 Repeat step 1 to 3 for all Radios.

3.12 Configure Deployment

This section describes how to configure an IPBS for deployment used for coverage test of air sync and speech.

NOTE: For coverage test of air sync, two IPBSs must be configured, one as Sync Master and one as Sync Slave.

Each configuration step is briefly described in the step list below. For more detailed information see the corresponding subsection in 4 *Operation* on page 27.

1 Determine the IP address and access the GUI, see 3.2 *Access the GUI* on page 8.

2 Change the default password, see 3.2.2 *Change the Default Password* on page 10.

3 Set a static IP address and set DHCP to off, see 4.2.2 *Set a Static IP Address* on page 44.

4 Set the mode to Master, see 4.5.16 *Select Mode* on page 62.

5 Perform a reset to restart the IPBS/IPBL in Master mode, see 4.27 *Reset* on page 118.

6 Select system name and password, see 4.5.1 *Change System Name and Password* on page 55.

7 Set subscription method, see 4.5.2 *Set Subscription Method* on page 55.

8 Configure authentication code, see 4.5.3 *Configure Authentication Code* on page 55.

9 Select tones, see 4.5.4 *Select Tones* on page 56.

10 Set default language, see 4.5.5 *Set Default Language* on page 56.

11 Set frequency band, see 4.5.6 *Set Frequency Band* on page 56.

12 Enable carriers, see 4.5.7 *Enable Carriers* on page 56.

13 Set Master Id, see 4.5.17 *Set Master Id* on page 63.

14 Enable Pari function, see 4.5.18 *Enable PARI Function* on page 63.

15 Assign PARI, see 4.5.32 *PARI* on page 70. Note: If two IPBSs are configured for coverage test of air sync, both IPBS must have the same system ID.

16 Enter SARI, see 4.5.33 *SARI* on page 70.

17 Reset in order to make the configuration changes take effect, see 4.27 *Reset* on page 118.

18 For coverage test of speech sync, register one handset in the IPBS configured as Sync Master, see 3.13 *Add Users* on page 21.

19 Set the mode to Deployment, see 4.5.16 *Select Mode* on page 62.

3.13 Add Users

This section describes how to add users to the IP-DECT system. The IPEI, which is the unique identification number of the handset, can be registered in three ways:

- Anonymous Registration can be used in en existing IP-DECT system. Instead of the administrator collects all the handset, the user of the handset does the registration.

The IPEI is automatically associated to the user, see 3.13.1 *Anonymous Registration* on page 22.

- Individual Registration can be used if a few new handsets shall be added to the IP-DECT System. The IPEI is entered manually, see 3.13.2 *Individual Registration* on page 23.
- Easy Registration can be used if many users shall be added to the IP-DECT System. The IPEI is entered with for example a barcode reader to a csv file, see 3.13.3 *Easy Registration* on page 25.

Note: Display Name is only used during Active Directory (AD) replication, see *Attribute Mappings* on page 50.

3.13.1 Anonymous Registration

Anonymous Registration is done in two steps. First, the user is registered in the IP-DECT System. Second, the handset is assigned to the user from the handset.

Add users in the IP-DECT System

1 Under *Administration*, select "Users".

2 Click "New".

3 Enter the following information in the corresponding text fields, leave the *IPEI / IPDI* text field empty, do not remove the automatically generated *Auth. Code*:

Field name	Description	Max. characters
Long Name	Mandatory, the name of the user, need to be unique throughout the system.	30
Display Name	Optional and only available when using the Ascom VoIP Gateway, the calling or called party name will be shown in the handset display (depending on whose handset).	30
Name	Optional, the user name.	30
Number	Mandatory, the phone number extension, need to be unique throughout the system.	30
Auth Name (SIP)	Auth name is the Authentication name used in SIP authentication. If it is not set the number will be used as authentication name. If SIP authentication is used or not is decided by the configuration in the IP-PBX.	60
Password	Optional, is used for registration towards the gatekeeper. However, in a system with many users where the same password shall be used for all users, instead of setting the password here, it is possible to use the system password for registration towards the gatekeeper. To enable registration with system password, see 4.5.20 *Configure Gatekeeper* on page 63.	30
Idle Display	Optional, will be shown in the handset display when the handset is idle.	47

4 Click "OK".

5 Repeat step 2 to 4 for all users.

Assign Handsets to Users

1 Select DECT > System.

2 In the *Subscriptions* drop-down list, select "With System AC" to enable anonymous registration. Click "OK".

3 Perform an "over air subscription" using the system Authentication Code. For information on how this is done, see the reference guide of the handset.
The handset IPDI number appears in the Anonymous list. To view the list: Select Users > Anonymous.

4 Assign the handset to any user, subscribed or unsubscribed, on any Master defined in the system by calling the desired Master id & extension & optional individual AC code and hang up.
Example where **0** is the Master id, **200** is the extension and **1234** is the AC code: *0*200*1234#. If **200** is occupied by another handset, the new handset will be assigned this identity and the old handset will be moved to the anonymous list when logging in the new handset.
NOTE: When using AC code, start with * and end with # character. Otherwise skip the *# characters.

5 Repeat step 3 - 4 for all handsets.

Note: For safety reasons, when the Anonymous Registration is finished change the Subscription Method to "*Disable*" or "*With User AC*". See below for more information.

6 Select DECT > System.

7 Disable anonymous registration by selecting "Disable" or "With User AC" in the Subscription drop-down list. Click "OK".

3.13.2 Individual Registration

1 Select DECT > System.

2 In the *Subscriptions* drop-down list, select "With System AC" or "With User AC". Click "OK".

Tip: See also 4.5.2 *Set Subscription Method* on page 55 for more information.

3 Select "Users".

4 Click "New".

5 Enter the following information in the corresponding text fields:

Field name	Description	Max. characters
Long Name	Mandatory, the name of the user, need to be unique throughout the system.	30
Display Name	Optional and only available when using the Ascom VoIP Gateway, the calling or called party name will be shown in the handset display (depending on whose handset).	30
Name	Optional, the user name.	30
Number	Mandatory, the phone number extension, need to be unique throughout the system.	30

Auth Name (SIP)	Auth name is the Authentication name used in SIP authentication. If it is not set the number will be used as authentication name. If SIP authentication is used or not is decided by the configuration in the IP-PBX.	60
Password	Optional, is used for registration towards the gatekeeper. However, in a system with many users where the same password shall be used for all users, instead of setting the password here, it is possible to use the system password for registration towards the gatekeeper. To enable registration with system password, see 4.5.20 *Configure Gatekeeper* on page 63.	30
IPEI / IPDI	The unique identification number of the handset.	
Idle Display	Optional, will be shown in the handset display when the handset is idle.	47
Auth. Code	Optional, the individual authentication code for this user. Automatically created by default. Can be modified manually.	

6 Click "OK".

7 If "With User AC" have been selected as subscription method, see step 2 above: In the column "IPEI / IPDI", click on the blue text link for the user to allow subscription within 2 minutes.

8 Perform an "over air subscription" using the individual authentication code. For information on how this is done, see the reference guide of the handset.

3.13.3 Easy Registration

Easy Registration is done in two steps. First, the users are registered in the IP-DECT System through an import of a csv file. Second, the handset is assigned automatically to the user from the handset.

Add users in the IP-DECT System

If many users should be added it is possible to import a csv file with the IPEI / IPDI.

Field name	Description	Max. characters
Long Name	Mandatory, the name of the user, need to be unique throughout the system.	30
Display Name	Optional and only available when using the Ascom VoIP Gateway, the calling or called party name will be shown in the handset display (depending on whose handset).	30
Name	Optional, the user name.	30
Number	Mandatory, the phone number extension, need to be unique throughout the system.	30
Auth Name (SIP)	Auth name is the Authentication name used in SIP authentication. If it is not set the number will be used as authentication name. If SIP authentication is used or not is decided by the configuration in the IP-PBX.	60
Password	Optional, is used for registration towards the gatekeeper. However, in a system with many users where the same password shall be used for all users, instead of setting the password here, it is possible to use the system password for registration towards the gatekeeper. To enable registration with system password, see 4.5.20 *Configure Gatekeeper* on page 63.	15
IPEI / IPDI	The unique identification number of the handset.	
Idle Display	Optional, will be showed in the handset display when the handset is idle.	47

The csv file may have the following format:

Long Name;Name;Number;Display Name;Auth Name (SIP);Idle Display;IPEI/IPDI;Password;

Different separators may be used in a delimiter-separated file. Import of files with the separators semicolon or TAB is supported.

1 Select Users.

2 Click “Import”.

3 Click “Browse” to locate the csv file.

4 Click Open > Next Make sure the correct number of entries are correct.

5 Click Next

Limitations

- Maximum 1000 rows in the csv file.
- The maximum csv file size is 128 Kb. If the file is to large, divide the file into several files.
- Only the new user data is imported. The old user data is not deleted.
- Existing user data cannot be updated.
- If the separator is wrong an error message will be displayed.
- The Authentication Code (AC) can not be entered in the csv file for safety reasons. The system generates a AC for every user in the list. If the user needs the AC the administrator will have to use Show, see 4.9.1 *Show all Registered Users in the IP-DECT System* on page 83.
- The software in the Handset d41, d62 and d81 must have support for Easy Registration.
- No other handsets in addition to the above works.

Assign Handset to Users

1 Select DECT > System.

2 In the *Subscriptions* drop-down list, select "With User AC" or "With System AC" to enable easy registration. Click "OK".

3 If "With User AC" have been selected as subscription method:
In the column "IPEI / IPDI", click on the blue text link for the user to allow subscription within 2 minutes.

4 Perform an "over air subscription" by inserting the battery in the handset. The handset automatically connects to the IP-DECT system and assigns to the correct user.

4 Operation

This section describes the settings in the Configuration and Administration menu, each subsection represents a sub menu to the Configuration and Administration menu.

Some changes require a reset in order to take effect. It is possible to do several changes before resetting the IPBS/IPBL.

The GUI for the IPBS and IPBL are similar. Screen shots from the IPBS are used as default.

4.1 General

This section describes how to do the following configurations and settings.

- Name the equipment
- Change Administrator User Name and Password
- Kerberos
- Configure the NTP settings

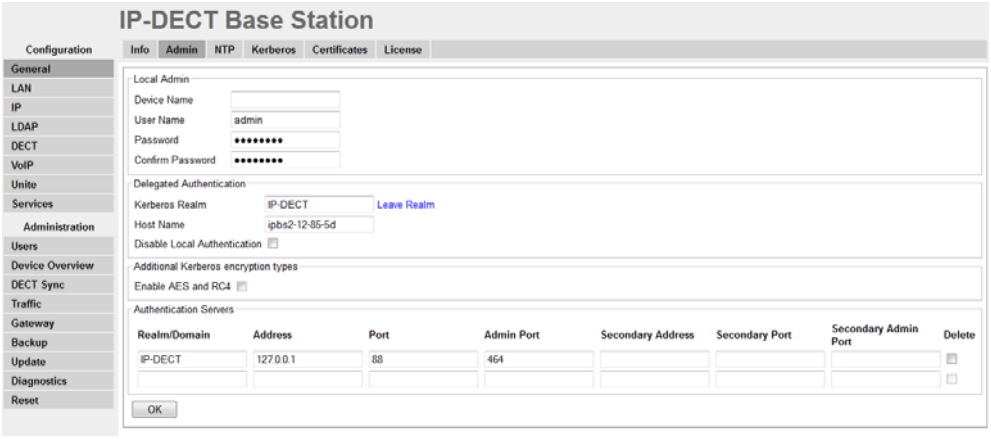


Figure 2. Assigning an administrator name, username, and password.

4.1.1 Name the IPBS and IPBL

Each IPBS/IPBL can be assigned a name. It is recommended to assign a descriptive name for example IPBS/IPBL location.

1 Select General > Admin.

2 Enter a name in the Device Name text field.

3 Click "OK".

4.1.2 Change User Name and Password

The user name and password are used to access the IPBS/IPBL through the web GUI.

1 Select General > Admin.

2 Write a user name in the User Name text field.

3 Enter a new password in the Password text field. Repeat the password in the second text field.

4 Click "OK".

4.1.3 Centralized Management of Administrator and Auditor Accounts Using Kerberos

In software version 3.X.X, each IPBS/IPBL had their own set of administrator/auditor accounts. Kerberos is a network authentication protocol that is used when you want to have the same set of user accounts for several IPBSs/IPBLs and then want to administrate these user accounts at one central location (Kerberos server). When an IPBS/IPBL is setup as a Kerberos server the IPBS/IPBL act as an authentication server for the rest of the IPBSs/IPBLs that are setup as client devices in the installation. The Kerberos server and the group of client devices constitute a domain called a realm. During Kerberos communication no password is actually sent over the network. Kerberos uses encrypted data packets (tickets) which are time-stamped and expire after a certain period of time. Therefore it is crucial to get the correct time across the system for which a NTP server should be used.

Set up the Kerberos server

It is recommended to set up the Kerberos server on the Master. To configure an IPBS/IPBL to act as a Kerberos server, do the following:

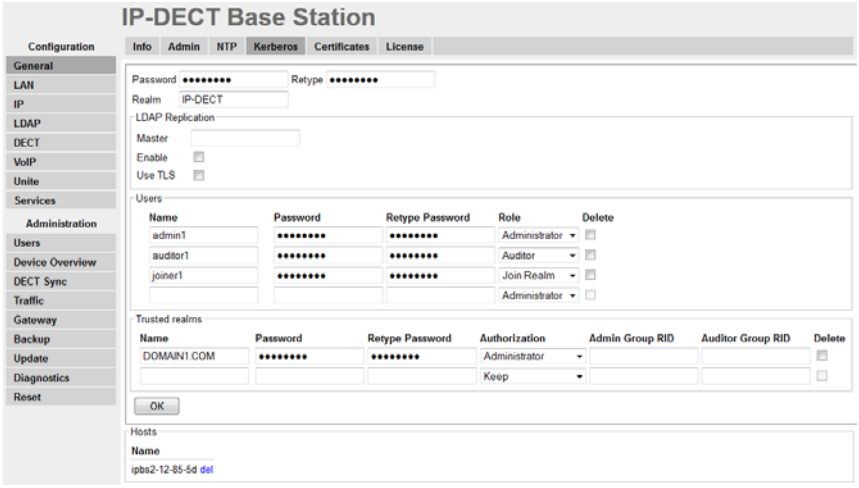


Figure 3. Configure Kerberos server

1 Make sure that the IP address of a NTP time server is specified. Select General > NTP.

2 Select General > Kerberos.

3 Enter a root password for the Kerberos server. This password is used to encrypt the information stored on the server.

4 Click "OK".

5 The Kerberos server is enabled. Enter the realm name of your choice in the *Realm* field. The Kerberos realms are typically written in upper-case letters.

6 Select/Enter the following information for the users of the realm.

Field Name	Description
Name	Enter a login user name.
Password	Enter a password.
Retype Password	Confirm password.

Role	• Administrator: Write access to all device parameter settings. • Auditor: Read access to device parameter settings. • Join Realm: Add devices to the realm. Is used only to add or remove devices in the realm. This role cannot be used to login to the GUI.

7 Click "OK".

Set up the client

Depending on the type of system the IPBS/IPBL can be configured to act as a client in three different ways:

- Configure IPBS/IPBL as a client in a small existing system (few clients), see *Configure IPBS/IPBL as a client in a small existing system (few clients)*.
- Configure IPBS/IPBL as a client in a large existing system (many clients), see *Configure IPBS/IPBL as a client in a large existing system (many clients)* on page 30.
- Configure IPBS/IPBL as a client in a new system, see *Configure IPBS/IPBL as a client in a new system* on page 30.

Configure IPBS/IPBL as a client in a small existing system (few clients)

The location of the Kerberos server must be configured locally on each client. The server must be configured as a client as well so that it can also join the realm. To configure each IPBS/IPBL as a client, do the following:

1 Make sure that the IP address of a NTP time server is specified. Select General > NTP.

2 Select General > Admin.

3 Go to the *Additional Kerberos encryption types* section.

4 Select the *Enable AES and RC4* check box.

5 Go to the *Authentication Servers* section.

6 In the *Realm/Domain* text field, enter the realm name specified in the Kerberos server.

7 In the *Address* text field, enter the IP address of the Kerberos server. In the Kerberos server enter 127.0.0.1 (localhost) as the IP address. The *Port* and the *Admin Port* text fields are filled out automatically with default ports. Note: If other than default ports are used, in the text fields replace the default ports with the other ports.

8 In the *Secondary Address* text field, enter the IP address of the secondary Kerberos server. In the secondary Kerberos server enter 127.0.0.1 (localhost) as the IP address. The *Secondary Port* and the *Secondary Admin Port* text fields are filled out automatically with default ports. Note: If other than default ports are used, in the text fields replace the default ports with the other ports.

9 Click "OK".

Join the realm

To enable delegated authentication using the Kerberos server, each client must join the Kerberos realm of the server. To join the realm, do the following:

1 Select General > Admin.

2 Click on the blue text link "Join realm" in the *Delegated Authentication* section.

3 In the *Join Kerberos realm* window, enter the following in the text fields:
Realm: Enter the realm name of the Kerberos server.
Host name: The MAC address of the device. Default value is used.
Admin user name and Admin password: Enter the user name and password for a user with administrator account or "join realm" account on the Kerberos server.

4 Click "Join".

Configure IPBS/IPBL as a client in a large existing system (many clients)

Requirements for IPBS/IPBL: Software version 6.1.X is required if Windows 2008 R2 server is used.

1 Setup the update server using the update script described in *Appendix E*.

2 Select DECT > Radio config.

3 Go to the *Update* section.

4 In the *Command File URL* text field, enter the path to the update server and the name of the update script.

5 In the *Interval (min)* text field, enter the update period.

6 Click "OK".

After the script is executed and each Radio is restarted, the Kerberos client will join the Kerberos Server and it shall be possible to see all joined Kerberos clients in the bottom of the *Kerberos Server* tab.

The way the update script is done in *Appendix E: Update Script for Configuration of Kerberos Clients* it will automatically disable the local login possibilities if the joining was successful.

The password used in the script is now possible to change to a more secret password from the Kerberos server page.

It shall now be possible login to the Radio using the Kerberos login credentials, see *Log in using Kerberos* on page 31.

Configure IPBS/IPBL as a client in a new system

Precondition: The IPBS/IPBL must have software version 4.1.X or higher.

The idea is to use the *Device Overview -> Add* to configure the Radios and the Kerberos Client. By using this feature it is not needed to browse into each Radio for configuration.

The Radios are in broadcast mode which means none of them are attached to the Master and configured. If any of the Radios are attached to the master and configured, the Radios must be detached from the Master if this procedure shall work.

1 Select Device Overview > Radios.

2 Click "Add" to add the Radio to the Master.

3 In the *Add Radio* window, enter a name for the device. You can also add a Standby Master IP Address.

4 Go to the *Kerberos* section and enter the following in the text fields:
Realm: Enter the realm name of the Kerberos server.
Host name: Optional.
User: Enter the same user name defined in the Kerberos server.
Password: Enter the same password defined in the Kerberos server.
Disable local authentication: Select the *Disable local authentication* check box

(recommended).
Enable AES and RC4: Select the *Enable AES and RC4* check box.
Overwrite existing: Select the *Overwrite existing* check box (optional).

5 Go to the *Authentication Servers* section.

6 In the *Realm/Domain* text field, enter the realm name specified in the Kerberos server.

7 In the *Address* text field, enter the IP address of the Kerberos server. In the Kerberos server enter 127.0.0.1 (localhost) as the IP address. The *Port* and the *Admin Port* text fields are filled out automatically with default ports. Note: If other than default ports are used, in the text fields replace the default ports with the other ports.

8 In the *Secondary Address* text field, enter the IP address of the secondary Kerberos server. In the secondary Kerberos server enter 127.0.0.1 (localhost) as the IP address. The *Secondary Port* and the *Secondary Admin Port* text fields are filled out automatically with default ports. Note: If other than default ports are used, in the text fields replace the default ports with the other ports.

9 Click "OK".

Log in using Kerberos

1 Make sure that secure HTTPS protocol is used when logging in.

2 Login on the client using a server account. When prompted for user name, the name of the realm has to be entered in front of the user name, separated by a backslash in the following way: REALM\username or username@REALM.

Disable local authentication

It is recommended to disable local authentication after Kerberos authentication is configured. It provides additional security and it is much easier to change the password of a user account or delete a compromised user account on the Kerberos server than changing the local user accounts on each IPBS/IPBL.

IMPORTANT: Make sure that the Kerberos authentication is working properly before disabling local authentication. If the Kerberos authentication is not working and local authentication is disabled it is not possible to access the IPBS/IPBL in any other way.

1 In the *Delegated Authentication* section select the *Disable local authentication* check box.

2 Click "OK".

Configure cross-realm authentication

Cross-realm authentication is used to authenticate users from another trusted realm. In this way it is possible for IP-DECT users to login to the IPBS/IPBL using their Windows user name and password in the Active Directory (AD). Security policies of the AD can then be used in IP-DECT. The trust relationship between the two realms is confirmed by configuring a shared password on both servers in the realms. This password is used to encrypt communication between the realms. To configure cross-realm authentication, do the following:

Requirements for IPBS1, IPBS2 and IPBL:

- Software version 6.1.X and later
- NTP configured

- Make sure that the device has been configured as a client in the system, see *Set up the client* on page 29.
- Make sure that the AES and RC4 encryption types are enabled. Select General > Admin and select the *Enable AES and RC4* check box.

AD server configuration for Windows 2008 R2 servers:

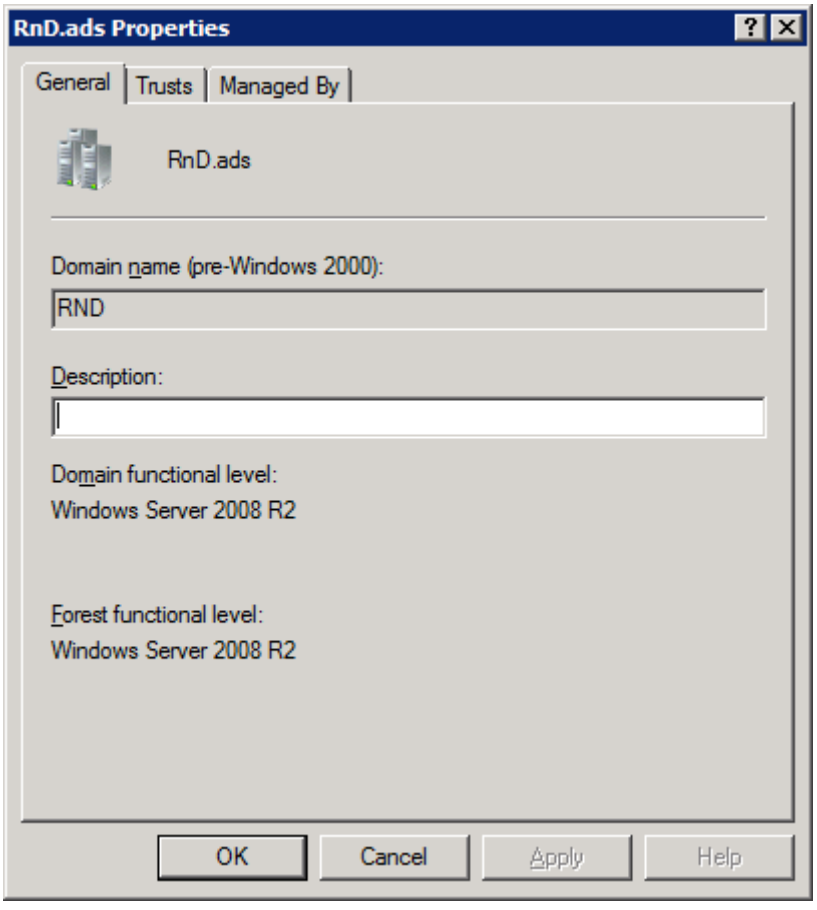
The trust relationship must be configured in the AD server.

3 Connect to the Windows 2008 R2 server.

4 In the Windows Start menu select Administrative Tools > Active Directory Domains and Trusts

5 Right-click the realm name you wish to establish a cross realm trust with and select "Properties".

6 Select the General tab and make a note of the windows realm name.



7 Click the *Trusts* tab and click "New Trust...".

8 The *New Trust Wizard* appears. Click "Next".

9 Enter the name of the Kerberos realm. Must be capital letters. Click "Next".

10 Select "Realm trust". Click "Next".

11 Select "Nontransitive". Click "Next".

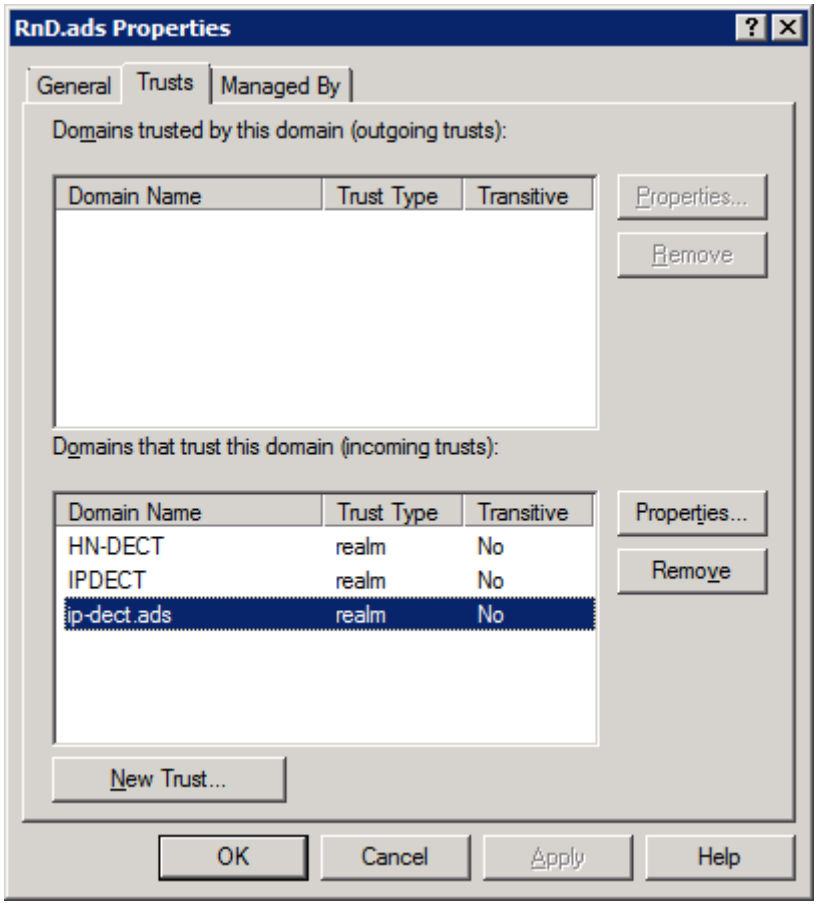
12 Select "One-way incoming". Click "Next".

13 Enter a password that will be a shared secret between the AD server and the Kerberos server. Make a note of the password and click "Next".

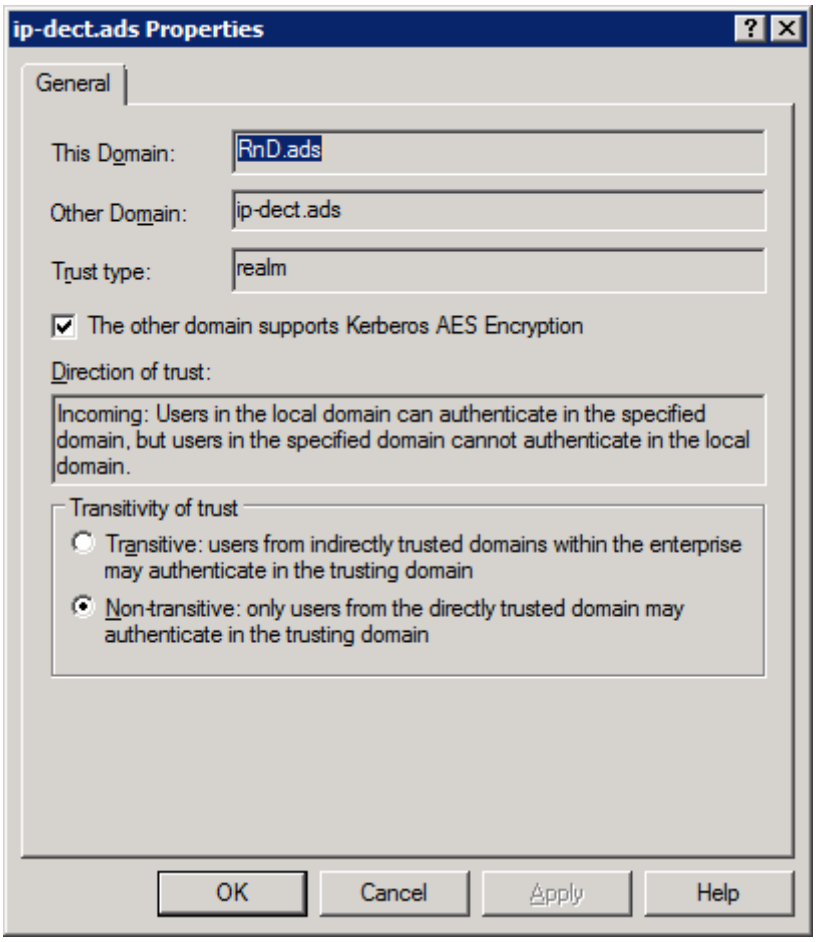
14 Click "Next".

15 Click "Finish"

16 Click the *Trusts* tab. Select the realm that you have established a cross realm trust with and click "Properties...".



17 Select the *The other domain supports Kerberos AES Encryption* check box.



18 Click "OK".

On IPBS1, IPBS2 and IPBL (the Kerberos server):

19 Select General > Kerberos.

20 In the Trusted *realms* section and the *Name* text field, enter the name of the realm of the AD server (see step 9). Must be capital letters.

21 In the *Password* text field, enter the password entered in step 13.

22 In the *Authorization* drop-down list, select "Use domain group" (recommended).

About "Use domain group", "Administrator" and "Auditor":

- "Use domain group": Only users belonging to a specified AD group will have administrator and auditor access rights.
- "Administrator": All Windows domain users have administrator access rights.
- "Auditor": All Windows domain users have auditor access rights.

23 Note: This step is only applicable if "Use domain group" is selected in the *Authorization* drop-down list, see above.

In the *Admin Group RID* text field, specify the Relative Identifier (RID) of a Windows group with administrator rights.

In the *Auditor Group RID* text field, specify the Relative Identifier (RID) of a Windows group with auditor rights.

The RID is the last part of the Security Identifier (SID) of a group.
Here is an example of a SID where the last five digits (in bold) are the RID: S-1-5-21-4151926548-1272113248-3927039109-**11265**.

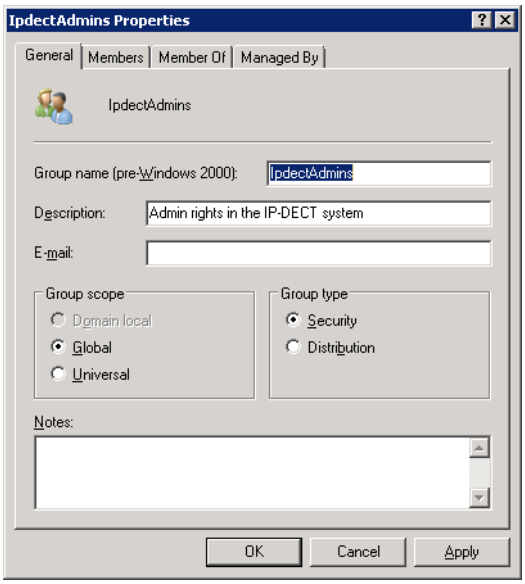
To determine the SID of a group, do as follows:
1. Start Windows Command Prompt (cmd.exe). To find Windows Command Prompt, enter "cmd.exe" in Windows Start Menu search field.
2. In Windows Command Prompt, enter "whoami /groups". This command displays the group information of the user logged in to the Windows domain.

24 Click "OK".

About security groups in AD
Groups are characterized by their scope and their type (security or distribution). Using security groups, you can assign user rights to security groups in AD.
The scope of a security group determines the extent to which the security group is applied within a domain or forest. There are three scopes that can be selected when creating a security group:

- **Universal** - Can contain users/universal groups/global groups from all domains in the forest. Can PARTLY be used in trusted domains, but maybe makes little sense as only users/groups of the trusted domain will work in IP-DECT.
- **Global** - Can only contain users/global groups from the same domain. Can be used in trusted domains.
- **Domain Local** - Can contain any users/universal groups/global groups of the forest and domain local groups of the same domain. Can NOT be used in trusted domains.

With the above said, it is recommended to select Global as scope for security group.



On IPBS1, IPBS2 and IPBL (the client):

25 Select General > Admin.

26 In the *Authentication Servers* section and the *Realm/Domain* text field, enter the realm name of the AD server (see step 9). Must be capital letters.
Note: This has not to be done if a DNS server has been configured to be used in the IP-DECT system. In this case the clients will look up the needed information automatically.

27 In the *Address* text field, enter the IP address of the AD server.

28 Click "OK".

Log in using Kerberos cross-realm authentication

1 Make sure that secure HTTPS protocol is used when logging in.

2 Login on the client using a Windows server account. When prompted for user name, the name of the Windows domain has to be entered in front of the user name, separated by a backslash in the following way: DOMAIN\username or username@DOMAIN.

Configure secondary Kerberos server

The Kerberos server is crucial when using Kerberos authentication, so it is recommended to have a secondary Kerberos server in the IP-DECT system. The secondary server is used if the primary server is not working properly. It is recommended to set up the secondary Kerberos server on the Standby Master. To configure an IPBS/IPBL as a secondary Kerberos server, do the following:

1 Make sure that the IP address of a NTP time server is specified. Select General > NTP.

2 Select General > Kerberos.

3 Enter the root password for the secondary Kerberos server which should be the same as the password used for the primary server. This password is used to encrypt the information stored on the server.

4 Click "OK".

5 The secondary Kerberos server is enabled. Enter the realm name in the *Realm* field.

6 LDAP is used to replicate the primary server database. Enter the IP address of the primary Kerberos server in the *Master* field in the LDAP Replication section. For more information about LDAP, see 4.4 *LDAP* on page 47.

7 Select the *Enable* check box.

8 Select the *TLS* check box.

9 Click "OK".

10 Click "OK" again to perform the LDAP replication.

Each client must also be configured with the secondary server information.

11 Select General > Admin.

12 Go to the Authentication Servers section.

13 In the *Secondary Address* text field, enter the IP address of the secondary Kerberos server. In the secondary Kerberos server enter 127.0.0.1 (localhost) as the IP address. The *Secondary Port* and the *Secondary Admin Port* text fields are filled out automatically with default ports. Note: If other than default ports are used, in the text fields replace the default ports with the other ports.

14 Click "OK".

Delete a user or trusted realm

To delete a user account from the Kerberos server do the following:

1 Select General > Kerberos.

2 In the Users section select the Delete check box for the user to be deleted.

3 Click "OK".

To delete a trusted realm relationship from the Kerberos server do the following:

1 Select General > Kerberos.

2 In the Trusted Realms section select the Delete check box for the realm to be deleted.

3 Click "OK".

Deactivate Kerberos realm membership

IMPORTANT: Make sure that local authentication is enabled and working properly before leaving the Kerberos realm. If local authentication is still disabled and the IPBS/IPBL is no longer a member of the realm it is not possible to access the IPBS/IPBL in any other way.

1 Select General > Admin.

2 In the Delegated Authentication section clear the Disable local authentication check box.

3 Click "OK".

To deactivate the Kerberos membership for a client, do the following:

1 Select General > Admin.

2 Go to the Kerberos section and click on the blue text link "Leave realm".

3 It is possible to deactivate Kerberos realm membership in two ways:

- Deregister: The client is removed from the server database.
  In the *Leave Kerberos realm* window, enter the user name and password for a user with administrator or join the realm account in the *Deregister with Kerberos server* section.
  Click "Deregister".
- Delete: Leave the realm without removing data from the server.
  Click "Delete".

4.1.4 Configure the NTP Settings

Since the IPBS/IPBL does not have a battery-backed real-time clock, the internal time will be set to 0:00 hrs, 1.1.1970 in the case of a restart.

In order to get the correct time in the system, specify the IP address of a NTP time server. The IPBS/IPBL will synchronize its internal clock to the time server at startup and at the specified intervals. The clock is, for example, used by the handsets and log files.

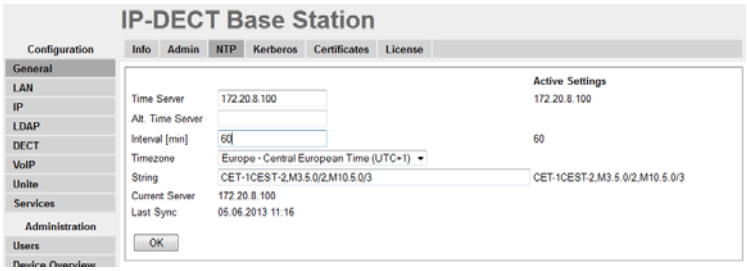


Figure 4. Configure NTP settings

1 Select General > NTP.

2 Enter the IP address to the primary NTP server in the *Time Server* text field.

3 Enter a time interval in the *Interval (min)* text field.

4 Select time zone in *Time zone* drop-down list. If the desired time zone is not in the list, select "Other" and edit the *String* text field following the instructions in the next step.

5 Enter the timezone string if automatically updates summer/winter is desired.

<String = StdOffset [Dst[Offset], Date/Time, Date/Time]>

- Std = Time zone (for example EST for Eastern Standard Time).
- Offset = time difference between the timezone and the UTC (Universal Time Coordinator).
- Dst = summertime zone (for example EDT for Eastern Daylight Time).
- Second Offset = time difference between the summer time and the UTC.
- Date/ Time, Date/ Time = beginning and end of summertime.
  - date format = Mm.n.d (d day of n week in the m month)
  - time format = hh:mm:ss in 24-hour format.

Note that a week always starts on a Sunday and the number for Sunday is 0.

Example:
North Carolina is located in the Eastern Time Zone. Eastern Standard Time (EST) is 5 hours behind UTC (StdOffset = EST5), the Eastern Daylight Time (EDT) is 4 hours behind UTC (DstOffset = EDT4). Summertime for the year 2013 begins at two a clock, on a Sunday, the second week in March (M3.2.0/2). The summertime ends at two a clock, on a Sunday, the first week in November (M11.1.0/2).

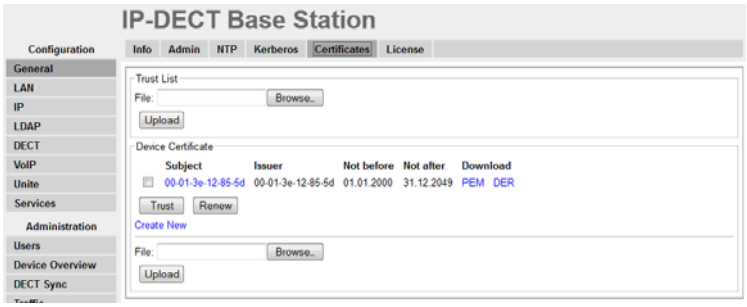
<String = EST5EDT4,M3.2.0/2,M11.1.0/2>

6 Click "OK".

4.1.5 Certificates

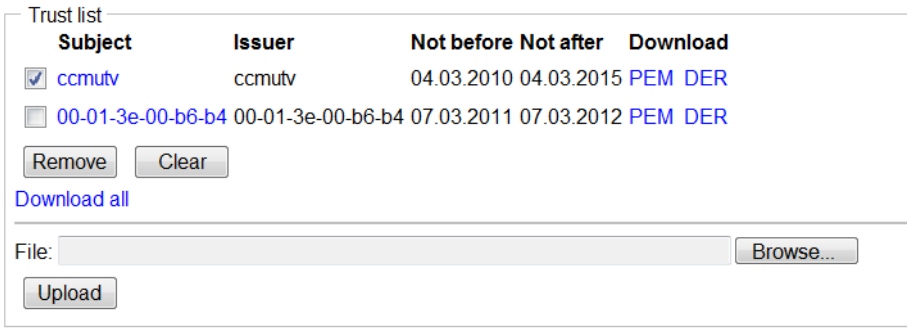
The Certificates tab is part of IP Security in IP-DECT. For more information on IP Security, see chapter 2 *IP Security* on page 3.

Select General > Certificates.



Trust List

A trust list is set up when the device must know which third parties (for example IP-PBX) it shall trust in. The list contains the certificates to be accepted by the device for TLS secured connections (for example HTTPS, SIPS).



The following table describes the different functions.

Field name	Description
Subject	Click the hyperlink (under the Subject header) to display certificate details in a window.
PEM	Click the PEM hyperlink (under the Download header) to download the certificate in PEM format.
DER	Click the DER hyperlink (under the Download header) to download the certificate in DER format.
Remove	To remove a certificate: Select the check box for the certificate and click the Remove button.
Clear	To remove all certificates from the trust list: Click the Clear button.
Download all	Click the Download all hyperlink (under the Remove button) to download the complete trust list as a PEM encoded text file.

Upload	Use the Upload function to upload a certificate file to the device. 1 Click the Browse button 2 Select a certificate file 3 Click the Upload button to upload the file to the device.

Rejected Certificates

This list contains the certificate chains that were rejected before, while trying to establish a secure TLS connection. This happens for example if the certificate is expired or neither the certificate nor any of the issuing CAs is trusted. If one of that certificates should be trusted for future connections you can select and add it to the trust list, directly.

The following table describes the different functions.

Field name	Description
Subject	Click the name of a certificate to display its details in a window.
Clear	Discard all rejected certificate chains.
Trust	Click this button to add the selected certificates to the trust list and remove the corresponding chains from the rejected certificates..

Device Certificate

As described in *2. Certificate Handling Options with Device Certificates* on page 5, there are three possible certificate options:

1 Default device certificate, see *Default Device Certificate* on page 41.

2 Self-signed certificates, see *Self-signed Certificates* on page 41.

3 Certificates signed by a Certificate Authority (CA), see *Certificate Signing Request (CSR)* on page 42.

The following table describes the different functions.

Field name	Description
Subject	Click the hyperlink (under the Subject header) to display certificate details in a window.
PEM	Click the PEM hyperlink (under the Download header) to download the certificate in PEM format.
DER	Click the DER hyperlink (under the Download header) to download the certificate in DER format.
Trust	Click this button to add the selected certificates to the trust list.
Clear	This button is only displayed if a certificate was installed by the user, before. Click this button to discard the current device certificate and restore the standard certificate.
Create New	The Create New hyperlink is used for two purposes: • *Self-signed Certificates* on page 41 • *Certificate Signing Request (CSR)* on page 42

Upload

Use the Upload function to upload a certificate file to the device.

1 Click the Browse button

2 Select a certificate file

3 Click the Upload button to upload the file to the device.

NOTE: The Upload function requires a previously issued CSR to exist.

Default Device Certificate

This section corresponds to option 1 in *2. Certificate Handling Options with Device Certificates* on page 5.

If the default device certificate is missing for the device it will be generated, together with a key pair, when the IPBS is upgraded to version R3. The default certificate contains the MAC address of the device and will be valid for 10 years.

If the self-signed certificate is deleted and the device is restarted, a new certificate and key pair will be generated.

HTTPS is deactivated during the generation (creation) of the certificate.

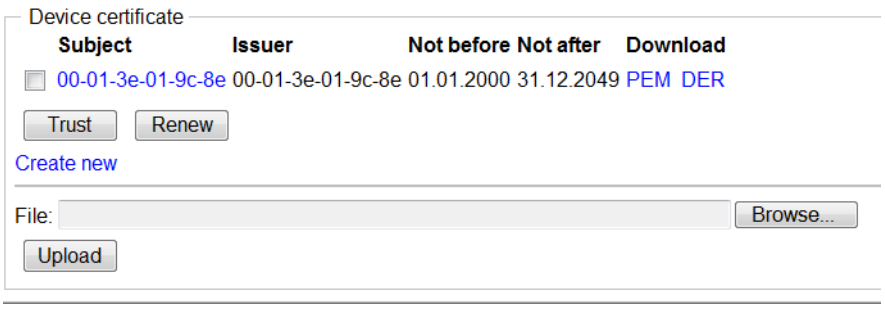
The default certificate is a self-signed certificate. This means that certificates cannot be verified and thus the user/administrator will be prompted by the web browser to accept the certificate before it can be used. From this point on within the browser session (as long as the certificate is not changed) communication between the browser and the device is possible without further accept operations from the user/administrator.

If the device certificate is replaced or regenerated the user/administrator has to manually accept the new certificate.

Self-signed Certificates

This section corresponds to option 2 in 2.2.2 *TLS Certificates* on page 5.

1 Select Configuration > General > Certificates.



2 Click the "Create New" hyperlink in the *Device Certificate* section. A *New Certificate* window opens.

3 Select "Self-signed certificate" in the *Type* drop-down list.

4 Select/Enter the following settings:

Field name	Description

Key	Select either the desired key strength (1024-bit, 2048-bit, 4096-bit) or select to reuse the old key pair (this is not recommended).
Signature	Select which signature that shall be used for the certificate. Following signatures can be selected: SHA1, SHA256, SHA384, SHA512. The last three ones are SHA2 variants.
Validity	Enter the default validity in years. This is a mandatory field.
Common Name	Enter the domain name or IP address for the device. This is the same value as entered in the web browser when accessing the device.
DNS Name	If the device has got a DNS name it should be entered here. It will be stored as a subjectAltName (SAN) in the certificate. The format of this field is a FQDN (e.g. host.domain.com).

5 Click "OK".

6 A new key pair and a certificate will be created. This may take up to one hour depending on the key strength selected. During this time the device will be fully operational with the exception of https not working and the certificate tab pane not being visible.

Certificate Signing Request (CSR)

This section corresponds to option 3A & 3B in 2.2.2 *TLS Certificates* on page 5. This will be the most common options for IP-DECT systems. For more information on CSRs see *Certificate Authorities* on page 3.

1 Select Configuration > General > Certificates.

2 Click the "Create New" hyperlink in the *Device Certificate* section. A *New Certificate* window will open.

3 Select "Signing Request" in the *Type* drop-down list.

4 Select/Enter the following settings:

Field name	**Description**
Key	Select the desired key strength (1024-bit, 2048-bit, 4096-bit) or select to reuse the old key pair (this is not recommended).
Signature	Select which signature that shall be used for the certificate. Following signatures can be selected: SHA1, SHA256, SHA384, SHA512. The last three ones are SHA2 variants.
Validity	This is an read-only information field indicating a default mandatory validity of 1 year. The time length of the validity is defined by the CA.
Common Name	Enter the domain name or IP address for the device. This is the same value as entered in the web browser when accessing the device.
DNS Name	If the device has got a DNS name it should be entered here. It will be stored as a subjectAltName (SAN) in the certificate. The format of this field is a FQDN (e.g. host.domain.com).

5 Click “OK”. The windows closes.

A key pair and a CSR file will be created. This may take up to one hour depending on the key strength selected. During this time the device will be fully operational with the exception of https not working and the certificate tab pane not being visible.

When the CSR file has been generated it is visible in the Signing Request section of the Certificates page.

6 Download the CSR file by clicking the "PEM" or "DER" link in the *Signing Request* section.

7 Send the CSR file to your CA.

8 If successful your CA will send back a digitally signed certificate file. This file should now be uploaded.

9 Select the certificate file.

10 Click "Upload".

Note: If the CSR file generated in step 5 is deleted before receiving the reply from the CA (in step 8) it will not be possible to upload the signed certificate file in step 10. The system will automatically delete the CSR file when step 10 has completed.

4.1.6 License

Select Configuration > General > License.

Licenses are used to activate additional functions in the IP-DECT system. Which functions that are activated are depending on type of license.

There are two ways to activate functions using licenses:

- From the IP-DECT device.
- From a Device Manager.

To activate functions from the IP-DECT device, do as follows:

1 In the License Key field: Enter a license number.

2 Click "OK".

To activate functions from a Device Manager, do as follows:

1 Make sure that the IP-DECT device is connected to the Pari Master, see 4.5.30 *Enter IP Address to the PARI Master and the Standby PARI Master* on page 69.

2 Connect the Pari Master to a Device Manager, see 4.7.2 *Device Management* on page 74.

3 Import a license in the IP-DECT device using the Device Manager, see *Function Description, Product Licensing Overview, TD 92677GB*.

4.2 LAN

This section describes how to do the following configurations and settings in the IPBS/ IPBL:

- Set DHCP mode

- Set IP static address
- Set dynamic IP address
- Set link type
- Configure VLAN
- Enable RSTP (only for IPBL)
- View LAN statistics
- Deactivate LAN port (only for IPBL)

Note: The IPBL has two LAN ports. LAN1 port must be used in the IP-DECT system (LAN2 port is for administration only). This is not applicable when RSTP is used, see 4.2.7 *Enable RSTP (only for IPBL)* on page 45.

Some of the above configurations and settings plus additional ones can be set by a DHCP server via DHCP options. For more information about DHCP options, see Appendix H: *Configure DHCP Options* on page 162.

4.2.1 Set DHCP Mode

The IPBS/IPBL can have different DHCP modes, see the table below.

Disabled	Used if the IPBS/IPBL should have a static IP address.
Client	The IPBS/IPBL acts as a DHCP Client, if there is a DHCP server in the network it will be assigned an IP address
Automatic	In automatic DHCP mode the IPBS/IPBL will act as a DHCP client on power up. If the IPBS/IPBL is restarted by shortly pressing the reset button it will get the IP address 192.168.0.1 and the netmask 255.255.255.0 for the LAN1 port.

Change DCHP mode following the steps below.

1 On the IPBS: Select LAN > DHCP.
On the IPBL: Select LAN1 > DHCP.

2 Select DCHP mode in the *Mode* drop-down list.

3 Click “OK”.

4 If "Client" or "Automatic" is set, reset to make the changes take effect. See 4.27 *Reset* on page 118.

4.2.2 Set a Static IP Address

It is necessary for the Master and the Standby Master to have static IP addresses. The Radios can have dynamic IP addresses retrieved from the network DHCP server.

Ask the network administrator to reserve an IP address for the Master and Standby Master.

1 On the IPBS: Select LAN > DHCP.
On the IPBL: Select LAN1 > DHCP.

2 Select “Disabled” in the *Mode* drop-down list.

3 Click “OK”.

4 Do NOT reset the device yet. Set a static IP address first.

5 On the IPBS: Select LAN > IP.
On the IPBL: Select LAN1 > IP.

6 Enter "IP Address", "Network Mask", "Default Gateway" and "DNS Server" addresses provided by the network administrator in the text fields.

You can also enter an alternative DNS Server in the Alt. DNS Server text field and select the Check ARP check box to detect and prevent ARP poisoning attacks.

7 Click "OK".

8 Reset in order to make the changes take effect, see 4.27 *Reset* on page 118.

9 Start the web-based configuration, using the static IP address.

4.2.3 Dynamic IP address via DHCP

The Radios can have dynamic IP address allocation if the network has an DHCP server.

1 On the IPBS: Select LAN > DHCP.
On the IPBL: Select LAN1 > DHCP.

2 Select "Client" in the *Mode* drop-down list.

3 Click "OK".

4 Reset in order to make the changes take effect, see 4.27 *Reset* on page 118.

Note: If the DHCP lease time is shorter than the time-to-live of the name/IP address association in the Windows Internet Name Service (WINS) server, it may cause a mismatch, and a wrong device may be reached if its WINS name is used.

4.2.4 Link

1 On the IPBS: Select LAN > Link.
On the IPBL: Select LAN1 > Link.

The link setting should be set to "auto" under all normal circumstances.

4.2.5 Configure VLAN

Identity and priority settings for VLAN are done in the "LAN > VLAN" sub menu.

Note: It is necessary to have a VLAN with the same ID as configured in the IPBS/IPBL, otherwise it will not be possible to access the IPBS/IPBL.

Note: If "VLAN = 0", the Quality of Service (QoS) is inactive according to 802.1q.
It is also recommended to avoid "VLAN = 1" as it often is used as a default VLAN setting.

4.2.6 View LAN Statistics

To view statistics of LAN events:

1 On the IPBS: Select LAN > Statistics.
On the IPBL: Select LAN1 > Statistics.

To reset the ethernet statistics counters, click "Clear".

4.2.7 Enable RSTP (only for IPBL)

The RSTP (Rapid Spanning Tree Protocol) function is provided for IPBLs connected to a redundant bridged network when an IPBL must stay operational even if a network port or a bridge in the network fails. If RSTP is enabled LAN1 is assumed to be the primary port and LAN2 the backup port. RSTP packets are sent over both ports. From received RSTP packets it is learned which port shall be used for data traffic. The port to be used for data

traffic may change whenever the network topology changes, i.e. when a link between bridges goes down or up or a bridge is added. On each such change the IP stack is moved to the selected port without disruption of data traffic.

Before RSTP can be enabled the following preconditions must be met:

- The bridges in the network should support RSTP.
- LAN1 and LAN2 should be connected to RSTP enabled bridge ports.
- LAN1 and LAN2 should be connected to different bridges.
- LAN1 must be configured for a static IP address. See 4.2.2 *Set a Static IP Address* on page 44.
- Select LAN1 > IP. Make sure that the *Check ARP* and the *Disable* check boxes are unchecked.
- Select LAN2 > IP. Select the *Disable* check box.
- Select LAN2 > DHCP. Select *disabled* in the *Mode* drop-down list.
- Select LAN1 > VLAN. Check that VLAN is not enabled.
- Select LAN2 > VLAN. Check that VLAN is not enabled.

To enable RSTP:

1 Select LAN1 > RSTP.

2 Select the *Enable* check box.

3 To trace events triggering RSTP state machine actions and the associated events: Select the *Trace Actions* check box.

4 Click “OK”.

4.2.8 Deactivate LAN Port (only for IPBL)

To deactivate LAN port:

1 Select LAN2 > IP.

2 Select the Disable check box.

3 Click “OK”.

The LAN2 port is for administration only and it is the port you in normal case are interested in deactivating. This is not applicable when RSTP is used, see 4.2.7 *Enable RSTP (only for IPBL)* on page 45.

4.3 IP

4.3.1 Configure IP Settings

The following settings can be done in the IP settings sub menu:

ToS priority, RTP Data and VoIP Signalling:	Determines the priority from the ToS field in the IP header. This function can be used if the router can use ToS priority control. Hexadecimal, octal or decimal values can be used; 0x10, 020 and 16 are all equivalent. There are two fields for ToS priority, one for RTP Data and one for VoIP Signalling[a]. Other types of traffic (for example http and ldap) are not prioritized and use 0x00. NOTE: Remember that the same value should be set in the ToS field for all devices.
RTP ports:	If the ports fields are left blank, the ports 16384 to 32767 will be used.

a. VoIP Signalling includes roaming, handover, registrations towards the IP-PBX etc.

1 Select IP > Settings.

2 Enter the ToS priority value (recommended value is "0xb8") in the ToS Priority - RTP Data text field.

3 Enter the ToS priority value (recommended value is "0x68") in the *ToS Priority - VoIP Signalling* text field.

4 Select which ports to use for RTP traffic by entering the first port in the First UDP-RTP Port text field.

5 Enter the number of ports to use in the Number of Ports text field.

6 Click "OK".

4.3.2 Routing

View the IP routing by Select IP > Routing.

4.4 LDAP

The Lightweight Directory Access Protocol (LDAP) protocol is required for systems in which the server and a replicating client access a joint user database. All IPBSs/IPBLs in the system have access to the database, one of the IPBSs/IPBLs can be configured to be the LDAP server.

The joint user database contains information about the users registered in the system. It also contains the system configuration, that is the configurations made under the *DECT* menu.

This section describes how to do the following configurations and settings.

- Configure LDAP Server
- Check LDAP Server Status
- Configure LDAP Replicator
- Check LDAP Replicator Status

4.4.1 Configure LDAP Server

The IP-DECT system needs an LDAP server in some configurations. If the VoIP gateway is set up as an LDAP server, the Master should be set up as an LDAP replicator, see 4.4.3 *Configure LDAP Replicator* on page 48.

Setup the IPBS/IPBL as an LDAP server

Note: The selected user name and password must be the same in both the Master and the Standby Master. If a Multi Master system is used, the Masters must also have the same user name and password.

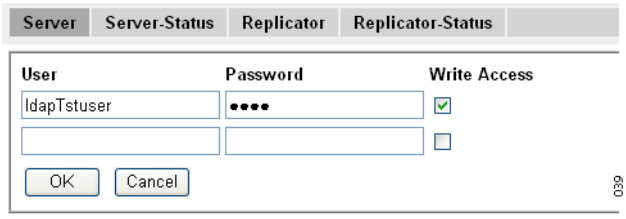
1 Select LDAP > Server.

2 Add a user, for example ldap-user, in the *User* text field.

3 Enter a password in the *Password* text field.

4 Select the *Write Access* check box.

5 Click "OK".



4.4.2 Check LDAP Server Status

Select LDAP > Server Status

The following information is displayed:

- connections - Total number of active connections to the LDAP server
- write connections - Number of write-enabled connections
- rx search - Number of received search requests
- rx modify - Number of received change requests
- rx add - Number of added objects
- rx del - Number of deleted objects
- rx abandon - Number of lost connections
- tx notify - Number of sent change notifications
- tx error - Number of sent error notifications
- tx error 49 - Number of sent error notifications due to invalid credentials
- tx error 50 - Number of sent error notifications due to insufficient access rights

4.4.3 Configure LDAP Replicator

LDAP Replicators are usually configured in the following cases:

- User data is replicated from the Master to the Standby Master. The replicator is configured on the Standby Master (Full Directory Replication)
- User data is replicated from the Active Directory (AD) to the Master. The replicator is configured on the Master

- User data is replicated from the PBX to the Master. The replicator is configured on the Master (Full Directory Replication)

Configure Full Directory Replication

1 Select LDAP > Replicator.

2 Select "Full Replication" in the *Type* drop-down list.

3 Select the *Enable* check box.

4 Enter the IP address to the LDAP server in the *Server* text field.

5 Enter the IP address to the alternative LDAP server in the *Alt. Server* text field.

6 NOTE: If this IPBS/IPBL is configured as an alternative/standby LDAP server, leave the *Alt. Server* text field empty.Select a filter method from the *Filter Type* drop-down list

- Dect Gateway Name - Enter the name of the DECT gateway to limit the replication to users of a certain group
- LDAP Filter - Enter an LDAP filter to limit replication to certain LDAP objects

7 Enter the LDAP User name and Password in the *User* and *Password* text fields.

8 Click "OK".

Note: In the case of Master to Standby Master Full Directory Replication, do not register new handsets when the LDAP Server is down even if there is a Standby LDAP Server in the system.

Configure Active Directory Replication

During Active Directory (AD) replication the configured LDAP replicator retrieves only relevant data.

AD replication is a one-way replication where data is only transferred from the AD to the IP-DECT but not from the IP-DECT to the AD. Data originating from the AD cannot be modified in the IP-DECT system, but it is possible to change or add those user attributes locally that are not replicated.

Note: If AD replication is enabled, existing local users are replaced with corresponding users in the AD, and some local attributes may be deleted. Contact Ascom Technical Support if you would like to enable AD replication with existing local users.

For AD Server configuration settings, see *Configure AD Server* on page 53.

1 Select LDAP > Replicator.

2 Select "Active Directory Replication" in the *Type* drop-down list.

3 Select the *Enable* check box.

4 Enter the IP address to the AD in the *Server* text field.

5 Enter a Distinguished Name (DN) to configure a search base for AD users.

The user information is usually replicated so It is recommended to write "CN=Users, DC=DomainName" where "DomainName" is the name of the domain on the AD server.

You can also click "Show Options..." to see some naming contexts on the configured server.

6 Enter an LDAP filter to retrieve only the relevant LDAP objects from the AD.

A default (objectclass=user) filter is offered, but it is recommended to assign all IP-DECT users to a group within the AD. For example, the following filter can be entered to retrieve only IP-DECT users.

"(&(objectClass=user)(memberOf=CN=grp_ipdect,CN=Users,DC=DomainName))"

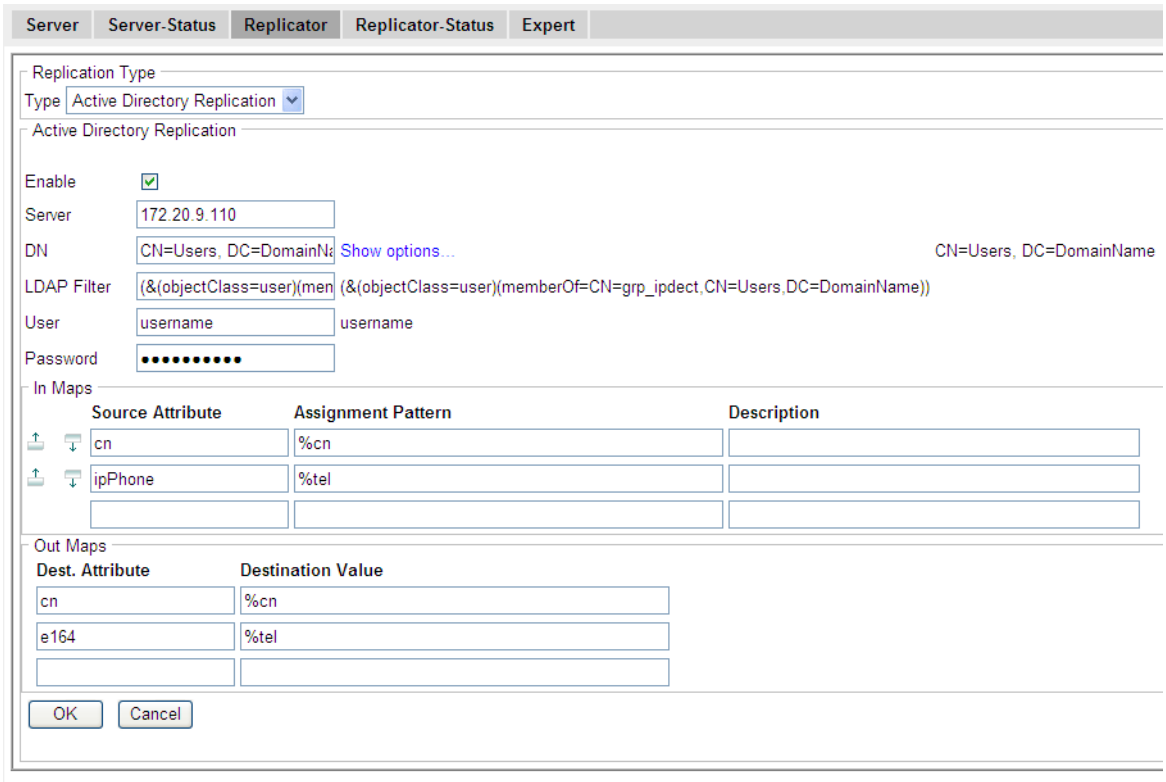
where "grp_ipdect" is the group created for IP-DECT users, "Users" is the default folder for users and "DomainName" is the name of the domain on the AD server.

7 Enter the user name and the password of a user who has read access to the AD in the *User* and the *Password* text fields. It is recommended to choose a user with Enterprise Administrator rights.

8 Configure In Maps and Out Maps for Attribute mapping. Attribute mapping describes how the obtained information from the AD is handled within the IP-DECT system. For more information see *Attribute Mappings* on page 50.

9 Click "OK".

10 After proper configuration check the Replicator Status by selecting LDAP > Replicator Status. The state of the Active Directory Replication should be "Up" and the state of the remote directory should be "Completed".



Attribute Mappings

The following attributes are generally used to configure attribute mappings:

IP-DECT designator	IP-DECT attribute name	AD attribute name	Description
Long Name	cn	cn	Mandatory, the name of the user, need to be unique throughout the system.
Display Name Idle Display	dn	displayName, givenName, sn	Display Name: First name or surname Idle Display: Optional, will be shown in the handset display when the handset is idle.
Name	h323	userPrincipalName	User name
Number	e164	telephoneNumber, ipPhone, mobile	Business or mobile phone number, mandatory and must be unique
Auth. Name (SIP)	auth		Auth name is the Authentication name used in SIP authentication. If it is not set the number will be used as authentication name. If SIP authentication is used or not is decided by the configuration in the IP-PBX.
Password	password		Optional, is used for registration towards the gatekeeper.
IPEI / IPDI	ipei		The unique identification number of the handset.
Auth. Code	authCode		Optional, the individual authentication code for this user. Automatically created by default. Can be modified manually.

Note: If IPEI is replicated shared phone does not work, i.e. login/logout is blocked. If password is replicated it is stored as clear text in config.

In Maps

In Maps define which attributes of the incoming objects are replicated and how the attributes are used in the IP-DECT system. In Maps can be configured with the following text fields:

- Source Attribute - The name of the AD attribute to be replicated. Only those users are replicated who have the defined source attributes. See *AD attribute name* on page 51 for examples.
- Assignment Pattern - A regular expression that assigns AD attributes to local temporary variables. A local temporary variable can have any name starting with a % sign, for example %tel. Regular expressions are written in a formal language that is widely used in Unix environments. For more information, see regular expression manuals on the internet.
- Description - Short explanation of what is configured with regular expressions

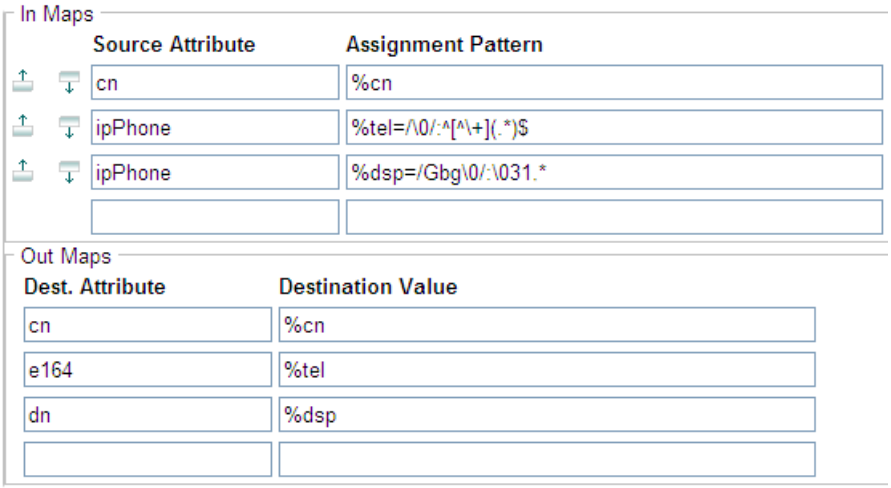
If there are several in maps for one attribute, all maps are handled in the order of appearance. To change the order of appearance click the "Move Up" or "Move Down" icons on the left side of the *In Maps* window.

Out Maps

Out Maps define how the local temporary variables configured for In Maps are assigned to the internal IP-DECT attributes. Out Maps can be configured with the following text fields:

- Dest. Attribute - The name of the IP-DECT attribute. See *IP-DECT attribute name* on page 51 for examples.
- Destination Value - The name of the local temporary variable

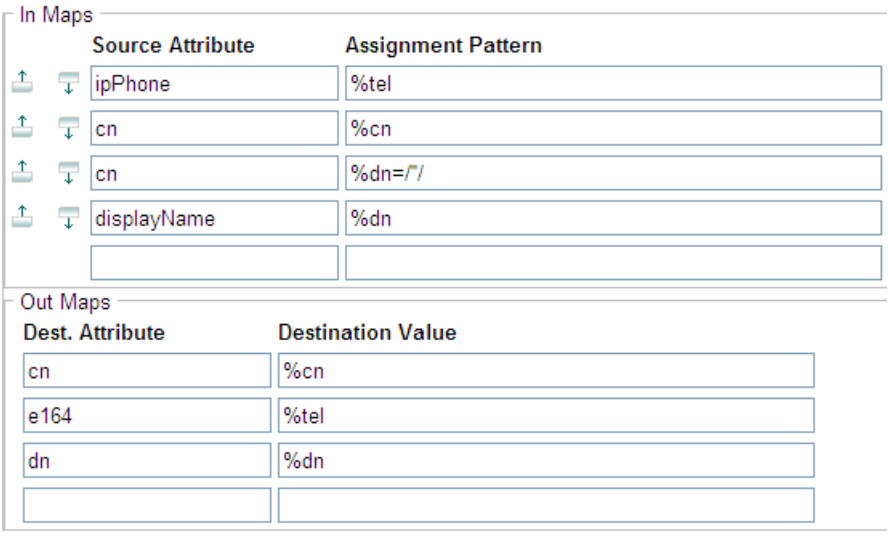
Example



In the example above regular expressions are used to remove non-numerical characters from the phone number (second line of In Maps). The third line of In Maps defines a local temporary variable (dsp) which stores all numbers starting with 031 with "Gbg" added before them. This is shown in the Display attribute as assigned in the Out Maps.

It is recommended to configure a default value for some attributes to avoid the retention of old information in the IP-DECT database. In the example below the display attribute is assigned an empty string if that attribute is not defined in the AD. The Source Attribute in the third line of In Maps is cn because it should be an attribute that is always present in the AD.

Example



Configure AD Server

The IP-DECT system supports only simple binding authentication. However, the default registry setting for Microsoft Active Directory 2003 does not allow simple binds, so it may be necessary to change Windows Registry settings to use AD replication.

1 In Windows, select "Run..." in the Start menu.

2 Enter "regedit" and click "OK" to start the Windows Registry Editor.

3 In the Editor navigate to the "HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\NTDS\Parameters\LDAPServerIntegrity" key.

4 Click on the key with the right mouse button and click "Modify".

5 Change the key value of 2 to the value of 1.

6 Click "OK".

4.4.4 Check LDAP Replicator Status

1 Select LDAP > Replicator-Status.

The following information is displayed:

- Server - The IP address and port of the LDAP server.
- Active Directory Replication - Current state of replication. Four states are possible: Stopped, Starting, Up, Down
- Remote - State of replication in the source directory. Three states are possible: Stopped, Active, Completed
- Notify - Number of change notifications received from the server
- Paged - Number of objects received from AD server in response to paged search requests
- No match - Number of objects received that are not matching the configured LDAP filter condition
- Discarded - Number of objects discarded because no suitable map is found
- Local - State of replication in the destination directory. Three states are possible: Stopped, Active, Completed
- Notify - Number of change notifications sent to the server
- Add - Number of locally added objects
- Del - Number of locally deleted objects
- Modify - Number of locally modified objects
- Pending - Number of local objects waiting to be sent to the server

4.4.5 Expert tool

The Expert function should only be used after consultation with Ascom Technical Support.

4.5 DECT

This section describes how to do the following configurations and settings.

- Change System Name and password
- Change Subscription Method
- Configure Authentication Code
- Select Tone system
- Set Default Language
- Set Frequency Band
- Enable/Disable Carriers
- Enable/Disable Local R-Key Handling
- Enable/Disable No Transfer on Hangup
- Enable/Disable No On-Hold Display
- Enable/Disable Display Original Called
- Enable/Disable Early Encryption
- Configure Coder
- Configure Supplementary Services
- Select Master Mode
- Configure Gatekeeper
- Select Crypto Master mode
- Select Mobility Master mode
- Connect Mobility Master to other Mobility Master(s)
- Connect Mobility Master to a Crypto Master
- Connect Master to a Mobility Master

- Enable/Disable Radio
- Enter IP address to the PARI Master and the Standby PARI Master
- Multiple Radio Configuration
- Assign PARI
- Enter SARI
- Configure Air Synchronization

4.5.1 Change System Name and Password

Note: This is only applicable for a Master, never on a Slave.

The system name and password must be the same for all IPBS/IPBLs throughout the system. Reset in order to make the changes take effect, see 4.27 *Reset* on page 118.

Note: If Ascom VoIP Gateway is the LDAP server, the password in the IPBS/IPBL must be identical to the Ascom VoIP Gateway (PBX/Password).

1 Select DECT > System.

Note: To access the System tab, the Master mode has to be activated, see 4.5.16 *Select Mode* on page 62.

2 Write a system name in the System Name text field.

3 Enter a new password in the Password text field. Repeat the password.

4 Click "OK".

Note: It is recommended to create a backup of the IPBS configuration when the password has been changed, see 4.14 *Backup* on page 105.

4.5.2 Set Subscription Method

The IP-DECT system can be set to use the following subscription methods:

- With User AC - Individual Registration and Auto Registration is possible.
- With System AC - Anonymous Registration and Individual Registration is possible.
- Disable - Registration is not possible.

Select subscription method:

1 Select DECT > System.

Note: To access the System tab, the Master mode has to be activated, see 4.5.16 *Select Mode* on page 62.

2 Select subscription method in the Subscriptions drop-down list.

3 Click "OK".

Note: When"With System AC" is enabled anyone could register to the IP-DECT System.

4.5.3 Configure Authentication Code

If "allow anonymous subscription" method is selected it is needed for the IP-DECT system to have an authentication code configured. The authentication code is generated automatically but can be modified manually by selecting a code consisting of 4 to 8 numbers (0-9).

1 Select DECT > System.

Note: To access the System tab, the Master mode has to be activated, see 4.5.16 *Select Mode* on page 62.

2 Enter an authentication code in the Authentication Code text field.

3 Click "OK".

4.5.4 Select Tones

1 Select DECT > System.

NOTE: To access the System tab, the Master mode has to be activated, see 4.5.16 *Select Mode* on page 62.

2 Choose tones in the Tones drop-down list.

3 Click "OK".

4.5.5 Set Default Language

If the handset does not send language information to the system, this setting determine which language that is displayed for some text messages (for example hung-up and disconnected).

1 Select DECT > System.

Note: To access the System tab, the Master mode has to be activated, see 4.5.16 *Select Mode* on page 62.

2 Choose language in the Default Language drop-down list.

3 Click "OK".

4.5.6 Set Frequency Band

The IPBS/IPBL can operate in the following frequency bands:

- 1880 - 1900 MHz, Europe, Africa, Middle East, Australia, New Zealand and Asia
- 1910 - 1930 MHz, South America
- 1920 - 1930 MHz, North America

1 Select DECT > System.

NOTE: To access the System tab, the Master mode has to be activated, see 4.5.16 *Select Mode* on page 62.

2 Select frequency area in the Frequency drop-down list.

3 Click "OK".

Note: All calls will be disconnected and all handsets will temporarily lose contact with the system.

4.5.7 Enable Carriers

The IPBS/IPBL has 5 carriers for the North American frequency band and 10 carriers for the other frequency bands. Under all normal circumstances all carriers should be enabled.

To enable or disable carriers:

1 Select DECT > System.

NOTE: To access the System tab, the Master mode has to be activated, see 4.5.16 *Select Mode* on page 62.

2 Select/clear the Enabled Carriers check boxes.

Note: For Brazil, the following carriers shall be selected only: 0, 1, 2 and 3.

3 Click "OK".

4.5.8 Local R-Key Handling

With this option enabled keypad information is handled locally. If this option is disabled keypad information is sent transparently to the IP-PBX. Local R-key handling is further described in *Appendix B*.

1 Select DECT > System.

NOTE: To access the System tab, the Master mode has to be activated, see 4.5.16 *Select Mode* on page 62.

2 To enable, select the Local R-Key Handling check box.

NOTE: To access the Local R-Key Handling check box, the SIP protocol has to be selected on the Master, see 4.5.20 *Configure Gatekeeper* on page 63.

3 Click "OK".

4.5.9 No Transfer on Hangup

If enabled it will not be possible to do a transfer by hanging up the handset. R4 must be pressed (see *Appendix B*).

1 Select DECT > System.

NOTE: To access the System tab, the Master mode has to be activated, see 4.5.16 *Select Mode* on page 62.

2 To enable, select the No Transfer on Hangup check box.

3 Click "OK".

4.5.10 No On-Hold Display

If enabled, no On-Hold indication will be displayed in the handsets.

When one party in a call put the other party on-hold, the existing information in the other party's handset display will be replaced with an on-hold message. To prevent this the "No On-Hold Display" option must be enabled. Do as follows:

1 Select DECT > System.

NOTE: To access the System tab, the Master mode has to be activated, see 4.5.16 *Select Mode* on page 62.

2 To enable, select the No On-Hold Display check box.

3 Click "OK".

4.5.11 Display Original Called

If enabled, the original called party, instead of the diverted party, is shown to the called party if the call is diverted.

Example: Handset B is diverted to handset C which in turn is diverted to handset D. When handset A is calling handset B the following extension number or name will be shown in handset D's display depending on if the feature "Display Original Called" is enabled or not.

- Display Original Called is **enabled**: The extension number or name of handset B will be shown in handset D.
- Display Original Called is **not enabled**: The extension number or name of handset C will be shown in handset D.

Note: In both cases the extension number or name of handset A will be shown as well.

To enable Original Called Display, do as follows:

1 Select DECT > System.

NOTE: To access the System tab, the Master mode has to be activated, see 4.5.16 *Select Mode* on page 62.

2 To enable, select the Display Original Called check box.

3 Click "OK".

4.5.12 Early Encryption

With this option enabled the early encryption feature will be activated in the IP-DECT system.

Note: Activating early encryption will cause a restart of all RFPs.

Note: For the early encryption feature to function in the system, the DECT handset must also support early encryption.

Note: Handsets already registered will continue to function without early encryption.

Note: Only the handsets registered after enabling the early encryption feature will have support for this feature.

For more information on early encryption, see about Enhanced DECT Security in the *System Description documentation for IP-DECT*.

1 Select DECT > System.

NOTE: To access the System tab, the Master mode has to be activated, see 4.5.16 *Select Mode* on page 62.

2 To enable, select the *Early Encryption* check box.

Note: To access the *Early Encryption* check box, the Pari Master mode has to be activated, see 4.5.18 *Enable PARI Function* on page 63.

3 Click "OK".

When using IPBL and the early encryption feature is enabled: The RFPs will startup only if they support this feature.

4 In a system with several PARI Masters, it is recommended to repeat step 1 to 3 for all PARI Master.

Note: It is possible to have a system with different Pari domains where early encryption is enabled in some and disabled in other. However, all RFPs and IPBSs must have software support for early encryption even though it is not enabled.

5 To enable the early encryption feature in a system with Mobility Master(s), connect the Mobility Master(s) to a Crypto Master, see 4.5.27 *Connect Mobility Master to a Crypto Master* on page 68.

6 To view a list of DECT handsets where early encryption is in use: Select Users > Users and then click "Show". Those DECT handsets where early encryption is in use is indicated with a dot in the column *EE* (Early Encryption).

4.5.13 Configure Coder

Select the preferred coder, and enter the desired frame length. If exclusive is selected for the coder the IPBS/IPBL is forced to use that coder. With Silence Compression enabled no information is sent during pauses in the conversation, this is used to save bandwidth.

Note: When exclusive is enabled for a coder it might be impossible to make calls outside the IP-DECT system.

1 Select DECT > System.

Note: To access the System tab, the Master mode has to be activated, see 4.5.16 *Select Mode* on page 62.

2 Choose the applicable coder in the Coder drop-down list.

NOTE: The G726-32 coder is not supported by SIP.

3 Enter the sample time in milliseconds in the Frame text field.

4 Choose Exclusive enabled or disabled by selecting/clearing the Exclusive check box.

5 Choose Silence Compression enabled or disabled by selecting/clearing the SC check box.

6 Click "OK".

4.5.14 Secure RTP

This option makes it possible to encrypt media streams. The encryption is activated if the SRTP is also enabled in the IP-PBX. For additional privacy it is recommended to use the encrypted signalling protocol (SIPS) as well to hide the exchange of the SRTP keys.

Note: If SRTP is enabled one Radio can handle maximum 5 calls for IPBS1 and 40 calls for IPBL (including relayed calls) at the same time. For this reason and because of the high load on the CPU when SRTP is used, it is recommended to deactivate the Radio in the Master.

1 Select DECT > System.

Note: To access the System tab, the Master mode has to be activated, see 4.5.16 *Select Mode* on page 62.

2 To enable SRTP: Select in the Secure RTP drop-down list a cryptographic suite. The numbers in the list refer to key-length/sha1 hash-length.

To disable SRTP: Select in the Secure RTP drop-down list the empty row at top.

3 Click "OK".

If a call is successfully encrypted a lock icon appears next to the ongoing call description in the Traffic > Master Calls section.

4.5.15 Configure Supplementary Services

The supplementary services determine how to handle a call if for example busy or not answered by the user.

1 Select DECT > Suppl. Serv.

NOTE: To access the *Suppl. Serv.* tab, the Master mode has to be activated, see 4.5.16 *Select Mode* on page 62.

2 Select the *Enable Supplementary Services* check box to activate the supplementary services below. The default Activate and Deactivate feature codes are preset.

Explanation of feature code syntax:
$ - Placeholder for user provided digits, e.g. a phone number
$# - Number of digits decided by end indicator #
$(N) – Number of digits decided by N

Example: Default feature code for Logout User is #11*$#

Note: To disable a specific service, select the Disable check box to the right.

Feature	Description
Call Forwarding Unconditional	Forwards incoming calls to a given number in all cases
Call Forwarding Busy	Forwards incoming calls to a given number if the handset is busy
Call Forwarding No Reply	Forwards incoming calls to a given number if the call is not answered or there is no coverage
Do Not Disturb	Sets the handset in busy mode
Call Waiting	A second incoming call during a call is indicated with a call waiting tone
Call Completion	Notifies the caller when a busy number or no answering user becomes available and reinitiates the call.
Call Park	Allow users to place a call on hold so it can be retrieved from another phone.
Interception	Allow users to enter absent information in a presence system to inform the calling person why the called person is not available. For information on how to configure an IP-DECT presence system, see *4.8.7 Configure IP-DECT to Connect to a Presence System Using ICP* on page 81
Call Service URI	Is used to initiate some of the features in the CCM. The local feature code is translated to a CCM default "Services URI". Default feature code is: *5$(1). For information about feature codes for Call Service URI, see *Configuration Notes, Cisco CallManager in Ascom IP-DECT System, TD 92424GB*.
Call Service URI (Argument)	Same as for Call Service URI but requires additional digits entered by the user. Default feature code is: *7(1)#. For information about feature codes for Call Service URI (Argument), see *Configuration Notes, Cisco CallManager in Ascom IP-DECT System, TD 92424GB*.
Logout User	Logs out the user and the handset becomes anonymously subscribed.

Feature	Description
Clear Local Settings	Clears all locally stored feature settings and all features are deactivated
MWI Mode	MWI (Message Waiting Indication) enables the receiving of a notification from an IP-PBX when, for example, a voice mail is available for listening. There are four modes that can be selected to enable MWI: Fixed interrogate and fixed notify number User dependent interrogate number User dependent notify number Both numbers users dependent "Fixed" means that a common call number is used for all users. "User dependent" means that the user's own call number is used.
MWI Interrogate Number	The number used by the handset when it checks with the IP-PBX if there are any message waiting indications to be notified about.
MWI Notify Number	A call number shown in the handset display when receiving a MWI notification. To receive the stored message the user dial the number.
Local Clear of MWI	If necessary, enter the number of the message center in this field to clear the message waiting indication locally when dialling the number.
External Idle Display	Depending on type of IP-PBX, absence and call forwarding texts will be displayed on the handset when idle. Note: If call forwarding is handled by the IP-PBX, the following options must be disabled: Call Forwarding Unconditional Call Forwarding Busy Call Forwarding No Reply

3 Click "OK".

4 Reset in order to make the changes take effect, see 4.27 *Reset* on page 118.

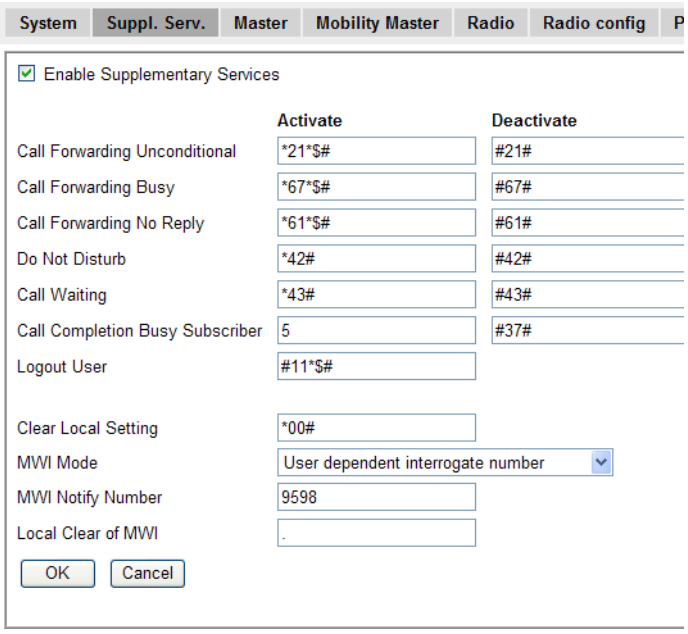


Figure 5. Supplementary services

4.5.16 Select Mode

1 Select DECT > Master.

2 **Note**: The Master can be set to be inactive or active or for redundancy purposes, the Master can be set to act in two other ways: As Standby or Mirror.

Select in the *Mode* drop-down list one of the following:

- "Off", if this IPBS/IPBL is not a Master.
- "Active", if this IPBS/IPBL is the Master.
- "Standby", if this IPBS/IPBL is the Standby Master.
- "Deployment" is used for coverage test only. The speech from the handset is looped back to the handset.
- "Mirror", if this IPBS/IPBL is the Mirror. For information about Mirror devices, see the system description for IP-DECT.

3 If you have selected the "Standby" mode enter the primary Master IP address in its text field.

4 If you have selected the "Mirror" mode enter the IP address to the other Mirror Master in the *Mirror Master IP address* text field.

For the Master that initially shall be the active Mirror: Click on the text link "Activate mirror". Any user and handset data in the inactive Mirror will be replaced with the user and handset data stored in the active Mirror.

To switch the active role between the Mirror Masters, click on the text link "Switch active mirror". **Note**: This should be done within a maintenance window as all active calls will be lost.

5 Click "OK".

6 Reset in order to make the changes take effect, see 4.27 *Reset* on page 118.

4.5.17 Set Master Id

1 Select DECT > Master.

2 Enter a Master id in the Master Id field. The id must be unique for each Master in a multiple Master system. The Standby Master must have the same id as the Master.

3 Reset in order to make the changes take effect, see 4.27 *Reset* on page 118.

4.5.18 Enable PARI Function

The PARI Master is responsible for assigning PARIs, being part of the same external handover domain, to the Radios associated. A Radio will always be given the same PARI, based on the PARI-mac-address-association.

1 Select DECT > Master.

2 If this is the Pari Master or standby Pari Master, select the Enable Pari function check box.

Note: Only one Master per handover and sync domain can have the Pari function enabled.

3 Reset in order to make the changes take effect, see 4.27 *Reset* on page 118.

4.5.19 Set Region Code

When placing calls from IP-DECT in a multiple site installation, the IP-PBX has no way of knowing in which site the user is located because the call is always sent from that user's Master. Knowing the location becomes especially important for emergency calls.

For more information on region codes, see about *Call Localization* in the *System Description documentation for IP-DECT*.

1 Select DECT > Master.

2 Enter a region code in the *Region Code* field. The region code can consist of numbers 0-9, * and #.

4.5.20 Configure Gatekeeper

The Master need to know the address to the system gatekeeper.

1 Select DECT > Master.

2 Select "H.323", "SIP", "TSIP" or "SIPS" protocol in the *Protocol* drop-down list.

If H323 protocol is selected, continue with step 3 and 4. Otherwise, jump to step 5.

3 Enter the address to the gatekeeper in the *Gatekeeper IP address* text field.

4 Enter the address to the alternative gatekeeper in the *Alt-Gatekeeper IP address* text field.

NOTE: As an alternative to the Gatekeeper IP Address, the Gatekeeper ID can be used.

NOTE: Unless you have a fully qualified domain name (FQDN) in your certificate when using SIPS with an alternative gatekeeper, please make sure that the parameter "No Server Certificate Subject Check For TLS Connections" under VOIP/SIP has been set to avoid connection problems with the PBX.

5 NOTE: Step 5 to 7 applies to the SIP, TSIP or SIPS protocols.

SIP uses the UDP protocol, TSIP uses the TCP protocol, and SIPS uses the TLS protocol.

Enter the IP address, domain name or host name and optionally port of proxy (e.g. proxy1.example.com:5060) to the SIP proxy (registrar) in the *Proxy* text field.

6 Depending on how many alternative SIP proxys that are used, do as follows:

In the *Alt. Proxy 1* text field: Enter the IP address, domain name or host name and optionally port of proxy (e.g. proxy2.example.com:5060) to the alternative SIP proxy (registrar).

In the *Alt. Proxy 2* text field: Enter the IP address or host name and optionally port of proxy (e.g. proxy3.example.com:5060) to the alternative SIP proxy (registrar).
Note: The *Alt. Proxy 2* text field cannot be used if the *Proxy* and the *Alt. Proxy 1* text fields contain domain names.

In the *Alt. Proxy 3* text field: Enter the IP address or host name and optionally port of proxy (e.g. proxy4.example.com:5060) to the alternative SIP proxy (registrar).
Note: The *Alt. Proxy 3* text field cannot be used if the *Proxy* and the *Alt. Proxy 1* text fields contain domain names.

NOTE: Unless you have a fully qualified domain name (FQDN) in your certificate when using SIPS with an alternative proxy, please make sure that the parameter "No Server Certificate Subject Check For TLS Connections" under VOIP/SIP has been set to avoid connection problems with the PBX.

7 If used, enter the domain address in the *Domain* text field.

8 Enter the maximum internal number length in the *Max. internal number length* text field.

9 To handle calls of international format: Depending on the type of IP-PBX and handsets that are used in the IP-DECT system, it can be necessary to enter an international CPN prefix in the IPBS/IPBL. Do as follows:
Enter in the *International CPN Prefix* text field the international CPN prefix for the country in which the IPBS/IPBL is used.

Following will happen: When the IP-DECT system is receiving a call of international format, the IPBS/IPBL will convert the plus sign (+) to the international CPN prefix that has been entered in the *International CPN Prefix* text field. The international CPN prefix will be shown in the handset display of the called party and when the called party calls back, the international CPN prefix will be used.

10 To use the system password for registration, select the *Registration with system password* check box.
In a system with many users where the same password shall be used for all users, it is possible to use the system password for registration towards the gatekeeper.
About how to set the system password, see 4.5.1 *Change System Name and Password* on page 55.
Note: When changing the system password you also need to change the password in all Radios and all other Masters, Pari Masters including standby devices. After this you need to restart all the devices where you made changes (i.e. probably the whole system).

11 To enable "Enbloc Dialing", select the Enbloc Dialing check box.

With this option enabled the keystrokes on the handsets are buffered in the IPBS/IPBL for a short period of time before sent to the IP-PBX (use this when the IP-PBX does not support overlap sending). If disabled the keystrokes are immediately sent to the IP-PBX.

12 To enable "DTMF through RTP Channel", select the DTMF through RTP channel check box.

If enabled DTMF is negotiated according to RFC2833/4733, resulting in DTMF digits being sent as RTP payload directly to the other endpoint. If the other party does not support RFC2833/4733, there will be fallback to DTMF over the signalling channel (SIP INFO or H.245)

If disabled, the DTMF is always sent in the signalling channel.

13 To enable "Short disconnect tone", select the Short disconnect tone check box.

With this option enabled, a short tone (i.e. busy tone) is received when the other party hangs up. If this option is not enabled, busy tones will be received for a longer period of time.

14 To determine how calls that are rejected by the user should be handled: Select "Busy", "Rejected", or "No user responding" in the *Treat rejected calls as* drop-down list.

15 If you in step 2 selected "SIP" protocol, enable or disable the following options in the SIP Interoperability Settings section:

Registration time-to-live
This is the Expires-header in the REGISTER message. The default is 120 seconds. To enable this option, enter a value specified in seconds in the "Registration time-to-live" field. Note: Depending on the number of users, the entered value may have to be increased. For example, for 500 users it is recommended to enter 300 seconds and for 1000 users it is recommended to enter 600 seconds. The SIP proxy might respond to the REGISTER with a different value. Then the responded value will be used for REGISTER refresh.
When secondary SIP proxy is in use, for example when the primary SIP proxy is down, the configured time-to-live value is used to decide how often the Master will try to reconnect to the primary SIP proxy.

Hold Signalling
Some IP-PBXs require special way of hold signalling. In the "Hold Signalling" list field, select one of the following:
inactive: No media stream is sent or received.
sendonly: Media stream is sent only and not received.
sendonly with 0.0.0.0: Special case of sendonly where also the media IP address is set to 0.0.0.0.

Hold before Transfer
If this option is enabled, the consultation call is put on hold before transfer. Some IP-PBXs require this option so that both called parties are put on hold before the transfer is carried out.
To enable this option, select the "Hold before Transfer" check box.

Accept Inbound Calls not Routed via Home Proxy
If this option is enabled it could be possible for inbound calls to bypass call restrictions configured in the IP-PBX. If it is disabled a 305 Use Proxy response will be sent.
To enable this option, select the "Accept inbound calls not routed via home proxy" check box.

Register with number
If this option is enabled, number will be used for registrations towards the IP-PBX instead of name. Name will be used for authentication.
To enable this option, select the "Register with number" check box.

KPML support
If this option is enabled, the DTMF digits are sent with the SIP signalling using the Keypad Markup Language (KPML) method. With this method single DTMF digits can also be sent during call setup to add digits to the callend number (overlap

sending). Enbloc dialing can then be unchecked. The IP-PBX must also support KPML.
To enable this option, select the KPML support check box.

Make sure that the Allow DTMF through RTP and the Send inband DTMF check boxes are cleared.

16 Click "OK".

17 Reset in order to make the changes take effect, see 4.27 *Reset* on page 118.

If you in step 2 selected the "SIPS" protocol the IPBS downloads a certificate from the IP-PBX to ensure a secure transaction. The IPBS does not initially trust the certificate so it must be added manually to the trust list of the IPBS. It is also possible that more than one certificate is downloaded creating a certificate chain. The root CA certificate is at the end of the chain which contains a self-signed signature and it is able to approve other certificate requests. It is recommended to add the root CA certificate to the IPBS trust list.

Note: The connection to the IP-PBX will only be established after the certificate is acknowledged.

If the certificate expires, the ongoing connection is maintained but it will not be possible to start a new connection until the certificate is renewed.

To add a certificate to the trust list do the following:

1 Select General > Certificates.

2 In the Rejected certificates section select the check box of the certificate you want to trust.

3 Click "Trust".

To ensure two-way authentication the IP-PBX also downloads a certificate from the IPBS. The trust list must also be manually updated with this certificate in the IP-PBX similarly to the IPBS.

For more information about certificate handling, see 4.1.5 *Certificates* on page 38.

4.5.21 Registration for Anonymous Devices

Handsets registered anonymously can make emergency calls through an extension reserved for anonymous users.

Note: Call restrictions must be configured in the PBX to allow for emergency calls only.

This option also provides a solution for the case when the Master, running on an IPBS with local power or an IPBL, loses IP connectivity without the local host Radio losing its connection to the Master. The handsets locked to this Radio become isolated from the system without any notification.

1 Select DECT > Master.

2 Enter the registration name and number to the PBX in the Registration Name / Number text fields.

3 Select the "Deactivate Master if no connection" check box to make the Master deactivate itself if the anonymous registration to the PBX fails. As a result the local host Radio will fail to register to the Master, and handsets, depending on their type, can move to another Radio that is operable.

Note: It is not recommended to use this option for a Master without a Standby Master.

4 Click "OK".

Note: A simpler and reliable way to handle this case is to deactivate the local host Radio on the Master.

4.5.22 Conferencing Unit

With an innovaphone PBX device with a conference interface it is possible to make 3-party conference calls. When the 3-party conference is started by the user, first the IP-DECT device starts a call to the configured *conferencing unit number*. If this call connects, the connected number is used to connect the other call parties to the conference call.

Configuration

1 Select DECT > Master.

2 In the *Conferencing Unit Number* text field: Enter the Trunk Line number appended by *1# ($*1#. Note: The Trunk Line number is configured in the innovaphone PBX.

3 Click "OK".

Usage

1 User A and user B are in a call. User A wishes to add user C to the call.

2 User A places user B on hold by pressing R and calls user C.

3 User C answers.

4 User A adds user C to the call with user B by pressing R3. The call is now a conference call.

4.5.23 Select Crypto Master Mode

In a system with Mobility Master(s), a Crypto Master must be configured to enable the early encryption feature.

1 Select DECT > Crypto Master.

2 Select "Active" in the Mode drop-down list.

3 Write a login name in the Name text field.

4 Enter a password in the Password text field.

5 Click "OK".

6 Connect Mobility Master(s) to the Crypto Master, see 4.5.27 *Connect Mobility Master to a Crypto Master* on page 68.

4.5.24 Select Mobility Master Mode

In a system with two or more Masters (Multiple Master system), a Mobility Master must be configured. For more information on Multiple Master Systems, see the System Planning documentation for IP-DECT.

1 Select DECT > Mobility Master.

2 Select in the Mode drop-down list:

- "Active", if this IPBS/IPBL is the Mobility Master.
- "Standby", if this IPBS/IPBL is the Standby Mobility Master.

3 If you have selected the "Standby" mode: Enter the primary Mobility Master IP address in its text field.

4 Write a login name in the Name text field.

5 Enter a password in the Password text field.

6 Click "OK".

4.5.25 Connect Mobility Master to other Mobility Master(s)

1 Select DECT > Mobility Master.

2 Write a name in the *Name* text field.

3 Enter a password in the *Password* text field.

4 Enter the address to the other Mobility Master in the *IP Address* text field.

5 Enter the address to the Standby Mobility Master for the other Mobility Master in the *Alt. IP Address* text field.

6 Click "OK".

7 Repeat the above steps to connect to additional Mobility Masters.

4.5.26 Disconnect Mobility Master from other Mobility Master(s)

1 Select DECT > Mobility Master.

2 Delete the name in the *Name* text field.

3 Delete the password in the *Password* text field.

4 Delete the address to the other Mobility Master in the *IP Address* text field.

5 Delete the address to the Standby Mobility Master for the other Mobility Master in the *Alt. IP Address* text field.

6 Click "OK".

7 Repeat the above steps to disconnect from additional Mobility Masters.

Note: When disconnecting from other Mobility Master(s) the password field might have to be reentered.

4.5.27 Connect Mobility Master to a Crypto Master

In a system with Mobility Master(s), all Mobility Master(s) must be connected to a Crypto Master to enable the early encryption feature.
For information on how to configure a Crypto Master, see 4.5.23 *Select Crypto Master Mode* on page 67.

1 Select DECT > Mobility Master.

2 In the *Crypto Master* section: Enter the name for the Crypto Master in the *Name* text field.

3 Enter the password for the Crypto Master in the *Password* text field.

4 Enter the address to the Crypto Master in the *IP Address* text field.

5 Click "OK".

6 Repeat the above steps to connect additional Mobility Masters to the Crypto Master.

7 To view a list of Mobility Masters connected to the Crypto Master: Select Device Overview > Crypto Master. The Mobility Masters sync status is shown in the list with a green, yellow or red dot in the column *Sync*. Green dot means that the Mobility Master is connected to the Crypto Master. Yellow dot means that the Mobility Master is disconnected from the Crypto Master. Red dot means that the Mobility Master must connect to the Crypto Master before the Crypto Master is operable.

4.5.28 Connect Master to a Mobility Master

In a system with several Masters, all Masters must be connected to the Mobility Master.

1 Select DECT > Master.
2 Enter the name for the Mobility Master in the *Name* text field.
3 Enter the password for the Mobility Master in the *Password* text field.
4 Enter the address to the Mobility Master in the *IP Address* text field.
5 Enter the address to the Standby Mobility Master in the *Alt. IP Address* text field.
6 Click "OK".
7 Reset in order to make the changes take effect, see 4.27 *Reset* on page 118.

4.5.29 Enable the Radio

If the IPBS/IPBL shall not be used as a radio, for example only be used as a *PARI* Master, it can be disabled by marking the *Disable* check box.

Tip: To assign a PARI Master, see 4.5.30 *Enter IP Address to the PARI Master and the Standby PARI Master* on page 69.

1 Select DECT > Radio.
2 Clear the *Disable* check box.

4.5.30 Enter IP Address to the PARI Master and the Standby PARI Master

All IPBS/IPBL need to know the IP address of the PARI Master and the Standby PARI Master.

1 Select DECT > Radio.
2 Enter the name for the PARI Master in the *Name* text field.
3 Enter the password for the PARI Master in the *Password* text field.
4 Enter the address to the PARI Master in the *PARI Master IP Address* text field. If this is the PARI Master, enter 127.0.0.1.
Note: The PARI Master can be configured as Active or Mirror.
5 Enter the address to the Standby PARI Master in the *Alt. PARI Master IP Address* text field. If this is the Standby PARI Master, enter 127.0.0.1.
Note: The Standby PARI Master can be configured as Standby or Mirror.
6 Click "OK".
7 Reset in order to make the changes take effect, see 4.27 *Reset* on page 118.

4.5.31 Multiple Radio Configuration

The PARI Master can configure the same Radio settings for all Radios in the system. All settings configured in the *Radio Config* page replace the local Radio settings. This means that all settings in the *Radio Config* menu will have precedence over values configured locally or received via DHCP options.

1 Select DECT > Radio Config.

NOTE: To access the Radio Config. tab, the PARI function has to be enabled, see 4.5.18 *Enable PARI Function* on page 63.

2 Configure alarm and event forwarding, see *Forward Alarms and Events* on page 77.
3 Configure automatic firmware update, see 4.8.1 *Configure Automatic Firmware Update* on page 76.

4 Configure NTP settings, see 4.1.4 *Configure the NTP Settings* on page 37.

5 Configure IP settings, see 4.3.1 *Configure IP Settings* on page 47.

6 Click "OK".

4.5.32 PARI

The PARI is a part of the broadcast identity, which uniquely identifies an IPBS/IPBL. This PARI is automatically assigned to each IPBS/IPBL in the system. But if more than one Ascom IP-DECT system operates within the same coverage area, the systems need to have a unique system identity in the PARI assigned in order to differentiate the systems.

To see the occupied system IDs of other Ascom IP-DECT systems within the coverage area, perform an RFP scan, see 4.26.10 *RFP Scan* on page 118.

1 Select DECT > PARI.

NOTE: To access the PARI tab, the PARI function has to be enabled, see 4.5.18 *Enable PARI Function* on page 63.

2 Select a number between 1 and 296, see below. If this is not done, the IPBS/IPBL will randomly select a number.

NOTE: The number of system IDs will affect how many IPBSs/IPBLs that can be used per PARI Master in an installation, as shown below:

In large systems with system ID 293 to 296, the Radio should be disabled in the Pari Master. Also, with the exception for the Pari Master role, no other roles (for example Crypto Master, Kerberos server, etc.) should be activated in the Pari Master.

System ID = 1 to 36:
Max. 1023 IPBS per Pari Master or max. 240 IPBL per Pari Master.

System ID = 37 to 292:
Max. 127 IPBS per Pari Master or max. 127 IPBL per Pari Master.

System ID = 293 to 296:
Max. 2047 IPBS per Pari Master or max. 240 IPBL per Pari Master.

3 Click "OK".

4 Reset in order to make the changes take effect, see 4.27 *Reset* on page 118.

Note: The RFPI, which the PARI is a part of, can be used for localization of a handset making a personal alarm. To ensure that RFPIs are system unique, use different System ID's for each PARI Master.

4.5.33 SARI

The SARI is the broadcast identity, which uniquely identifies an IP-DECT system. The SARI is added in the PARI Master. It is possible to add more than one SARI (guest SARIs). This is necessary if you want to join two separate IP-DECT systems and allow handsets to roam into each other's system. The advantage is that the handsets in the two different IP-DECT systems need not be re-registered to a common SARI.

Note: Several guest SARIs have an impact on the system performance, so it is recommended to use the same SARI across all PARI Masters in the system. If this is not feasible, you can add up to 10 SARIs.

1 Select DECT > SARI.

Note: To access the SARI tab, the PARI function has to be enabled, see 4.5.18 *Enable PARI Function* on page 63.

2 Enter the SARI number in the SARI text field.

3 Click "OK".

4 You can add optional guest SARI numbers in the empty field.

5 Click "OK". All RFPs are reinitialized to broadcast also the added guest SARI.

4.5.34 Configure Air Synchronization

This section only applies to the IPBS.

IPBS System

The IPBSs use the DECT air interface to synchronize to each other. For an individual IPBS it is not needed to configure which IPBS to synchronize to. It is needed to manually select one or several IPBS as synchronization master candidate. The PARI Master assigns one of these IPBS as an active sync master. The remaining candidates will act as sync slaves and can be new sync masters in case the active sync master will fail/break. When using one sync region it is recommended to configure at least two base stations in the middle of the building as synchronization masters.
All IPBSs in sync slave mode sends its list over received sync candidates to the PARI Master. The PARI Master informs the IPBS sync slaves which sync candidate it shall synchronize to.

Mixed System

All IPBLs are synchronization masters in region 0. Any IPBS in this region will receive its synchronization over the air from the RFPs, which are connected to the IPBL.

Sync Regions

Sync regions are used when, for example, several buildings are located in the same coverage area and all radios are using same PARI Master but where the synchronization coverage between buildings is not good enough for a stable synchronization.

A solution may be to use separate synchronization regions for the buildings and have reference synchronization between the regions. Each region has its own Sync Master but can take reference sync from another region and handover between the buildings is possible. If a region should lose the reference synchronization with another region, the internal synchronization in respective region will still work but there can be no handover between the regions.

Note: For the synchronization to work, it is not allowed to configure reference sync in a ring.

Configure Sync Slave IPBS

All IPBSs in sync slave mode sends its list of sync candidates to the PARI Master. The PARI Masters informs the IPBS sync slave which sync candidate it shall synchronize to.

In addition to the above automatic synchronization procedure it is also possible to use static synchronization, that is, manually lock on to a specific RFPI. When specifying a specific RFPI, it must be within the same synchronization region.

Configure Sync Slave as follows:

1 Select DECT > Air Sync.

2 Select "Slave" in the *Sync Mode* drop-down list.

3 To lock the sync slave to a specific RFPI, enter the sync RFPI in the *Sync RFPI* text field. Enter an alternative sync RFPI in the *Alternative Sync RFPI* text field (optional).

4 Enter a region ID between 0 and 249 in the *Sync Region* text field.

5 Click "OK".

Configure Sync Master IPBS

Radios configured as sync master will report to the PARI Master that it wants to be a sync master. The PARI Master will select one of them to be the active sync master.

When a sync master has been assigned to be active it searches for other IPBSs within the same region during 30 seconds. If any IPBS is found the values for slot, frame, multi frame and PSCN are received and applied to the Sync Master. After receiving all these values or after the time-out of 30 seconds the Sync Master enters the master state.

With this method it will be possible to restart only the Master in the region. The remaining slaves will be able to maintain synchronization for a few minutes during restart of the Master. The Master will adjust itself to the other IPBSs at startup. The slaves will notice that the Master is back and the synchronization will be received from the Master.

In master state the values are updated locally during all further operation of the Master IPBS and no synchronization to other IPBSs in the same region is done.

It is possible to configure the Sync Master to synchronize to a reference base station (another or same DECT system). In this case the Sync Master will try to synchronize to the reference system if the reference system is found but it will not require the reference system to be available. The Sync Master will operate even though the reference system is not available. During startup the Master will prefer to synchronize to a slave base in the same system before synchronizing to the reference base station.

Configure Sync Master as follows:

1 Select DECT > Air Sync.

2 Select "Master" in the *Sync Mode* drop-down list.

3 To synchronize the sync master to a reference base station, enter the reference base station in the *Reference RFPI* text field. Enter an alternative reference base station in the *Alternative reference RFPI* text field (optional).

4 Enter a region ID between 0 and 249 in the *Sync Region* text field.

5 Select type of resynchronization action to perform at reference sync failure, a manual or an automatic (scheduled) one.

6 Click "OK".

4.6 VoIP

This section only applies if the SIP protocol is used in the system.

4.6.1 Add instance id to the user registration with the IP-PBX

This might simplify administration with some IP-PBXs.

1 Select VoIP > SIP.

2 To enable, select the "Add instance id to the user registration with the IP-PBX" check box corresponding to the SIP protocol that is used.

3 Click "OK".

4.6.2 IP-PBX supports redirection of registration when registered to alternative proxy

When the primary proxy is down and an alternative proxy is in use, the IP-PBX will redirect the registration to the primary proxy when available again. IP-DECT will not make any attempts to contact the primary proxy as long as the alternative proxy is available.

1 Select VoIP > SIP.

2 To enable, select the "IP-PBX supports redirection of registration when registered to alternative proxy" check box corresponding to the SIP protocol that is used.

3 Click "OK".

4.6.3 Use local contact port as source port for TCP and TLS connections

Instead of having a dynamic/ephemeral source port for the persistent TCP/TLS connection, the local contact port of the corresponding phone can be used instead (required by some IP-PBXs.).

1 Select VoIP > SIP.

2 Select the *SIPS* check box.

3 Click "OK".

4.6.4 Session Timer (initial value)

If set, a keep-alive mechanism will be used to detect if a call is still valid as defined by rfc 4028. This is normally handled by the IP-PBX and then not necessary to be defined here.

1 Select VoIP > SIP.

2 To enable, enter a time (sec.) in the "(Session Timer initial value)" field.

3 Click "OK".

4.7 UNITE

4.7.1 Configure Messaging

Note: The Unite CM support for the below functions is depending on the Unite CM software version.

If an IMS3/Unite CM is to be used in the IP-DECT system, enter the IP address following the steps below.

1 Select UNITE > SMS.

NOTE: To access the SMS tab, the Master mode has to be activated, see 4.5.16 *Select Mode* on page 62.

2 Enter the address to the IMS3/Unite CM in the IP Address text field.

3 Click "OK".

About Broadcast:

NOTES: a) The Broadcast IDs are created in the Unite CM, refer to Configuration Manual, Unite Connectivity Manager, TD 92735EN.

b) To support Broadcast only Worf (KRCNB 30x, BS3x0) and DB1 RFPs shall be used.

If Multicast is to be used, do as follows:

1 Select UNITE > SMS.

NOTE: To access the SMS tab, the Master mode has to be activated, see 4.5.16 *Select Mode* on page 62.

2 Select the *Multicast* check box.

NOTES: a) The Multicast groups are created in the Unite CM, refer to Configuration Manual, Unite Connectivity Manager, TD 92735EN.

b) In a Multiple Master System all users to be reached by a Multicast message must exist in the PARI Master.

c) To support Multicast only Worf (KRCNB 30x , BS3x0) and DB1 RFPs shall be used.

3 Click "OK".

If the communication between the Master and the IMS3/Unite CM should be encrypted, do as follows:

1 Select UNITE > SMS.

Note: To access the SMS tab, the Master mode has to be activated, see 4.5.16 *Select Mode* on page 62.

2 Select the Encryption check box.

NOTES: a) When selecting or clearing the Encryption check box, it may take up to a couple of minutes until the IMS3/Unite CM is fully operational.

b) The IMS3/Unite CM support for encryption is depending on the IMS3/Unite CM software version.

3 Click "OK".

4.7.2 Device Management

NOTE: To access the *Device Management* tab, the Master mode has to be activated, see 4.5.16 *Select Mode* on page 62.

If a specific Device Manager (for example IMS3) is to be used in the IP-DECT system, enter the IP address to the Device Manager following the steps below. To set the Master to search for an existing Device Manager on the network, go to 4.7.3 *Service Discovery* on page 75.

For Portable Devices, do as follows:

1 Select UNITE > Device Management.

2 In the *Portable Devices* section: Enter the address to the Device Manager in the *IP Address* text field.

The IP address for the Device Manager that the Master is currently connected to is shown under *Active Settings*.

3 Click "OK".

For IP-DECT Devices, do as follows:

1 Select UNITE > Device Management.

2 In the *IP-DECT Devices* section: Enter the address to the Device Manager in the *IP Address* text field.

NOTE: To access the *IP-DECT Devices* section, the PARI Master mode has to be activated, see 4.5.18 *Enable PARI Function* on page 63.

The IP address for the Device Manager that the PARI Master is currently connected to is shown in the *Unite Address* text field.

3 Enter the Resource Identity/Service in the *Resource Identity* text field. The default is IPDECT.

4 Click "OK".

4.7.3 Service Discovery

If no Device Manager (for example IMS3) has been selected to be used in the IP-DECT system, see 4.7.2 *Device Management* on page 74, then the Master will automatically search for an existing Device Manager on the network. To set the Master to search in a specific domain on the network or to stop the search, follow the steps below.

1 Select UNITE > Service Discovery.

NOTE: To access the *Service Discovery* tab, the Master mode has to be activated, see 4.5.16 *Select Mode* on page 62.

2 Do one of the following:

- To stop the Master to search for a Device Manager, select the *Disable* check box.
- To set the Master to search for a Device Manager in a specific domain on the network, enter the domain id in the *Domain ID* text field. The domain id must be the same as the one entered in the Device Manager.

3 Click "OK".

When the Master is connected to a Device Manager, the IP address for the Device Manager is shown in the Unite Address text field under UNITE > Device Management.

4.7.4 Send Status Log

It is possible to send alarm and event reports to the Unite system. For example directly to the ESS fault handler or to the UNA (Unite Node Assistant) which in turn forwards the alarm event according to distribution lists.

1 Select UNITE > Status Log.

2 Enter the address to the server where the Status Log should be sent in the *Unite IP Address* text field.

3 Enter the Resource Identity/Service in the *Unite Resource Identity* text field. If this field is left empty then the default will be UNA (Unite Node Assistant).

4.7.5 Module Fault List

It is possible to change the severity level on alarms and events generated in the IP-DECT system.

1 Select UNITE > Module Fault List. A list of alarms and events generated in the IP-DECT system is shown with their fault codes (IP-DECT code and Unite code). Alarms are listed with a *Yes* and events are listed with a *No* in the column *Persistant*.

2 To change the severity level on an alarm/event: Select in the *Seriousness* drop-down list one of the following:

- *Disabled* (The alarm/event will not be sent to the Unite system.)
- *Information*
- *Warning*
- *Error*
- *Critical*

3 Click "OK".

Except for severity level *Disabled*, the alarm/event will be sent to the Unite system with changed severity level.

4.8 Services

4.8.1 Configure Automatic Firmware Update

The IPBS/IPBL can be configured to automatically update its firmware. A script file must be uploaded to a suitable directory on an internal web server. For information on the script file syntax, see Appendix A: *How to Configure and Use the Update Server* on page 137.

1 Select Services > Update

2 Enter the URL of the script file in the URL text field.

3 Enter the poll interval, in minutes, in the Interval (min) text field

4 Click "OK".

The Current Update Serials section shows the values of the variables set after the last execution of the associated command.

4.8.2 Configure Logging

There are three ways to collect logs, see the table below.

TCP	The syslog entries are transmitted using a TCP connection.
SYSLOG	The entries are reported to a “syslogd” server in the network, which is responsible for further evaluation or storage of the entries.
HTTP	The syslog entries are transferred to a web server where they can be further processed. Each individual syslog entry is transmitted as form data to the web server in HTTP GET format.
HTTPS	The syslog entries are transferred to a web server where they can be further processed. Each individual syslog entry is transmitted as form data to the web server in HTTPS GET format.

Store the Syslog Entries using a TCP Connection

1 Select Services > Logging
2 Select "TCP" in the *Type* drop-down list.
3 Enter the "IP address" of the logging server in the *Address* text field.
4 Enter the "Port" of the logging server in the *Port* text field.
5 Click "OK".

Store the Syslog Entries in a Syslogd

1 Select Services > Logging.
2 Select "SYSLOG" in the *Type* drop-down list.
3 Enter the "IP address" of the syslogd in the *Address* text field.
4 Enter the desired syslogd message class in the *Class* text field.
5 Click "OK".

Store the Syslog Entries on a Web Server

1 Select Services > Logging.
2 Select "HTTP" or "HTTPS" in the *Type* drop-down list.
3 Enter the IP address in the *IP Address* text field.
4 Enter the port in the *Port* text field.
5 Enter the relative URL of the form program on your web server in the *Path* text field.
6 Click "OK".

Note: The IPBS/IPBL will make an *HTTP GET* request or *HTTPS GET* request to the web server on the registered URL followed by the URL-encoded log entry.

Example:

Enter the value "/cdr/ cdrwrite.asp" in the "URL-Path" field if a page is on the web server with the name "/cdr/cdrwrite.asp" with a form that expects the log message in the "msg" parameter. In this example, the IPBS/IPBL will make a *GET /cdr/ cdrwrite.asp?event=syslog&msg=logmsg* request to the server.

Forward Alarms and Events

It is possible to forward alarms and events to a HTTP server destination. Typically this can be a Master base station. This programming can be done in the PARI Master (DECT > Radio config) or locally as described below.

1 Select Services > Logging.
2 If the HTTP server destination requires HTTPS then select "HTTPS" in the *Type* drop-down list.
3 Enter the IP Address of the IPBS/IPBL where you want to have an overview of all faults in the External HTTP Server Address text field.
4 Enter the HTTP server port in the External HTTP Server Port text field. The default value is 80.

4.8.3 Configure the HTTP settings

Traditionally IPBS/IPBL has been administered over the network via the http protocol (default port 80).

In a secure system (see the IP Security chapter) IPBS/IPBL should be administered via the https protocol (default port 443). If for some reason port 443 is not to be used, you can use another port for the local https server and then access the IPBS/IPBL via this port.

Http and https traffic, respectively, would be disabled if their port values were to be set to zero (0). Therefore:

- To disable http traffic set "Port" to 0 (which is recommended in a secure system). Attempts to contact the device using the http protocol will result in an Unable to connect message.
- To disable https traffic set "HTTPS Port" to 0 (not recommended).

Any other port values would enable http and https traffic, respectively, for the port specified.

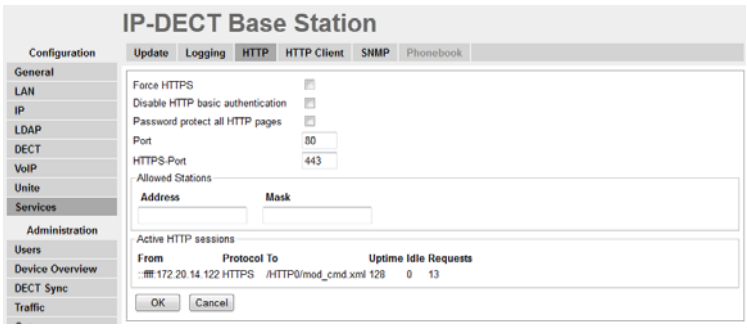


Figure 6. Configure the HTTP Settings

1 Select Services > HTTP

- Select the Force HTTPS check box to allow only HTTPS sessions and all HTTP requests are redirected as HTTPS requests.
- Select the Disable HTTP basic authentication check box to require all administrative and programmatic clients to support HTTP digest authentication.
- Select the Password protect all HTTP pages check box to password protect all HTTP pages.
- Enter "Port number" in the Port text field. The IPBS/IPBL is by default administered over the network via the TCP port 80 (http). If port 80 is not to be used another port can be set up for access. Set this value to 0 to disable http traffic (recommended). Attempts to contact the device using the http protocol will result in an Unable to connect message.
- Enter "HTTPS Port" in the HTTPS Port text field. To access IPBS/IPBL securely, use the TCP port 443 (https). Set this value to anything except zero (0) to enable https traffic. The default value is 443. The value zero (0) disables https traffic which is not recommended.
- Enter "Network Base Address" / "Network Base Mask" in the Allowed stations text fields to only allow access only from matching network, for example:172.16.0.0 / 255.255.0.0
- In the Active HTTP sessions field all ongoing HTTP traffic is displayed.

2 Click "OK".

4.8.4 Configure the HTTP Client settings

A list of URL that require authentication can be specified.

1 Select Services > HTTP Client.

2 Enter the "URL" in the *URL* text field.

3 Enter "User" and "Password" in the *User* and Password text fields.

4 Click "OK".

A new row will be shown and more URLs can be added.

4.8.5 SNMP

Faults can be reported in the IP-DECT system via the Simple Network Management Protocol (SNMP). The SNMP framework has three parts:

- An SNMP manager: the system used to control and monitor the activities of network hosts using SNMP.
- An SNMP agent: the software component within the managed device that maintains data for the device and reports data, as needed, to managing systems.
- A MIB: The Management Information Base (MIB) is a virtual information storage area for network management information.

The agent and MIB reside on a network device (for example, router, access server, or switch). To enable the SNMP agent on the IPBS/IPBL, the relationship between the manager and the agent must be defined.

The MIB file can be downloaded from the Ascom's Extranet where the MIB file is included in the software package zip file.

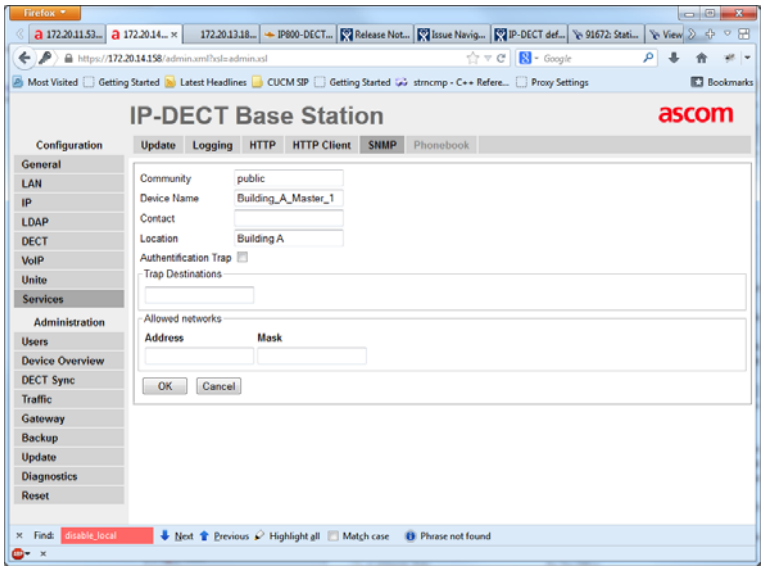


Figure 7. Configure SNMP Settings

1 Select Services > SNMP

2 Enter a name in the Community field if you are not using the standard community name (public). The community text string acts like a password to regulate access to the agent on the Base Station.

3 Enter a device name in the Device Name field. This field is optional and serves only informational purposes.

4 Enter the name and phone number of the contact person in the Contact field. This field is optional and serves only informational purposes.

5 Enter a location in the Location field. This field is optional and serves only informational purposes.

6 Select the *Authentification Trap* check box to enable the sending of authentification traps. Access via SNMP is only possible if the correct Community Name is entered. If enabled a trap will be generated in the event of access with an incorrect Community Name.

7 Enter the IP address of the desired trap destinations in the *Trap Destinations* field. SNMP traps will be sent to all destinations.

8 Enter the IP address and mask of the networks that are allowed to send SNMP requests. All networks are allowed if the field is empty.

9 Click "OK".

4.8.6 Phonebook

This section describes how to import entries to the central phonebook (see *Import Entries to the Central Phonebook* on page 80) and how to export the central phonebook to csv file (see *Export the Central Phonebook to a csv file* on page 81).

Central phonebook is a feature that when enabled in the Master allow DECT handset users to search for telephone numbers in a database stored locally on a Master.

If the same central phonebook shall be used in a multiple Master system and/or Standby Master functionality is used, the central phonebook must be stored in all masters. This is done by using LDAP replication where the central phonebook in one Master (LDAP server) is replicated to the masters configured as LDAP replicators. See *Import Entries to the Central Phonebook by Replication from other Master* on page 81.

Note: If the phonebook functionality in the IPBS/IPBL is enabled, then the SMS feature in the IMS3/Unite CM is disabled. If an IMS3/Unite CM is connected, the central phonebook should be located in the IMS3/Unite CM instead of the IPBS/IPBL.

Import Entries to the Central Phonebook

There are two ways to import entries to the central phonebook:

- from a csv file
- by replication from other Master

Import Entries to the Central Phonebook from a csv file

Note: A csv file can contain max 1000 users.

The csv file to be imported to the phonebook shall have the following format:

```
First name 1;Last name 1;Telephone number 1
First name 2;Last name 2;Telephone number 2
```

or

```
First name 1,Last name 1,Telephone number 1
First name 2,Last name 2,Telephone number 2
```

Note: When importing a central phonebook file in csv format, existing entries are deleted.

1 Select Services > Phonebook.
2 Select the *Enable* check box.
3 Select "File upload" in the *Data Source* drop-down list.
4 Select file type for the csv file in the *File Type* drop-down list.
5 If so needed, select separator for the csv file in the *Delimeter* drop-down list.
6 Click "OK". The options *Import* and *Export* are displayed.
7 Select Import > Choose File.
8 Locate the csv file in the system and select Open > Next. Make sure the correct number of entries are correct.
9 Click "Close"

Import Entries to the Central Phonebook by Replication from other Master

Note: An LDAP server and LDAP replicator(s) must first be configured. See 4.4 *LDAP* on page 47.

1 Select Services > Phonebook.
2 Select the *Enable* check box.
3 Select "Replication from other Master" in the *Data Source* drop-down list.
4 Enter the IP address to the LDAP server in the *Master IP Address* text field.
5 Enter the LDAP user name and password in the *Name* and *Password* text fields.
6 Click "OK".

To check the replicator status, select LDAP > Replicator-Status. See also 4.4.4 *Check LDAP Replicator Status* on page 54.

Export the Central Phonebook to a csv file

The complete phonebook can be exported to a csv file for example for editing or backup reasons.

1 Select Services > Phonebook.
2 Click “Export”.
3 Click “Download file” in the window that appears.
4 Click “Save” in the dialog window that appears.
5 Enter a name of the file and select in which folder the file should be saved.
6 Click "Save".

4.8.7 Configure IP-DECT to Connect to a Presence System Using ICP

With a presence system users will be able to enter absent information to inform the calling person why the called person is not available.

The IP-DECT system can be configured to connect to a presence system via the ICP protocol as follows:

1 Select Services > ICP.

Note: To access the ICP tab, the Master mode has to be activated, see 4.5.16 *Select Mode* on page 62.

2 Select the *Enable* check box.

3 In the *Presence System* text field, enter the IP address to the presence system to connect to. Note: Leave this field empty if connection is established from other side.

4 In the *Port* text field, enter the port over which presence information are sent/ received.

5 In the *Deactivation Type* drop-down list, select which type of deactivation message to use.

6 In the *Terminal ID Len* drop-down list, select the maximal length of a terminal id (operator desk).

7 In the *Directory Number Len* drop-down list, select the maximal length of a directory number (user number).

8 In the *Fill Character* text field, enter a character that will be used to fill shorter directory/terminal numbers. Recommended is to use "@".

9 Select the *Send Heartbeat* check box if the IP-DECT system should send heartbeat signals towards the presence system.

10 In the *Heartbeat Interval (s)* text field, enter in seconds the interval between two heartbeats.

11 In the *Server reconnection interval (s)* text field, enter in seconds the time between reconnection attempts if acting as server.

12 In the Code text fields, enter new display texts if other than the default ones (max 12 characters). For each code, set if time (HHMM) or date (MMDD) input is required.

13 In the month text fields, enter new display texts if other than the default ones (max three characters).

14 Click "OK".

To activate presence

Presence can be activated from a DECT handset or from an operator desk. To activate from a DECT handset the user is entering key pad data for activation of presence, for example ***23*3*1500#**, where "3" is the reason code and "1500" is the back time. Depending on what has been configured for reason code 3 (see step 12 above), the back time is entered in format HHMM (hour and minutes) or MMDD (month and day).

Note: To configure the key pad data for activation and deactivation of presence, select DECT > Suppl. Serv. Set the *Interception* parameter.
For more information, see 4.5.15 *Configure Supplementary Services* on page 59.

To deactivate presence

To deactivate from a DECT handset the user is entering key pad data for deactivation of presence, for example **#23#**.

4.9 Users

This section describes the *Users* sub menu and how to do the following:

- Show all registered users in the IP-DECT system.
- Search for user information.
- Add a user.
- Add a user administrator.
- Import a csv file with user information.
- Export a csv file with user information.

4.9.1 Show all Registered Users in the IP-DECT System

Shows both User Administrator and Users.

1 Select Users > Users.

2 Click "show".

It is possible to change the order of the list by clicking on the headings.

4.9.2 Search for User Information

It is possible to search for users registered in the system by name or extension number. Search for a user following the steps below:

1 Select Users > Users.

2 Enter the long name to search for in the text field, either by entering the whole long name or by entering the beginning of the long name.

3 Click "show".

4.9.3 Add a User

For information on how to add users to the IP-DECT system, see 3.13 *Add Users* on page 21.

Add a User to Another IP-DECT System

To allow handsets to identify the system to which the subscription shall be directed (e.g. the same physical area may be covered by different systems), it may be necessary to enter an initial PARK into a handset.

To view the PARK and the PARK 3rd pty code:

1 Select Users > Users.

PARK: Must be used for Ascom handsets. Can also be used for other handsets if they support a PARK that matches the SARI.

PARK 3rd pty: Must be used for handsets that do not support a PARK that matches the SARI.

For information on how to subscribe the user's handset to the other IP-DECT system, see the reference guide for the handset.

4.9.4 Add a User Administrator

For information on how to add user administrator to the IP-DECT system, see *Managing User Administrators* on page 15.

4.9.5 Export the Users to a csv file

The Users can be exported to a csv file, for example for editing or backup reasons.

1 Click "Export".

2 Click "Save" in the dialog window that appears.

3 Enter a name of the file and select in which folder the file should be saved.

4 Click "Save".

Note: For safety reasons, the *Auth. Code* and *Password* will not be included in the csv file.

4.9.6 Show Anonymous

The IPEI / IPDI number is displayed on anonymous registered handsets.

1 Select "Users".

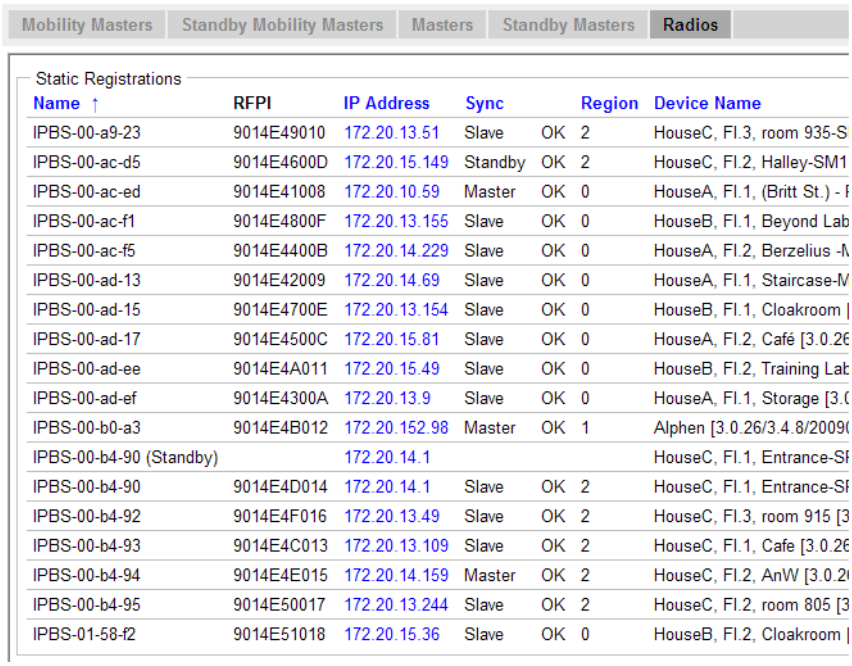
2 Select "Anonymous".

4.10 Device Overview

4.10.1 Radios

Information about the devices in the IP-DECT system.

1 Select Device Overview > Radios.



Name	RFPI	IP Address	Sync		Region	Device Name
IPBS-00-a9-23	9014E49010	172.20.13.51	Slave	OK	2	HouseC, Fl.3, room 935-S
IPBS-00-ac-d5	9014E4600D	172.20.15.149	Standby	OK	2	HouseC, Fl.2, Halley-SM1
IPBS-00-ac-ed	9014E41008	172.20.10.59	Master	OK	0	HouseA, Fl.1, (Britt St.) -
IPBS-00-ac-f1	9014E4800F	172.20.13.155	Slave	OK	0	HouseB, Fl.1, Beyond Lab
IPBS-00-ac-f5	9014E4400B	172.20.14.229	Slave	OK	0	HouseA, Fl.2, Berzelius -M
IPBS-00-ad-13	9014E42009	172.20.14.69	Slave	OK	0	HouseA, Fl.1, Staircase-M
IPBS-00-ad-15	9014E4700E	172.20.13.154	Slave	OK	0	HouseB, Fl.1, Cloakroom
IPBS-00-ad-17	9014E4500C	172.20.15.81	Slave	OK	0	HouseA, Fl.2, Café [3.0.26
IPBS-00-ad-ee	9014E4A011	172.20.15.49	Slave	OK	0	HouseB, Fl.2, Training Lab
IPBS-00-ad-ef	9014E4300A	172.20.13.9	Slave	OK	0	HouseA, Fl.1, Storage [3.(
IPBS-00-b0-a3	9014E4B012	172.20.152.98	Master	OK	1	Alphen [3.0.26/3.4.8/2009(
IPBS-00-b4-90 (Standby)		172.20.14.1				HouseC, Fl.1, Entrance-SI
IPBS-00-b4-90	9014E4D014	172.20.14.1	Slave	OK	2	HouseC, Fl.1, Entrance-SI
IPBS-00-b4-92	9014E4F016	172.20.13.49	Slave	OK	2	HouseC, Fl.3, room 915 [3
IPBS-00-b4-93	9014E4C013	172.20.13.109	Slave	OK	2	HouseC, Fl.1, Cafe [3.0.26
IPBS-00-b4-94	9014E4E015	172.20.14.159	Master	OK	2	HouseC, Fl.2, AnW [3.0.2(
IPBS-00-b4-95	9014E50017	172.20.13.244	Slave	OK	2	HouseC, Fl.2, room 805 [3
IPBS-01-58-f2	9014E51018	172.20.15.36	Slave	OK	0	HouseB, Fl.2, Cloakroom

Name	The unique identification name. The name syntax is ipbs-xx-xx-xx (IPBS1), ipbs2-xx-xx-xx (IPBS2) or ipbl-xx-xx-xx (IPBL), where xx-xx-xx should be replaced with the last 6 hexadecimal digits of the MAC address.
RFPI	Radio Fixed Part Identity.
IP Address	The IP address, click on the IP address to access the configuration GUI of that IPBS/IPBL.
Sync	The current synchronization status. Should be "Master OK", "Slave OK" or "Standby OK" if synchronized. "Standby" is a Radio configured as a Sync Master but it is active.
Region	The sync region which the Radio belongs to.
Device Name	The name entered in the general menu.

LDAP	The LDAP status, can be "" (blank), "-", "up", "server" or "down". Should be "-", "up" or "server".
Version	The current software version.
Connected Time	The elapsed time since connected to the Master.

Add Radios

In the *Uninitalized Registrations* section, uninitialized Radios not registered to a PARI Master are shown.

1 Select Device Overview > Radios

2 Click "Add" to add the Radio to the Master.

3 In the *Add Radio* window enter a name for the device. You can also add a Standby Master IP Address and a Sync Region.

4 Click "OK".

5 The Radio restarts and it establishes a connection to the PARI Master only.

Delete Radios

In the *Static Registrations* section, initialized Radios no longer registered to the PARI Master are shown.

1 Select Device Overview > Radios

2 In the *Static Registrations* section, click "Delete" to delete the Radio.

The Radio's RFPI is now released and can be reused. All other RFPIs in use are not affected.

Move RFPIs

In the *Static Registrations* section, initialized Radios no longer registered to the PARI Master are shown. If it is vital that the new device keeps the RFPI for the broken device e.g. alarm localization purposes, move the RFPI for the broken device to the new device registered to the PARI Master.

1 Connect the replacing device.

2 Add the Radio to the PARI Master, see *Add Radios* on page 85.

3 Select Device Overview > Radios

4 In the *Static Registrations* section, click "Move" for the Radio that is broken.

5 In the Move RFPI window, select in the *Destination* section the new Radio that you want to move the broken Radio's RFPI to.

6 Click "Move".

Existing RFPI on the new Radio is replaced by the broken Radio's RFPI. The new Radio's RFPI is now released and can be reused. All other RFPIs in use are not affected. The broken Radio will be deleted from the Static Registrations section.

4.10.2 RFPs

This section only applies to the IPBL.

Information about the DECT devices connected to the IPBL. For explanation on the information, see the table below.

1 Select Device Overview > RFPs.

2 Click the applicable port to open the RFP details pop-up window.

Port	The port used in the IPBL.
Status	Current status of the IPBS connected to the IPBL.
Description	A short description to help identify the IPBS.
Trace file	A blue text link for retrieval of a DB1 log. About retrieving a DB1 log, see *RFP Logging*.
RFPI	Identity number.
SW Version	The current software version.
Hardware	The hardware version.
Boot	RFP boot version.
Connected Time	The elapsed time since the RFP connected to the IPBL.
Cable Delay	The delay caused by the cable.
Tx Error	The number of required retransmissions. The counters "Tx Error" and "Rx Error" are indicators of how many packets that did not receive an acknowledge and had to be retransmitted. If the number of errors exceeds 1% of the total number of sent frames, it might be an indication of a communication problem between IPBL and RFP. A remark is also that these counters are only valid for the signaling to the RFP and not for the voice stream itself.
Rx Error	See the explanation for Tx Error.

3 The following actions are available:

- Click "OK" to save your settings and close the pop-up window.
- Click "Cancel" to close the pop-up window.
- Click "Refresh" to update the information.
- Click "Reset" to reset the RFP.

RFP Logging

An IPBL can retrieve logs from connected DB1s. A DB1 continuously produce logs by default, but during normal operation there will be few logs. Detailed logs will be produced if the DB1 experience a major event, such as an unexpected restart.

Retrieving an RFP Log

To retrieve a log, do as follows:

1 Select Device Overview > RFPs.

2 Click the applicable port (blue text link) to open the RFP details pop-up window.

3 Click on the blue retrieval text link "No file available (retrieve from RFP)" (see figure 8 on page 87). The log is being prepared for download which may take up to 3 to 4 minutes (Figure 9). The retrieval link will thereafter turn into the blue text link "Download" (Figure 10).

4 Click on the blue text link "Download" and open or save the log.

Note: The log can only be downloaded once. It is removed from the RFP after download. Logs are stored in the volatile memory and will be lost if the RFP loses power for whatever reason.

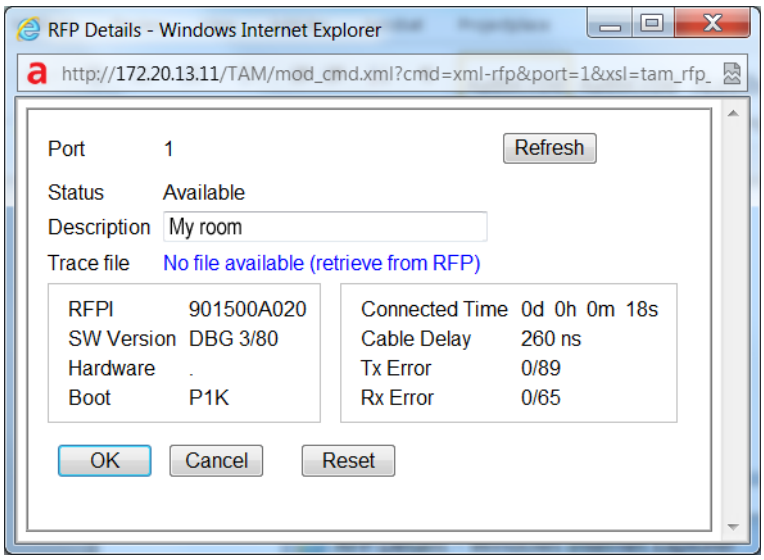


Figure 8.

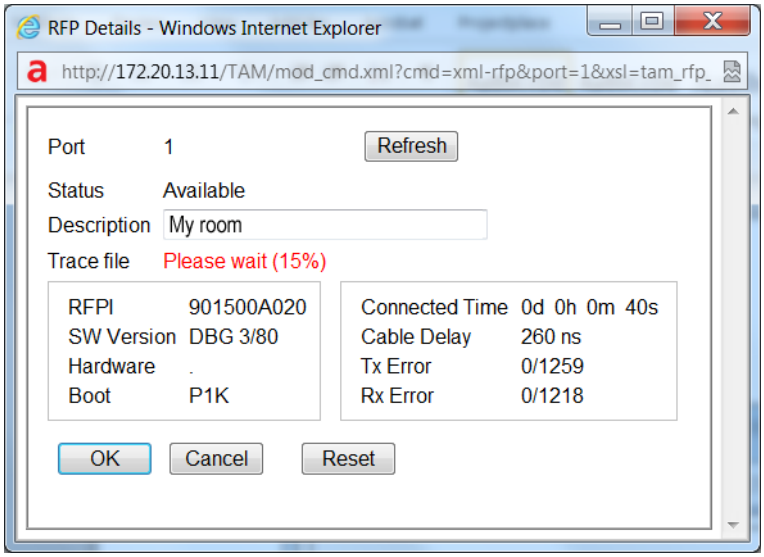


Figure 9.

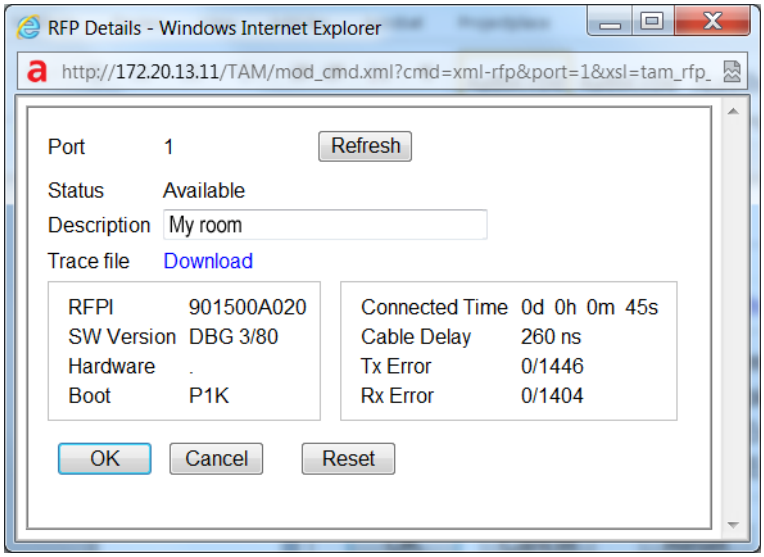


Figure 10.

Halted Logs

At certain major events, such as an unexpected restart, the logging will be halted so that the major event can be investigated. When the logging has been halted, the blue RFP link on the RFP overview (Device Overview > RFPs) will turn red (see Figure 11). The logging will be restarted after the log has been downloaded.

Note: An unexpected RFP restart will be indicated by the fault code 0x000e000a under Diagnostics > Events.

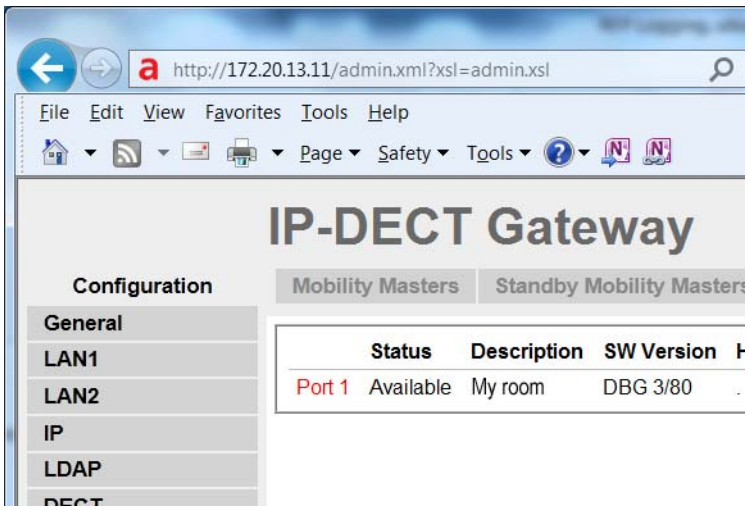


Figure 11.

4.10.3 Sync Ring

This section only applies to the IPBL.

A wire map of the synchronization ring is available in the GUI. The identities (IPBL-xx-xx-xx) of the IPBLs and the position in the ring is displayed. If the ring is broken it is possible to locate where. Click the IP address to access another IPBL.

1 Select DECT Sync > Sync Ring.

4.10.4 Sync Ports

This section only applies to the IPBL.

Displays the current status of the synchronization ports.

1 Select DECT Sync > Sync Ports.

Status	The current status of the port.
Sync Offset	The synchronization offset for the IPBL.
Cable Delay	The delay caused by the cable.
Sync Lost Counter	The number of times synchronization lost.
Communication	The present status of communication.
Connected to	The IP address of the IPBL connected.
Tx Error	The number of transmitting errors.
Rx Error	The number of receiving errors

4.10.5 Air Sync

This section only applies to the IPBS.

Air Sync status is displayed in the Device Overview > Air Sync menu. For explanation on the information shown for the active and the alternative sync bearers, see the table below.

RFPI	Radio Fixed Part Identity is the Id number of the sync bearer.
Carrier	The carrier used for air synchronization
Slot	The slot used for air synchronization
Hop	The number of hops from the Sync Master to the sync bearer
RSSI	Received Signal Strength Indication
FER	Frame Error Rate, a value between 0 and 100%. For a good synchronization the FER should be 0. It is OK to occasionally have a high FER, but only for short periods (up to one minute).

4.10.6 Sync Lost Counter in IPBS

This section will describe briefly the different situations when the "sync lost counter" is incremented and what impact it has for the users.

Sync Lost Counter

When an IPBS increments the sync lost counter it means that the IPBS stops to handle all radio traffic for a while and after that restarts the synchronization procedure. The radio part is not really restarted but out of service for a short time period. The IP-part of the IPBS is not affected by this but is in service all the time.

There are five reasons for when the sync lost counter is incremented:

- The IPBS has not been able to find a synchronization source within 9 minutes.
- The PSCN value is changed.
- The value for frame number is changed.
- The value for multi frame number is changed.
- The number of enabled carriers is changed.

If the PSCN, frame number, multi frame number and/or the number of enabled carriers is changed, then the radio stops to handle traffic immediately.

Impact for the Users

During speech

If the radio stops to handle traffic as described in *Sync Lost Counter* on page 89, it does not necessarily mean a disconnected call. In a system with good overlapping coverage it might be possible to make a handover to another IPBS without disconnecting the call. If the handset does not quickly find any other IPBS the call will be disconnected and the handset will indicate "No System". As soon as the IPBS is synchronized it is available again for handset communication. The handset will then connect to the system in the same way as for a normal power on.

In idle mode

In idle mode the user will most likely not discover any problem. Since the handsets have a short delay before showing "No System" the handset has time to roam to another IPBS. This requires a good overlap between radio cells to make it possible for the handset to roam to another IPBS. If no other IPBS is available the handset(s) will indicate "No System". As soon as the IPBS is synchronized it is available again for handset communication. The handset will then connect to the system in the same way as for a normal power on.

4.11 DECT Sync

4.11.1 Air Sync Overview

This section only applies to the PARI Master.

To see a graphic presentation of the air synchronization in a system, select DECT Sync > Air Sync Overview.

The internal synchronization for each region is shown separately by an expandable tree view, see Figure 12. The green, yellow and red dots in the sync tree show the following sync status for the Radios:

- Green: Synchronized
- Yellow: Synchronized but poor received signal strength (RSSI < -83 dBm)
- Red: Unsynchronized

The grey dot at top in the sync tree shows that it is a reference sync RFPI.

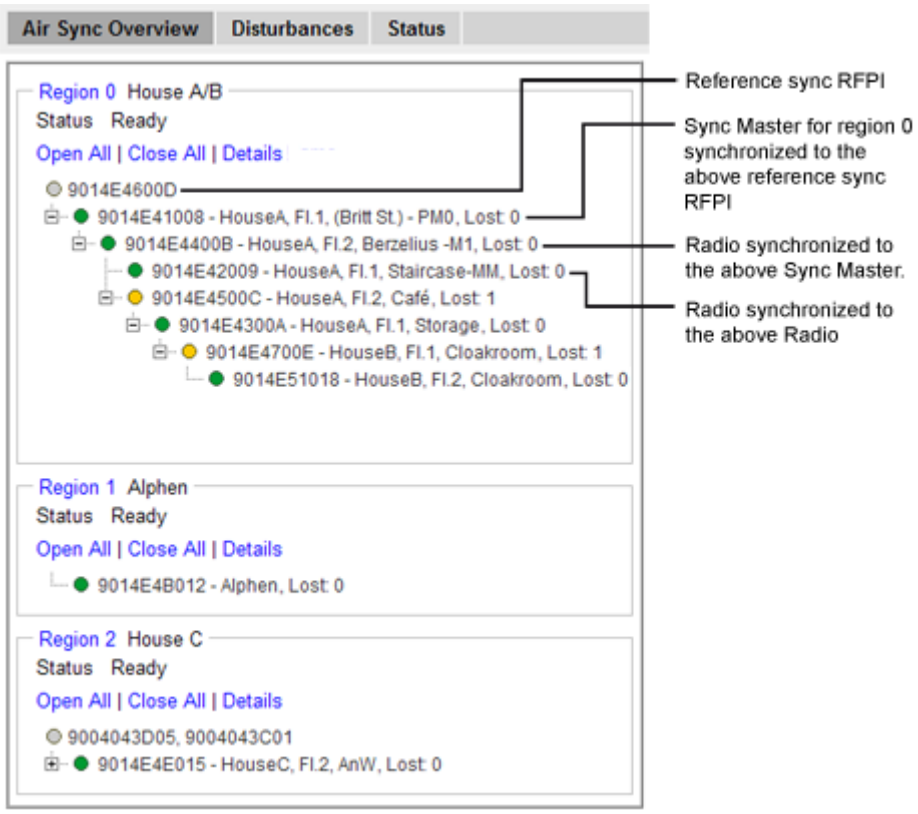


Figure 12. The sync trees for region 0, 1 and 2 where region 0 is fully expanded.

Region Details

1 Select DECT Sync > Air Sync Overview.

2 Click on the region ID text at top above the sync tree.

3 If this has not already been done: In the Region Details window, enter a name for the region.

4 In section Statistics, there are three counters:
- Calculations: Is incremented each time the sync tree is calculated.
- Configurations: Is incremented when an IPBS has received a new sync instruction.
- *Sync Lost*: Is incremented when an IPBS stops to handle radio traffic for a while and after that restarts the synchronization procedure.
To clear the counters, click "Clear".

Reference Synchronization

To get the Sync Master to resynchronize to the reference sync, do as follows:

1 Select DECT Sync > Air Sync Overview.

2 Click on the region ID text at top above the sync tree.

3 In the Region Details window, click "Start". When resynchronizing, all ongoing calls in the region will be disconnected.

IPBS Details

1 Select DECT Sync > Air Sync Overview.

2 Click on the "Details" text link above the sync tree. The sync tree will now display name and sync lost counter for the IPBSs in the region. The sync lost counter is a counter that is incremented when the IPBS stops to handle radio traffic for a while and after that restarts the synchronization procedure.

4.11.2 Disturbances

This section only applies to the PARI Master.

1 Select DECT Sync > Disturbances.

2 Click "Start".

A list of potential disturbances is shown, that is, alien DECT systems that have a higher signal strength than the current sync signal.

4.11.3 Status

This section only applies to the IPBS.

Air Sync status is displayed in the DECT Sync > Status menu. For explanation on the information shown for the active and the alternative sync bearers, see the table below.

Sync offset	Adjustment of frequency in progress performed by the current IPBS so it can be in synchronization with the synch source.
Drift	The time difference between the current IPBS and its sync source.
Sync lost counter	A counter that is incremented when the IPBS stops to handle radio traffic for a while and after that restarts the synchronization procedure.
RFPI	Radio Fixed Part Identity is the Id number of the sync bearer.
Carrier	The carrier used for air synchronization
Slot	The slot used for air synchronization
Hop	The number of hops from the Sync Master to the sync bearer
RSSI	Received Signal Strength Indication
FER	Frame Error Rate, a value between 0 and 100%. For a good synchronization the FER should be 0. It is OK to occasionally have a high FER, but only for short periods (up to one minute).

4.12 Traffic

Traffic information is displayed in the Traffic sub menu. For the Master the traffic information for the IP-DECT system is displayed as well as traffic information for the Radio itself (if this Radio is enabled).

4.12.1 Display All Ongoing Calls in the System

All ongoing calls in the IP-DECT system can be displayed by selecting Traffic > Master Calls in the Master. See the table below for information about the different statistics fields.

Master	

Calls In	The total number of incoming calls to the Master.
Calls In Delivered	The number of connected incoming calls in the Master.
Calls Out	The number of outgoing calls from the Master.
Handover	The number of handovers in the Master.
Handover Cancelled	The number of cancelled handovers in the Master. Occurs when the handset decides to stay on the original Base Station.
Abnormal Call Release	The number of abnormal call terminations. A call release can occur if for example the user leaves the system's coverage area. To analyze the events, select Diagnostics > Events. To analyze how calls are connected and disconnected, select Diagnostics > Logging and select the *DECT Master* check box.
Busy Hour Call Attempts	The number of calls under the busiest hour counting from when pressing the Clear button.
Busiest hour start time	The start time of the busiest hour counter which was started when pressing the Clear button.

4.12.2 Display Calls

All calls on an IPBS/IPBL can be displayed by selecting Traffic > Radio Calls. See the table below for information about the different statistics fields.

Radio	
Calls In	The number of incoming calls to the Radio.
Calls Out	The number of outgoing calls from the Radio.
Handover	The number of handovers in the Radio.
Handover Cancelled	The number of failed handovers in the Radio. NOTE: There can be several reasons for uncompleted handovers occuring. This will in most cases not cause dropped or disconnected calls.

4.12.3 Handover

During call, all ongoing handovers in the IP-DECT system can be displayed by selecting Traffic > Handover in the Master.

4.13 Gateway

IPBS/IPBL has the option to act as a SIP registrar. In fact IP-DECT has several gateway interfaces that independently from each other can handle device registrations.

Gateways can be used to register to another device such as a gatekeeper in a PBX.

SIP interfaces can be used to obtain, for example, a trunk line from a SIP Provider. This solution still requires handset VoIP registrations to be managed in IP-DECT - this is not performed by the SIP provider.

4.13.1 General

1 Select Gateway > General.

2 Select/Enter following settings.

Field name	Description
Gatekeeper ID	The Gatekeeper Identifier. This is used with VOIP interfaces (GWn) configured as "Gatekeeper/Registrar" as Gatekeeper Identifier (H.323) or Registrar Name (SIP), see 4.13.4 *Gatekeeper Interfaces* on page 98. If multiple gatekeepers are installed in a network this can be used to find the right gatekeeper using Gatekeeper Discovery. If a PBX is enabled on the same system a different Gatekeeper Identifier must be used for Gateway and PBX.

3 Click “OK”.

4.13.2 Interfaces

Select Gateway > Interfaces.

This page shows the gateway’s interfaces organized into columns. The individual columns are explained in the table below.

Column	Values	Description
Interface		The descriptive name of the interface. Click this name to open a page, on which all settings can be configured. For more information, see *TEST Interface* on page 94.
CGPN In, CDPN In, CGPN Out, CDPN Out		CGPN In, CDPN In, CGPN Out and CDPN Out mappings. Click the “+” sign next to the interface name to bring up mapping details. For more information see *Call Number (CGPN/CDPN) Mappings* on page 97.
State		The current state of the interface at protocol level. Possible states are: Up, Down.
Alias		The H.323 call name and the E.164 call number.
Registration		If a terminal has successfully registered with an SIP or TEST interface, then this is indicated in this column through specification of the IP address <Name of the interface:Call number:IP address>.

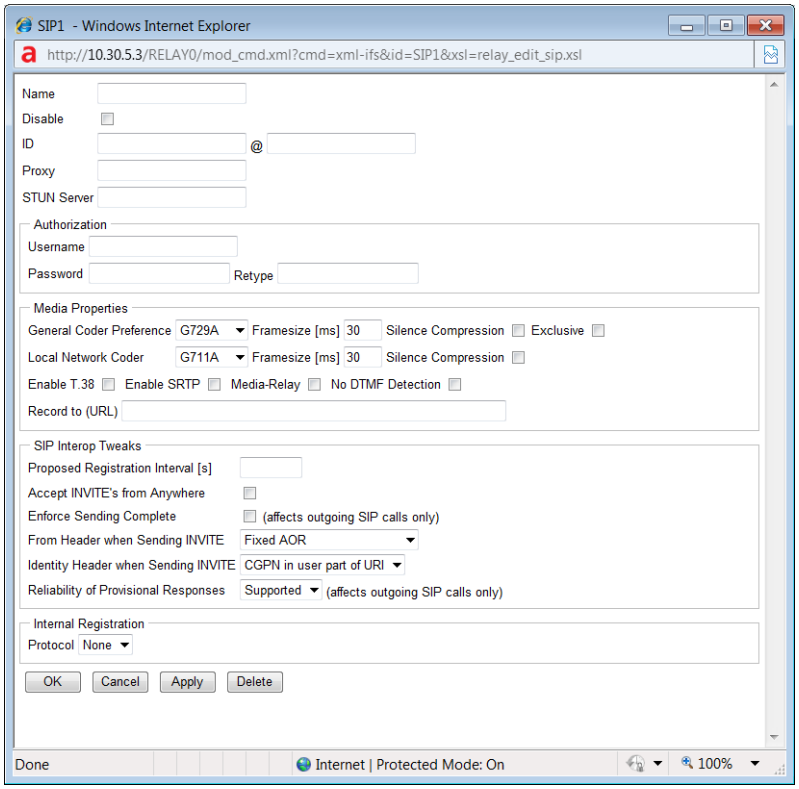
TEST Interface

Normally there is one non-configurable, internal TEST interface called TEST, usable only as the destination for a call. If a call is received on this interface, the on hold music stored in the non-volatile memory is played. Incoming calls must be in G.729A or G.723 format; other formats are not supported. Suffix dialling digits are ignored.

4.13.3 SIP Interfaces

1 Select Gateway > SIP.

2 Click on one of the SIP interfaces (SIP1 - SIP4) under the *Interface* heading. A new window opens.



3 Select/Enter following settings:

Field name	Description
Name	Enter a name for the SIP interface
Disable	Select the Disable check box to disable the Interface
ID	Enter the registration ID followed by the SIP provider domain name preceded by an @ (for example 8111111e0@sipgate.de).
Proxy	The IP address of the SIP provider to where the SIP messages (REGISTER,INVITE,etc.) are to be sent.
STUN Server	Only necessary if the SIP server is outside the private network. Note: STUN Server has not been tested and is not officially supported by the Ascom IP-DECT System.
Authorization	
Username	Username for authorization (only if different from the registration ID).
Password / Retype	The password for authorization must be specified here (Password) and confirmed (Retype).
Media Properties	
General Coder Preference	Select the applicable coder in the drop-down list.
Framesize	Enter the sample time in milliseconds.

Silence Compression	Select this check box to enable silence compression.
Exclusive	Select this check box to accept only preset coders.
Local Network Coder	Select the preferred coder in the drop-down list for a local network address.
Enable T.38	Select this check box to enable T.38 Fax-over-IP protocol.
Enable SRTP	Select this check box to enable encrypted media streams.
Media Relay	Select this check box to allow RTP-DTMF interoperability between H.323 and SIP devices
No DTMF Detection	Select this check box to send DTMF tones in-band through the media channel but not as separate signalling messages.
Record to (URL)	HTTP url where the recording file is to be stored. HTTP server must allow write access (PUT) at this location. One PCAP file is written for every call via this interface containing both RTP streams. Audio streams can be played using Wireshark.

SIP Interop Tweaks

Proposed Registration Interval [s]	Set in seconds, default is 120 seconds. A value too low increases the network load.
Accept INVITE's from Anywhere	Check this box to accept invites from anywhere, not only from the proxy configured.
Enforce Sending Complete	Affects handling of "484 Address Incomplete" responses. If enabled and "484 Address Incomplete" is received, the call is cleared. If not enabled and "484 Address Incomplete" is received, the call is retained and re-initiated in case of new dialing digits.
From Header when Sending INVITE	Interoperability option for outgoing calls. This controls the way CGPN is transmitted to the SIP provider. Possible values are: - Fixed AOR - The From header contains the fixed registration URI (AOR). The actual calling party number and name will be transmitted inside the P-Preferred-Identity header (RFC 3325). - AOR with CGPN as display - The From header contains the fixed registration URI (AOR) with the calling party number as display string in front of the AOR. - CGPN is user part of URI - The From header contains an URI with the calling party number as user part (left from @).

Identity Header when Sending INVITE	Interoperability option for outgoing calls. This controls the way CGPN is transmitted to the SIP provider. Possible values are: - CGPN is user part of URI - The Identity header contains an URI with the calling party number as user part (left from @). - Fixed AOR - The Identity header contains the fixed registration URI (AOR). The actual calling party number and name will be transmitted inside the P-Preferred-Identity header (RFC 3325).
Reliability of Provisional Responses	This controls the way the option tag "100 rel" is offered. Possible values are: - Supported - The tag is an optional extension. - Required - The tag is a mandatory extension. - Disabled - The tag is not offered.
Internal Registration	
Protocol	Select "None" in the drop-down list, which is the default value.

4 Click "OK".

Call Number (CGPN/CDPN) Mappings

For every interface, it is possible to store mappings for CGPN In, CDPN In, CGPN Out and CDPN Out (explained in the table below), enabling call numbers and call number formats to be adjusted for incoming and outgoing calls.

Call Number Mappings Table

Map name	Description	Used to
CGPN In	Calling Party Number In	edit the calling number of incoming calls
CDPN In	Called Party Number In	edit the called number of incoming calls
CGPN Out	Calling Party Number Out	edit the calling number of outgoing calls
CDPN Out	Called Party Number Out	edit the called number of outgoing calls

1 Select Gateway > SIP.

2 For the interface that you want to set up call number modifications on, click the “+” sign next to the interface name. A new window opens and call number mapping can be made for the interface.

3 Select one of the following mapping lines.

Field name	Description
CGPN in	if you want to edit the calling number of incoming calls. Digits used for the headmatch on the received number. In addition to the normal dialling digits (0..9,*,#) the following characters have special meaning: R If 'R' is used as first digit of the number only numbers with 'presentation restricted' match. In this case the 'presentation restricted' property is cleared if 'R' is not used on 'Number Out'. ? Can be used at any place inside the number and means that any received digit matches.

CGPN out	If you want to edit the calling number of outgoing calls.
CDPN in	If you want to edit the called number of incoming calls.
CDPN out	If you want to edit the called number of outgoing calls.

4 On each mapping line, a Call Number Type can be selected from the Call Number Type drop-down list (found on the righthand side of the lines).

NOTE: This step is optional.

Possible values are:

- Unknown: The mapping applies to unknown, external calls
- ISDN: The mapping applies to external calls
- Private: The mapping applies to internal calls

5 On each mapping line, a Call Number Format can be selected from the Call Number Format drop-down list (found on the lefthand side of the lines).

NOTE: This step is optional.

The table below describes of the possible values:

Call Number Formats Table

Name	Description	Typical use	Abbreviation
Unknown	Unspecified	Called number in outgoing calls	u
Subscriber	Call number in local network	Number called in incoming calls.	s
National	Call number with area code.	Calling number from home country.	n
International	Call number with country code and area code.	Calling number from abroad.	i
Abbreviated:	Unusual.		a
Network-specific	Unusual.		x

6 Click "OK".

4.13.4 Gatekeeper Interfaces

Gatekeeper (GK) interfaces are channels to the world of Voice over Internet Protocol (VoIP). If your IP-DECT system needs to communicate with other devices via VoIP, access to these devices can be configured as a Gatekeeper interface.

Note: Normally the Master connects to a PBX via H.323/SIP endpoint registrations. In that case, no configuration in this section is needed.

These can be different types of equipment:

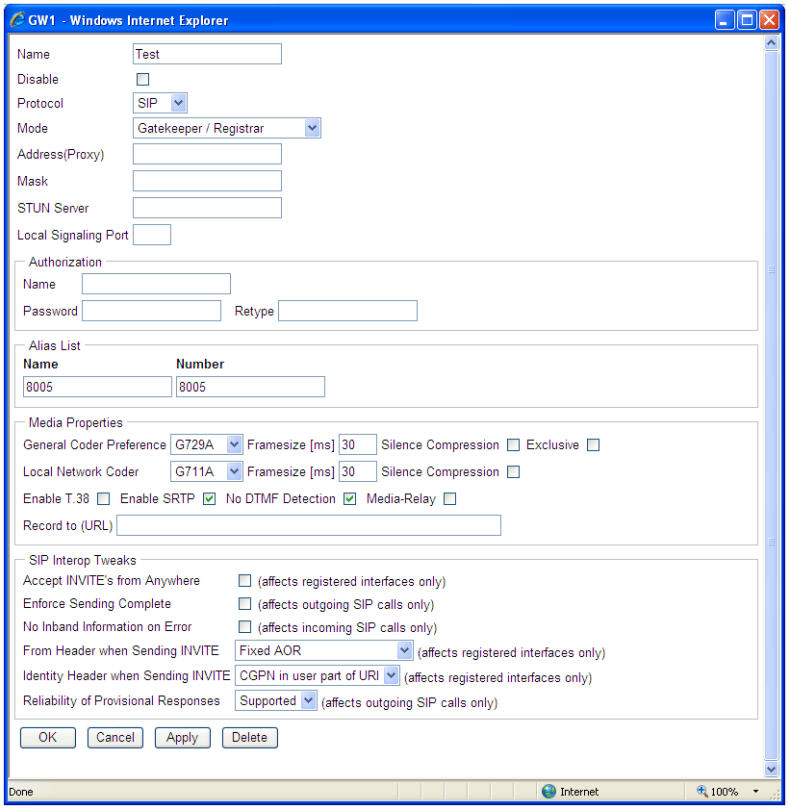
- Remote PBX
- Ascom VoIP Gateways
- VoIP terminal equipment
- VoIP terminal adapters to connect analogue terminals or a IPBS

- Third-party VoIP Gateway, as a gateway to telephone switches or, for example, into the SS7 network
- Further gatekeepers for call control
- VoIP PC programs

Each Gatekeeper interface defines access to a group of devices, which are all treated similarly. This allows, for example, all VoIP devices at one location to be configured via a single Gatekeeper interface. Since IP-DECT allows the definition of 12 different groups, it is able to communicate in all with several hundred VoIP devices.

1 Click Gateway > GK.

2 Click the desired interface name to be configured. A new window opens.



3 Select/Enter following settings.

Field name	Description
Name	Enter a name for the route.
Disable	Select the Disable check box to disable the route
Protocol	Select one of the values below in the Protocol drop-down list. Possible values are: - H.323 - Selecting "H.323" (default) results in the GUI displaying a H.323 registration section and a *H.323 Interop Tweaks section*, both described below. - SIP - Selecting "SIP" results in the GUI displaying a SIP registration section and a *SIP Interop Tweaks section*. See4.13.3 *SIP Interfaces* on page 94 for a description of these sections.

Mode	Select one of the values below in the Mode drop-down list. Possible values are: - Gateway without Registration - connects to the VoIP interface (gateway) to the configured gatekeeper without a registration. - Register as Endpoint - registers as VoIP terminal with the configured gatekeeper. - Register as Gateway - registers as VoIP gateway with the configured gatekeeper. - Gatekeeper / Registrar - accepts registrations from other VoIP devices. - ENUM - registers an ENUM connection with the relevant interface.
Gatekeeper address (primary)	IP adress of the remote VoIP device
Gatekeeper address (secondary)	It is important to enter an alternative gatekeeper IP address, especially when using redundant systems.
Mask	Enter network mask
Gatekeeper Identifier	In general, you can operate without Gatekeeper ID if only one gatekeeper is operated in your network or if Gatekeeper discovery is not used.
Authorization	Use these settings if log on to another gatekeeper is needed.
Password	The Password corresponds to the H.235/SIP password required for logging on to the remote gatekeeper.
Retype	Confirm password
Alias list	
Name	Define the H.323/SIP name required to identify yourself with the gatekeeper. This is the "Long name" on the PBX *Show* area.
Number	Usually the gateway only registers with a H.323/SIP name and not with an E.164 address (i.e. with a telephone number). Refer to the documentation for the gatekeeper you want to register.
Media properties	For information on these settings see *Media Properties* on page 95.
H.323 Interop Tweaks	
No Faststart	Enable if the H245 Faststart procedure is to be disabled.
No H.245 Tunneling	A TCP connection of its own is established for the voice data connection negotiation. Only recommended if compatibility problems occur with third party products.
Supress HLC	Suppresses the transmission of "high layer compatibility" information elements on the interface.
Supress FTY	Suppresses the transmission of "facility information elements" on the interface.

Supress Subaddress	Suppresses the transmission of "Subaddresses" on the interface.

4 Click "OK".

Call Number Mappings

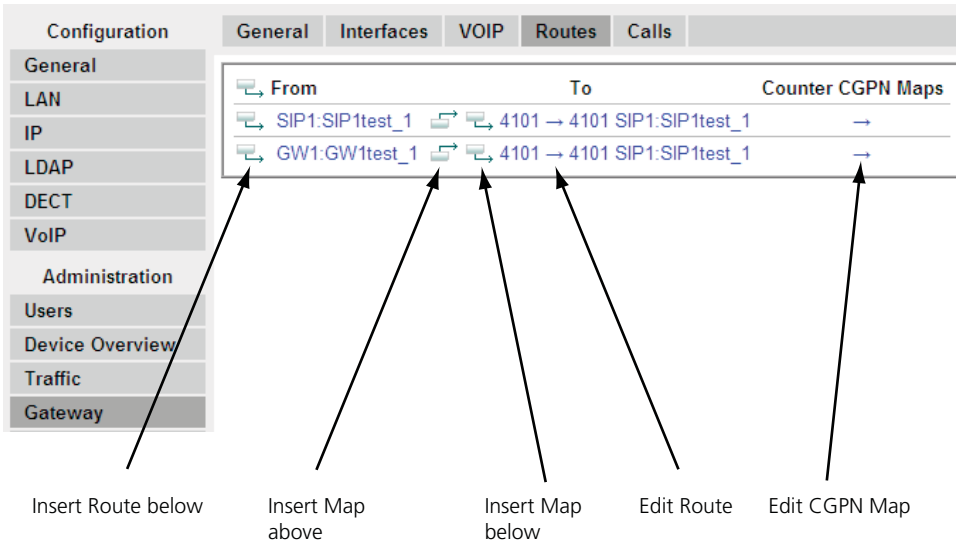
Call number (CGPN/CDPN) mappings are described in *Call Number (CGPN/CDPN) Mappings* on page 97.

4.13.5 Routes – Configuration

Call routing determines which calls are able to be accepted by the gateway and where they are to be switched.

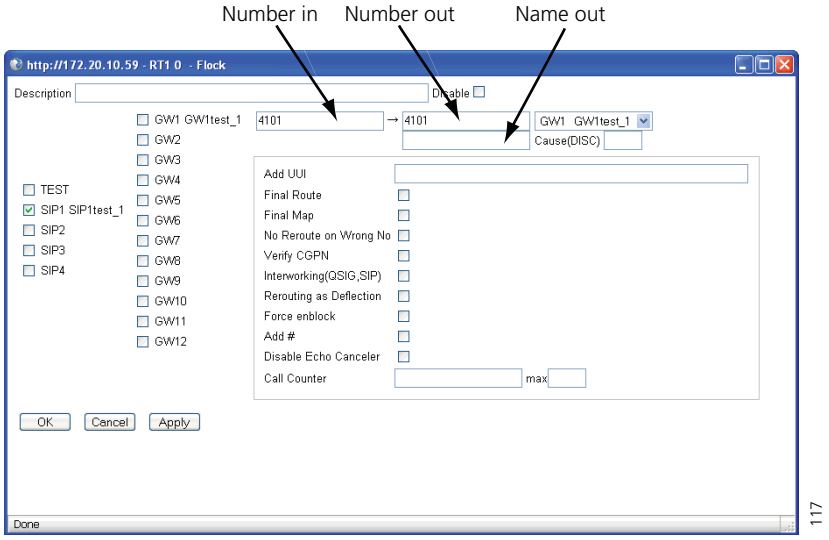
1 Select Gateway > Routes.

All configured routes are shown in a routing table.



2 **a.** If no routes have been configured, click on the in front of From.

b. Add a new route by clicking on the leftmost in the route which you want to insert the new route after.
Note the order of the routes here. The new route is always inserted after the current entry. A new window opens.



3 Select the check boxes of the VoIP interfaces in the left area, to mark them as valid sources for this route. Select interfaces which have been configured.

4 In the drop-down list in the right area, select the destination to which the calls are to be connected. Select interfaces which have been configured.

5 Select/Enter the following settings:

Field name	**Description**
Description	Enter a name for the route. This will help you maintain an overview later on.
Number in	Enter the dial prefix the route shall be valid for. Number in can be used in two ways: Pre and Post dial. We can use the following special characters here: - the period . - the question mark ? - and the exclamation mark ! 42.3 ignores the 3 and will use any number in starting with 42, of length 4 42?3 will allow the following numbers [4203,4213,4223,4233,4243,4253,4263,4273,4283,4293]
Number out	Enter the replacement for the dial prefix that you specified in the “Number in” field. Simply copy the dial prefix into this field if the call number is to be adopted unchanged. Add an “!” to the number if a route is to apply to a certain number and all of the digits subsequently dialled are to be ignored.
Name out	
Add UUI	If manufacturer-specific data is to be transmitted in the signalling channel, for example, the URL for an announcement, this URL (e.g. “http://www. ...”) can be entered here.

	Leave all the remaining fields blank, in the normal case.
Final Route	Enable if the routing shall stop here
Final Map	Enable if the mapping shall stop here.
No Reroute on wrong No	Enable if you don’t want to reroute when call fails due to wrong number.
Verify CGPN	Map will match only if there is a matching CGPN map too.
Interworking (QSIG, SIP)	Enable to support supplementary services (such as name display, call transfer, call diversion etc.)u between the H.323/SIP network and a QSIG network.
Rerouting as Deflection	Enable if "call rerouting" supplementary service shall be implemented as "call deflection".
Routing on Diverting No	Enable if routing shall be done based on diverting number (diverting leg2 info).
Force enblock	Enable to send call en-block after 4 seconds interdigit timeout.
Add #	A # can be transmitted to mark the end of the call number. This is required for devices, such as from Cisco, which are unable to identify the end of a number properly.
Disable Echo Canceler	
Call Counter	A name for resource management can be entered.
Max	Limits the number of permitted calls for a route.

6 Click “OK”

If, by way of exception, the route for a Map entry is to be configured with a different destination than that specified in the route's destination field, you can select this from the Destination field of the “Map”.

Add CGPN map

1 Select Gateway > Routes.

2 For the interface, that you want to add a CGPN map, click the "->" sign under the CGPN map heading.

A new window opens.

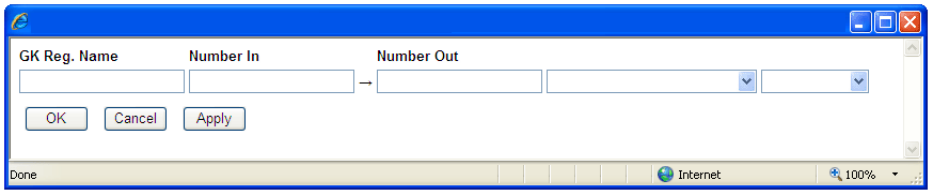


Figure 13. Number In – Number Out

3 Under "Number in" define the number type and –prefix that you wish to have replaced. The number type is denoted using the abbreviation from the Call Number Formats Table (see *Call Number Formats Table* on page 98).

4 Define the substitution under "Number out".

5 Click "OK".

Note: All call numbers in IP-DECT are always processed in "unknown" format. That is why the result of a number replacement for incoming calls, always is of the type "unknown" and the call number type of outgoing calls to be replaced is likewise always "unknown". Accordingly, you cannot specify a number type for replacements of incoming numbers in the "Number out" field and for replacements of outgoing numbers in the "Number in" field.

4.13.6 Show Active Calls

Select Gateway > Calls.

On this page you can see the currently active calls on all configured gateway interfaces. Calls from the IP-DECT Master does not normally display here.

The individual columns are explained in the table below.

Column	Format	Values	Description

Interfaces	sif:cgpn:cgnm ->dif:cdpn:cdnm/ ccn		Sif: Interface for incoming call. Cgpn: calling number, before routing. Cgnm: calling name before routing. Dif: Interface for the outgoing call. Cdpn: called number after routing. Cdnm: called name after routing. ccn: Name of the call counter used for this route (call counter name).
Protocols	AProtocol/BProtocol		The protocol used on the calling and the called side.
Coders	ACoders/BCoders Coder,ms (round, jitter)		Encoder used from A to>B or B to> Coder: voice compression used. ms: packeting used. round: Transmission duration in ms. jitter: Variance of transmission delay in ms.
Numbers	Caller->Called	Caller Called	The number of the caller as transmitted to the call destination. The number dialled.
Uptime	d:h:m:s		The uptime of the call in days, hours, minutes and seconds.
State		Dialling Alerting Connected Clearing	Dialling is in progress. The dialled distant terminal is being called. The call is connected. The call has been terminated by one of the two parties.

4.14 Backup

The IPBS/IPBL configuration can be downloaded and saved on a disc or a server. This is useful when identical configuration should be applied to several IPBSs/IPBLs, for example when configuring the Radios in a system. For information on how to load a saved configuration on the IPBS/IPBL, see 4.21 *Update* on page 110.

1 Select Backup > Config.

2 Click "download".

Click "download with standard password" to save the configuration with the default system password.

3 Click "Save" in the dialogue window and browse to the place where the configuration should be saved.

4 Click "Save".

4.15 Software Upgrade

The RFP version information is not displayed in the IPBS2 GUI. RFP software is more integrated now and this information becomes obsolete. In IPBS1 the RFP software has a separate flash memory, but this is not the case for IPBS2. On the IPBS1 the RFP version is still displayed.

4.15.1 Before Upgrading

1 For safety, take a backup of the configuration parameters for the Master and Standby Master.

2 Make a note of the Master and Standby Master IP address.

On the device configured as Master, continue with step 3 to 5 below.

3 When upgrading from software version 2.X.X to later: Select DECT > SMS and make a note of the IMS3/Unite CM IP address.

4 When upgrading from software version 2.X.X to later: Select DECT > Master and make a note of the SIP proxy (registrar) IP address, found in the Gatekeeper IP Address text field.

5 When upgrading from software version 2.X.X to later: Select DECT > Master and make a note of the alternative SIP proxy (registrar) IP address, found in the Alt. Gatekeeper IP Address text field.

4.15.2 Upgrading Sequence

1 Upgrade firmware and boot file of Standby Mobility Master, see *4.15.3 Software Upgrade from 2.X.X* and *4.15.4 Software Upgrade*.

2 Upgrade firmware and boot file of Mobility Master, see *4.15.3 Software Upgrade from 2.X.X* and *4.15.4 Software Upgrade*.

3 Upgrade firmware and boot file of Radios, see *4.15.3 Software Upgrade from 2.X.X* and *4.15.4 Software Upgrade*.

When upgrading from software version 2.X.X to later: Update configuration of Radios, see *4.15.5 Configuration After Updating the Firmware From Software Version 2.X.X to Later*.

4 Upgrade firmware and boot file of Standby Master, see *4.15.3 Software Upgrade from 2.X.X* and *4.15.4 Software Upgrade*.

When upgrading from software version 2.X.X to later: Update configuration of Standby Master, see *4.15.5 Configuration After Updating the Firmware From Software Version 2.X.X to Later*.

When upgrading from software version 3.X.X to later: Update configuration of Standby Master, see *4.15.6 Configuration After Updating the Firmware From Software Version 3.X.X to Later*.

5 Upgrade firmware and boot file of Master, see *4.15.3 Software Upgrade from 2.X.X* and *4.15.4 Software Upgrade*.

When upgrading from software version 2.X.X to later: Update configuration of Master, see *4.15.5 Configuration After Updating the Firmware From Software Version 2.X.X to Later*.

When upgrading from software version 3.X.X to later: Update configuration of Master, see *4.15.6 Configuration After Updating the Firmware From Software Version 3.X.X to Later*.

4.15.3 Software Upgrade from 2.X.X

1. When upgrading from software version 2.X.X to later: Disable LDAP replication for all Radios except in the case of Standby Master to Master Replication. Select LDAP > Replicator and make sure that the Enable check box is not selected.
2. Only for IPBL: When upgrading from software version 2.X.X to later: Update the boot file to 413. See *4.21.3 Update the Boot File* for more information on how to update the boot file.
3. When upgrading from software version 2.X.X to later: Update the firmware to 2.4.0 or later 2.X.X. See *4.21.2 Update Firmware* for more information on how to update the firmware.
4. Reset in order to make the changes take effect, see *4.27 Reset*.
5. Update the firmware to 3.4.12. See *4.21.2 Update Firmware* for more information on how to update the firmware.
6. Reset in order to make the changes take effect, see *4.27 Reset*.
7. Update the boot file to 3.0.26. See *4.21.3 Update the Boot File* for more information on how to update the boot file.
8. Reset in order to make the changes take effect, see *4.27 Reset*.
9. To update the IPBS Web GUI, press CTRL+F5 on the keyboard or close the IPBS Web GUI and start it again in order to update the GUI.
10. Continue with *4.15.4 Software Upgrade*.

4.15.4 Software Upgrade

1. Update the firmware to the latest. See *4.21.2 Update Firmware* for more information on how to update the firmware.
2. Update the boot file to the latest. See *4.21.3 Update the Boot File* for more information on how to update the boot file.
3. Reset in order to make the changes take effect, see *4.27 Reset*.
4. To update the IPBS Web GUI, press CTRL+F5 on the keyboard or close the IPBS Web GUI and start it again in order to update the GUI.

4.15.5 Configuration After Updating the Firmware From Software Version 2.X.X to Later

The following configuration settings should be changed in the Web GUI after updating the firmware from version 2.X.X to later.

Radio Configuration

1. Select DECT > Radio and enter the name and password for the Pari Master.
2. Reset in order to make the changes take effect, see *4.27 Reset*.

Master/Standby Master Configuration

For both Master and Standby Master, do as follows:

1 If the Radio is activated, select DECT > Radio and enter the name and password for the Pari Master in the Name and Password text fields.

2 For Standby Master only: Enter the address to the Master in the Primary Master IP Address text field.

3 Select UNITE > SMS and enter the address to the IMS3/Unite CM in the IP Address text field.

4 Select DECT > Master.

5 Select the Enable Pari function check box.

If SIP protocol is used, continue with step 6 to 11 below:

6 Enter the IP address to the SIP proxy (registrar) in the Proxy text field.

7 Enter the IP address to the alternative SIP proxy (registrar) in the Alt. Proxy text field.

8 Select the Enbloc Dialing check box.

9 Select the Allow DTMF through RTP check box.

10 Select the Register with number check box.

11 To update the Web GUI, press CTRL+F5 on the keyboard or close the Web GUI and start it again in order to make the new menu to appear.

12 If H.323 protocol is used: Enter the address to the gatekeeper in the Gatekeeper IP Address text field.

13 Reset in order to make the changes take effect, see *4.27 Reset*.

4.15.6 Configuration After Updating the Firmware From Software Version 3.X.X to Later

Master/Standby Master Configuration

When upgrading from version 3.X.X to later the MWI will automatically be set to Off. If the MWI was enabled prior to the upgrade: Select DECT > Suppl. Serv. and select an MWI mode in the MWI Mode drop-down list.

When upgrading a system from software version 3.X.X to later, existing system administration accounts remain configured locally in the IPBS(s)/IPBL(s). However, it is recommended that the system administration accounts are configured centrally instead by moving them to the Kerberos server. To have the system administration accounts configured locally is a potential security risk. For information on how to configure Kerberos, see 4.1.3 *Centralized Management of Administrator and Auditor Accounts Using Kerberos* on page 28.

To move the system administration accounts to the Kerberos server, do as follows:

Step 1: For each IPBS/IPBL where system administration accounts have been configured locally, do as follows:

1 Select General > Admin.

2 Go to the Additional Administrator and Auditor Accounts section.

3 Write down each accounts configuration data such as the user name, password (when known) and role.

Step 2: On the Kerberos server, do as follows:

1 Select General > Kerberos Server.

2 Go to the Users section and enter the configuration data for each account that was written down in step 1 above.

3 Click "OK".

Step 3: For each IPBS/IPBL where system administration accounts have been configured locally, do as follows to delete the local system administration accounts:

1 Select General > Admin.

2 Go to the Additional Administrator and Auditor Accounts section.

3 For each account row, select the Delete check box.

4 Click "OK".

All local system administration accounts are deleted and the Additional Administrator and the Auditor Accounts section is no longer visible. The system administration accounts are now instead configured centrally on the Kerberos server.

4.16 System Upgrade from Software Version 4.X.X to 7.0.X

Radios with software version 4.X.X will not be able to connect to a Pari Master with software version 7.0.X. It is therefore recommended when doing a manual upgrade (i.e. when not using an update server) to upgrade Radios first and then the Pari Master.

4.17 System Upgrade from Software Version 7.0.X or earlier to 7.1.X

When upgrading an IP-DECT Base Station that have no LLDP (Link Layer Discovery Protocol) support to a version with LLDP support, extra care has to be taken in an IP network which sends VLAN configuration through LLDP. A Base Station which is upgraded to a version with an active LLDP support will change its VLAN configuration upon upgrade and might become unreachable.

LLDP functionality has been gradually introduced for certain hardware in IP-DECT 6.1.X to 7.0.X and has been activated for all hardware combinations in 7.1.X. To see if a Base Station have LLDP support, search for "LLDP" under "Diagnostics > Config show". If "LLDP" is found, then there is LLDP support. To see if LLDP is activated or not, look for the "/disable" flag on this configuration line.

When upgrading an IP-DECT Base Station from a version without LLDP support to a version with LLDP support in a network that propagates VLAN settings, follow these steps:

1 Disable VLAN configuration over LLDP for the network or move the Base Station to a network without VLAN configuration over LLDP.

2 Upgrade the Base Station.

3 Disable LLDP for the Base Station with these HTTP commands:
!config add LLDP0 /disable
!config write
!reset

4 Enable VLAN configuration on the network again or move the Base Station back.

Note: If there is a need to activate LLDP for the Base Station again, use the following HTTP command: **!config rem LLDP0 /disable**

4.18 System Downgrade from Software Version 7.0.X

Downgrade has to be done in several steps:

1 Take a configuration backup of at least all the central modules, e.g. Master, Mobility Master, Crypto Master etc. For information about how to backup, see 4.14 *Backup* on page 105.

2 Downgrade complete system to version "ToPreV7". This firmware will convert the database. The conversion only takes a few seconds and it is ready when the message "VARS compression completed" is shown on the General > Info page.

3 Downgrade to desired version.

4.19 System Downgrade to Software Version 2.X.X

After downgrading: The LDAP replication must be activated again.

1 Select LDAP > Replicator.

2 Select the Enable check box to activate LDAP replication.

3 Check the MWI settings.

4.20 System Downgrade to Software Version 4.X.X and 3.X.X

After downgrading: Check the MWI settings.

4.21 Update

This section describes how to do the following configurations and settings.

- Update Configuration
- Update Firmware
- Update the Boot File
- Update the RFPs

4.21.1 Update Configuration

A previously saved configuration can be loaded and activated on the IPBS/IPBL. See 4.14 *Backup* on page 105 for information on how to save a configuration.

1 Select Update > Config.

2 Click "Browse..." and browse to the saved configuration.

3 Click "Upload".

4 Reset in order to make the changes take effect, see 4.27 *Reset* on page 118.

Considerations when updating of configuration

Configuration files are only fully compatible if the backup and restore are done on products that have CPUs with the same endianess. Both IPBS1 and IPBL have "big-endian" CPUs compared to IPBS2 which have "little-endian" CPU. Hence, IPBS1 and IPBL are compatible.

If a device (e.g. IPBS2) is configured and the configuration is taken from another type of device (e.g. IPBS1), some lines in the configuration will be skipped by the configured device (IPBS2). This is because devices of different types do not have the same hardware and some configuration lines are therefore not applicable in the configured device (IPBS2).

When upgrading an IP-DECT system where IPBS1(s)/IPBL(s) is replaced with IPBS2s and the backup file of the IPBS1(s)/IPBL(s) configuration is installed on the IPBS2s, the severity level on alarms and events listed in the configuration file will be changed in the IPBS2s. For information on how to change the severity level on alarms and events, see 4.7.5 *Module Fault List* on page 76.

4.21.2 Update Firmware

Updated software files are distributed by your supplier.

There are three ways to update the firmware:

- Using an update server, see Appendix A: *How to Configure and Use the Update Server* on page 137.
- Using a Device Manager.
  To setup a connection to a Device Manager, see 4.7.2 *Device Management* on page 74. To update the firmware using a Device Manager, see the user manual for the Device Manager in or the user manual for the Device Manager in Unite Connectivity Manager.
- Manual update, see below.

To update manually:

1 Select Update > Firmware.

2 Click "Browse..." and browse to the firmware file.

3 Click "Upload"

4 Reset in order to make the changes take effect, see 4.27 *Reset* on page 118.

4.21.3 Update the Boot File

Updated software files are distributed by your supplier.

There are three ways to update the boot file:

- Using an update server, see Appendix A: *How to Configure and Use the Update Server* on page 137.
- Using a Device Manager.
  To setup a connection to a Device Manager, see 4.7.2 *Device Management* on page 74. To update the boot file using a Device Manager, see the user manual for the Device Manager in or the user manual for the Device Manager in Unite Connectivity Manager.
- Manual update, see below.

To update manually:

1 Select Update > Boot.

2 Click "Browse..." and browse to the boot file.

3 Click "Upload".

4 Reset in order to make the changes take effect, see 4.27 *Reset* on page 118.

4.21.4 Update the RFPs

This section only applies to the IPBL.

Updated software files are distributed by your supplier.

There are two ways to update the RFPs:

- Using an update server, see Appendix A: *How to Configure and Use the Update Server* on page 137.
- Manual update, see below.

To update manually:

In the RFP status list, information on connected RFPs are displayed.

1 Select Update > RFPs.

2 Click "Browse..." and browse to the RFP update file.

3 Click "Upload".

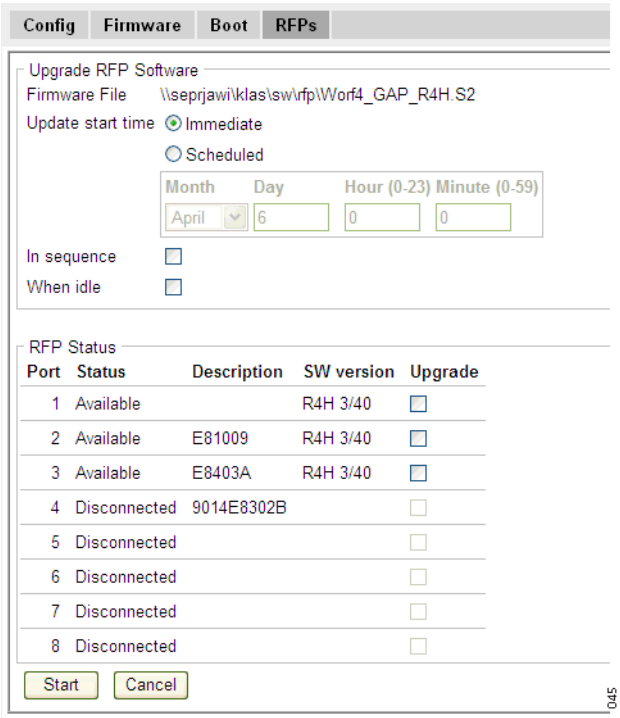


Figure 14. Upgrade the RFP

4 Select "Immediate" or "Scheduled" update.

5 Select "In sequence" check box to update the selected RFPs one by one.

6 Select "When idle" check box to start the update when the RFP is idle.

7 Mark the applicable RFPs to be updated.

8 Click "Start" to upgrade the selected RFPs.

The RFP restarts after the upload is finished.

4.22 System Upgrade in System with Mobility Masters

Upgrade in the following order:

1 Upgrade all Standby Mobility Masters.

2 Upgrade all Mobility Masters.

3 Upgrade all of the remaining devices for each site by following the upgrade sequence under 4.15.2 *Upgrading Sequence* on page 106.

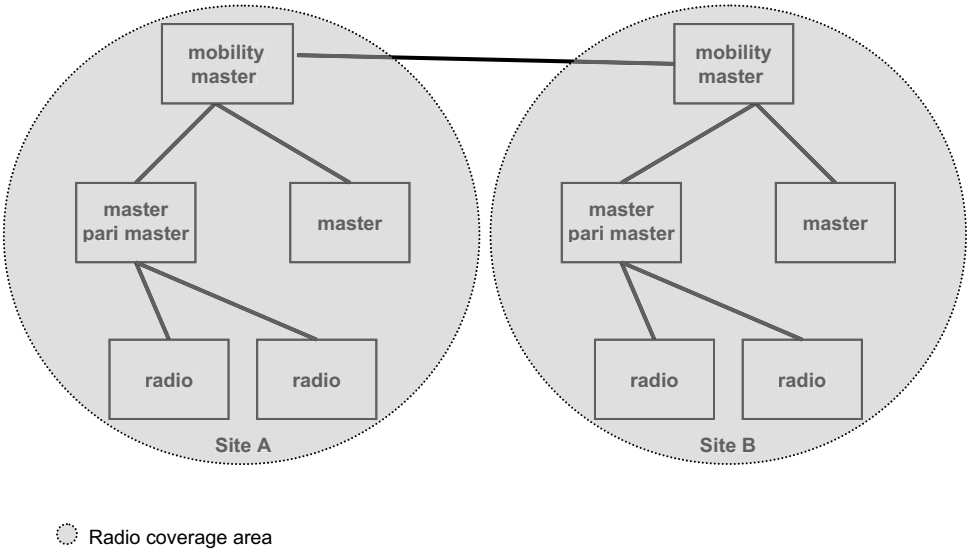


Figure 15. System with several Mobility Masters

Note: Roaming between sites is only possible when the sites have the same software version.

4.23 Replacing Master Hardware in Multiple Master System

If a faulty Master IPBS is replaced with a new one, then the faulty Master must have been disconnected from the system more than 2 minutes before the new Master is connected, otherwise all the subscription data will be lost.

For information on how to load a configuration on the new Master, see 4.21.1 *Update Configuration* on page 110.

4.24 Replacing Master Hardware in a System with a Crypto Master Active

If a faulty Master is replaced with a new one, then the faulty Master must be deleted in the Mobility Master. The reason for deleting the replaced Master is that the Crypto Master is operable only if all Masters, part of the Crypto Master hierarchy, are connected.

4.25 Replacing Mobility Master Hardware in a System with a Crypto Master Active

If a faulty Mobility Master is replaced with a new one, then the faulty Mobility Master must be deleted in the Crypto Master. The reason for deleting the replaced Mobility Master is that the Crypto Master is operable only if all Mobility Masters, part of the Crypto Master hierarchy, are connected.

4.26 Diagnostics

4.26.1 Logging

The IPBS/IPBL can generate a number of logs which can be useful when supervising and troubleshooting the IP-DECT system. For information on how to collect the log files, see 4.8.2 *Configure Logging* on page 76. For a description of each log, see the table below.

Setting	Description
TCP	Logs generated upon TCP connection set-ups in the H.225 / H.245 protocol.
Gateway Calls	Logs generated by calls that go through the gateway interface.
Gateway Routing	Logs generated by calls that are routed through the gateway interface.
H.323 Registrations	Logs generated upon RAS registration.
SIP/UDP Registrations	Logs generated upon SIP registration.
SIP/TCP Registrations	Logs generated upon SIP registration.
SIP/TLS Registrations	Logs generated upon SIP registration.
DECT Master	Logs generated by the Master software component in the IPBS/IPBL.
DECT Radio	Logs generated by the Radio software component in the IPBS/IPBL.
DECT Stack	A low level DECT log, intended for support departments.
Config Changes	Logs generated upon configuration changes in the IPBS/IPBL or the IP-DECT system.
Radio is busy for speech	Enable if a fault event should be sent when all speech resources are busy.

1 Select Diagnostics > Logging.

2 Select which logs to generate by selecting the check box next to the log name.

3 Click "OK".

4 View the logs by clicking the "syslog" link. The logs are updated in real-time.

4.26.2 Tracing

The information gathered from the trace functionality is mainly used for troubleshooting in case of failure in the system. The trace information is intended for the support departments.

It is possible to trace traffic information on the LAN for troubleshooting purposes.

1 Select Diagnostics > Tracing.

2 Select the *Enable* check box in the *Remote PCAP* section to enable the use of a network protocol analyzer program, for example Wireshark.

The *Trace* check box in the *Remote PCAP* section is mainly used by the R&D department to follow the desired network attributes.

3 Select the *TCP/UDP Traffic* check box in the *IP* section to capture traffic information.

4 Click "OK".

4.26.3 Alarms

Under Diagnostics > Alarms are all active alarms displayed.

An alarm is a fault that affects the normal service of the IP-DECT system and may require action from personnel to correct it. An IP-DECT Master can collect alarms from Radios and it can display all active alarms in the system. If an object is removed from the system, object-related alarms are automatically cleared after a timeout period of 30 minutes. Active alarms are also cleared if the related object is restarted.

For a description of the attributes, see the table below.

Attribute	Description
Time	The date and time when the alarm is issued.
Code	A unique number that identifies the alarm. Click the code to get more detailed information about the alarm. For a list of possible codes and their descriptions, see 6.2 *Fault Code Descriptions* on page 123.
Severity	It has three possible states: • Critical - Immediate action is required. It is displayed, for example, if a managed object goes out of service. • Major - Urgent action is required. It is displayed, for example, if the capability of the managed object is severely degraded. • Indeterminate - Level of severity cannot be determined
Remote	The IP Address of the object that reported the alarm. Click the IP address to access the object.
Source	The software module that reported the alarm. Together with the code it uniquely identifies an alarm.
Description	A textual description of the alarm.

4.26.4 Events

Under Diagnostics > Events is history of alarms and errors displayed including active alarms. Click "Clear" in the top-right corner to clear the list of alarms and errors.

For a description of the attributes, see the table below.

Attribute	Description
Time	The date and time when the alarm, error is issued or cleared.

Type	The status of the fault. It has four possible states: • Alarm - Alarms displayed in red are active alarms • Alarm cleared - The alarm is already cleared • Alarm timeout - The alarm exceeded the timeout period • Error - Refers to faults that are not active for a specific time.
Code	A unique number that identifies the alarm. Click the code to get more detailed information about the alarm. For a list of possible codes and their descriptions, see 6.2 *Fault Code Descriptions* on page 123.
Severity	It has three possible states: • Critical - Immediate action is required. It is displayed, for example, if a managed object goes out of service. • Major - Urgent action is required. It is displayed, for example, if the capability of the managed object is severely degraded. • Indeterminate - Level of severity cannot be determined
Remote	The IP Address of the object that reported the alarm. Click the IP address to access the object.
Source	The software module that reported the alarm. Together with the code it uniquely identifies an alarm.
Description	A textual description of the alarm.

4.26.5 Performance

It is possible to check different performance parameters. For a description of the parameters, see the table below.

Parameter	**Description**
CPU	Shows CPU utilization. To have a 100% utilization for a longer time is not good but occational peaks are acceptable. Reason for high utilization may be caused by running SRTP. Another reason may be that there are a lot of users registered on the Master.
CPU-R	Shows utilization of CPU resources allocated by different tasks. If the CPU resources are fully utilized it will prevent connection of more calls. One solution in that case can be to install an additional Base Station in the same coverage area.

MEM	Shows utilization of the RAM memory. If the utilization is continuously and significantly increasing then it can be due to memory leakage. It can also be due to a large number of simultaneous ongoing events. Another reason can be that a Base Station has to much to handle and a solution can be to divide the roles of Pari Master, Radio etc. on several Base Stations. The displayed utilization curve will never decrease as it shows the amount of memory that has been dedicated to a specific memory pool. Within each memory pool it can still be reused.
ETH0	Shows the traffic on the Base Station's ethernet interface.
Concurrent calls	Shows the number of simultaneous ongoing calls on the Base Station's air interface. Maximum number of calls that can be handled simultaneous in air is 8. If the number of concurrent calls is 8 for a longer time, a solution could be to add an additional Base Station to the system.
Temperature (only for IPBL)	Shows the temperature of the cabinet.
Voltage (only for IPBL)	Shows the power supply voltage level. An alarm warning about high voltage will be sent at 54 V. An alarm warning about low voltage will be sent at 42 V. The IPBL will shut down when the voltage drops below 36 V or goes above 60 V.
Current (only for IPBL)	Shows the power supply current consumption.

1 Select Diagnostics > Performance

2 Select the check box(es) for the desired performance statistics.

3 Click "OK".

4 One window shows statistics for the last 24 hours. The maximum possible value is displayed in the top-left corner. Click the left or right arrow buttons to see different time frames.

4.26.6 Config Show

Under Diagnostics > Config Show, the configuration is displayed as a text output.

4.26.7 Ping

The ping function is used to determine the response time from the IPBS/IPBL to a certain IP address. It can be used to analyse the connection between the IP-DECT system components.

1 Select Diagnostics > Ping.

2 Enter an IP address in the IP Address text field.

3 Press "Enter" on the keyboard.

4.26.8 Traceroute

The traceroute function displays how packets travel from the IPBS/IPBL to a certain IP address. The result is an ordered list of IP addresses with the measured round trip time.

1 Select Diagnostics > Traceroute.

2 Enter an IP address in the IP Address text field.

3 Press "Enter" on the keyboard.

4.26.9 Environment

This section only applies to the IPBL.

The environment tab gives information power supply and consumption. It also display temperature and fan status.

1 Select Diagnostics > Environment.

2 The following information is available in the *Power* section:

- Power supply - AC or DC power port.
- Voltage - input voltage.
- Current consumption - total consumption for the IPBL and the connected RFPs.
  – Max current consumption is 1,9/0,9 A when supplied with 110/230 VAC.
  – Max current consumption is 5,2 A when supplied with 48 VDC.

3 The following information is available in the *Environment* section:

- Temperature - °C
- Fan status - OK, not OK

4.26.10 RFP Scan

This section only applies to the IPBS.

To scan for occupied system IDs of other IP-DECT systems within the coverage area, perform an RFP scan following the steps below.

Note: Executing an RFP scan will terminate all calls on the IPBS.

1 Select Diagostics > RFP Scan

2 Click "Start Scanning"

4.26.11 Service Report

To download a service report do the following:

1 Select Diagnostics > Service Report.

2 Click "download".

3 Click “Save” and browse where to save the service report.

4.27 Reset

Some configuration changes requires a reset in order to take effect. A reset reboots the software. There are two ways to perform a reset:

- Idle reset - waits until there are no active calls in the IPBS/IPBL.
- Immediate reset - clears all calls and resets the IPBS/IPBL.

4.27.1 Idle Reset

1 Select Reset > Idle Reset.

2 Click "OK".

3 The IPBS/IPBL will reset when there are no active calls.

4.27.2 Immediate Reset

1 Select Reset > Reset.

2 Click "OK".

3 The IPBS/IPBL will terminate all active calls and reset.

4.27.3 TFTP Mode

Note: When the IPBS/IPBL is in TFTP mode it can only be reached using the *gwload* utility. This mode should not be used during normal operation.

4.27.4 Boot

When the IPBS/IPBL is in Boot mode it uses a small version of the firmware (minifirmware) which contains only the IP stack and the web interface.

1 Select Reset > Boot.

2 Click "OK".

4.28 Reset Using the Reset Button

It is possible to do a hardware reset of the IPBS and IPBL by pressing the reset button. The button is accessed through a hole in the back of the IPBS and on the front of the IPBL. See the applicable Installation Guide for the IPBS and the IPBL.

Note: Use a pointed object in an non conducting material to perform a reset.

Short press < 1 sec	Restart
Medium press ~3 sec. For IPBS2: When 3 sec. has gone, the LED on IPBS2 will start to flash in blue and the reset button can then be released.	Restart in TFTP mode. In TFTP mode the IPBS and IPBL can be accessed only through the gwload application. This mode is intended for support and development departments.

Long press ~ 10 sec. For IPBS2: When 10 sec. has gone, the LED on IPBS2 will start to flash in blue, indicating the start of the factory reset process. Hence the reset button can then be released. When the LED (LED 1 for IPBS1) is steady amber/ yellow, the factory reset process is complete. The device can now be restarted by disconnecting the supply voltage.	Factory reset - all configuration parameters will be set to default values.

5 Commissioning

This section describes the visual inspection and tests that must be executed after completing the installation and initialization of the IP-DECT system. The purpose of the visual inspection and tests is to verify that all installation activities have resulted in a correctly functioning system. If it appears that a part is malfunctioning while the system is installed correctly (that is, no cabling faults, no configuration faults), the technician must consult the maintenance section included in this manual for fault finding.

5.1 Radio coverage verification tests

The radio coverage verification consists of two tests:

- Base station operation test
- Coverage area test

Note: Be sure that all batteries in the handset are charged before executing the tests.

5.1.1 Base Station Operation Test

The purpose of this test is to check if all base stations are operational.

1 Put a handset in the service display mode (DCA mode), see applicable User Manual for the handset.

2 Use the base station plan, see the applicable System Planning documentation for IP-DECT.

3 Move close to each base station and check that the handset locks to it (the service display should display the correct number).

After having checked that all base stations are operational proceed with the coverage area test.

5.1.2 Coverage Area Test

The purpose of this test is to verify that there is satisfactory field strength to enable good speech quality everywhere within the covered area (rooms, lift shafts, staircases). This test is executed with two handsets and requires two persons.

1 Place the handset in the service display mode (DCA mode) and call the other handset. One user of the handset should now start moving around the covered area. Both users must check that a good speech quality is maintained everywhere. Special attention should be paid to areas such as edges of the building and areas behind metal structures where there is a possibility of reduced speech quality.

2 Mark areas where cracking sounds or mutes are heard.

5.1.3 Evaluation

After having performed the coverage area test, the results should be evaluated. If the coverage is not sufficient you should review the planning and move or add equipment.

5.2 Cordless Extension Number Test

This test checks for each handset the complete connection from the IP-DECT system to the PBX. Furthermore it checks that the handsets' numbers have been correctly programmed. The test is performed by calling all handset from one specific handset.

1 Put all handset together in order of extension number on a table.

2 Go off-hook with each handset and check that the dial tone is heard.

3 Call with a handset (handset A) all other handsets sequentially and check that the handset with the corresponding number on its display rings when called.

4 Call handset A and check if it rings.

6 Troubleshooting

6.1 Load Firmware Using the Gwload Tool

If the firmware is corrupt, for example if firmware download is interrupted the IPBS/IPBL could become unreachable by the web GUI. It will not be possible to load new firmware or to start correctly. If this occurs, the IPBS/IPBL runs on the bootcode and the Gwload tool (a tftp-style client used to repair a broken firmware) can be used to upload firmware.

1 Download the Gwload software from the IP-DECT system provider.

2 Set the IPBS/IPBL in TFTP-mode by performing a medium (~3 sec) hardware reset, see 4.28 *Reset Using the Reset Button* on page 119.

3 Start a command window.

To update with wew firmware, execute the following command from the folder where the gwload.exe file is located:

IPBS:
gwload /setip /i <ipaddress> /gwtype 1201 /prot <..path/firmwarefilename> /go

IPBL:
gwload /setip /i <ipaddress> /gwtype 4001 /prot <..path/firmwarefilename> /go

4 If there is more than one IPBS/IPBL in TFTP mode, select the unit to update and press enter.

6.2 Fault Code Descriptions

This section lists the possible fault codes, their description and severity level.

Explanation of the table columns **C**, **M** and **I**:

C = Critical (IP-DECT) / Critical (Unite)
M = Major (IP-DECT) / Error (Unite)
I = Indeterminate (IP-DECT) / Warning (Unite)

Description	Code	Device	C	M	I
Interface down (Gateway) This is an alarm which is generated, if an physical interface which is configured to be up gets down.	0x00010001	IPBS/IPBL		X	
Registration down (Gateway) This is an alarm which is generated if an configured outgoing registration is down.	0x00010002	IPBS/IPBL		X	
Protocol error (Gateway) The gateway process receive a call clearing with cause code 'Protocol Error'. This can be an indication for an interop problem with some other equipment.	0x00010003	IPBS/IPBL		X	
The LDAP replicator is not connected (Users)	0x00030001	IPBS/IPBL		X	
CPU resources are not available (Radio)	0x00030101	IPBS/IPBL			X
Standby master active (Master)	0x00030201	IPBS/IPBL		X	
User registration failure (Master)	0x00030202	IPBS/IPBL		X	
Emergency registration down (Master)	0x00030203	IPBS/IPBL		X	

Connection to Radio lost (Master)	0x00030204	IPBS/IPBL		X	
Primary/redundant trunk is down (Master)	0x00030205	IPBS/IPBL		X	
Master active (Master) This event is generated when the Mirror becomes active.	0x00030206	IPBS/IPBL			X
Master inactive (Master) This event is generated when the Mirror becomes inactive.	0x00030207	IPBS/IPBL			X
Limit of static radios is reached (Master) This is an alarm which is generated when the number of radios in the radios list (Device Overview > Radios) is reaching 2100. The alarm is cleared once the number of radios goes below 2100.	0x00030208	IPBS/IPBL		X	
Connection to Mobility Master lost (Mobility Master)	0x00030301	IPBS/IPBL		X	
Cannot establish connection to Mobility Master (Mobility Master)	0x00030302	IPBS/IPBL		X	
Connection to Master lost (Mobility Master)	0x00030303	IPBS/IPBL		X	
Standby Mobility Master is active (Mobility Master)	0x00030304	IPBS/IPBL		X	
Connection to Mobility Master lost (Crypto Master)	0x00030401	IPBS/IPBL		X	
No Media data received (RTP) No RTP packets from remote side were received on a connected call. This points to either a NAT problem (private RTP address was given to remote side) or a general signaling problem (media negotiation).	0x00050001	IPBS/IPBL		X	
Excessive loss of data (RTP) This event is generated if in a period of 10s more than 3% received RTP packets were lost. This is an indication of a network problem and it is recommended to check the involved media IP addresses and what kind of device that is involved.	0x00050002	IPBS/IPBL		X	
Wrong payload type received (RTP) Caused by signaling/negotiation problems (interoperability). An endpoint sends RTP packets with a payload type other than negotiated. Wrong Payload Type is a message if there is a Media Problem with a another PBX.	0x00050003	IPBS/IPBL		X	
Stun failed (RTP)	0x00050004	IPBS/IPBL		X	
SRTP authentication failed (RTP)	0x00050005	IPBS/IPBL		X	
SRTCP authentication failed (RTP)	0x00050006	IPBS/IPBL		X	
Unexpected message (H323) A message was received, which was not expected by the protocol in this state. This could be caused by network problems or by incompatible equipment.	0x00060001	IPBS/IPBL		X	
Status inquiry (H323)	0x00060002	IPBS/IPBL		X	

Signaling TCP failed (H323) The signaling transport connection could not be established. This usually means, the destination (IP) is not reachable. Check network connectivity.	0x00060003	IPBS/IPBL		X	
Signaling timeout (H323) A signaling timer expired. The reason for this could be a network problem or an interop problem.	0x00060004	IPBS/IPBL		X	
NAT discovery failed (SIP)	0x00070001	IPBS/IPBL		X	
Overload (SIP) The SIP protocol stack reached its build-in memory allocation limit. The total number message allocations is limited to be safe against denial-of-service attacks. Under normal working conditions the limit should not be reached.	0x00070003	IPBS/IPBL		X	
Coder selection failed (SIP)	0x00070004	IPBS/IPBL		X	
Media configuration failed (SIP)	0x00070005	IPBS/IPBL		X	
DNS failed (SIP)	0x00070006	IPBS/IPBL		X	
Invalid URL (WebMedia)	0x00080001	IPBS/IPBL		X	
Coder missing in URL (WebMedia)	0x00080002	IPBS/IPBL		X	
Unexpected restart (watchdog/reset/power on) (Cmd) The system was restarted because of watchdog, trap or by pressing the reset button. This event is generated 60s after the restart.	0x000b0001	IPBS/IPBL		X	
Unexpected message (TLS)	0x000c010a	IPBS/IPBL			X
Unexpected message (TLS)	0x000c020a	IPBS/IPBL			X
Bad MAC (TLS)	0x000c0114	IPBS/IPBL			X
Bad MAC (TLS)	0x000c0214	IPBS/IPBL			X
Decryption failed (TLS)	0x000c0115	IPBS/IPBL			X
Decryption failed (TLS)	0x000c0215	IPBS/IPBL			X
Record overflow (TLS)	0x000c0116	IPBS/IPBL			X
Record overflow (TLS)	0x000c0216	IPBS/IPBL			X
Decompression failure (TLS)	0x000c011e	IPBS/IPBL			X
Decompression failure (TLS)	0x000c021e	IPBS/IPBL			X
Handshake failure (TLS)	0x000c0128	IPBS/IPBL			X
Handshake failure (TLS)	0x000c0228	IPBS/IPBL			X
No certificate (TLS)	0x000c0129	IPBS/IPBL			X
No certificate (TLS)	0x000c0229	IPBS/IPBL			X
Bad certificate (TLS)	0x000c012a	IPBS/IPBL			X
Bad certificate (TLS)	0x000c022a	IPBS/IPBL			X
Unsupported certificate (TLS)	0x000c012b	IPBS/IPBL			X
Unsupported certificate (TLS)	0x000c022b	IPBS/IPBL			X
Revoced certificate (TLS)	0x000c012c	IPBS/IPBL			X
Revoced certificate (TLS)	0x000c022c	IPBS/IPBL			X
Expired certificate (TLS)	0x000c012d	IPBS/IPBL			X
Expired certificate (TLS)	0x000c022d	IPBS/IPBL			X

Unknown certificate (TLS)	0x000c012e	IPBS/IPBL			X
Unknown certificate (TLS)	0x000c022e	IPBS/IPBL			X
Illegal parameter (TLS)	0x000c012f	IPBS/IPBL			X
Illegal parameter (TLS)	0x000c022f	IPBS/IPBL			X
Unknown CA (TLS) A TLS connection could not be established because the CA of the remote certificate is not trusted. Check the rejected certificates for details.	0x000c0130	IPBS/IPBL			X
Unknown CA (TLS) A TLS connection could not be established because the remote party does not trust the CA of the certificate of this device.	0x000c0230	IPBS/IPBL			X
Access denied (TLS)	0x000c0131	IPBS/IPBL			X
Access denied (TLS)	0x000c0231	IPBS/IPBL			X
Decode error (TLS)	0x000c0132	IPBS/IPBL			X
Decode error (TLS)	0x000c0232	IPBS/IPBL			X
Decryption error (TLS)	0x000c0133	IPBS/IPBL			X
Decryption error (TLS)	0x000c0233	IPBS/IPBL			X
Export restriction (TLS)	0x000c013c	IPBS/IPBL			X
Export restriction (TLS)	0x000c023c	IPBS/IPBL			X
Protocol version (TLS)	0x000c0146	IPBS/IPBL			X
Protocol version (TLS)	0x000c0246	IPBS/IPBL			X
Insufficient security (TLS)	0x000c0147	IPBS/IPBL			X
Insufficient security (TLS)	0x000c0247	IPBS/IPBL			X
Internal error (TLS)	0x000c0150	IPBS/IPBL			X
Internal error (TLS)	0x000c0250	IPBS/IPBL			X
User cancelled (TLS)	0x000c015a	IPBS/IPBL			X
User cancelled (TLS)	0x000c025a	IPBS/IPBL			X
No renegotiation (TLS)	0x000c0164	IPBS/IPBL			X
No renegotiation (TLS)	0x000c0264	IPBS/IPBL			X
Service not found (Kerb client) The host account of the device has been deleted on the Kerberos server. Join the Kerberos realm again.	0x000c0403	IPBS/IPBL		X	
Kerberos server unreachable (Kerb client) The device did not get a response from the Kerberos server. Make sure that the Kerberos server is up and its address is well configured on the devices.	0x000c0406	IPBS/IPBL		X	

Kerberos cross realm failure (Kerb client) ***Kerberos: Cross-realm trust not configured*:** The user tried to log-in with a user account from a Kerberos realm that does not trust or is not trusted by the realm of the device. ***Kerberos: Cross-realm password mismatch:*** The password for the cross-realm trust is not the same on both of the Kerberos servers.	0x000c0407	IPBS/IPBL		X	
Certificate validation is disabled until system time is set (X509) System time is not set but the current date is needed to validate if cryptographic certificates are valid. Therefore encrypted TLS connections will fail. Configure a NTP server or set the system time manually.	0x000c1000	IPBS/IPBL			X
Certificate expired/Will expire soon (X509) The device certificate or one of the trusted certificates has already expired or will expire during the next 30 days. After the certificate has expired TLS connections using this certificate will fail. Replace the certificate with a new one.	0x000c1001	IPBS/IPBL			X
RFP disconnected (TAM)	0x000e0001	IPBL		X	
RFP malfunctioning (TAM)	0x000e0002	IPBL		X	
RFP disabled (TAM)	0x000e0003	IPBL		X	
RFP software download (Dwl)	0x000e0004	IPBL		X	
RFP unsynchronized (RFPInit) *Four common reasons:* 1. The IPBS has lost contact for nine minutes with the RFPI used as synchronization source. 2. The IPBS is not PSCN synchronized (Primary Receiver Scan Carrier Number). 3. The IPBS is not MFN synchronized (Multiframe Number). 4. The IPBS is not slot number synchronized.	0x000e0005	IPBS		X	
Synchronization to reference system lost (RFPInit) Get the Sync Master to resynchronize to the reference sync either manually or automatically (scheduled). To select type of resynchronization action, see *Configure Sync Master IPBS* on page 72. To resynchronize manually, see *Reference Synchronization* on page 91.	0x000e0006	IPBS		X	
Other DECT system with same sysid detected (RFPInit)	0x000e0008	IPBS		X	
Sync master failed to resynchronize to reference (RFPInit)	0x000e0009	IPBS		X	
RFP restarted Burst mode controller of the IPBS restarted.	0x000e000a	IPBS		X	
High temperature (TAM)	0x000f0001	IPBL	X		
High power consumption (TAM)	0x000f0002	IPBL	X		

Supply voltage low (TAM)	0x000f0004	IPBL	X		
Supply Voltage High (TAM)	0x000f0008	IPBL	X		
Fan failure (TAM)	0x000f0010	IPBL		X	
Synchronization ring broken (Sync)	0x00100001	IPBL		X	
Reference synchronization signal lost (Sync)	0x00100002	IPBL		X	
Synchronization lost (Sync)	0x00100004	IPBL		X	
Unsynchronized to reference (Sync)	0x00100008	IPBL		X	
Interface down (ipproc)	0x00110000	IPBS/IPBL		X	
Interface not configured (ipproc)	0x00110001	IPBS/IPBL			X
DHCP server not responding (ipproc)	0x00110002	IPBS/IPBL		X	
Invalid UDP-RTP port base/range (ipproc)	0x00110019	IPBS/IPBL		X	
Invalid UDP-NAT port base/range (ipproc)	0x0011001a	IPBS/IPBL		X	
Invalid NAT port base/range (ipproc)	0x0011001b	IPBS/IPBL		X	
ARP poisoning detected (ipproc)	0x00110041	IPBS/IPBL		X	
Out of TCP/NAT ports (ipproc)	0x00110046	IPBS/IPBL		X	
Out of TCP ports (ipproc)	0x00110047	IPBS/IPBL		X	
TCP bind error (ipproc) Local error. TCP socket was trying to bind itself to a specific local port number. The port number was found to be in use by some other socket.	0x00110049	IPBS/IPBL		X	
Out of UDP/RTP ports (ipproc)	0x00110050	IPBS/IPBL		X	
Out of UDP ports (ipproc)	0x00110051	IPBS/IPBL		X	
UDP bind error (ipproc) Local error. UDP socket was trying to bind itself to a specific local port number. The port number was found to be in use by some other socket.	0x00110053	IPBS/IPBL		X	
No route to destination (ipproc)	0x0011005a	IPBS/IPBL		X	
No route to destination, if down (ipproc) The IP routing process failed to deliver a packet explicitely directed to a specific network interface. The network interface was either down or disabled. Packets directed to a specific network interface are used for example by DHCP (UDP) and by PPTP Tunnels (TCP/GRE). If this error is reported for UDP broadcast packets rather often it usually indicates that DHCP client mode is configured for the interface but the interface is not connected to a network or disabled. In this case the DHCP mode should be changed to disabled.	0x0011005b	IPBS/IPBL		X	
No route to destination, if unknown (ipproc)	0x0011005c	IPBS/IPBL		X	
No route to destination, if unconfigured (ipproc)	0x0011005d	IPBS/IPBL		X	
No route to destination, no gateway (ipproc)	0x0011005e	IPBS/IPBL		X	

No route to destination, loop (ipproc)	0x0011005f	IPBS/IPBL		X	
Memory Low (box) This alarm indicates that there is less then 200000 bytes of memory available for allocation	0x00120001	IPBS/IPBL	X		
Radio busy for speech (Dect)	0x00140001	IPBS			X
Default encryption key timeout (Dect) Too long delay in the LAN/WAN network for early encryption to work. The problem can be solved by configuring a local Mobility Master. Even though a local Mobility Master is configured, the fault message will not disappear, i.e. it will be shown at first location registration attempt when the home Master must be reached. At the next location registration attempt, the key will be in the local Mobility Master and early encryption will work.	0x00140065	IPBS/IPBL			X
Cipher timeout (Dect) This indicates that a call has been forcefully disconnected since the cipher option has been disabled in the radio.	0x00140066	IPBS/IPBL		X	
Master connection timeout (Dect) A signaling timer expired. The reason for this could be a network problem between Radio and Master.	0x00140067	IPBS/IPBL		X	
Busy for speech (CLU)	0x00150001	IPBL			X
Failed to transfer Unite communication block (Unite) Check that the Unite address is correct.	0x001a0001	IPBS/IPBL			X
ICP Connection down	0x00200000	IPBS/IPBL		X	
Read update script Failed to read script from update server.	0x00210001	IPBS/IPBL		X	
Upload bootcode Failed to get the bootcode from update server.	0x00210002	IPBS/IPBL		X	
Upload firmware Failed to get the firmware from update server.	0x00210003	IPBS/IPBL		X	
Upload config Failed to get the config from update server.	0x00210004	IPBS/IPBL		X	
Download config Failed to send the config to update server.	0x00210006	IPBS/IPBL		X	

7 Related Documents

System Description, Ascom IP-DECT System	TD 92375EN
System Planning, Ascom IP-DECT System	TD 92422EN
Installation Guide, IP-DECT Base Station and IP-DECT Gateway	TD 92989EN
Data Sheet, TDM-DECT Base Station (DB1)	TD 92913EN
Data Sheet, IP-DECT Base Station	TD 92370GB
Data Sheet, IP-DECT Base Station (IPBS2)	TD 92836EN
Data Sheet, IP-DECT Gateway	TD 92430GB
Configuration Notes for Cisco Call Manager in Ascom IP-DECT System	TD 92424GB
Technical Product Manual, DCT1800-GAP	TD 92093GB

Document History

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

Version	Date	Description
A	5 February 2009-02-02	First released version.
B	15 April 2009 2009-04-15	Updated 4.7 *UNITE* on page 73 and added information about device management and service discovery.
C	5 May 2010 2010-03-05	Updated 4.5.15 *Configure Supplementary Services* on page 59. Updated 4.5.34 *Configure Air Synchronization* on page 71. Updated 4.10.1 *Radios* on page 84. New 4.10.6 *Sync Lost Counter in IPBS* on page 89. New 4.11 *DECT Sync* on page 90. Updated 4.15 *Software Upgrade* on page 106.
D	3 September 2010	New 3.13.3 *Easy Registration* on page 25 Updated 4.1.3 *Centralized Management of Administrator and Auditor Accounts Using Kerberos* on page 28 Updated 4.5.2 *Set Subscription Method* on page 55 New 4.7.1 *Configure Messaging* on page 73 New 4.8 *Import and Export a Central Phonebook* on page 94 New 4.9.5 *Export the Users to a csv file* on page 83
E	26 January 2011	Several changes, see change bars.
F	2October 2011	Several changes, see change bars.
G	15 December 2011	Several changes, see change bars.
H	15 February 2012	Several changes, see change bars.
I	1 May 2012	Several changes, see change bars.

Version	Date	Description
J	31 May 2013	**Updated** *Assign Handsets to Users* on page 23 3.13.2 *Individual Registration* on page 23 *Assign Handset to Users* on page 26 *Set up the Kerberos server* on page 28 *Configure IPBS/IPBL as a client in a small existing system (few clients)* on page 29 *Configure IPBS/IPBL as a client in a large existing system (many clients)* on page 30 *Configure IPBS/IPBL as a client in a new system* on page 30 *Log in using Kerberos* on page 31 *Configure cross-realm authentication* on page 31 *Log in using Kerberos cross-realm authentication* on page 36 4.1.4 *Configure the NTP Settings* on page 37 4.2 *LAN* on page 43 4.2.8 *Deactivate LAN Port (only for IPBL)* on page 46 4.5.6 *Set Frequency Band* on page 56 4.5.15 *Configure Supplementary Services* on page 59 4.8.6 *Phonebook* on page 80 4.9.2 *Search for User Information* on page 83 4.9.3 *Add a User* on page 83 4.12.1 *Display All Ongoing Calls in the System* on page 92 4.15 *Software Upgrade* on page 106 4.19 *System Downgrade to Software Version 2.X.X* on page 110 4.20 *System Downgrade to Software Version 4.X.X and 3.X.X* on page 110 4.22 *System Upgrade in System with Mobility Masters* on page 113 4.26.5 *Performance* on page 116 4.26.9 *Environment* on page 118 4.28 *Reset Using the Reset Button* on page 119 6.2 *Fault Code Descriptions* on page 123 A.1.8 *Configure Microsoft IIS as an Update Server* on page 141 Appendix E: *Update Script for Configuration of Kerberos Clients* on page 155 **New** 4.2.7 *Enable RSTP (only for IPBL)* on page 45 4.5.10 *No On-Hold Display* on page 57 4.5.11 *Display Original Called* on page 57 4.5.12 *Early Encryption* on page 58 4.5.22 *Conferencing Unit* on page 67 4.5.24 *Select Crypto Master Mode* on page 80 4.5.27 *Connect Mobility Master to a Crypto Master* on page 68 4.8 *Services* on page 76 4.8.7 *Configure IP-DECT to Connect to a Presence System Using ICP* on page 81 4.23 *Replacing Master Hardware in Multiple Master System* on page 113 4.24 *Replacing Master Hardware in a System with a Crypto Master Active* on page 113

Version	Date	Description
K	10 January 2014	Updated the section 4.5.32 *PARI* on page 70 to reflect that 2047 IPBSs can now be used per Pari Master in an installation by setting the system ID to 293-296. Updated the fault code descriptions table in section 6.2 *Fault Code Descriptions* on page 123 with the fault code "Limit of static radios is reached (Master), 0x00030208" (Issue IPDECT-509) Updated the fault code descriptions table in section 6.2 *Fault Code Descriptions* on page 123 with the fault code "Cipher timeout (Dect), 0x00140066" (Issue IPDECT-896) Updated sections 3.13.1 *Anonymous Registration* on page 22, 3.13.2 *Individual Registration* on page 23 and 3.13.3 *Easy Registration* on page 25 to reflect that it is now possible to use up to 60 characters in the *Auth. Name* field for an IP-DECT user. (Issue IPDECT-836) Updated the attribute mappings table in section *Attribute Mappings* on page 50 with new attribute names. Have also added a note text below the table. (Issue IPDECT-492) Updated the below sections to reflect that a new DECT Master mode "Mirror" has been added to the currently available modes. Both the previously used modes "Active" and "Standby" can now instead be set to "Mirror". 3.6 *Configure the Pari Master* on page 17 3.7 *Configure the Standby Pari Master* on page 18 3.8 *Configure the Master* on page 18 3.9 *Configure the Standby Master* on page 19 4.5.16 *Select Mode* on page 62 Updated the fault code descriptions table in section 6.2 *Fault Code Descriptions* on page 123 with the fault codes "Master active (Master), 0x00030206" and "Master inactive (Master), inactive.0x00030207" (Issue IPDECT-355) Updated the section 4.5.30 *Enter IP Address to the PARI Master and the Standby PARI Master* on page 69 to reflect that a new PARI Master mode, Mirror, has been added. To better correlate with different PARI Master roles, the name of the field *Standby PARI Master IP Address* in DECT > Radio has been changed to *Alt. PARI Master IP Address*. (Issue IPDECT-887) Have added the section 4.18 *System Downgrade from Software Version 7.0.X* on page 110 to describe the necessary steps to downgrade from software version 7.0.X. (Issue IPDECT-848)

Version	Date	Description
		Have added the section 4.7.1 *Configure Messaging* on page 73 to reflect that a new check box (Broadcast) has been added in Unite > SMS. (Issue IPDECT-953) Have added section 4.5.19 *Set Region Code* on page 63 which describes how to set region codes which is used for the new feature Call Localization. This feature is especially important for emergency calls when it is necessary to know the location of the calling party. (Issue IPDECT-633) Have added Appendix G: *Used IP Ports* on page 161 which describes which IP ports that are used by the IP-DECT system. (Issue IPDECT-838) Have added the section 4.5.20 *Configure Gatekeeper* on page 63 to reflect that a new text field (International CPN Prefix) has been added in DECT > Master. (Issue IPDECT-945) Have added a note in section 3 *Configuration* on page 8 regarding that when the IPBS/IPBL is reconfigured to another role (for example from being a Standby Master to becoming a Master), a factory reset should be done. (Issue IPDECT-985) Have added a note in section 4.5.32 *PARI* on page 70 regarding that in large systems with system ID 293 to 296, the Radio should be disabled in the Pari Master. Also, with the exception for the Pari Master role, no other roles (for example Crypto Master, Kerberos server, etc.) should be activated in the Pari Master. (Issue IPDECT-850) Have updated the attribute mappings table in section *Attribute Mappings* on page 50 with new description texts. Have also changed the order of the attributes in accordance with how it looks in the GUI of the device. (Issue IPDECT-1033) Have updated sections 4.10.5 *Air Sync* on page 89 and 4.11.3 *Status* on page 92 regarding the information about FER (Frame Error Rate). (Issue IPDECT-800) Have updated section 4.10.2 *RFPs* on page 85 about how to retrieve an RFP log. (Issue RFP-74)

Version	Date	Description
PL1	20 January 2014	Have updated the table in section 4.10.2 *RFPs* on page 85 with more information about Tx and Rx error. (Issue IPDECT-785) Have updated the table in section 4.12.1 *Display All Ongoing Calls in the System* on page 92 with more information about the statistics field "Handover Cancelled". Have updated the fault code descriptions table in section 6.2 *Fault Code Descriptions* on page 123 with more information for the fault code "Excessive loss of data (RTP), 0x00050002". (Issue IPDECT-575 and IPDECT-450) Have updated the fault code descriptions table in section 6.2 *Fault Code Descriptions* on page 123 with the fault code "Master connection timeout (Dect), 0x00140067". (Issue IPDECT-1158) Have updated the section 4.7.1 *Configure Messaging* on page 73 to reflect that the check box (Broadcast) is no longer available in Unite > SMS. Have updated section 4.5.32 *PARI* on page 70 regarding that broadcast and multicast messaging are now supported when selecting system ID 293 to 296. Previously it was stated that broadcast and multicast messaging are not supported when selecting system ID 293 to 296. (Issue IPDECT-1193) Have updated the section 4.5.20 *Configure Gatekeeper* on page 63 with a note regarding configuring alternative proxy/gatekeeper. (Issue IPDECT-1189) Have updated the IP ports table in section Appendix G: *Used IP Ports* on page 161 with IP ports: 1722-1723, 1724-1727 and 1728-?. (Issue IPDECT-1191)
PL2	14 March 2014	Have updated the section 4.5.20 *Configure Gatekeeper* on page 63 and D.1 *Load Balancing Using Fixed Connection Towards IP-PBXs* on page 148 regarding configuring SIP proxy and alternative SIP proxy(s). (Issue IPDECT-316) Have updated the section *Self-signed Certificates* on page 41 and *Certificate Signing Request (CSR)* on page 42 about supported certificate signatures. (Issue IPDECT-1150)
L	20 May 2014	Have only removed the preliminary stamp at top of pages.

Version	Date	Description
M	15 October 2014	Have updated the section 4.2 *LAN* on page 43 and added Appendix H: *Configure DHCP Options* on page 162 about DHCP options. (Issue IPDECT-1473) Have updated the section 4.5.20 *Configure Gatekeeper* on page 63 about how to set the *Treat rejected calls as* option. (Issue IPDECT-1452) Have updated the section 1.1 *Abbreviations and Glossary* on page 2 about LLDP (Link Layer Discovery Protocol). Have added the section 4.17 *System Upgrade from Software Version 7.0.X or earlier to 7.1.X* on page 109. (Issue IPDECT-1527) Have added the section *Considerations when updating of configuration* on page 110. (Issue IPDECT-1373) Have updated the section *Configure cross-realm authentication* on page 31 about security groups in AD. (Issue IPDECT-1577) Have updated the sections *Add users in the IP-DECT System* on page 22, 3.13.2 *Individual Registration* on page 23, *Add users in the IP-DECT System* on page 25 and 4.5.20 *Configure Gatekeeper* on page 63 about how to use the system password for registration towards the gatekeeper. (Issue IPDECT-1579 and IPDECT-1633)

Appendix A: How to Configure and Use the Update Server

A.1 Summary

Automatic update is based on configuration and firmware information stored on a standard web server and retrieved by the devices on a regular basis.

There are 2 modules in the device which work in tandem. The first is known as "UP0" and actually executes the upload and download of configuration information as well as the download of updated firmware. UP0 is controlled by commands as described below.

The second module is known as "UP1". It serves to poll a given website for changed configuration information. If certain conditions are met, UP1 will issue commands to UP0 to perform the requested updates.

UP0 can also receive commands from the "Update clients" page of the PBX Administration user interface.

A.1.1 System Requirements

One or more regular Web Server that can be accessed by all devices are required. This has been tested with Microsoft IIS and Apache, but any regular Web Server should do.

For best results, the Web Server should be able to maintain a large number of HTTP sessions simultaneously, since potentially all devices may attempt a configuration update at the same time. For example, Microsoft's Personal Web Server is not adequate, since it only support 10 simultaneous sessions.

Following URLs are supported: HTTP, HTTPS and TFTP.

A.1.2 Configuration in IP-DECT

See 4.8.1 *Configure Automatic Firmware Update* on page 76 on how to configure the IPBS/IPBLs for automatic update.

The URL parameter must point to the site where the file containing the commands is stored. Note that in this URL, no host names are supported. The web servers IP address must be used.

A.1.3 Setting the UP1 Parameters

If the URL ends with a '/' then a default filename is used based upon the product in question. If for example the URL for an IPBS1 is "http://1.2.3.4/configs/", it is expanded to "http://1.2.3.4/configs/update-IPBS.htm".

	Command filename
IPBS1	update-IPBS.htm
IPBS2	update-IPBS2.htm
IPBL	update-IPBL.htm

The product type name used is the one used in the Version line on the devices Info page. Note that the extension is irrelevant, .htm or .txt or no extension at all may be used. On some Web servers, URLs are case sensitive.

The command file is retrieved initially after the configured poll interval (in minutes) is expired after boot. Short poll intervals can create substantial load on a big network. A value less than 15 minutes (which is the default) is therefore not recommended.

However, for new devices (that is, devices which have been reset to factory settings and never had a successful download of a command file), the command file is retrieved every minute (for up to 30 minutes). This is done so that a fresh device can quickly retrieve a site depending standard configuration when it is installed.

When the command file is retrieved, the commands found in the file are executed in sequence. Theoretically, all commands which can be typed in to a telnet session to the device or which appear in a config file can be used in the command file. However, in most cases, you will use config change commands and commands to the UP0/UP1 modules.

The command file is executed every time it is retrieved (depending on the poll interval). However, in most cases, you don't want it to be executed each time, but only once. For example, if you are about to deploy a certain configuration change to all IPBSs, then you want this change to be done once per IPBS only. This can be achieved by the check command:

```
mod cmd UP1 check <final-command> <serial>
```

The devices maintain an internal variable UPDATE/CHECK which is initially (or when the device is reset to factory settings) empty. The check command will compare the <serial> parameter with the UPDATE/CHECK variable. If it is equal, any further processing of the command file is cancelled.

If it differs, the remainder of the file will be processed and, after the last command is executed, the UPDATE/CHECK variable will be set to <serial> and the <final-command> will be executed. The following commands are useful values for <final-command>:

ireset	resets the device as soon it is idle
reset	resets the device immediately
iresetn	resets the device as soon it is idle, only if a reset is required
resetn	resets the device immediately, only if a reset is required
ser	this is a no-op

Often, configuration changes shall be made only during certain times (e.g. non-working hours). This can be achieved using the times command:

```
mod cmd UP1 times [/allow <hours>] [/initial <minutes>]
```

The times command will check the current time against <hours>. If it does not match this restriction, any further processing of the command file is cancelled. <hours> is a comma separated list of hours. Only those hours listed are considered valid times for execution of the command file.

```
mod cmd UP1 times /allow 12,23,0,1,2,3,4
```

The command above allows command executions only between 12:00 and 12:59 and 23:00 and 4:59 local time (on a 24h clock). Note that if the device has no time set, all command executions will be cancelled.

If the /initial parameter is set, the no commands will be executed within the first <minutes> minutes after the device has been booted. This is done to avoid firmware download and flashing when installing devices.

```
mod cmd UP1 times /allow 12,23,1,2,3,4 /initial 6
```

The command above suppresses any command file processing within the first six minutes after each boot of the device. If /initial is set, new devices (or those that have been reset to factory settings), the command file will be retrieved even if it normally would be

suppressed by the /allow parameter. This allows new devices to retrieve a site specific standard configuration quickly.

A.1.4 Setting the UP0 Parameters

To perform a firmware update, use the following command:

```
mod cmd UP0 prot <url> <final-command> <build-serial>
```

The command above downloads the new firmware from <url> and flash it to the device, then <final-command> is executed.

The IPBSs maintain an internal variable UPDATE/PROT which is initially (or when the device is reset to factory settings) empty. The prot command will compare the <build-serial> parameter with the UPDATE/PROT variable. If it is equal, no firmware will be loaded or flashed. If there is no UPDATE/PROT yet (like for a new device), <build-serial> is compared against the build number of the current firmware. After a successful download, UPDATE/PROT is set to <build-serial>. Note that <build-serial> is not checked against the firmware version actually loaded. It is your responsibility to keep this consistent.

If <url> ends with a slash ('/'), then a default firmware filename is added to the URL depending on the type of the device.

	Firmware filename
IPBS1	ipbs.bin
IPBS2	ipbs2.bin
IPBL	ipbl.bin

```
mod cmd UP0 prot http://192.168.0.10/firm/ ireset 5.0.0
```

The command above determines if firmware 5.0.0 is already installed. If not, new firmware will be downloaded from the following location depending on type of device:
IPBS1: http://192.168.0.10/firm/ipbs.bin
IPBS2: http://192.168.0.10/firm/ipbs2.bin
IPBL: http://192.168.0.10/firm/ipbl.bin
The UPDATE/PROT variable will be set to 5.0.0 and the device will be reset as soon as it is idle.

Similar to the prot command, the boot command will update the boot code.

	Boot filename
IPBS1	boot_ipbs.bin
IPBS2	boot_ipbs2.bin
IPBL	boot_ipbl.bin

```
mod cmd UP0 boot http://192.168.0.10/firm ireset 5.0.0
```

The command above determines if boot code 5.0.0 is already installed. If not, new boot code will be downloaded from the following location depending on type of device:
IPBS1: http://192.168.0.10/firm/boot_ipbs.bin
IPBS2: http://192.168.0.10/firm/boot_ipbs2.bin
IPBL: http://192.168.0.10/firm/boot_ipbl.bin
The UPDATE/BOOT variable will be set to 5.0.0 and the device will be reset as soon as it is idle.

Using UP0, device configurations can be saved to a web server.

```
mod cmd UP0 scfg <url>
```

This will cause the device to upload its current config to url This will be done using an HTTP PUT command. url must be writable thus. With url, some meta character strings are replaces as follows:

Sequence	Replacement	Example
#d	Current date and time	20040319-162544
#m	Device mac address	00-90-33-03-0d-f0
#h	Device hardware ID	ipbs-03-0d-f0
#b	Rolling backup index loops over 0 .. n-1 for each backup	5

Example IPBS1/IPBS2/IPBL Boot and Firmware Update

This example shows an "update file" for the IPBS1/IPBS2 and IPBL.

```
mod cmd UP0 prot http://172.20.8.128/ascom/firmware/ ireset
5.0.0
```

```
mod cmd UP0 boot http://172.20.8.128/ascom/boot/ ireset 5.0.0
```

A.1.5 Configuration File Backup

To make a backup of the configuration file, use the following command:

```
mod cmd UP0 scfg <url> [<final-command> <save-serial> [ /force
<hours>]]
```

The scfg command uploads the current configuration file to the specified <url>.

Example

```
mod cmd UP0 scfg http://192.168.0.10/configs/saved/#h#b5.txt no-
op WEEKLY /force 168
```

The command above saves the device configuration file once a week with a backlog of 5 weeks.

A.1.6 Download Configuration File

To load a configuration file on the IP-DECT device use the following command:

```
mod cmd UP0 cfg <url> <final-command> <serial>
```

The command loads the configuration file, and all commands in it are executed.

A.1.7 Setting the RFP_UPDATE0 Parameter

Note: This section only applies to the IPBL.

To perform a RFP firmware update, use the following commands.

```
mod cmd RFP_UPDATE0 firmware http://192.168.0.10/
Worf4_GAP_R4H.s2
```

The command above specifies the url to the RFP firmware to use.

```
mod cmd RFP_UPDATE0 select 0x2753
```

Specifies which RFPs to update using a hex-encoded bit-mask. Each bit represents an RFP port starting with port 1 at the LSB (0x0001) up to port 16 (0x8000).

0x2753 specifies RFP "1,2,5,7,9,10,11,14" to be updated.

```
mod cmd RFP_UPDATE0 schedule DD.MM.YYYY-HH:MM
```

Specifies when the update shall start. If no date is provided, the update will be immediate when the start command is issued.

```
mod cmd RFP_UPDATE0 start /idle
```

Starts the update or activates the schedule. Normally the /idle command is selected and an update starts only if the RFP is idle.

If multiple RFPs are selected for update, they will be updated one at a time If /sequence command is used.

Example Update RFP Firmware

This example shows an "update file" for the IPBL.

```
mod cmd UP1 check ser 20070316-1

mod cmd RFP_UPDATE0 firmware http://172.20.8.125/ascom/rfp/
Worf123.S2

mod cmd RFP_UPDATE0 select 0xffff

mod cmd RFP_UPDATE0 start /idle
```

A.1.8 Configure Microsoft IIS as an Update Server

To be able to upload (save) device configuration information on the web server, it must allow HTTP PUT requests. All other functions require HTTP GET permissions only.

You may want to restrict access to that site to certain network address ranges.

To avoid entering authentication data in every IPBS/IPBL, it is recommended to allow anonymous read access. For write access (http PUT), authentication is needed with IIS ver. 6 and later. Authentication data needs to be configured in the devices that need to be backed up, e.g. the PARI Master, Master and Mobility Master.

Requirements for IP-DECT

- Version 5.1.X and later supports the authentication algorithm "md5-sess".

Requirements for Microsoft IIS

- Must be a Windows 2008 R2 server containing Microsoft IIS ver. 7.5.

To configure Microsoft IIS as an Update Server

The steps that are involved are shown in the figure below. The steps are described in more detail below the figure.

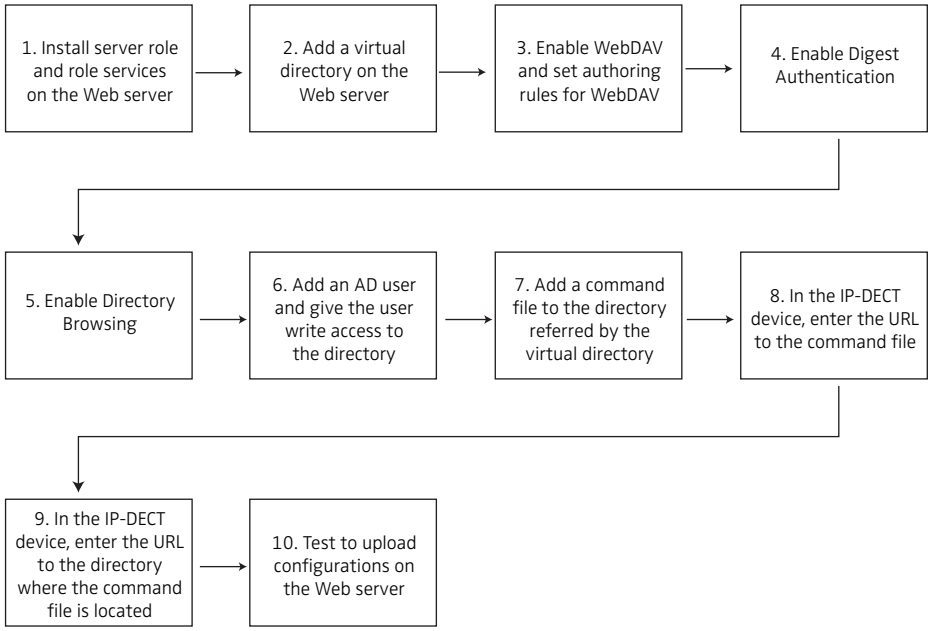


Figure 16. To configure Microsoft IIS as an Update Server.

1. Install server role and role services on the Web server

1 Connect to the Windows 2008 R2 server.

2 In Server Manager": Right-click on "Roles" and select "Add Roles" (menu item). The "Add Roles" wizard starts.

3 Click "Next".

4 Select the server role *Web Server (II)* check box.

5 Click "Next".

6 Click "Next".

7 Make sure that the following role services check boxes are selected and leave the rest unchecked:

- *Directory Browsing*
- *WebDAV Publishing*
- *Digest Authentication*

8 Click "Next".

9 Click "Install".

2. Add a virtual directory on the Web server

10 In "Internet Information Services (IIS) Manager": Right-click on "Default Web Site" and select "Add Virtual Directory..." (menu item). The "Add Virtual Directory" window is shown.

11 In the *Alias* text field, enter a name for the virtual directory.

12 In the *Physical path:* field, click on the "..." button to the right of the field and browse to the location where the virtual directory shall be stored. Create a new virtual directory and name it.

13 Close the "Add Virtual Directory" window, click "OK".

3. Enable WebDAV and set authoring rules for WebDAV

14 In "Internet Information Services (IIS) Manager": Left-click on "Default Web Site".

15 Left-double click on "WebDAV Authoring Rules"

16 Left-click on "Enable WebDAV" (link).

17 Left-click on "Add Authoring Rule..." (menu item)". The "Add Authoring Rule" window is shown.

18 In section *Allow access to this content to:*, select the *All users* option.

19 In section *Permissions*, select the *Read, Source* and *Write* check boxes.

20 Click "OK".

4. Enable Digest Authentication

Note: Digest Authentication requires that the Web server is joined to a domain.

21 Left-click on the virtual directory.

22 Left-double click on "Authenticaton" and left-click on "Enable" (link).

5. Enable Directory Browsing

23 Left-click on the virtual directory.

24 Left-double click on "Directory Browsing" and left-click on "Enable" (link).

6. Add an AD user and give the user write access to the directory

Note: This section requires an existing Active Directory (AD) user.

25 Right-click on the virtual directory and left-click on "Edit Permissions..." (menu item). The *Properties* window for the virtual directory is shown.

26 Click on the *Security* tab.

27 Click on "Edit..." (button). The "Permissions for *virtual directory name*" window is shown.

28 Click on "Add" (button). The "Select Users, Computers, Service Accounts, or Groups" window is shown.

29 In the *Enter the object names to select (examples):* text field, enter the name of an AD user. Click on "Check Names" (button) to the right of the text field.

30 Click "OK".

31 In the "Permissions for *virtual directory name*" window: Allow modify permission for the AD user by selecting the *Allow* check box for the *Modify* permission.

32 Click "OK".

33 Click "OK".

7. Add a command file to the directory referred by the virtual directory

34 Add a command file to the directory referred by the virtual directory. For information on the command file syntax, see A.1.4 *Setting the UP0 Parameters* on page 139.

8. In the IP-DECT device (IPBS/IPBL), enter the URL to the command file

35 See 4.8.1 *Configure Automatic Firmware Update* on page 76 on how to configure the IPBS/IPBLs for automatic update.

9. In the IP-DECT device (IPBS/IPBL), enter the URL to the directory where the command file is located

36 Select Services > HTTP Client.

37 In section *Authenticated URLs*, enter in the *URL* text field the URL to the directory.

38 In the *User* text field, enter the user name of the AD user that was given write access, see *6. Add an AD user and give the user write access to the directory* on page 143.

39 In the *Password* text field, enter the password.

10. Test to upload configurations on the Web server

40 During the test period, set the poll interval to 1 minute.

41 When the command file has been run, check that the label data in the IPBS/IPBL (select Services > Update) is the same as in the command file.

42 Check that the configuration file is located in the directory.

Appendix B: Local R-Key Handling

Local R-key handling assume that the check box for local R-key handling is selected, see 4.5.8 *Local R-Key Handling* on page 57.

The following R-key functions are available during a call.

Key	Description
R	Put the ongoing call on hold and get a new line. (Dial the number to the second call.)
R0	Reject the incoming call.
R1	Terminate the ongoing call and switch to call on hold/incomming call.
R2	Switch between ongoing call and call on hold/incomming call.
R3	This function is normally used for three-party conference.
R4	Transfer call on hold to ongoing call and disconnect.
RR (unattended transfer)	Put the ongoing call on hold and dial the number to the destination where the last held call shall be transferred to.

Appendix C: Database Maintenance

This section describes how IP-DECT user configuration can be moved from one system to another. By moving users, one IP-DECT system can be split into many systems or several IP-DECT systems can be merged to one single system.

Before database merge you should consider if the IP-DECT R3 Multi Master concept can be used instead and whether it is possible to have several Masters on one site.

C.1 Prerequisites

For all systems involved in the database maintenance procedure:

- It is highly recommended to have the same software version running on all systems.
- If a user is moved to a system with a different SARI, the target system must be configured with multiple SARIs containing the SARI number of the originating system as well as its existing SARI. For more information, see 4.5.33 *SARI* on page 70.
- The systems must have the same DECT system name and the same DECT system password (configured under DECT > System) as well as the same device password (General > Admin).
- LDAP replication must not be activated.

C.2 Database Maintenance Procedure

1 Make sure the handsets that correspond to the moved user data have no contact with the system. Turn off the handsets or switch off the Radio(s) in the area where the handsets are located. Handsets should show "No system". Handsets may be desubscribed if they have connection to the system during database maintenance.

2 Save a configuration file from each Master involved. See 4.14 *Backup* on page 105.

3 Identify user records in the saved configuration files and modify them according to the desired plan. User records are located at the end of the file beginning after the row:

```
mod cmd FLASHDIR0 add-view 101 cn=PBX0
```

4 To remove a user, remove the corresponding line.

To add a user (from another file), insert a line that has been removed from another file. Remove the following attributes:

```
(guid;bin=###)
```

```
(usn=###)
```

where ### denotes an arbitrary value.

5 Save modifications to the configuration files.

6 Make sure that step 1 is met, and upload configuration files to the corresponding entities. See 4.21.1 *Update Configuration* on page 110.

7 Reset in order to make the changes take effect, see 4.27 *Reset* on page 118.

Removing a User Example

This example shows part of the configuration file. There may also be other attributes in the used system.

Before Removal

```
mod cmd FLASHDIR0 add-view 101 cn=PBX0
mod cmd FLASHDIR0 add-item 101
(cn=1950)(guid;bin=80319FC0E909D311905C00013E00EFC8)(dn=
1950)(h323=1950)(e164=1950)(pbx=<user admin="no"/
>)(pbx=<gw name="DECT_CEg" ipei="002020173394"
subs="977e9bfc568c8223197e4195bec9ec28"/>)(usn=14)
mod cmd FLASHDIR0 add-item 101
(cn=1951)(guid;bin=7B7C9D01E909D311905C00013E00EFC8)(dn=
1951)(h323=1951)(e164=1951)(pbx=<user admin="no"/
>)(pbx=<gw name="DECT_CEg" ipei="002020173479"
subs="90bd79116daec066105610822cabc1e7"/>)(usn=15)
```

After Removal

```
mod cmd FLASHDIR0 add-view 101 cn=PBX0
mod cmd FLASHDIR0 add-item 101
(cn=1950)(guid;bin=80319FC0E909D311905C00013E00EFC8)(dn=
1950)(h323=1950)(e164=1950)(pbx=<user admin="no"/
>)(pbx=<gw name="DECT_CEg" ipei="002020173394"
subs="977e9bfc568c8223197e4195bec9ec28"/>)(usn=14)
```

Adding a User Example

This example shows part of the configuration file. There may also be other attributes in the used system.

Before Addition

```
mod cmd FLASHDIR0 add-view 101 cn=PBX0
mod cmd FLASHDIR0 add-item 101
(cn=1950)(guid;bin=80319FC0E909D311905C00013E00EFC8)(dn=
1950)(h323=1950)(e164=1950)(pbx=<user admin="no"/
>)(pbx=<gw name="DECT_CEg" ipei="002020173394"
subs="977e9bfc568c8223197e4195bec9ec28"/>)(usn=14)
```

After Addition

```
mod cmd FLASHDIR0 add-view 101 cn=PBX0
mod cmd FLASHDIR0 add-item 101
(cn=1950)(guid;bin=80319FC0E909D311905C00013E00EFC8)(dn=
1950)(h323=1950)(e164=1950)(pbx=<user admin="no"/
>)(pbx=<gw name="DECT_CEg" ipei="002020173394"
subs="977e9bfc568c8223197e4195bec9ec28"/>)(usn=14)
mod cmd FLASHDIR0 add-item 101
(cn=1951) (dn=1951)(h323=1951)(e164=1951)(pbx=<user
admin="no"/>)(pbx=<gw name="DECT_CEg"
ipei="002020173479"
subs="90bd79116daec066105610822cabc1e7"/>)
```

The `guid;bin` and `usn` attributes are not insterted. The system will create these attributes when the file is uploaded to the device.

Appendix D: Load Balancing

Load balancing can be used in an IP-DECT system when the number of handsets exceeds what an IP-PBX is able to register.

When load balancing the traffic is distributed over several IP-PBXs which can be done in two ways using:

- fixed connections for users on each Master towards *multiple* IP-PBXs.
- dynamic connection for users on each Master towards IP-PBX *network* using DNS services.

D.1 Load Balancing Using Fixed Connection Towards IP-PBXs

When the number of users exceeds what an IP-PBX is able to register, you can load balance using several IP-PBXs where each Master in the IP-DECT system is connected to a fixed IP-PBX.

Note: For redundancy, an alternative gatekeeper/proxy should always be used.

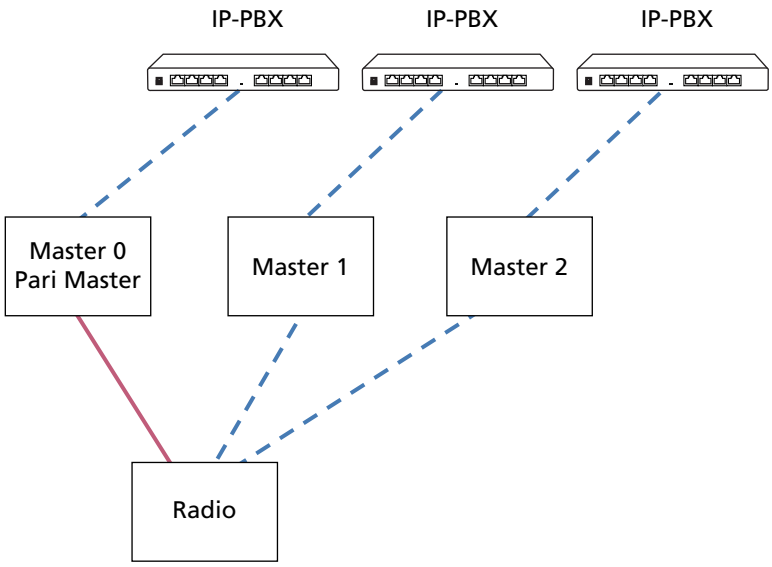


Figure 17. Load balancing using fixed connection towards IP-PBXs.

1 Select DECT > Master.

2 In the drop-down list, select "SIP" protocol.

3 Enter the IP address, domain name or host name and optionally port of proxy (e.g. proxy1.ascom-rd.com:5060) to the SIP proxy (registrar) in the *Proxy* text field.

4 To get redundancy: Depending on how many alternative SIP proxys that are used, do as follows:

In the *Alt. Proxy 1* text field: Enter the IP address, domain name or host name and optionally port of proxy (e.g. proxy2.ascom-rd.com:5060) to the alternative SIP proxy (registrar).

In the *Alt. Proxy 2* text field: Enter the IP address or host name and optionally port of proxy (e.g. proxy3.ascom-rd.com:5060) to the alternative SIP proxy (registrar).

Note: The *Alt. Proxy 2* text field cannot be used if the *Proxy* and the *Alt. Proxy 1* text fields contain domain names.

In the *Alt. Proxy 3* text field: Enter the IP address or host name and optionally port of proxy (e.g. proxy4.ascom-rd.com:5060) to the alternative SIP proxy (registrar). Note: The *Alt. Proxy 3* text field cannot be used if the *Proxy* and the *Alt. Proxy 1* text fields contain domain names.

5 Reset in order to make the changes take effect, see *4.27 Reset*.

D.2 Load Balancing Using Dynamic Connection Towards IP-PBX Network

When the number of users exceeds what an IP-PBX is able to register, you can use load balancing towards an IP-PBX network. Using DNS services, users on each Master are dynamically connected towards the IP-PBX network. In addition to the load balancing of the traffic, redundancy is also achivied.

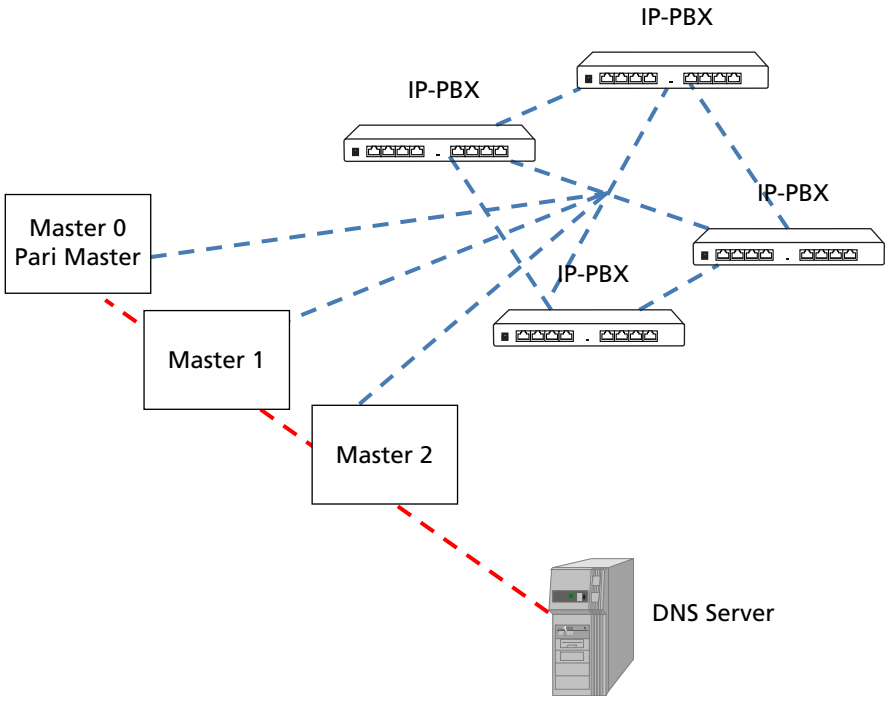


Figure 18. Load balancing using dynamic connection towards IP-PBX network.

D.2.1 How the Load Balancing Works

When you register a handset, a SRV-type query is sent to the DNS server asking for existing SIP proxys (IP-PBXs) in the domain defined in the Master. The DNS server will reply with a list of SRV (Service) records, one for each IP-PBX. Each SRV record contains a priority and a weight value. Lower priority value means more preferred. When there are two or more records with the same priority, then the weight value determines which IP-PBX the user should be dynamically connected to.

A DNS server assign each user a primary and a secondary proxy address using DNS-SRV service mechanism.

D.2.2 Local Site Redundancy

If redundancy is wanted in a remote site, that is you want to be able to make emergency phone call if the WAN connection to the central site goes down, a local site proxy server, e.g. SRST (Cisco), can be used in the remote site, see figure 19 on page 150.

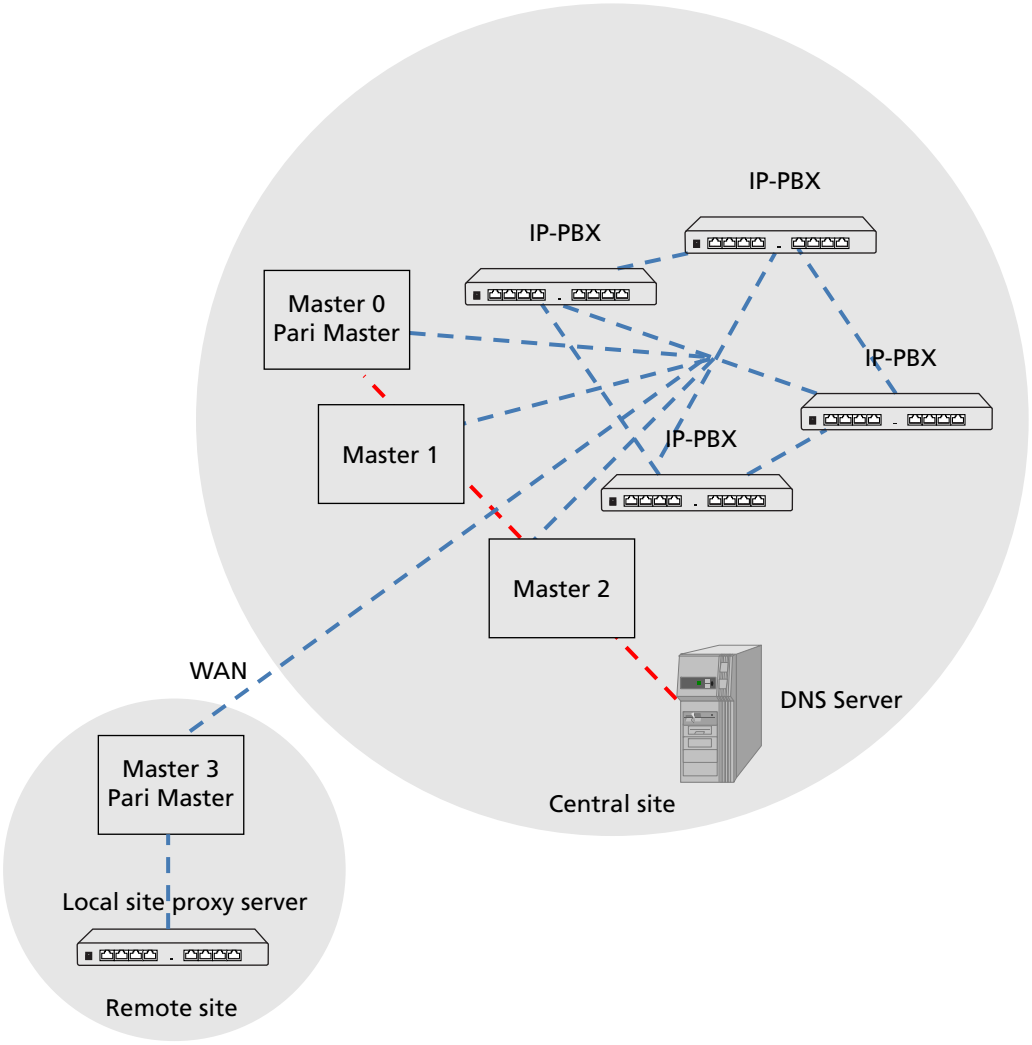


Figure 19. Redundancy in the remote site using a local site proxy server.

D.2.3 About SRV Records

Record format

An SRV record has the form:.

```
_Service._Proto.Name TTL Class SRV Priority Weight Port Target
```

- **Service**: the symbolic name of the desired service.
- **Proto**: the protocol of the desired service; this is usually either TCP or UDP.
- **Name**: the domain name for which this record is valid.
- **TTL**: standard DNS time to live field.
- **Class**: standard DNS class field (this is always IN).
- **Priority**: the priority of the target host, lower value means more preferred.

- **Weight**: A relative weight for records with the same priority.
- **Port**: the TCP or UDP port on which the service is to be found.
- **Target**: the hostname of the machine providing the service.

An example of an SRV record might look like this:

```
_sip._udp.ascom-rd.com. 86400 IN SRV 0 5 5060 sipserver.ascom-rd.com.
```

This points to a server named sipserver.ascom-rd.com listening on TCP port 5060 for SIP protocol connections. The priority given here is 0, and the weight is 5.

SRV records must contain the fully qualified domain name (FQDN) of the host.

How to set priority and weight

SIP clients always use the SRV record with the lowest-numbered priority value first, and only fall back to other records if the connection with this record's host fails. Thus a service may have a designated "fallback" server, which will only be used if the primary server fails. Only another SRV record, with a priority field value higher than the primary server's record, is needed.

If a service has multiple SRV records with the same priority value, clients use the weight field to determine which host to use. The weight value is relevant only in relation to other weight values for the service, and only among records with the same priority value.

In the following example showing five records, both the priority and weight fields are used to provide a combination of load balancing and backup service.

```
_sip._udp.ascom-rd.com. 86400 IN SRV 10 60 5060 bigbox.ascom-rd.com.
_sip._udp.ascom-rd.com. 86400 IN SRV 10 20 5060 smallbox1.ascom-rd.com.
_sip._udp.ascom-rd.com. 86400 IN SRV 10 20 5060 smallbox2.ascom-rd.com.
_sip._udp.ascom-rd.com. 86400 IN SRV 20 50 5060 backupbox1.ascom-rd.com.
_sip._udp.ascom-rd.com. 86400 IN SRV 20 50 5060 backupbox2.ascom-rd.com.
```

The first three records with priority 10 are primary servers and the last two records with priority 20 are secondary servers.

For each client, a primary server is selected at random with the help of the weight values 60, 20 and 20. This will distribute all clients on the primary servers according to the weight values.

If a client's primary server goes down, the client will use the secondary server instead, i.e. **backupbox1.**ascom-**rd.com** and **backupbox2.**ascom-**rd.com.**

D.2.4 Load Balancing Using Dynamic Connection: Master Settings

1 Select DECT > Master.

2 In the drop-down list, select "SIP" protocol.

3 Enter the SIP server's domain address in the *Proxy* text field.

4 A local site proxy server (IP-PBX), e.g. SRST (Cisco), can be used to make emergency phone call in case that the WAN connection goes down, see D.2.2 *Local Site Redundancy* on page 150.
Enter the IP address or host name and optionally port of proxy (e.g. proxy2.ascom-rd.com:5060) to the local site proxy server in the Alt. Proxy text field.

5 Reset in order to make the changes take effect, see *4.27 Reset*.

6 Repeat step 1 to 5 for all exisiting Masters.

D.2.5 Load Balancing Using Dynamic Connection: DNS Server Settings

The example below shows the settings in Microsoft Windows Server where the DNS server is installed.

1 From a Microsoft Windows Server with the DNS server installed, open the DNS management tool.

2 Right click the domain (or subdomain) you are assigning this service to and select "Other New Records...".

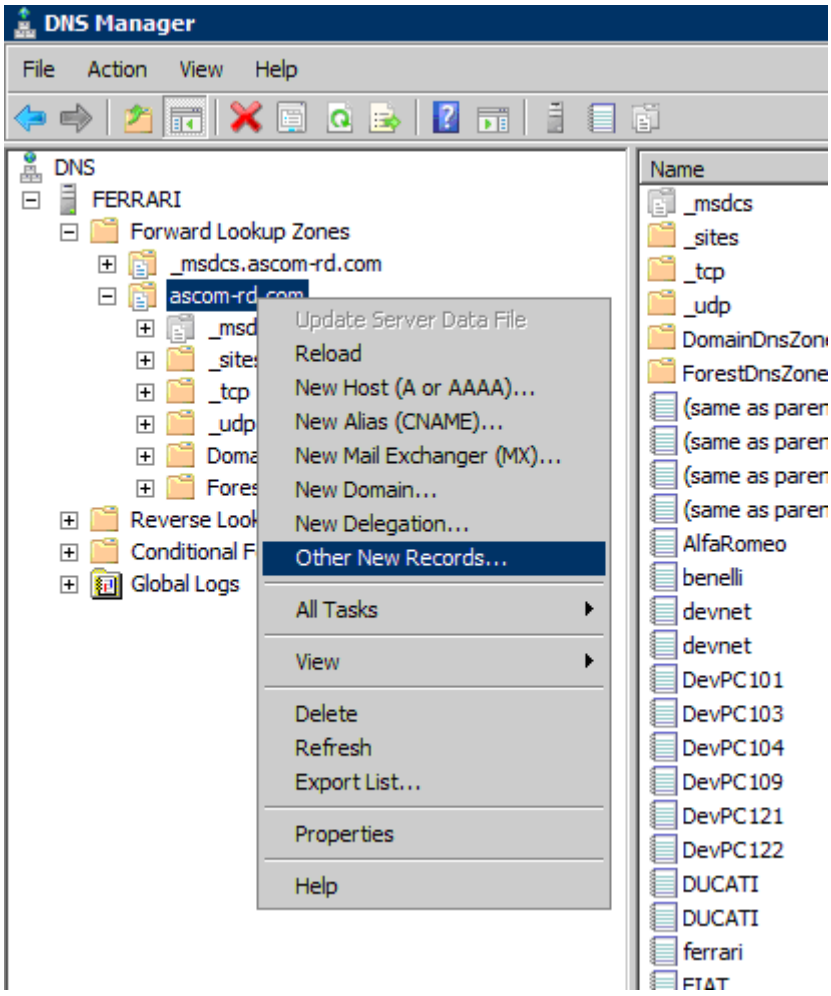


Figure 20. Select "Other New Records...".

3 Scroll down to Service Location (SRV) in the list.

4 In the "New Resource Record" window, see Figure 21, do as follows:

Enter "_sip" in the *Service* field.

Enter _udp in the *Protocol* field.

Assign a priority and weight. For information on how to set priority and weight, see D.2.3 *About SRV Records* on page 150.

Enter "5060" as the port number.

Enter the host name of your SIP server (IP-PBX). Note: The host name must be a fully qualified domain name (FQDN).

Click "OK".

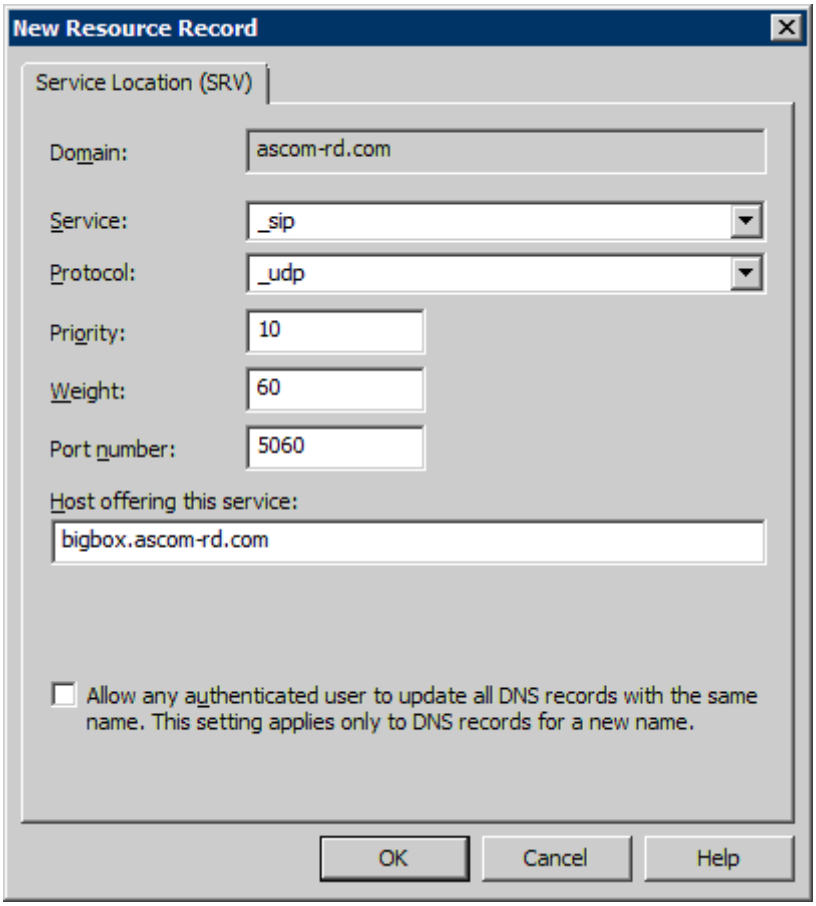


Figure 21. New resource record settings

5 You can view your new SRV record by clicking on the _udp item under your domain.

6 Right click the domain (or subdomain) where the new SRV record is located and select "New Host (A)...".

7 In the "New Host" window, see Figure 22, do as follows:

Enter in the *Name* field the host name of your SIP server (IP-PBX).

Verify that the fully qualified domain name (FQDN) is the correct one.

Enter the IP address of your SIP server.

Click "Add Host".

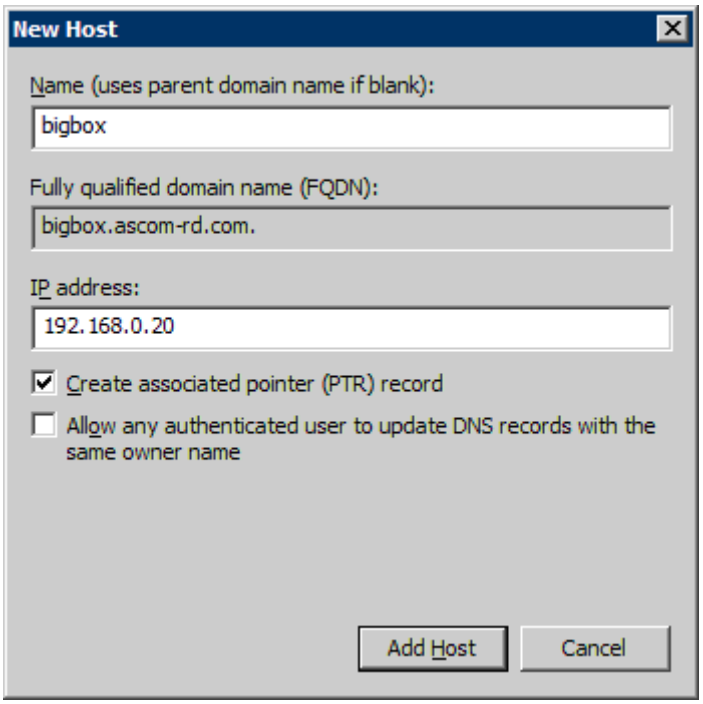


Figure 22. New host settings

8 Repeat step 1 to 7 for all exisiting IP-PBXs.

Appendix E: Update Script for Configuration of Kerberos Clients

The update script is as follows:

```
mod cmd UP1 check resetn serial002

config add NTP0 /addr 192.168.42.136

config write

config activate

vars create CMD0/KCMD p <join+realm="negrealm1"+user="neguser1"+
password="negpwd1"+force="true"+disable-local="true"+kerberos-rc4=
"true"><server+realm="negrealm1"+address="192.168.42.34"><server+
realm="negrealm2"+addres="192.168.42.99"/></join>
```

Description of the update script:

Command line 1: `mod cmd UP1 check resetn serial002`

By inserting this into the update script file the update server will check the variable ''check'' and if the value (serial002) is different from the value in the update server this script will be executed and the box will be rebooted afterwards.

Command line 2: `config add NTP0 /addr 192.168.42.136`

By inserting this into the update script the local Time server is configured with IP address to valid time server and active time can be retrieved. Correct time is very important in Kerberos for joining of realm and for login purpose.

Command line 3: `vars create CMD0/KCMD p ....`

The format of this line is very important. It is very important to only modify the data surrounded with double quote (''''). This script describes the mandatory data, the other data is set to default values. All parameters set by the Add-tab (see section 1) is possible to set with this script.

The XML format is as follows:

```
<join realm="..." host="..." user="..." password="..." disable-
local="..." force="..."><server realm="..." address="..." port="..."
secondary-address="..." secondary-port="..."/></join realm>
```

`realm`: The realm to join
`host`: The host name for the box (optional, otherwise the hardware id will be used)
`user`: Admin user name from the Kerberos server
`password`: Admin password from the Kerberos server
`disable-local`: the config flag will be set accordingly (true or false, optional, defaulting to false)
`force`: tells if an existing realm membership shall be discarded (true or false, optional, defaulting to false)
`server`: multiple servers may be given

In the above example two servers are configured one for the Kerberos server and one if using an Active Directory or Standby Kerberos server.

Appendix F: Install Certificate in the Web Browser

To access the GUI for an IPBS/IPBL using secure web access (https), the certificate for the IPBS/IPBL can be installed in the web browser to avoid getting certificate error messages.

To install the certificate, perform the following two steps:

Step 1. Create a certificate. See *F.1 Create a Certificate*.

Step 2. Install the certificate in the web browser. See *F.2 Install the Certificate*.

F.1 Create a Certificate

Note: Make sure the name you use to access the IPBS/IPBL is in the "Common Name" of the certificate (e.g. IP-address) or if the name is an FQDN, in the "DNS Name". The Web Browser will require a match when validating the certificate information.

Create a certificate by selecting one of the following two types of certificate handling options:

- Self-signed certificate
  This option is for customers not planning on having their certificates signed by public or private CAs. Self-signed certificates provide encryption but do in most cases not provide authentication. For more information see *Self-signed Certificates* on page 41.

- Certificates signed by a Certificate Authority (CA)
  Two options are possible:
  A Certificates signed by the customer's own CA. Customers possessing the knowledge and infrastructure to house their own CA could build an internal enterprise CA, enabling them to sign (approve) their own certificate requests. This would make the customer a private CA.
  B Certificates signed by a trusted public third party entity/organization. There are only about a dozen issuers who have the authority to sign certificates for servers worldwide. An example is VeriSign. To use a public CA for certificate approvals the IP-DECT system would in most cases need to be connected to the Internet and hold a fully qualified domain name. For more information see *Certificate Signing Request (CSR)* on page 42.

F.2 Install the Certificate

The instructions below apply for Internet Explorer version 8 and may differ for later versions.

Note: If your PC is running Windows Vista or later, select "run as administrator" for Internet Explorer.

1 Access the GUI for an IPBS/IPBL. A security warning window will appear when using secure web access (https) to access the GUI.

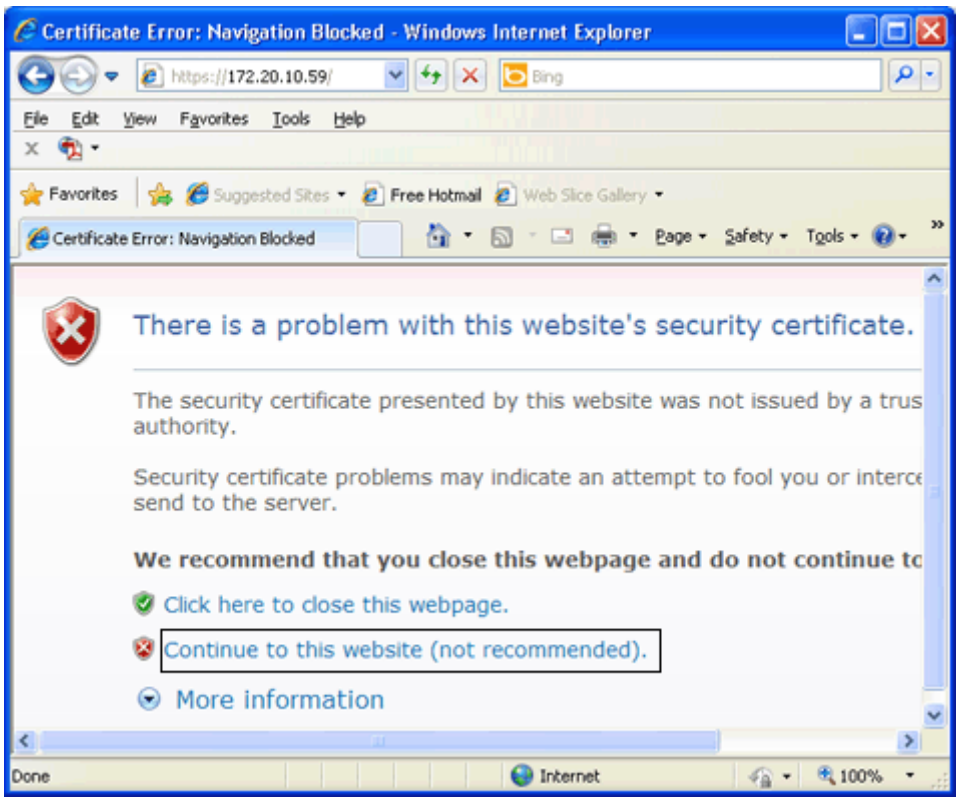


Figure 23. Security warning window.

2 In the security warning window, click on the text link "Continue to this website (not recommended)." The login window for the device will appear.

3 Click on the "Certificate Error" notification in the Security Status bar (next to the Internet Explorer Address bar), see Figure 24. The Security Report window will appear, see Figure 25.

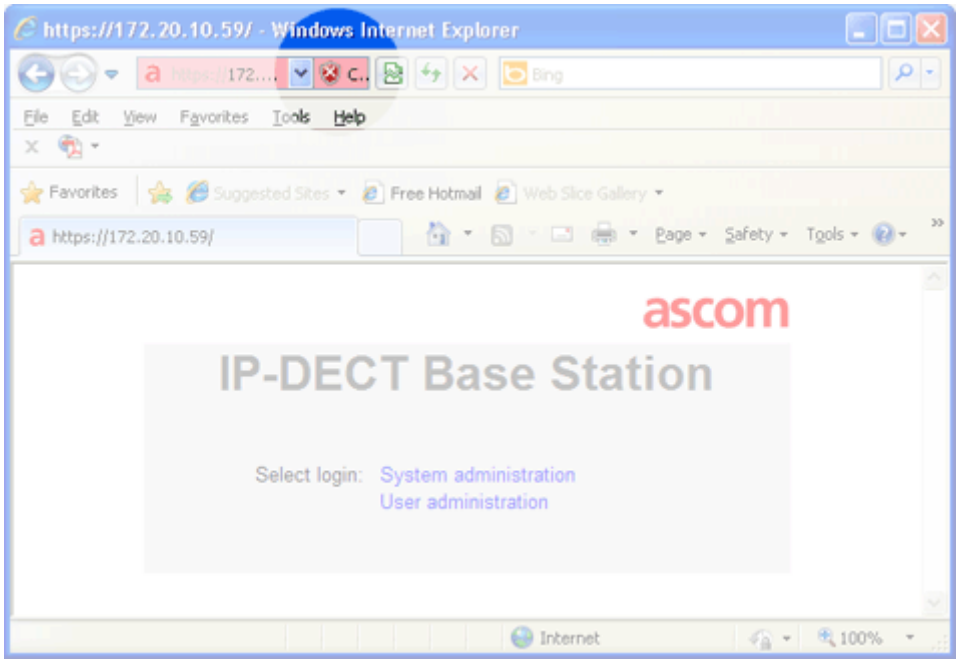


Figure 24. Sceen shot of the login window, with the "Security Status bar highlighted.

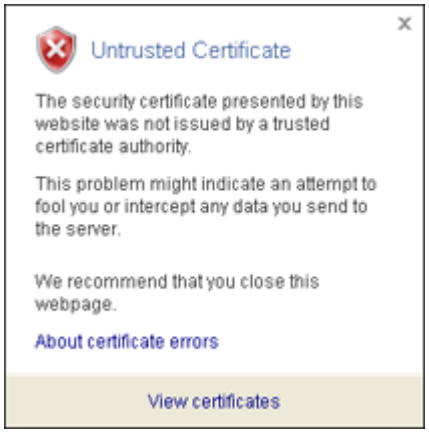


Figure 25. The Security Report window.

4 In the Security Report window, click on the blue text link "View certificates". The Certificate window will appear.

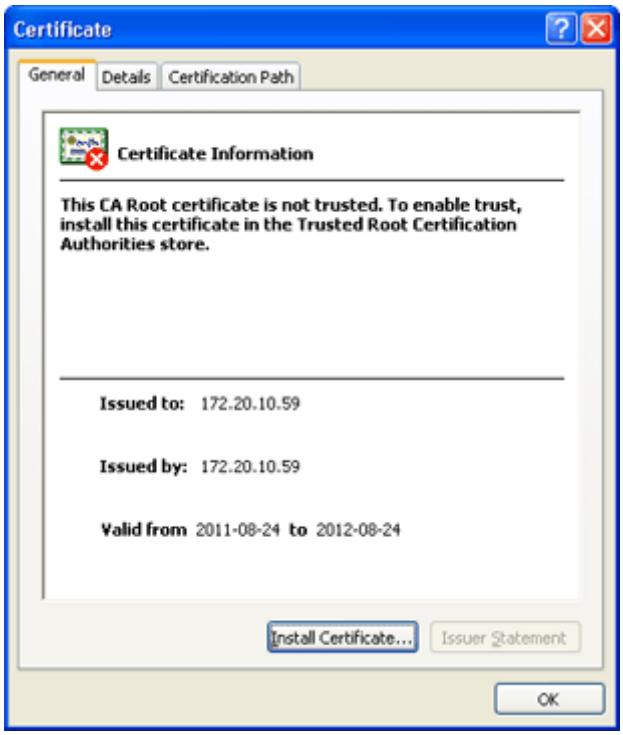


Figure 26. The Certificate window.

5 In the Certificate window, click on the button "Install Certificate...". The Certificate Import wizard is started.

6 Click on "Next".

7 Make sure that option "Automatically slelct the certificate store based on the type of certificate" is selected, see Figure 27. Click on "Next".

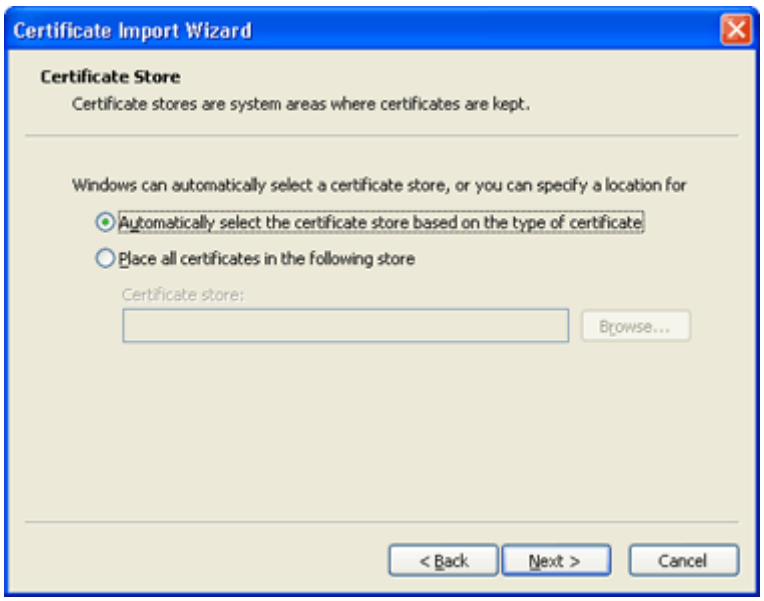


Figure 27. The Certificate Import wizard.

8 Click on "Finish" to complete the Certificate Import wizard. The Security Warning window will appear.

9 Click on "Yes" to install the certificate".

Appendix G: Used IP Ports

Port	TCP/UDP	Protocol	Comment
68	UDP	DHCP	
80	TCP	HTTP	Configurable
88	UDP	KERBEROS	
123	UDP	NTP	
161	UDP	SNMP	
389	TCP	LDAP	
636	TCP	LDAPS	
443	TCP	HTTPS	Configurable
464	UDP	KERBEROS	
1716-1717	TCP	H.323	Master
1718-1719	UDP	H.225	Master, Mobility Master, Radio
1718-1719	TCP	H.323	Radio
1722-1723	TCP	H.323	Master
1724-1727	TCP	H.323	Radio
1728-?	TCP	H.323	Radio (Multiple Master system), see system description for details
1814-1817	TCP	UNITE	Messaging
3217	UDP	UNITE	IP-DECT Device Management, Fault Reporting, Service Discovery
12346	TCP	UNITE	Portable Device Management
16384-32767	UDP	RTP	Media (port range is configurable)

Appendix H: Configure DHCP Options

IPBS/IPBL include a DHCP client which allows the IP interface to be configured from a DHCP server. In addition to that, IPBS/IPBL also allow configuring a number of settings via special DHCP vendor options.

H.1 System Requirements

To use vendor specific DHCP options, a DHCP server that supports such options is required. Most popular DHCP server implementations such as the Microsoft Windows DHCP service and the Linux dhcpd do so.

H.2 Configuration

For the DHCP server to support vendor specific options, the options must be made known to the server. Consult the accompanying documentation which comes with your DHCP server implementation how to do this.

H.3 Supported Options

Name	Data type	Array	Code	Meaning	How to code
H323 gatekeeper	IP address	Yes	200	Defines the IP address of both the primary and the alternate gatekeeper for the device. This is only required, if gatekeeper discovery is not feasible	This is an array of IP addresses. Put the primary gatekeepers IP into the first entry, the alternate gatekeepers IP into the second entry. Further entries are ignored.
H323 gatekeeper id	String	No	201	The gatekeeper id of the gatekeeper the device likes to register with. Usually required only if several gatekeepers are running and a particular one must be chosen during gatekeeper discovery	Type the gatekeeper id as configured in the gateway or PBX configuration into the string field.

POSIX TZ	String	No	202	Defines both the time zone and the daylight saving time information.	This option is in fact identical to the standard DHCP option number 88 (TZ). However, various DHCP servers do not support this option, so it is provided as a redundant vendor specific option. If your DHCP server supports option 88, the vendor specific option is not needed.
Default coder	String	No	203	Defines the preferred coders for H.245 coder negotiation, as well as the packet size when sending RTP packets and the use of CNG and VAD.	This string option must contain the value of the "/coder" option in the configuration file, e.g. **G729A,40,esx**. Additional options are: e - Exclusive, s - Silence Compression, x - Enable Secure RTP (SRTP), n - No DTMF Detection.
VLAN ID	Word (16bit)	No	206	The 802.1q VLAN ID for traffic sent and received by the device	Enter the numerical ID into the 16bit edit field
VLAN Priority	Byte (8bit)	No	207	The 802.1p VLAN priority for traffic sent by the device	Enter the numerical priority into the 8bit edit field
TOS Bits	String	No	208	The values for the IP TOS/DSCP field in the IP header of UDP-RTP and TCP-signalling packets sent by the device (Bit 0..2 'precedence', bit 3..6 'type of service')	Enter the comma separated numerical priorities into the string field. You may prefix with **0x** to specify hexadecimal numbers (or **0** to specify octal numbers). The default for RTP packets is 0xb8 (RFC 3246 - Expedited Forwarding), for signalling packets it is 0x68 (RFC 3246 - Assured Forwarding). 0xb8,0x68 for example defines the default values

Enbloc dialling	Byte (8bit)	No	209	The number of seconds dialled digits are kept in IP-DECT before they are sent en-bloc to the gatekeeper	Enter the number of seconds into the 8bit edit field. A value of **0** indicates that en-bloc dialling is turned off and digits are sent to the gatekeeper as they are dialled
Dialtone type	Byte (8bit)	No	210	The type of dialtone to generate locally	Enter the numeric dialtone type (**0** - EUROPE-PBX, **1** - EUROPE-PUBLIC, **2** - US, **3** - UK, **4** - ITALY-PUBLIC, **5** - CZECH-PBX, **6** - CZECH-PUBLIC, **7** - SWEDEN, **8** - FRANCE, **9** - SWISS, **10** - ITALY-PBX, **11** - BELGIUM, **12** - NETHERLANDS, **13** - NORWAY, **14** - DENMARK, **15** - GERMANY, **16** - SPAIN, **17** - FINLAND, **18** - AUSTRIA, **19** - IRELAND, **20** - AUSTRALIA, **21** - NEWZEALAND, **22** - MALAYSIA, **23** - TURKEY, **24** - RUSSIA, **25** - SOUTH AFRICA, **26** - BRAZIL)
Faststart	Byte (8bit)	No	211	Disable/Enable the H245 faststart procedure	To disable enter **0**, otherwise enter **1** into the 8bit edit field
H245-Tunnelling	Byte (8bit)	No	212	Disable/Enable H245 tunneling	To disable enter **0**, otherwise enter **1** into the 8bit edit field
Update URL	String	No	215	URL to retrieve update commands from. This is identical to the /url option parameter of the UP1 module	Complete URL as in **http://192.168.0.10/file.txt**. No symbolic host names are supported
Update Poll Interval	Word (16bit)	No	216	Standard poll interval in minutes. This is identical to the **/poll** option parameter of the UP1 module	Interval in minutes

H.4 Disabling the DHCP Client

In certain circumstances, it is convenient to partly disable the DHCP client. This way, the device still gets its IP address from the DHCP server, however, additional settings possibly

supplied by the DHCP server are ignored. This is especially useful if in a given setup, some devices are to be configured differently but the majority is still configured by DHCP.

This can be achieved using the following config file options:

config change UP1 /no-dhcp	The update server uses the config files configuration even though there is a configuration supplied from DHCP (innovaphone vendor options "Update URL [215]" and "Update Poll Interval [216]" are ignored).
config change DHCPn /no-vlan	The VLAN settings use the config files configuration even though there is a configuration supplied from DHCP (innovaphone vendor options "VLAN ID [206]" and "VLAN Priority [207]" are ignored).
config change DHCPn /no-vendor	All vendor options are ignored.

H.5 Known Problems with Lengthy Options

The minimum space available for options in a BOOTP/DHCP record is 312 byte. There are some extension mechanisms but only a few DHCP servers support it. The Windows 2000 DHCP server for example does not, but silently truncates options not fitting in this 312 byte space.

H.6 Known Problems with VLAN Configurations

The handling of the 802.1q VLAN ID is a bit tricky. If not hard configured otherwise, the device will request a DHCP lease using the Ethernet switch ports default VLAN ID (that is, it will not send any VLAN header). It will thus receive a DHCP offer dedicated to devices on that VLAN. If this offer includes a VLAN ID option, the device will not accept the offered lease, set the VLAN ID to the value received in the otherwise disregarded offer and start the DHCP process all over again. Now, the DHCP request will be issued on a new VLAN ID. Therefore, the DHCP server will now send an offer dedicated for devices on that new VLAN. This will most probably be a different DHCP scope.

As a consequence, DHCP options on a non-default VLAN must be configured twice. The VLAN ID option itself must be configured in the default VLANs DHCP scope. All other options must be configured in the new VLANs DHCP scope.

Be sure to configure the VLAN in both scopes identically. If not, the DHCP client process will never terminate, since it will always detect a changed VLAN ID, set the VLAN ID and restart the DHCP process.

Here is how DHCP leases are handled in detail:

First boot

The client will broadcast a DHCP DISCOVER, expecting an OFFER from the server including all requested parameters. If the client intends to use the offered lease, it will issue a request for the offered lease. Once it receives an ACK for the lease requested, it will configure itself accordingly. All lease information is stored in the devices config file using the /laddr option (unless suppressed using /no-keep).

Re-boot

If there is lease information (in the /laddr config file option), the client will broadcast requests for the same lease again. If there is no answer within 30 seconds, the device will configure itself using the parameters in /laddr. It will nevertheless continue to request this lease from the DHCP server again (every 30 seconds, a broadcast will be sent).

If the server acknowledges the old lease, the client will check for changes in the DHCP options and re-configure itself accordingly. Changed options will be saved in the config file.

If the server rejects the lease using a NAK, the client will forget about the lease and continue to operate like it does for the first boot.

First boot with VLAN ID option received

If an offered lease includes the VLAN-ID option and the ID proposed differs from the VLAN ID the devices currently operates with (that is, from the id configured in the devices configuration), the device will change its VLAN ID to the one received in the VLAN-ID option. It will not request the lease though. Instead, it will continue to send DISCOVER requests on the new VLAN ID. If a lease is obtained there, all lease information is stored in the config file as usual.

You can disable the VLAN-ID processing using the /no-vlan option.

Reboot with VLAN ID

If the device finds lease information in the config file at boot time and if there is a VLAN ID different from the devices current VLAN-ID, it will re-configure itself to the new VLAN ID and try to request the saved lease as usual. If the lease is rejected with a NAK by the server, the device will re-configure itself to the pre-configured VLAN ID and try to DISCOVER a new lease as usual.

H.7 VLAN set with LLDP

From version 7.1.X, VLAN is also set with LLDP if provided by the switch. See 4.2.5 *Configure VLAN* on page 45.

H.8 Changing Configuration Options set by DHCP Options

If a device has been configured by DHCP, those parameters cannot be changed. Any attempt to do so will issue a “Reset required” message.