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Installation and Operation Manual
IP-DECT Base Station

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1   Introduction

This section describes the IP-DECT Base Station (IPBS), it also briefly describes the IP-DECT system For a thorough description of the IP-DECT system, see IP-DECT System Description - TD92375.

1.1   IP-DECT System Overview

This section describes the IP-DECT system layout, it also describes the IPBS software components DECT Master and DECT Radio.

1.1.1   System Layout

All IPBSs are connected to the LAN but one dedicated IPBS, called the DECT Master, acts as a VoIP proxy. The DECT Master has support for standardized VoIP signalling such as H323, SIP, Skinny, and MGCP. The DECT master is the only IPBS communicating with the VoIP gatekeeper or the IP-PBX.

The other IPBSs in the system are DECT Radios, they are a software interface between DECT and VoIP signalling. It is a flat layout where all DECT Radios are logically communicating directly to the DECT Master, see figure 1 on page 4.
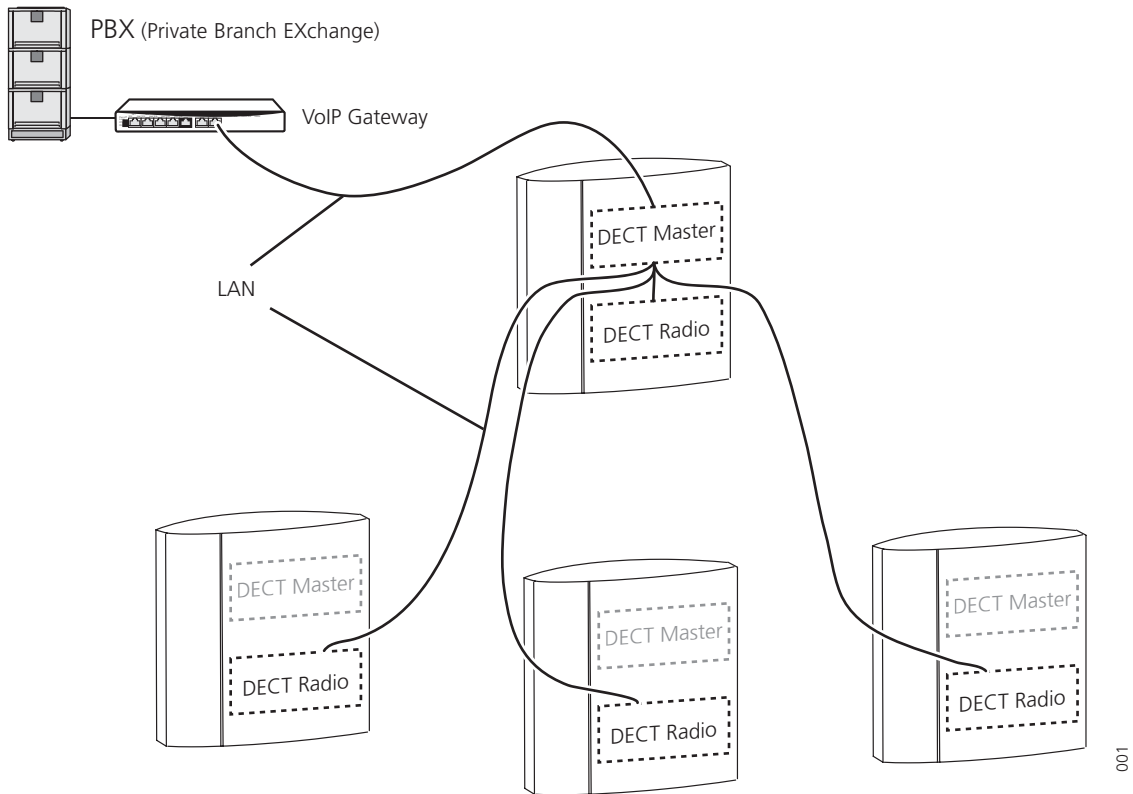
Figure 1. Logical connections of the software components DECT Master and DECT Radio.

DECT Master

The DECT Master is a software interface between the IP-DECT system and the VoIP gateway. The DECT Master is responsible for all or a subset of the DECT handsets in the system. When the DECT Master is notified that a handset is within the system coverage it

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makes a RAS registration to the IP-PBX. This RAS registration is maintained by the DECT Master until a notification that the handset has been detached is received.

The DECT Master knows which DECT Radio the handsets are located to, that is which DECT Radio in the system that received the latest location registration message from the handset. A call to a handset is directed only to the DECT Radio where the handset is located. Thus limiting the H323 and DECT load in the system.

DECT Radio

The DECT Radio is a software interface between DECT and H323. A DECT Radio always communicates with at least one DECT Master. All DECT Radios have a complete database for all DECT handsets that may be used in the system, that is the DECT Radios has access to the LDAP database.

1.1.2 Single Site Installation Example Layout

The layout in figure 2 can be used for customers with a single site installation.
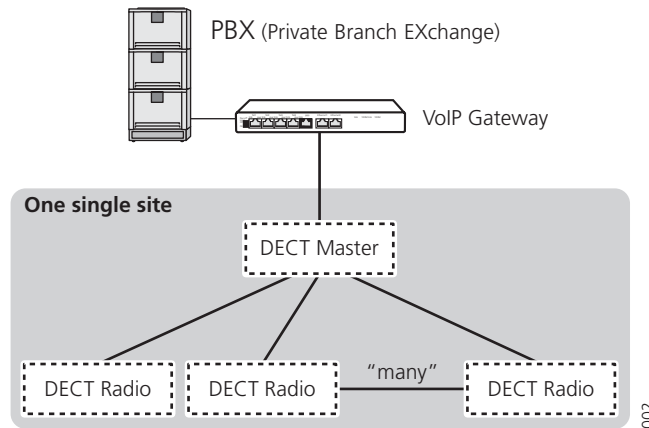
Figure 2. Single site layout with one IP-DECT Master

The lines displayed between the VoIP gateway, the IP-PBX, the DECT Master, and the DECT Radios are used to indicate the logical connection between the software modules.

Note: The figure shows the software components. An IPBS includes both the software components DECT Master and DECT Radio.

One IPBS must be assigned the role as master IPBS, this IPBS can also act as a DECT Radio, if so, the IPBS will have both an active DECT Radio as well as an active DECT Master software component. All other IPBS will only have the software component "DECT Radio" active.

1.1.3 Multiple Site Installation

The layout as in a single site can also be used for customers with an installation on several sites. The sites may have one or several IPBSs at each site. The IP-PBX and the DECT Master are centrally located (may be one of the sites).

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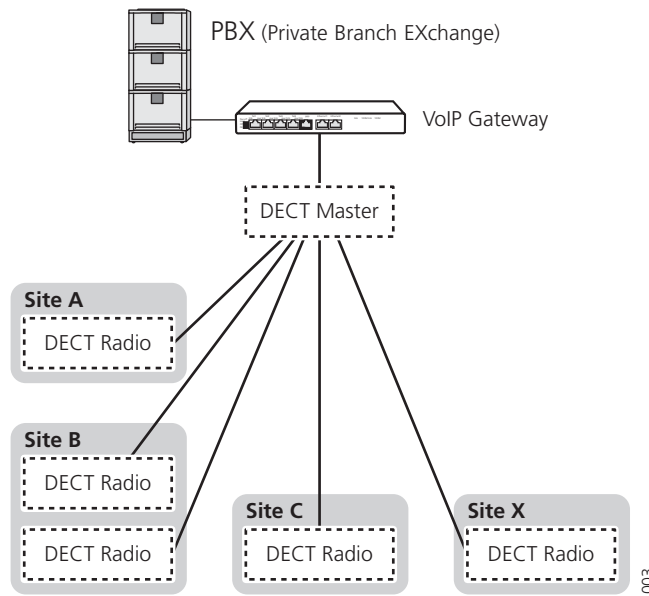
Figure 3. Multiple site layout with one IP-DECT Master

The lines displayed between the VoIP gateway, the IP-PBX, the DECT Master, and the DECT Radios are used to indicate the logical connection between the software modules.

Note: The figure shows the software components. An IPBS includes both the software components DECT Master and DECT Radio.

The handsets in the multiple site installation will be able to roam to a different site and it will be possible to receive incoming and make outgoing calls. It will also be possible to do external handover between DECT Radios if two sites have overlapping coverage.

1.2   IP-DECT Base Station Overview

1.2.1   Air Synchronisation

IP-DECT base stations are intended to use the existing DECT air interface to synchronize to each other. This makes it possible to fulfil the CAP standard and to use the existing portables.

One IPBS is configured as a synchronization master in the system. From this sync master all other IPBSs adjust there internal crystal oscillator to have the same frequency drift as the master. This does not mean all IPBSs need to be within coverage of the master base, a IPBS running in slave mode can synchronize to another IPBS in slave mode.

It is not needed to configure what IPBS to synchronize to. This is handled automatically by introducing a proprietary message sent from the IPBSs (called "air sync hop").

Since a single IPBS failure may spread to other IPBSs it is needed, for critical systems, to install the IPBSs to always be within sync coverage of at least two IPBSs.

It is also possible to configure one or several backup sync masters in case of failure of the sync master.

Speech radius: the radius of the circle (circular radiation patterns of the IPBS antennas are assumed), around a particular IPBS, in which portable parts can communicate with that IPBS.

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Sync radius: the radius of the circle, around a particular IPBS, in which other IPBSs lose synchronization with that IPBS with a given synchronization loss probability. This means that the size of the sync radius depends on requested probability of losing synchronization.

1.3 IP-DECT Base Station with Internal Antenna

1.3.1 General

Front viewBack view

LED2

LED1

Test
(RJ12)
LAN/PoE
(RJ45)
Power Supply
(RJ45)
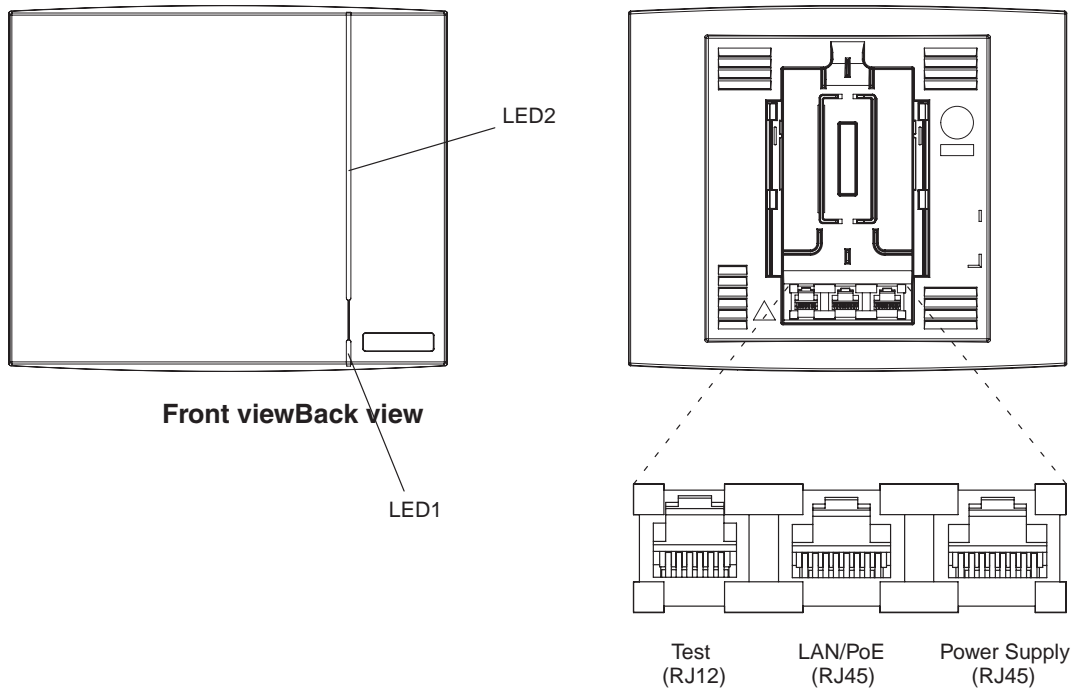
Figure 4. IPBS Overview

Versions

The following versions of the IPBS are available:

• Internal antenna
• External antennas

The IPBS can be set to operate in the following frequency bands:

• 1880 - 1900 MHz, EU
• 1910 - 1930 MHz, South America
• 1920 - 1930 MHz, North America

Contents of the Box

The box in which the IPBS is packed contains:

• An IPBS
• A mounting bracket
• Two screws with wall plugs

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Note: The brand label is not included in the box, and must be ordered separately.

Power Distribution

The IPBS can be powered using the following methods:

- Power over Ethernet, IEEE 802.3af
- A local AC-adapter

Note: For more information about power distribution, see 4.3 *Powering the IPBS* on page 32.

Software

The software in the IPBS can be updated by downloading new software to the IPBS. Downloading can be performed without disconnecting the IPBSs. The new software is stored in flash memory. For information on how to update the IPBS software, see 6.9 *Update* on page 55.

Connectors

- Two 8-pin RJ45 modular jacks for LAN/PoE and powering
- A 6-pin RJ12 modular jack for factory testing

LEDs

Status of LED1 - lower LED	Meaning
Green	Operational
Quick flashing amber	Download of firmware in progress.
Amber	TFTP mode
Alternating red/green	No Ethernet connection

Status of LED2 - upper LED	Meaning
Off	IPBS operational and **no** traffic Air synchronization OK
Fixed green	IPBS operational **and** traffic Air synchronization OK
Slow flashing green	Air synchronization OK and fully occupied with traffic
Flashing amber	Air synchronization inadequate and **no** traffic
Slow flashing amber	Air synchronization inadequate and fully occupied with traffic
Fixed amber	Air synchronization inadequate and traffic
Flashing red	No air synchronization - searching for air sync candidates
Quick flashing red	Download of RFP software in progress

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1.4 IP-DECT Base Station with External Antennas

1.4.1 General

The IPBS is available with two omni-directional external antennas. Other external antennas can be mounted as well. This section contains the differences between the IPBS with internal and external antennas. For all other information see 1.3 *IP-DECT Base Station with Internal Antenna* on page 7.

Content of the Box

The box in which the IPBS is packed contains:

- An IPBS
- Two antennas
- A mounting bracket
- Two screws with wall plugs

Note: The IPBS cannot be mounted with the antennas pointing downwards as the mounting bracket does not support it.

Insert the antennas into the IPBS before following the installation instructions in 4.2 *Installation* on page 26.

2 Safety and Regulations

2.1 Safety

2.1.1 Safety Rules

- Ensure that the voltage and frequency of the mains power socket matches the voltage and frequency inscribed on the equipment's electrical rating label.
- Never install telephone wiring during a thunderstorm.

Note: Avoid touching or punching down the IPBS signal and power pairs as there is 48Vdc or 24Vdc present on these wires at all times.

- Always install the IPBS conforming to relevant national installation rules.
- Disconnect all power sources before servicing the equipment.
- Do not use the telephone to report a gas leak in the vicinity of the leak.
- The power source must be short circuit protected (15 A maximum).
- Use only approved spare parts and accessories. The operation of non-approved parts cannot be guaranteed and may cause damage or danger.
- Service is to be performed by qualified personnel only.
- A readily accessible disconnect device, that is suitably approved and rated, shall be incorporated in the field wiring.
- Only approved power supplies according to valid editions of EN/IEC/CSA/UL/AU/NZS 60950 are to be used when the IPBSs are powered by local power supplies, see 4.3.4 *AC-adapter – BMLNB 101 09/n* on page 32.
- Torque power supply terminal block screws to 7 in. - lbs

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2.1.2 Safety Symbols

For protection and to avoid damage to the IP-DECT system you will find stickers where applicable. The stickers have the following symbols and meaning:

Caution
Read and follow the safety rules and warning messages in this manual.
If the instructions are not followed, there is risk of damage to the equipment.

Caution ESD
Read and follow the handling instructions described in chapter *2.2.2 ESD Handling* on page 10.
Boards which contain Electrostatic Sensitive Devices (ESD) are indicated by this sign.
If the instructions are not followed, there is risk of damage to the equipment.
For handling these boards see *2.2 Protection Against Electrostatic Discharge (ESD)* on page 10.

Warning
Read and follow the safety rules and warning messages in this manual.
Hazardous voltages are present.
If the instructions are not followed, there is risk of electrical shock and danger to personal health.

2.2 Protection Against Electrostatic Discharge (ESD)

2.2.1 General

Integrated circuits are sensitive to ESD.

To avoid damage caused by ESD, service engineers and other people must handle equipment and boards carefully.

Electronic equipment has become more resistive to ESD, but we see an increase of situations where static electricity can build up. This is caused by an increasing application of man–made fibres like nylon, acrylic, etc. which are capable of generating ESD of 10,000 Volts and more.

Walking across a nylon carpet, even for a few feet, could cause a person to be charged–up to more than 10,000 Volts.
Under these conditions, if a system board or a (C)MOS device is touched it could easily be damaged. Although the device may not be totally defective, it is often degraded, causing it to fail at a later date without apparent reason.

To make sure that equipment and parts are well protected during shipment, special packaging materials are utilized. System boards will be shipped in anti–static bags and (C)MOS devices and other sensitive parts in small shielded boxes.

2.2.2 ESD Handling

In the interest of quality and reliability, it is advisable to observe the following rules when handling system parts:

• Keep parts in their protective packaging until they are needed.

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- When returning system parts like EEPROMS to the factory, use the protective packaging as described.
- Never underestimate the damaging power ESD can have and be especially careful when temperatures are below freezing point and during very warm weather in combination with low humidity. Make sure that the environmental conditions remain within the limits specified in the components' data sheets.

IMPORTANT NOTE

In the interest of quality and reliability system boards and other parts returned for exchange or credit may be refused if the proper protective packaging is omitted!

2.3 Safety Aspects of the IP-DECT System

The IP-DECT system meets the valid editions of safety standard EN/IEC/CSA/UL/AU/NZS 60950. The system is a class III equipment for stationary wall mounting.

The safety status of the different interconnection points of the system is as follows:

- RS232A, RS232B port: SELV circuits[1] (test port)
- IPBS connections: TNV circuits[2]
- LAN/PoE: TNV circuits[2]
- Power Supply: SELV circuits[1]

2.4 Standards and Regulations for US

2.4.1 Standards and Regulations

The IP-DECT System adheres to the following standards and regulations:

- FCC Part 15
- IEC 60950-1

2.4.2 Radio Equipment

- FCC Part 15, Subpart B - "Unintentional Radiators"
- FCC Part 15, Subpart D - "FCC Rules for Radio Frequency Devices"
- FCC/DET, Bulletin 63, Supplement C (2001) and IEEE St., IS28-2003 - "Safety Levels with Respect to Human Exposure to Radio Frequency

2.4.3 Fixed Position System Equipment: Power Adapters

- FCC Part 15 - "FCC Rules for Radio Frequency Devices."

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1. Operating within the limits of SELV circuits.
2. Operating within the limits of TNV circuits.

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2.4.4   Regulatory Compliance Statements

FCC CLASS B NOTICE

This equipment complies with part 15 of the FCC rules. Operation is subject to the following conditions: 1) This equipment may not cause harmful interference, and 2) This equipment must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the
limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. this equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installtion. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

• Reorient or relocate the receiving antenna
• Increase the separation between the equipment and the receiver.
• Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
• Consult the dealer or an experienced radio/tv technician for help.

MODIFICATIONS: Any modifications not expressly approved by Ascom could void the user's authority to operate the equipment.

The term "IC:" before the radio certification number only signifies that industry of canada technical specification were met.

EXPOSURE TO RADIO FREQUENCY SIGNALS

This device complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. The antenna used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

2.5   CE-marking

2.5.1   General

The IP-DECT Base Station is CE-marked.

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Products marked with the label $C \epsilon$ comply with the following European Council Directives:

- 99/5/EEC, concerning Radio- and Telecommunications Terminal Equipment (RTTE)
- 73/23/EEC, concerning Low Voltage Directive (LVD)
- 89/336/EEC, concerning Electromagnetic Compatibility Directive (EMC)

Declarations of Conformity of the products are available at the webpage: www.ascom.com/ws/solutions_ws/products_ws.htm

3   Base Station Planning

The major task in installing an IP-DECT system is defining the number of base stations required to cover an area to a satisfactory level. This chapter describes how a base station planning can be made in order to gain full area coverage.

Small sites usually have a homogeneous layout, it is therefore easy to predict the field pattern of the IPBSs which makes the planning relatively easy. The larger the site, the more complex the site survey becomes. Since a larger site often is less homogenous the base station placing will be more difficult. Generally the client has particular requirements which have to be considered, these requirements can be coverage in a lift, underground car park, conference rooms, outdoors and so on.

Base station planning is not difficult, on the contrary, but size, architecture and structure of buildings all have influence on the field pattern which cannot be foreseen. The quickest and simplest way is therefore measuring. During a site survey, an average cell size can be determined, with help of a site survey tool. The average cell size is the foundation of a base station planning.

The steps in base station planning are as follows:

1   Find out the client specific requirements, see 3.1 *Client's Requirements* on page 13.

2   Determine the average cell size using the site survey tool, see 3.3 *Determine the Average Cell Size* on page 19.

3   Decide base station positions, see 3.5 *Location of the Base Stations* on page 22.

4   Make a base station plan, see 3.7 *Making a Base Station Plan* on page 25.

5   Perform a measurement using the site survey tool to confirm that speech and air sync coverage is as expected.

3.1   Client's Requirements

The most important thing when planning an IP-DECT system in that the system meets the needs and requirements of the customer. Discuss with the customer where high quality is of absolute necessity and whether there are areas where it is sufficient for people to be available but with lower sound quality, for example outdoors or in a production hall.

Also discuss whether special areas such as lifts, stairwells, basements, indoor car parks, toilets, maintenance shafts, and so on should be covered.

In some areas and departments, for example: sales, purchase, technical support departments, canteens, a higher traffic capacity is needed. Consequentially these areas requires additional base stations, see 3.4 *Traffic capacity of the system* on page 20 for information how to calculate traffic capacity. Discuss with the customer where a higher traffic capacity is needed.

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3.2 IP-DECT Base Station Coverage

This section describes the coverage of the IPBS. It also describes how architecture, building elements, and special areas affect the coverage and the placing of the IPBSs.

The radio environment or the cell that is covered by a base station is not of a spherical shape as often suggested in figures. If a snapshot could be taken of its form, it would become clear that its shape is much more irregular. The momentary size and shape are dependant on the material of which walls and floors are made, the position and material of furniture, machines, air-conditioning and the position of the base station in such an environment. Because of these unpredictable conditions it is not possible to give any hard rules on calculating the number of base stations in a given situation.

- The in-house cell size in offices can have a radius of between 10 and 30 meters, see figure 5 on page 14. The cell size in exhibition or production halls can have a radius of up to 200 metres.
- The free space (outdoors) cell radius can be up to 300 metres.
- Base stations may partially cover the floors immediately above and below. The useful range through floors and ceiling varies between 0 and 8 m (2 floors) radius; see figure 5 on page 14.

3.2.1 Architecture

This section describes how the architecture of the building can affect the IPBS coverage.

- Central areas giving access to stairs and lifts may require extra base stations due to heavier constructions.
- Coverage in lifts may require base stations closer to or in the lift shaft.
- Corners and irregularities in the construction such as partial renovation, extensions of older buildings, and so on have influence.
- Concentration of air-conditioning ducts or other technical installations may influence the field pattern and thus the coverage.
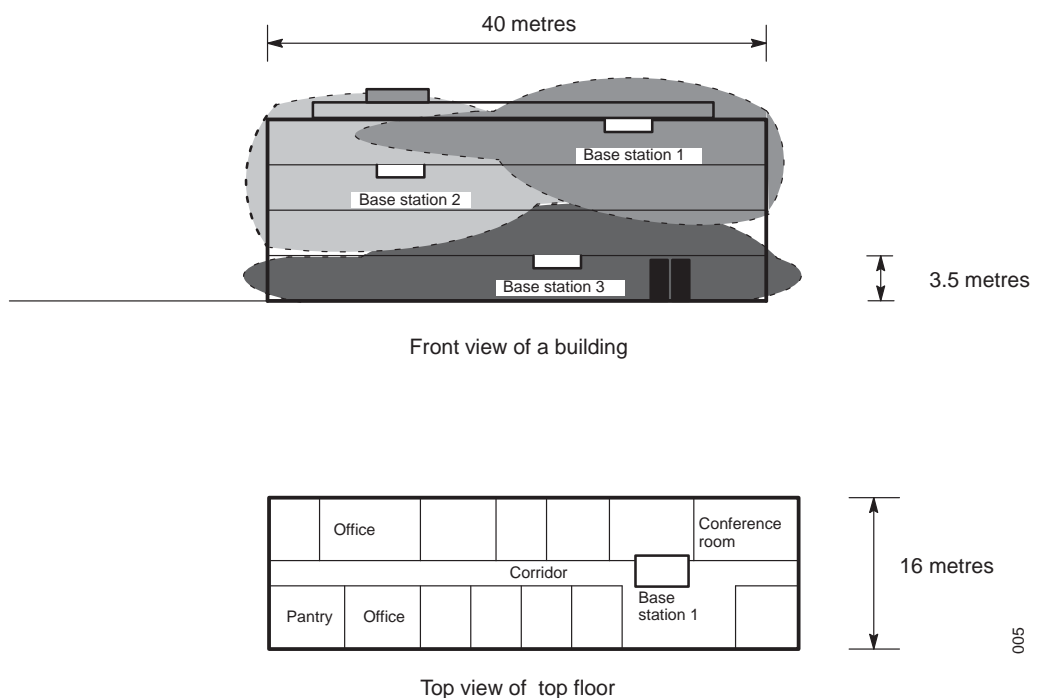
Figure 5. Example of the locations of base stations in a building.

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3.2.2 Building Elements

This section describes how different building elements can affect the IPBS coverage.

- The cell size is dependant on the material of which walls, ceilings and floors are made.
- Plain, light or reinforced concrete, wood and plaster absorb and pass radio waves in different ways.
- Metal walls and large metal cabinet rows reflect all signals, resulting in a greatly reduced coverage in areas behind these objects.
- X-ray rooms in hospitals protected by lead walls and computer rooms in banking buildings protected against unwanted interference do not allow radio signals to enter.
- Exhibition halls or production halls may give reflections due to large metal structures. This causes interference which reduces the capacity and coverage range of the base station.

Walls

Walls, ceilings and floors have large impact of the IPBS coverage range, different types of walls have different impact on the signal range. For list of the commonest types and the approximate range achieved through these materials, see the table below.

Type	Examples	Range in meters
Stud wall	Plaster	30-60
Concrete		10-30
Reinforced concrete	Fire wall	0-10
Stone/brick		30-50
Metal	A panel on brickwork.	0-10
Wood		30-60
Wired glass	Fire protection.	0-10
Surface coated float glass	Only of importance for coverage outside if the base station is installed inside.	30-50
None	Open-plan office or outdoors.	150-300

Note: The values in this table are estimated values. Furniture (cupboards etc.), and the amount of movement in the area to be covered, for example, cranes in a production hall (see also 3.2.4 *Metal Halls* on page 17) are further factors that affect the coverage range.

Ceilings and Floors

The difference between ceilings and floors compared to walls lies in the materials used. Concrete and reinforced concrete are the main materials and it is important to determine the level of coverage of a base station on the floor above and below. For 'normal' concrete this coverage extends to a radius of approximately 15-20 metres which provides coverage for the floors below and above. An open stairwell or an atrium can in some cases be used to provide coverage to two floors at the same time, see figure 6.

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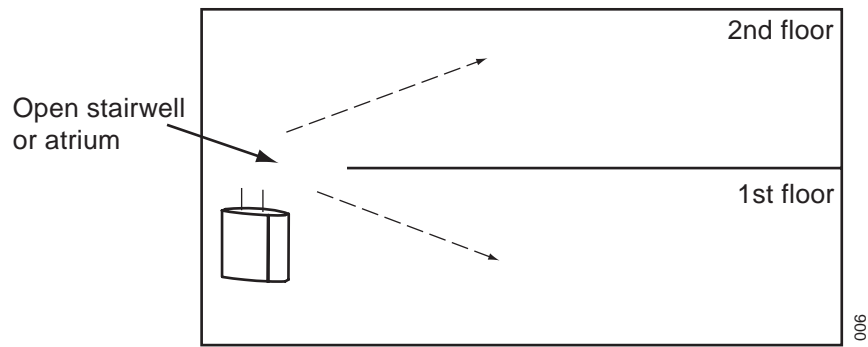
Figure 6. Base station covering two floors

Fire-resistant walls/doors

The same facts applies for fire walls as for normal walls mentioned in the section above. However, fire doors are usually open during the site survey, it is important to close the fire doors before doing the final site survey measurement and before finalising the IPBS plan. Should a fire break out and the doors then be closed, there must of course still be sufficient coverage.

3.2.3   Special Areas

This section describes a number of special areas which must be considered when doing a base station planning, and how to ensure full DECT coverage in these areas.

Outdoors/car park

Coverage outdoors is usually not a problem since there are few or no obstacles. The IPBS location depends on the client and on the size of the area to be covered. If the client wishes to have as few base stations as possible installed outside (because of the costs of the outdoor housing), it is possible install one or more base stations with the antennas in front of a window.

The base station must be able to 'see' as much as possible of the outdoor area to be covered (that is, there must be as few obstacles as possible between the base station and the covered area). Ensure that a measurement is carried out in order to check how much coverage a base station provides to the outdoor area, the intention is not to install all the base stations in front of windows, since this is not the ideally position to provide indoor coverage (normally 1-2 base stations are sufficient).

Type of glass	Range in meters
Normal glass	150-300
Surface coated float glass	30-50
Wired glass (fine-mesh)	0-20

Lift

If coverage in lifts are desired, locate the base station close to the lift, preferably at the front in a way that the base station can 'see' the front[1]. This is because a lift is usually surrounded on three sides by a reinforced lift shaft, with the only opening being at the

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front. Locating a base station in front of a lift is usually not the most ideal position for the planning as a whole. It is usually the case that one or more extra base stations will be required to provide coverage for a lift. The base station will generally also provide coverage for the storey above and below the floor on which it is installed.

Stairwell

The major problem with stairwells is that they are often sited in a corner of the building. Coverage is not a problem in itself, but it must be seen in the context of the overall planning. There are various ways of providing coverage for a stairwell. Either the IPBS is installed directly in the stairwell as a dedicated base station for the stairwell, or it is installed in the close vicinity of a stairwell. The method depends on the type and location of the stairwell (is it an open or closed stairwell; is it sited in a corner of the building or in the centre and so on).

Toilet Rooms

Toilets rooms are generally in awkward positions for a site survey: behind or next to lifts, in or next to stairwells or in a corner of the building. A base station installation in the toilet room itself can be considered. If the IPBS is placed outside the toilet room it should be placed in the vicinity of the toilet room in a location where the base station can 'see' as much as possible of the toilet room (preferably the entrance because doors are generally made of wood and these damp the signal less than the walls).

If the base station is placed in the vicinity of the toilet room, locate it in a way that it provides coverage for as much of the rest of the floor as possible.

Maintenance Shaft

In larger buildings there is usually the requirement that coverage also be provided in maintenance rooms. The most common are the rooms for the lift and ventilation system. The lift maintenance room is often on the roof or in the basement. The ventilation maintenance room is usually on the roof. Do not omit these rooms they should be discussed with the client to avoid the client being faced with surprises. A well-positioned base station on the top floor (20 to 30 metres at most from the room where coverage is required) usually provides sufficient coverage for the maintenance rooms on the roof.

Basement and Indoor Car Park

It can be difficult to provide sufficient coverage in basements and indoor car parks due to the usually heavy constructions.

3.2.4 Metal Halls

When providing coverage in a metal hall (for example, a production hall or storage building), there are a number of issues which call for additional attention. The dimensions of the hall and the material used (metal, concrete, brick etc.) are important deciding factors in the hall's radio reception. Every hall is different, and it is very difficult to predict the radio reception. Check carefully, therefore, whether the walls are made of metal, what the hall's dimensions are, whether the roof is reflective, what is contained in the hall, and whether objects in the hall are stationary or constantly moving.

In the case of poor speech quality in a metal hall, this can be attributed to time delay spread and/or the actuation of the soft suppressor. Both are explained in greater detail below.

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1.   'see': there are as few obstacles as possible such as walls etc. between the base station and the lift.

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Time Delay Spread

Time delay spread can be compared with dispersion in cables and fibres. This means that the radio signal can travel by various paths to reach the user because the signal can reach the user directly but also via reflections. These possibilities are illustrated in the figure below.
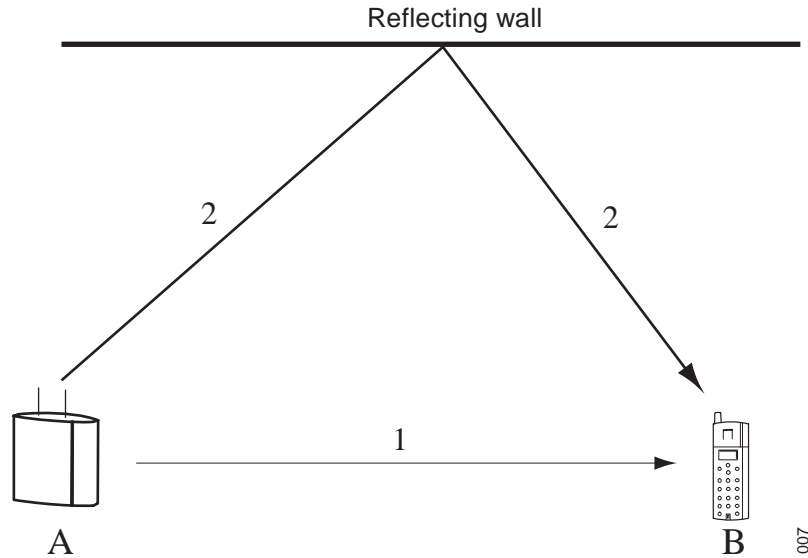
Figure 7. Time delay spread

The base station at corner A reaches the cordless phone at corner B by means of a direct signal (signal 1) and by means of a reflected indirect signal (signal 2). Generally there are many reflected signals reaching the cordless phone. In general the paths travelled by these signals are not equal which means in turn that they will arrive at the cordless phone at different times.

A DECT signal consists of frames of 420 bits transmitted every 10 ms. The bit length for DECT is 0.868 µs. Mutes[1] and clicks on the line will occur if the time difference between the various received signals is of the order of 1 bit length. If this occurs, the receiver has difficulty in distinguishing between the different transmitted bits. Therefore, the base stations in a metal hall must be sited in a way that the time delay spread is minimized. This means in turn that you must locate the base stations such that the number of reflections is minimized.

Locations for Base Stations in Metal Halls

Apart from the time delay spread there are a number of general rules to consider when placing a base station:

- Install a base station in line of sight[2].
- It is possible to increase the number of base stations at those locations that are important to the client, but the speech quality can deteriorate in other places in the hall because the cordless phone has to carry out more handovers.
- Place the base station at a minimum height of 3 metres as otherwise it is highly possible that something will be placed in front of the base station, and this prevents the materials and machines in the hall reflecting the signal.

1.Interruptions in your conversation
2.The base station 'sees' the user

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- Ensure that the distance between the base station antennas and a metal wall is at least 30 centimetres to avoid interference with the impedance of the antennas.

All these considerations, of course, depend on the dimensions of the hall and the type of antenna which you are using.

3.3 Determine the Average Cell Size

To satisfy coverage and traffic demands, the site must be surveyed in order to determine the number and position of base stations. To do a site survey, a site survey tool and ground plans of the floors are required. Samples must be taken to determine an average cell size. With the average cell size, base station positions can be indicated on the map, together with the area covered by each base station. After this, the planned positions can be verified with the site survey tool and with help of the traffic requirements a final plan can be made.

Note: Since coverage for air sync and speech differs, two average cell sizes need to be determined, one for the speech coverage and one for the air sync coverage.

For information on how to use the site survey tool, see *'DCT1800 Site Survey Tool User's Guide'*. The principle of a site survey is as follows:

Observe the Building to Find a Typical Area

Modern buildings usually have standard constructions. In older buildings, due to renovations or expansions, areas with different structures may exist. However, inside these areas a uniformity in structure can be found again.

Find an area with a typical structure for the building and of about the expected cell size. This area will be used to determine the typical cell size. When having a building with different structures, do so for each of those areas, so that differences in 'typical cell size' can be detected.

Measure the horizontal cell size on the middle floor, see (1) in figure 8

The cell size can be determined as follows:

1. Install the site survey base station in the middle of the 'typical area'.

2. Walk away from the base station with the cordless phone. Also enter rooms to the left and right.

3. Determine the edge of the cell by means of the limit warning or by looking to the LinkInfo display and listening to the sound quality (see the *'DCT1800 Site Survey Tool User's Guide'*).

4. Do the same in the opposite direction.

5. This is the horizontal coverage on the floor of the base station.

Measure horizontal range on floor above, see (2) in figure 8

Go to the floor above, leaving the base station on its current location and measure the horizontal coverage here.

Measure Horizontal Range on floor below, see (3) in figure 8

Go to the floor below, leaving the base station on its current location and measure the horizontal coverage again.

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Note: If the building is transparent to radio signals, the vertical coverage can reach to yet another floor above and below.

In this way the horizontal and vertical coverage of a single base station in a typical area is found, see figure 8. The cell size found can be taken as an average, used to calculate the total number of base stations. Depending on the size of the building and the type of construction, one or two more 'random checks' in typical areas can be done to verify the first measurement. The typical cell size is determined by averaging the values.
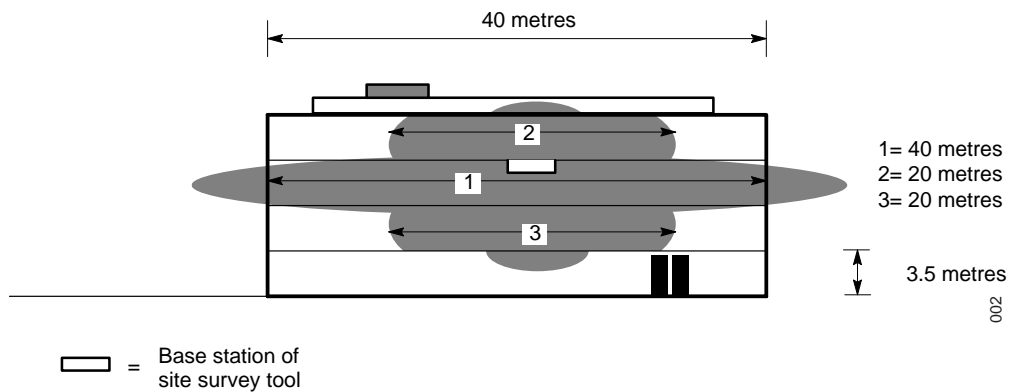
Figure 8. Measurement of typical cell size

3.4 Traffic capacity of the system

The traffic capacity of the IP-DECT system is mainly determined by the number of IPBSs and in exceptional cases also by the LAN bandwidth. A single base station has a capacity of 8 simultaneous calls.

The traffic capacity of the IP-DECT system is determined by:

• Grade Of Service (GOS) accepted by the customer.
• Number of speech circuits available - 8 per IPBS.

The grade of service is the probability that a call cannot be made because of congestion in the system. The customer has to indicate which grade of service is acceptable. A grade of service of 1%, or 0.01, means an average of 1 lost call in every 100 calls.

The two parameters mentioned above (GOS and number of speech circuits) and the total amount of traffic (erlang) that is required, are related to each other. The table below shows an excerpt of these relations. Practically, this table is used to calculate from a given GOS and erlang value the number of IPBSs needed. The erlang value is the total traffic generated by all cordless phone users.

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Number of IPBSs	Speech circuits	Grade Of Service (GOS)			
		2%	1%	0.5%	0.1%
1	8	3.6	3.2	2.7	2.1
2	16	9.8	8.9	8.1	6.7
3	24	16.6	15.3	14.2	12.2
4	32	23.8	22.1	20.6	18.2
5	40	31.0	29.0	27.3	24.5
6	48	38.4	36.1	34.2	30.9
7	56	45.9	43.3	41.2	37.5
8	60	49.7	46.9	44.8	40.8

The table below shows what erlang values practically mean in call-minutes for a cordless phone

mE	Minutes per hour	mE	Minutes per hour
50	3	250	15
100	6	300	18
150	9	500	30
200	12	750	45

Example:

A customer ordering a system with 55 cordless phones, generating 200 mE each in average, requires a system with a traffic capacity of 11 E. With an accepted GOS of 0.5% the number of IPBSs is found as follows:
The total traffic is 11 E. In the column of 0.5% GOS, the next higher value of 11 E is 14.2 E, resulting in 3 IPBSs.
So, the system shall be equipped with 3 IPBSs, offering the client 14.4 E instead of 11. This means that the system has an over-capacity 3.2 E, which allows expansion of the system with 16 cordless phones without reducing the grade of service or the need of more IPBSs.

According to the table above, 60 circuits with an accepted GOS of 0.5% result in a maximum traffic capacity of the system of 44.8 E. When each cordless phone generates 150 mE in average, the system has a capacity of serving approximately 300 cordless phones.

3.4.1 Traffic capacity of the base stations

The total traffic that is being generated by all cordless phones of the systems should be in accordance with the capacity of the cordless network as well. A base station, having 8 channels available, has an erlang value of 2.7 with a GOS of 0.5%. This value can be read from the table above. This means that each base station can serve 18 cordless phones, assuming that cordless phones generate 150 mE each during busy hour, (13.5 cordless phones if 200 mE each).

Example:

Suppose that in the building of the customer in the example in *3.4 Traffic capacity of the system*, full coverage can be achieved by 4 base stations. This means that all cordless phones generate together 55 x 0.200 = 11 E, while the base stations traffic capacity is

PRELIMINARY

only 4 x 2.7 = 10.8 erlang. This is too little. This discrepancy can be solved by adding another base station nearby the busiest part of the company.

Practically, the total capacity offered by the cordless network is generally more than sufficient, but this is from an average point of view. On certain places, traffic demands may vary such that locally the network is often blocking, or has a lower GOS than required. For instance a purchase department may easily generate 300 mE per cordless phone during busy hour, thus, when e.g. with 6 persons giving a very high load on the base station close by. It may be necessary to add a base station in this area to have enough capacity for others to call as well. Also think of e.g. canteens during lunch time etc.

3.5   Location of the Base Stations

Once the surroundings are analysed and the average cell size is determined an exact position for each IPBS must be decided. The most important thing when deciding the location of the IPBSs is to ensure sufficient coverage and traffic capacity as mentioned in section 3.2 *IP-DECT Base Station Coverage* on page 14.

Deciding factors when determine the IPBSs location are as follows:

- Client's requirements, see *3.1 Client's Requirements*.
- Coverage and traffic capacity, see *3.2 IP-DECT Base Station Coverage*.
- Air sync coverage, see *3.5.1 Air Sync Coverage*.
- LAN Access, see *3.5.2 LAN Access*.
- Powering of the IPBS, see *3.5.3 Powering the IPBSs*.
- Different types of antennas, see *3.5.4 Antennas*.

3.5.1   Air Sync Coverage

Each IPBS must be placed within the air sync coverage of at least one other IPBS. Since the air sync cover radius is somewhat larger than the speech radius it is often enough to consider the speech coverage when placing the IPBSs, see figure 9. Always ensure that all IPBS are able to synchronize with, preferably two, but at least one other IPBS.

PRELIMINARY
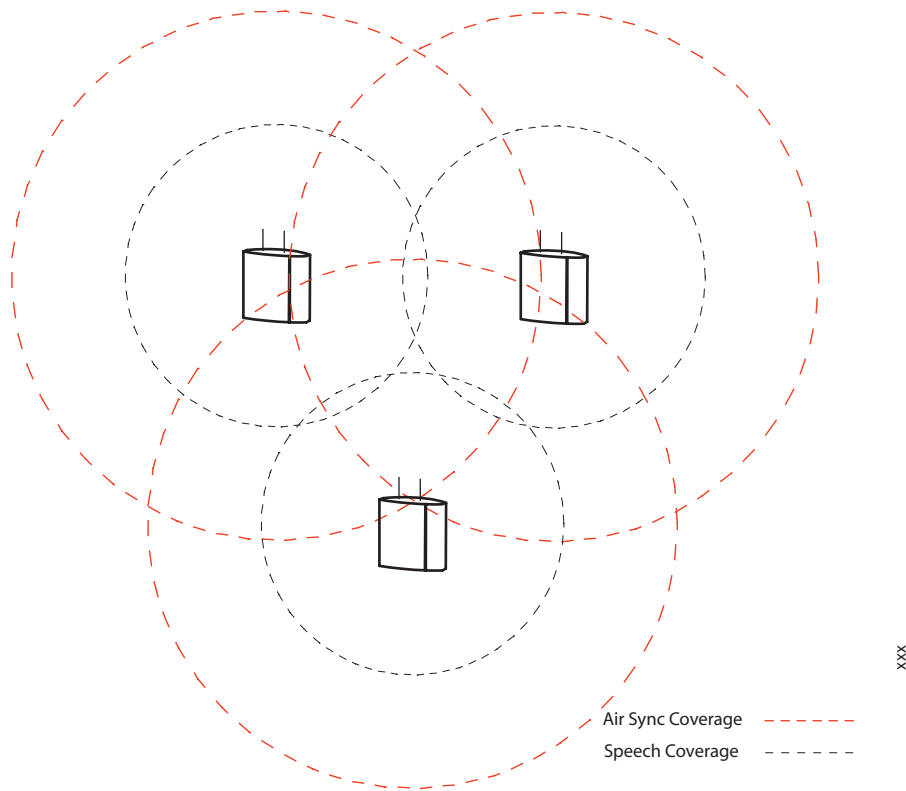
Figure 9. Air and speech sync coverage

3.5.2   LAN Access

Access to the LAN must be considered when placing the IPBSs, it should be placed as close as possible to existing LAN ports. The segment length limitation of the ethernet 802.3 10/100base-T is 100 meters.

3.5.3   Powering the IPBSs

Another aspect of base station planning is powering of the base stations. The various ways of powering and the requirements on the power supply are described in section *4.3 Powering the IPBS*.

If the IPBS is to be powered by a local AC-adapter the IPBS must be placed within 8 meters from a AC power outlet. The ethernet cable cannot exceed 100 meters when using power over ethernet.

3.5.4   Antennas

This section describes the behaviour of the different types of antennas.

Internal and External Antennas

In an environment with much reflections (such as most office environments) there will not be much difference in coverage of the internal and external antennas. Some areas that are covered by the internal antennas will not be covered by the external and vice versa.In an environment with low reflections the somewhat directional behaviour (forward bias) of the internal antennas will be noticeable, see figure 10. It may be worth trying to place base stations in the upright position in order to get more vertical coverage in for example stair wells.

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Base Station Seen from Above

002
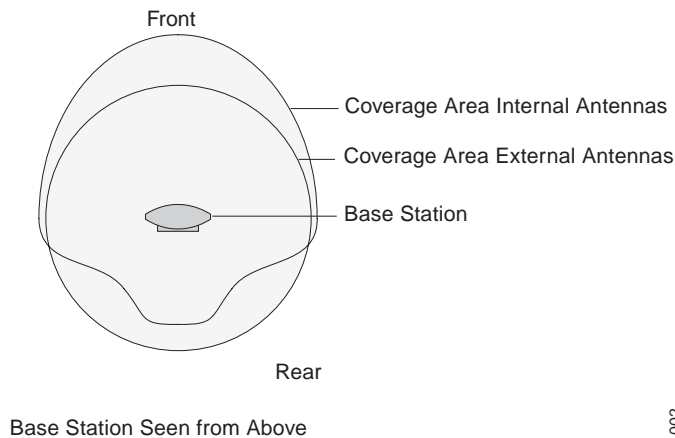
Figure 10. Antenna pattern of the Internal and External Antennas of the IPBS

Directional Antennas

It is possible to use directional antennas in small corridors and halls. Give careful consideration to the type of antenna that you intend using for your application: why that antenna in particular? The fact is that there are many different types of antenna, all with a different radiation pattern. It is difficult to summarize the type of antenna and the application; it is often a question of experience and empiricism. It may be, for example, that you achieve the best result by mounting the base stations on the ceiling, allowing the antennas to radiate vertically downwards. It is possible that you need a beam that is very directional horizontally but has a wider radiation pattern vertically (for example, an extremely high hall), or precisely the opposite. It is advisable to consider this before carrying out the measurement, but the fact remains that you must always carry out a measurement to ensure the best possible operation.

3.6 Base Station Planning Tips

All information needed to do a solid base station planning are given in sections figure 3.1 to figure 3.5. Below is a list of the most important issues:

- Always involve the client in the site survey. Ensure that the client shares the responsibility for the decision on the siting of base stations. Also always involve the client in problems which you encounter (a difficult area to cover), and ensure that the client is not faced with surprises afterwards.
- Discuss with the client whether the base stations are to be installed visibly or out of sight. If the client wants the base stations not to be visible, the possibility of installing the base stations with antennas pointing out of the ceiling should be considered. This is done to prevent a base station from being obstructed by ventilation ducts, metal panels on the ceiling or other obstacles. If this is not acceptable, ensure that the IPBS is placed in a way that disruption by the obstacles above the ceiling or behind walls is minimized.
- Pay particular attention to the 'non-standard' areas such as toilet rooms, stairwells, lifts, maintenance shafts etc.
- Always mount a base station at least 30 cm away from a metal wall, to avoid a substantial impedance change for the antennas.
- Always try to place the base station in a way that it can 'see' as much as possible of the area to be covered.
- Locate the base stations such that it can 'see' as much as possible of the area to be covered or such that there are as few obstacles as possible between the base station and the area to be covered.

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- Locate the base station strategically: for example, not on a large concrete pillar in the middle of a hall, this will result in bad coverage behind the
- To achieve outdoor coverage, mount a base station on a wall containing a window. Place the IPBS with its antennas in front of the window or in a way that the base station can see as much as possible of the outdoor area.
- Base stations should not be placed near the outer walls of the building as this reduces the effective covered area, except of course when outdoors coverage is desired.
- Always keep the necessary traffic capacity in mind during the site survey. How many people there are in a particular department, how often people call on average and how long people call on average. A standard rule of thumb for this ratio is one base station for 27 people. If you are dealing with, for example, a purchase department, the ratio will quickly change. Talk this over with the client.
- Ensure that during the installation of a base station, the base station is given an extra length (5-10 metres) of cable because it is possible that it will have to be moved for one reason or another.

3.7 Making a Base Station Plan

Once the average cell size is found according to 3.3 *Determine the Average Cell Size* on page 19, do the following:

1 Make a sketch of all base station positions on the ground plan.

2 Indicate the expected speech and air sync coverage for each base station on the map.

3 Verify with the site survey tool that the real speech coverage is as expected.

4 Verify with the site survey tool that the air sync coverage is as expected. Make sure that air sync coverage is sufficient even considered a worst case scenario, that is with all doors, windows etc. closed. See *3.7.1 Verifying the Air Sync Coverage* for information on how to do this.

Note: It is strongly recommended that each base station is able to synchronize with at least two other base stations.

5 Especially verify coverage in difficult areas such as lifts, stair houses and discontinuity in construction.

6 If weak areas are found, try if re-positioning base stations solves it, otherwise plan an extra base.

7 Select which base station should be assigned the role as master base station. The master IPBS should ideally be centrally located since it is often configured as air synchronization master. Make sure that the bandwidth between the master IPBS and the IP-PBX is sufficient.

3.7.1 Verifying the Air Sync Coverage

1 Configure an IPBS to be air sync slave, to synchronize to the base station in the site survey tool, see 6.4.14 *Configure Air Synchronization* on page 50.

2 Enable LED indication of the air sync.

3 Power the IPBS using a battery pack.

4 Move the IPBS to the planned base station locations and check the LED.The LED should be green, if it is flashing in amber, the air synchronization is inadequate.

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3.7.2   Finalizing the plan

When all base station positions on the map are verified and the plan is found okay, discuss with the client whether, due to local traffic requirements extra base stations are needed in particular areas. In that case, integrate these base stations with the plan.

Thus a final base station planning is made and tested simultaneously.

4   Installation

The IPBS can be fixed to a wall, a ceiling, a pole or a beam, by means of the mounting bracket included. When fixing the IPBS to a wall or ceiling the included plugs and screws must be used. When fixing it to a pole or beam a strap or a flexible metal band must be used, this is not included.

4.1   IPBS Cabling

The IPBS cable is a standard CAT5 unshielded ethernet cable **with minimum 26 AWG copper conductors**, this cable is also used for powering the IPBS if it is powered using PoE.

It is assumed that installation personnel know how to crimp these connectors to a cable.

Note: Ensure that during the installation of an IPBS, each IPBS is given an extra length (5-10 metres) of cable because it is possible that it will have to be moved for one reason or another.

4.2   Installation

IPBSs can be mounted vertically or horizontally. Mount the IPBSs at places and positions as determined in the base station plan, see 3.7 *Making a Base Station Plan* on page 25. The IPBS must be placed in a way that it is not facing large metal objects such as large heating pipes.

4.2.1   Fixing the Mounting Bracket to a Wall

Fix the mounting bracket (see figure 11) to the wall as follows:

1   Hold the mounting bracket with its flat side against the wall with the text 'TOP' upwards and mark the two holes. The minimum distance between the upper hole and the ceiling or any object above the IPBS must be at least 65 mm, see figure 11. If the distance is less than 65 mm, the IPBS cannot be slid onto the bracket.

2   When using wall plugs: Drill the two holes using a ∅ 6 mm drill and insert the included wall plugs.

3   Position the mounting bracket with its flat side to the wall and fasten it with the two included ∅ 3.5 mm screws.

PRELIMINARY
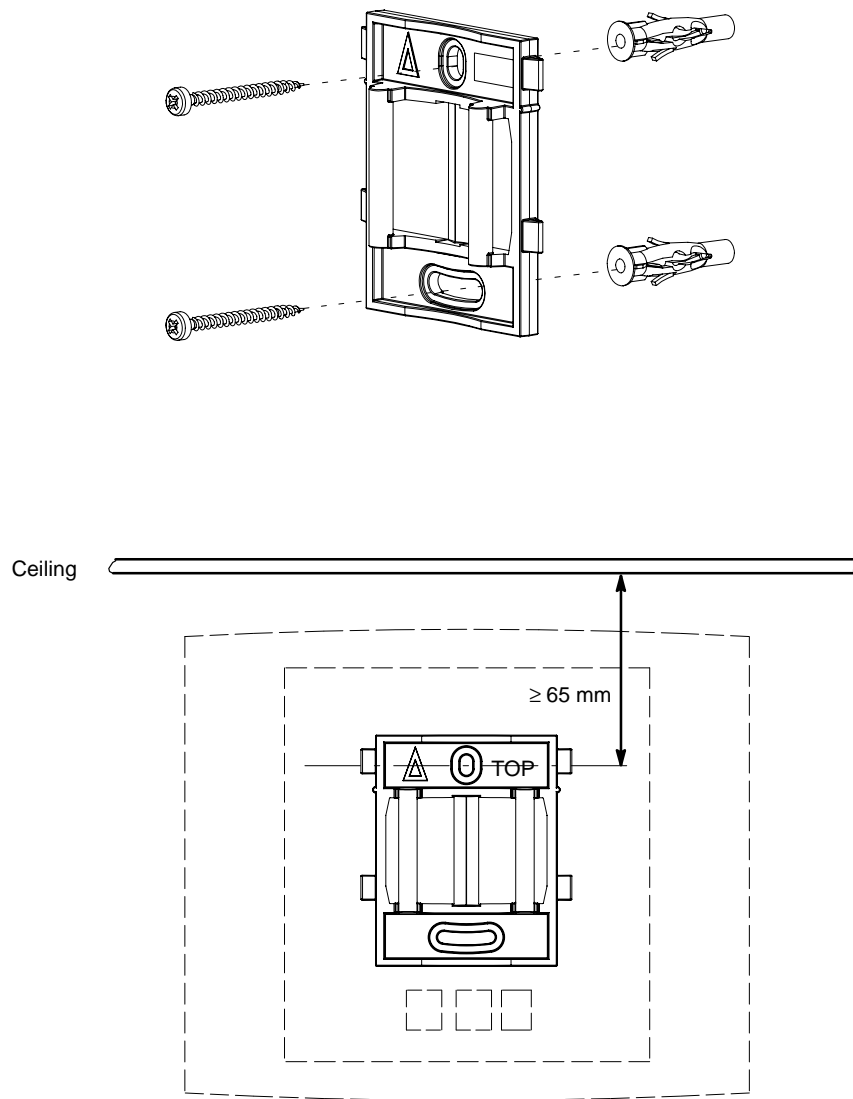
Figure 11. Fixing the mounting bracket to a wall

4.2.2   Fixing the Mounting Bracket to a Ceiling

Fixing to a ceiling is done in the same way as the a wall, see *4.2.1 Fixing the Mounting Bracket to a Wall*. When the IPBS has to be positioned above a suspended ceiling, make sure that the front of the IPBS points downwards.

4.2.3   Fixing the Mounting Bracket to a Pole or Beam

The mounting bracket can be fixed to a pole (diameter ≥ 45 mm) or a beam (wider than 50 mm) by means of a strap or flexible metal band less than 30 mm wide. The strap or flexible metal band is not included in the box.

1   Fix the mounting bracket to a pole or beam using the metal band, see figure 12.

PRELIMINARY

Tied wrongly

040
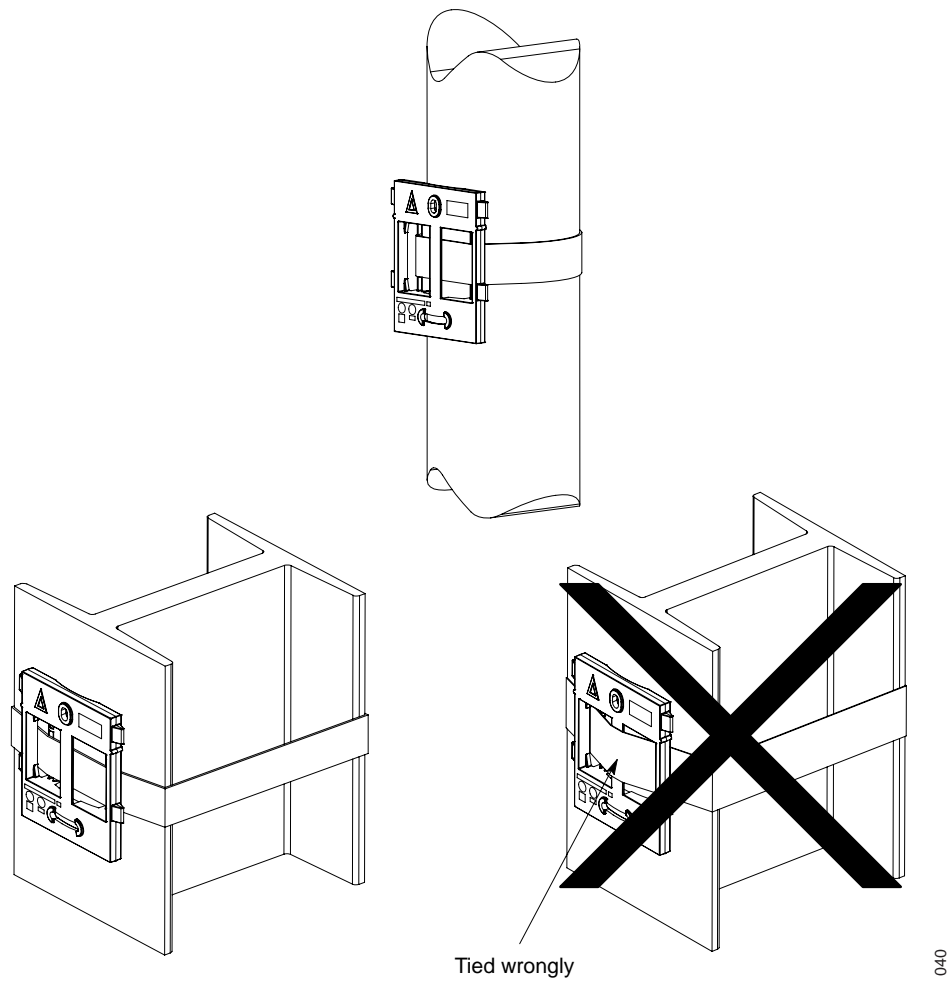
Figure 12. Fixing the mounting bracket to a pole or beam

4.2.4 Using Cable Ducts

When the IPBS is mounted to the wall, cable ducts can be used to route the wiring through.

1   Fix the cable duct to the wall in one of the positions shown in .

PRELIMINARY
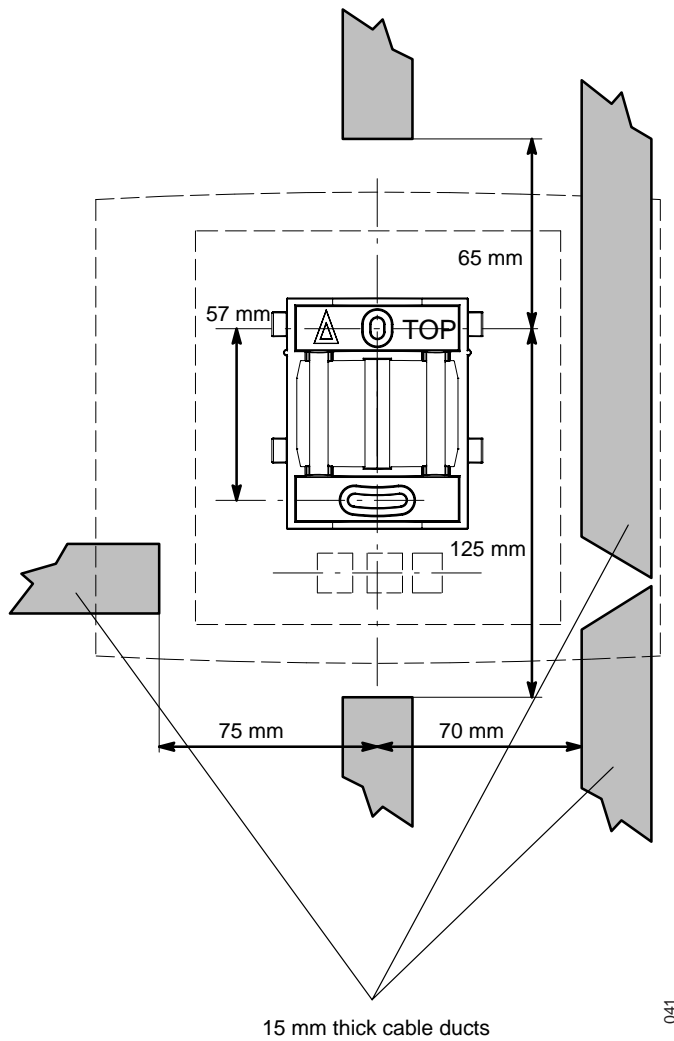
Figure 13. Minimum distances between a cable duct and the mounting bracket

4.2.5 Securing the Cable

1   For safety reasons secure the base station cable to a convenient point at about 30 cm from the IPBS.

If for some reason the base station drops, it is secured by the cable.

4.2.6 Pinning of the IPBS Cabling

1   Cut the IPBS cable to the correct length and connect the cable to a RJ45 modular jack. For information on the pinning of the data jack, see figure 14 on page 30 and figure 15 on page 30. Do **not** plug the connector in the IPBS yet!

PRELIMINARY
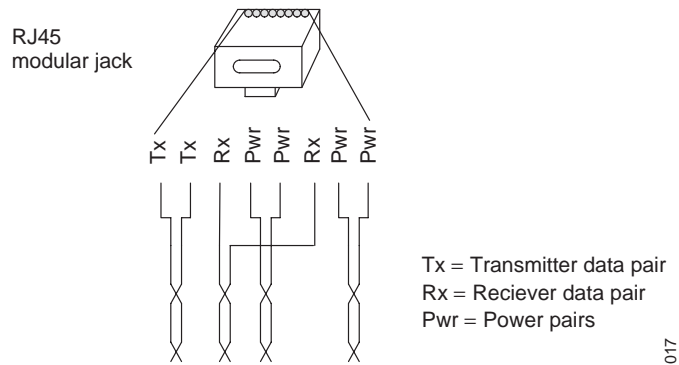
Figure 14. Connector pinning of the LAN/PoE connector, power feed over the spare cable pairs.
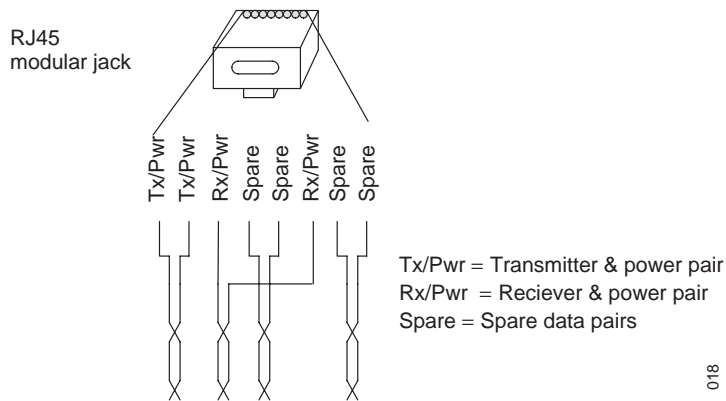
Figure 15. Connector pinning of the LAN/PoE connector, power feed over the Rx/Tx data cable pairs.

4.2.7 Sticking the Label on the IPBS

Brand labels have to be ordered separately.

1   Stick the brand label in the front cover recess.

4.2.8 Connecting the IPBS Cables

1   If it is required that the cables enter the IPBS centrally from above, guide the cables through the recess in the middle of the IPBS as shown in figure 16 on page 31.

PRELIMINARY
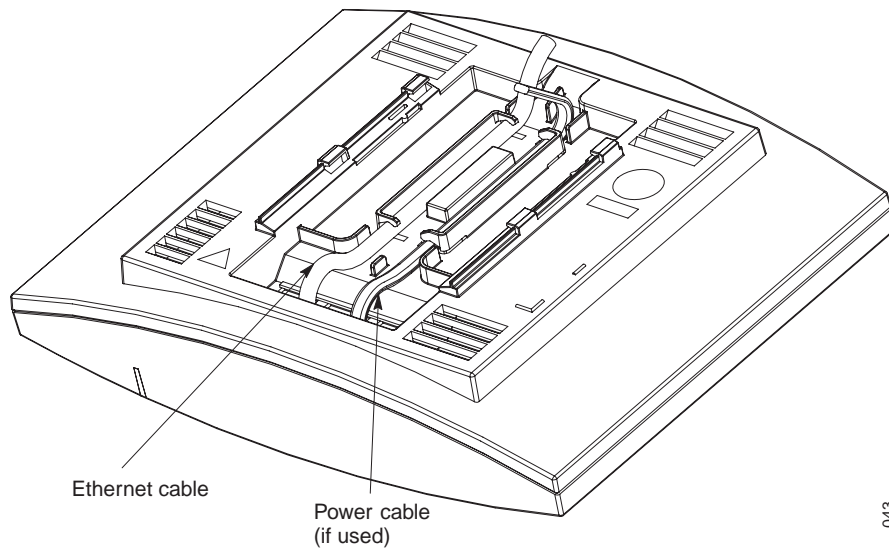
Figure 16. Cables entering the IPBS centrally from above

2   Plug the modular jack of the data cable into one of the data/power connectors.

3   When an AC-adapter is used:

  - Plug the modular jack of the AC-adapter in one of the data/power connectors.
  - Plug the AC-adapter into a wall-outlet.

4.2.9   Mounting the IPBS

1   Hold the IPBS flat against the mounting bracket and move it downwards until it clicks, see figure 17.
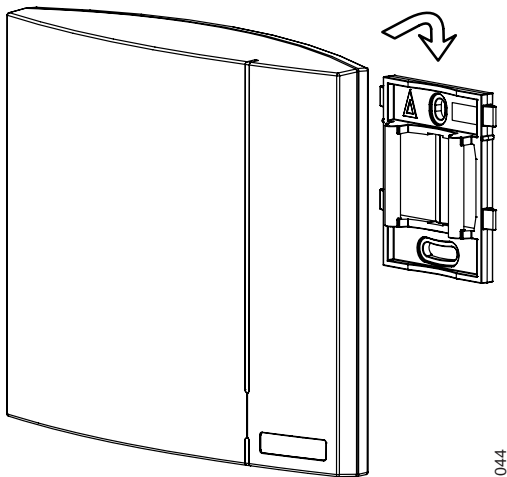
Figure 17. Mounting the IPBS

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4.3 Powering the IPBS

4.3.1 General

After a base station plan has been made according to 3.7 *Making a Base Station Plan* on page 25 it must be established which powering method is most suitable to power the IPBSs. The methods to power a IPBS are as follows:

- Power over Ethernet, see 4.3.2 *Powering IPBSs over Ethernet* on page 32
- By a local power supply, see 4.3.3 *Powering IPBSs Using a Local Power Supply* on page 32.

4.3.2 Powering IPBSs over Ethernet

The IPBS supports Power over Ethernet, IEEE 802.3af. The PoE standard supports two ways of feeding the power:

1   Power over the Rx/Tx data pairs

2   Power over the spare cable pairs.

Both power feed methods are supported in the IPBS, it is also insensitive to change of the polarity. For information on pinning of the IPBS connectors, see 4.2.6 *Pinning of the IPBS Cabling* on page 29.

4.3.3 Powering IPBSs Using a Local Power Supply

Powering IPBSs with a local power supply can be done using the second data/power inlet on the IPBS. IPBSs can be powered individually by an AC-adapter. For individual powering a special AC-adapter is available, see 4.3.4 *AC-adapter – BMLNB 101 09/n* on page 32. This AC-adapter is provided with an 8-pin RJ45 plug that can be plugged into the second data/power inlet.

Note: Only approved power supply according to valid editions of EN/IEC/CSA/UL/AU/NZS 60950 is to be used when the IPBS is powered by a local power supply.

4.3.4 AC-adapter – BMLNB 101 09/n

This adapter is used to power a IPBS.

Versions

BSX-0013   BMLNB 101 09/1:   For European countries except U.K.

BSX-0014   BMLNB 101 09/2:   For U.K. (different mains plug)

BSX-0015   BMLNB 101 09/3:   For US/Canada

BSX-0016   BMLNB 101 09/4:   For Australia

Compliance to Regulations and Standards

Safety	: EN/IEC 60950-1
EMC	: EN55022, EN55011 and EN55014

Environmental

Operating temperature	: -10 ×C to +55 ×C
Storage temperature	: -40 ×C to +70 ×C

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General Specifications

Length x width x height	: 96 mm x 63 mm x 48.5 mm
Length of cable from adapter	: 10 m
Plug secondary side	: 8-pins RJ45
Primary voltage	: depending on version
Secondary voltage	: 24 Vdc ± 5%
Maximum secondary current	: 250 mA (1 A short circuit)
Protection	: Against short-circuit and over-voltage

Note: Only approved power supplies according to valid editions of EN/IEC/CSA/UL/AU/NZS 60950 are to be used when the IPBSs are powered by local power supplies.

5   Configuration

This section describes how to configure the IPBSs using the web interface.

The recommended order to configure the IPBSs in the IP-DECT system is as follows:

1   Configure the Master IPBS, see 5.3 *Configure the Master IPBS* on page 35.

2   Configure the standby master IPBS, see 5.4 *Configure the Standby Master IPBS* on page 36.

3   Configure the slave IPBSs, see 5.5 *Configure the Slave IPBSs* on page 37.

5.1   Requirements

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

- PC
- 10/100base-T10/100base-T Ethernet connection
- Web browser, see *5.1.1 Web Browser Requirements*.

5.1.1   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
- Frames
- XML/XSL Version 1.0

The GUI has been tested with Internet Explorer 6.x, but can also be operated with other browsers.

5.2   Accessing the IPBS GUI

The Graphical User Interface of the IPBS is accessed through a standard web browser entering http://xxx.xxx.xxx.xxx in the browser address field. In this address, xxx.xxx.xxx.xxx should be replaced with the IP address determined in 5.2.1 *Determine the IPBS IP Address* on page 34.

Access the GUI and change the default password as described in 5.2.2 *Change the Default Password* on page 35.

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5.2.1 Determine the IPBS IP Address

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

- If the network has a DHCP server, see *In a Network without a DHCP Server*.
- If the network does not have a DHCP server, see *In a Network with a DHCP Server*.

In a Network without a DHCP Server

If the network does not have a DHCP server, follow the steps below to assign a predefined IP address to the IPBS.

1   Perform a hardware reset of the IPBS by shortly pressing the reset button at the back of the IPBS.

2   The IPBS will be assigned the IP address 192.168.0.1 and the netmask 255.255.255.0.

3   Enter http://192.168.0.1 in the browser address field to access the IPBS GUI.

In a Network with a DHCP Server

The factory setting of the DHCP mode is "automatic", at first power up of the IPBS it will act as a DHCP client. If the network has a DHCP server, it will assign an IP address to the IPBS. This IP address is determined following the steps below.

Note: After the first startup of the IPBS the DHCP mode should be changed from "automatic" to either "client" or "off", see 6.2.1 *Set DHCP Mode* on page 43.

The MAC address of the IPBS can be found on the label on the box and on the label on the backside of the IPBS. The hexadecimal numbers (xx-xx-xx-xx-xx-xx) represent the MAC address of the IPBS, see figure 18.

Figure TBD

Figure 18. The IPBS label with the MAC address.

Determine the IP address following the steps below:

Note: In order to determine the IPBS IP address it is necessary to have a PC with MS Windows, it must be connected to the same LAN (broadcast domain) as the IPBS.

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
     C:\ nbtstat -a ipbs-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 19.

PRELIMINARY
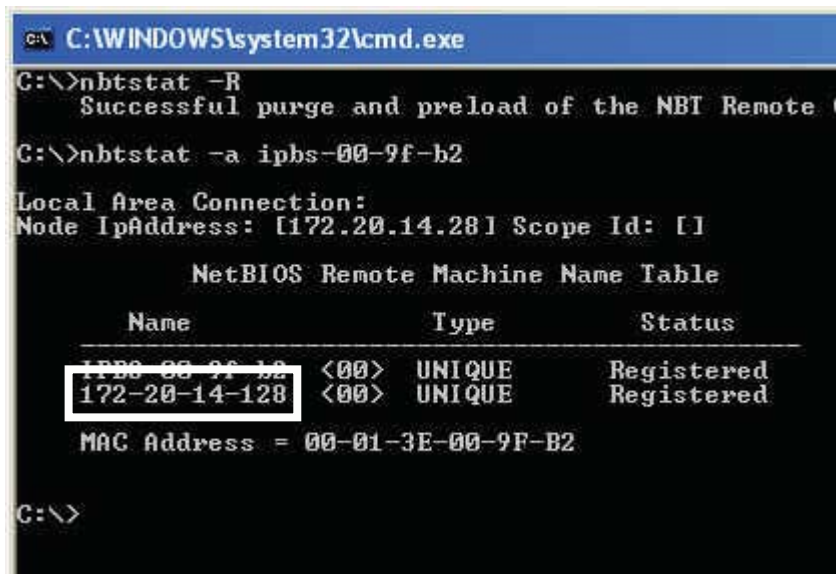
Figure 19. Determine the IPBS IP address

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

5.2.2   Change the Default Password

1   Enter the IP address determined in *5.2.1 Determine the IPBS IP Address* in the web browser address field.

2   Select General > Admin.

3   Enter user name and password in the dialogue box.
     Default user 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".

5.3   Configure the Master IPBS

This section describes how to configure the Master IPBS. Each configuration step is briefly described in the step list below. For more detailed information see the corresponding subsection in *6 Operation* on page 39.

1   Determine the address of the IPBS and access the GUI, see *5.2 Accessing the IPBS GUI* on page 33.

2   Change the default IPBS password, see *5.2.2 Change the Default Password* on page 35.

3   Configure LDAP user name and password, mark the *Write Access* check box, see *6.3.1 Configure LDAP Server* on page 45.

4   Set a static IP address and set DHCP to off, see *6.2.3 Set a Static IP Address* on page 44.

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5   Select system user name and password, see 6.4.1 *Change System Name and Password* on page 47.

6   Set frequency band, see 6.4.5 *Set Frequency Band* on page 48.

7   Select tones, see 6.4.4 *Select Tones* on page 48.

8   Set IPBS mode to Master, see 6.4.10 *Select IPBS Mode* on page 49.

9   Enter gatekeeper IP address or ID, see 6.4.11 *Configure Gatekeeper* on page 49.

10   Set the master IP address to 127.0.0.1, see 6.4.12 *Enter IP Address to the Master and the Standby IPBSs* on page 49.

11   Perform a reset to restart the IPBS in master mode, see 6.11 *Reset* on page 56.

12   Configure air synchronization, see 6.4.14 *Configure Air Synchronization* on page 50.

13   Enter IMS IP address, see 6.4.15 *Configure IMS* on page 51.

14   Install licence, see 6.1.3 *Add licence* on page 40.

15   Reset the IPBS in order to make the configuration changes take effect, see 6.11 *Reset* on page 56.

5.4   Configure the Standby Master IPBS

It is optional, but recommended, to have a standby master IPBS in the IP-DECT system. This section describes how to configure a standby master IPBS. Each configuration step is briefly described in the step list below, for more detailed information see the corresponding subsection in 6 *Operation* on page 39.

1   Determine the address of the IPBS and access the GUI, see 5.2 *Accessing the IPBS GUI* on page 33.

2   Change the default IPBS password, see 5.2.2 *Change the Default Password* on page 35.

3   Set a static IP address and set DHCP to off, see 6.2.3 *Set a Static IP Address* on page 44.

4   Enter system user name and password, this should be the same user name and password as in the Master IPBS. See 6.4.1 *Change System Name and Password* on page 47.

5   Set IPBS mode to standby master, see 6.4.10 *Select IPBS Mode* on page 49.

6   Enter gatekeeper address, see 6.4.11 *Configure Gatekeeper* on page 49.

7   Enter master IP address, see 6.4.12 *Enter IP Address to the Master and the Standby IPBSs* on page 49.

8   Configure air synchronization, see 6.4.14 *Configure Air Synchronization* on page 50.

9   Enter IMS IP address, see 6.4.15 *Configure IMS* on page 51.

10   Configure LDAP user name and password, the user name and password must be the same as in the master IPBS. Mark the *Write Access* check box, see 6.3.1 *Configure LDAP Server* on page 45.

11   Reset the IPBS in order to make the configuration changes take effect, see 6.11 *Reset* on page 56.

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5.5 Configure the Slave IPBSs

This section describes how to configure the Slave IPBSs. Each configuration step is briefly described in the step list below, for more detailed information see the corresponding subsection in 6 Operation on page 39.

Note: When one slave IPBS is configured, the configuration can be saved and uploaded to the other slave IPBSs in the system.

1. Determine the address of the IPBS and access the GUI, see 5.2 Accessing the IPBS GUI on page 33.

2. Change the default IPBS password, see 5.2.2 Change the Default Password on page 35.

3. Set DHCP mode to "Client", see 6.2.4 Dynamic IP address via DHCP on page 446.2.4.

4. Configure LDAP replicator, enter the IP address, user name and password to the LDAP server and the alternative LDAP server. Check the *Enable* check box, see 6.3.2 Configure LDAP Replicator on page 46.

5. Enter the system user name and password, this must be the same user name and password as in the Master IPBS.
    With LDAP replication enabled, the password will be verified against the master IPBS. If the password is wrong a single dot will appear in the text field.

6. Set IPBS mode to Slave, see 6.4.10 Select IPBS Mode on page 49.

7. Enter master and standby master IP addresses, see 6.4.12 Enter IP Address to the Master and the Standby IPBSs on page 49.

8. Configure air synchronization, see 6.4.14 Configure Air Synchronization on page 50.

9. Reset the IPBS in order to make the configuration changes take effect, see 6.11 Reset on page 56.

10. Save the configuration of the Slave IPBS, see 6.8 Backup on page 54.

Configure the rest of the IPBSs following the steps below:

Note: Uploading the same configuration to all slave IPBSs can only be done if the IPBS is set to dynamically allocate an IP address (DHCP is set to client).

1. Determine the address of the IPBS.

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

3. Reset the IPBS in order to make the configuration changes take effect, see 6.11 Reset on page 56.

4. Repeat step 1 to 3 for all Slave IPBSs.

5.6 Add Users

This section describes how to add users to the IP-DECT system. There are two ways to register handsets:

*   Using the handset to automatically associate the IPEI number to a user, see 5.6.1 Anonymous Registration on page 38.
*   Entering the IPEI number of the handset manually, see 5.6.2 Individual Registration on page 38.

PRELIMINARY

5.6.1 Anonymous Registration

The IPEI, which is the unique identification number of the handset, can be assigned automatically to a user. This is used to avoid having to enter the IPEI number manually.

Adding users in the IP-DECT System

1   Under the Administration menu, select Users.

2   Click "new".

3   Enter the following information in the corresponding text fields, leave the *IPEI* and the *Auth. Code* text fields empty:

   • Long Name - The name of the user. This is the name presented in a called party´s display.
   • Name - The user name, need to be unique throughout the system.
   • Number - The phone number extension.
   • Password - Optional. The password is used for RAS registration towards the gatekeeper.
   • Display Text - Will be showed in the handset display when the phone is idle.

4   Click "OK".

5   Repeat step 2 to 4 for all users.

Assigning Handsets to Users

1   Select DECT > System.

2   Enable anonymous registration by selecting "Allow Anonymous" in the *Subscriptions* drop-down list.

3   Click "OK".

4   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 handsets' IPEI number appears in the Anonymous list. To view the list: Select Users > Anonymous.

5   Assign the handset to the user defined in the system by calling the desired extension and hang up.

6   Go off hook and hang up.

7   Repeat step 4 to 6 for all handsets.

8   Under the Configuration menu, select DECT > System.

9   Disable anonymous registration by selecting "Disable" in the *Subscription* drop-down list.

10   Click "OK".

5.6.2 Individual Registration

1   Select Users.

2   Click "new".

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3   Enter the following information in the corresponding text fields:

- Long Name - The name of the user, this is the name presented in a called party´s display.
- Name - The user name, need to be unique throughout the system.
- Number - The phone number extension.
- Password - Optional, is used for RAS registration towards the gatekeeper.
- Display Text - Will be showed in the handset display when the phone is idle.
- IPEI - The serial number of the handset.
- Auth. Code - The individual authentication code for this user.

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

5   Click "OK".

6   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.

6.1   General

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

- Change IPBS User Name and Password
- Name the IPBS
- Add licence
- Download licence
- Delete licence
- Configure automatic firmware update
- Configure the NTP Settings
- Configure Logging
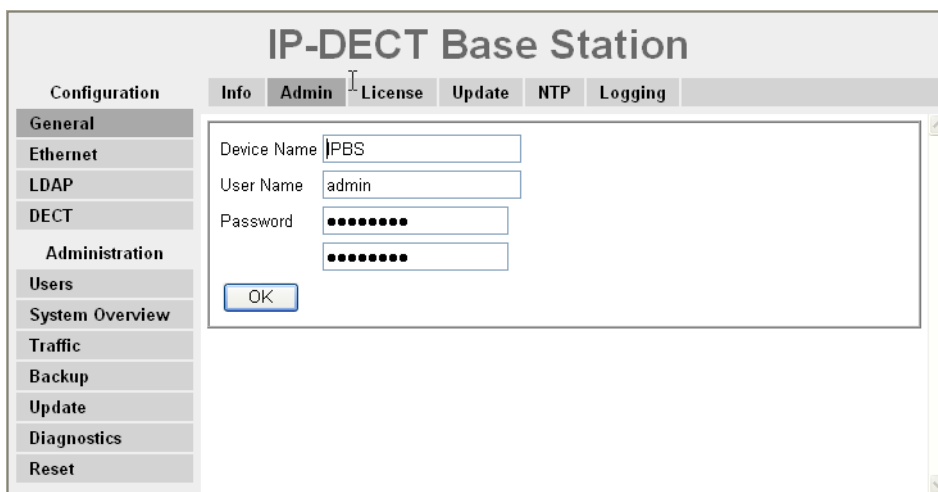
Figure 20. Assigning a name, username, and password to the IPBS.

PRELIMINARY

6.1.1 Change IPBS User Name and Password

The IPBS user name and password us used to access the IPBS 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".

6.1.2 Name the IPBS

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

1   Select General > Admin.

2   Enter a name in the *Device Name* text field.

3   Click "OK".

6.1.3 Add licence

A licence is needed to make the IP-DECT system operate.

1   Select General > licence.

2   Click "Browse" and select the licence delivered by your supplier.

3   Click "Upload"

4   Reset the IPBS in order to make the changes take effect, see 6.11 *Reset* on page 56.

6.1.4 Download licence

The licence file can be downloaded from the IPBS and saved on a disc or a server.

1   Select General > licence.

2   Click the "download" link to the right of the licence or click "download all" if all licences shall be downloaded.

3   Click "Save" and select where to save the licence file.

6.1.5 Delete licence

Note: A licence file is needed for the IPBS to operate properly. Be sure to have a backup of the licence before deleting it.

1   Select General > licence.

2   Click the "delete" link to the right of the licence or click "delete all" if all licences shall be deleted.

6.1.6 Configure Automatic Firmware Update

The IPBS can be configured to automatically update its firmware. A script file, following the syntax described in the document ("How to use the Update Server" TBD), must be uploaded to a suitable directory on an internal web server.

1   Select General > Update

2   Enter the URL of the script file in the *URL* text field.

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3   Enter the poll interval, in minutes, in the *Interval(min)* text field

4   Click "OK".

6.1.7   Configure the NTP Settings

Since the IPBS 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 will synchronize its internal clock to the time server at startup and at the specified intervals.

1   Select General > NTP.

2   Enter the IP address to the SNTP server.

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.

Note: Time zone information can be found on www.worldtimezone.com.

   Example:
   North Carolina is located in the Eastern Time Zone. Eastern Standard Time (EST) is 5 hours behind UTC (StdOffset = EST-5), the Eastern Daylight Time (EDT) is 4 hours behind UTC (DstOffset = EDT-4). Summertime for the year 2006 begins at two a clock, on a Sunday, the first week in April (M4.1.0/2). The summertime ends at two a clock, on a Sunday, the fifth week in October (M10.5.0/2).

   <String = EST-5EDT-4,M4.1.0/2,M10.5.0/2>

6   Click "OK".

PRELIMINARY
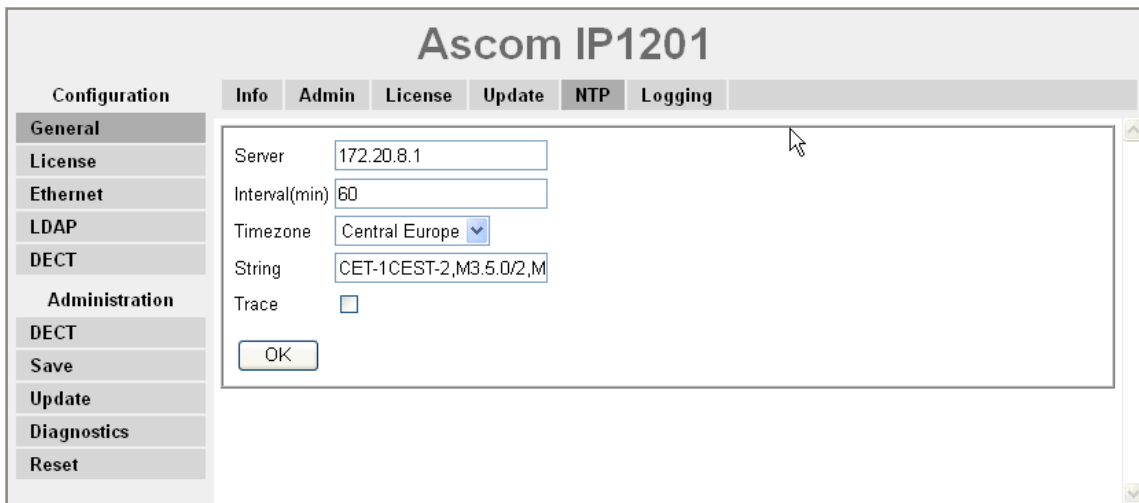
Figure 21. Configure NTP settings.

6.1.8 Configure Logging

There are three ways to collect logs from the IPBS, see the table below.

TCP	The IPBS writes the Syslog entries to a TCP connection. The other end of the TCP link is responsible for further evaluation of the entries.
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.

Transferring the Syslog Entries to a TCP Program

1   Select General > Logging.

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

3   If the IPBS is to establish the TCP connection automatically, enter the "IP address" of the destination in the *Address* text field.

4   Enter the "TCP port number" in the *Port* text field.

5   Click "OK".

Storing the Syslog entries in a syslogd

1   Select General > 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".

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Storing of Syslog entries in a Web server

1   Select General > Logging.

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

3   Enter the "IP address" in the *Address* text field.

4   Enter the "relative URL of the form programme" on your web server in the *Path* text field.

5   Click "OK".

Note: The IPBS will make an *HTTP 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 will make a *GET /cdr/ cdrwrite.asp?event=syslog&msg=logmsg* request to the server.

6.2   Ethernet

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

- Set DHCP mode
- Set IP static address
- Set dynamic IP address
- Set ethernet link type
- Configure VLAN
- Configure advanced ethernet settings
- View ethernet statistics

6.2.1   Set DHCP Mode

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

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

Change DCHP mode following the steps below.

1   Select Ethernet > DHCP.

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

3   Click "OK".

4   Reset the IPBS in order to make the changes take effect, see 6.11 *Reset* on page 56.

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6.2.2 Link

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

6.2.3 Set a Static IP Address

It is necessary for the master and the standby master IPBSs to have static IP addresses. The slave IPBSs 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 IPBSs.

1   Select Ethernet > DHCP.

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

3   Click "OK".

4   Select Ethernet > IP.

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

6   Click "OK".

7   Reset the IPBS in order to make the changes take effect, see 6.11 *Reset* on page 56.

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

6.2.4 Dynamic IP address via DHCP

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

1   Select Ethernet > DHCP.

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

3   Click "OK".

4   Reset the IPBS in order to make the changes take effect, see 6.11 *Reset* on page 56.

6.2.5 Configure VLAN

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

6.2.6 Configure Advanced Network Settings

The following settings can be done in the advanced network settings sub menu:

• Set ToS priority.
• Set RTP ports.

1   Select Ethernet > Advanced.

2   Enter ToS priority (0..7) in the *ToS Priority* text field.

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

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

Note: If the ports fields are left blank, the ports 16384 to 32767 will be used.

5   Click "OK".

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6.2.7 View Ethernet Statistics

To view statistics of ethernet events: Select Ethernet > Statistics

To reset the ethernet statistics counters: Click the *clear-stat* button.

6.3 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 in the system have access to the database, one of the IPBSs or the VoIP gateway 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
- Configure LDAP replicator
- Check LDAP replicator Status
- Check LDAP server Status

6.3.1 Configure LDAP Server

The IP-DECT system needs an LDAP server. If the VoIP gateway is setup as an LDAP server the master IPBS should be setup as an LDAP replicator, see 6.3.2 *Configure LDAP Replicator* on page 46.

If the VoIP gateway is not setup as an LDAP server, follow the steps below to setup the IPBS as an LDAP server:

Note: The selected user name and password must be the same in both the master IPBS and the standby master IPBS.

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   Mark the *Write Access* check box.

5   Click "OK"

PRELIMINARY
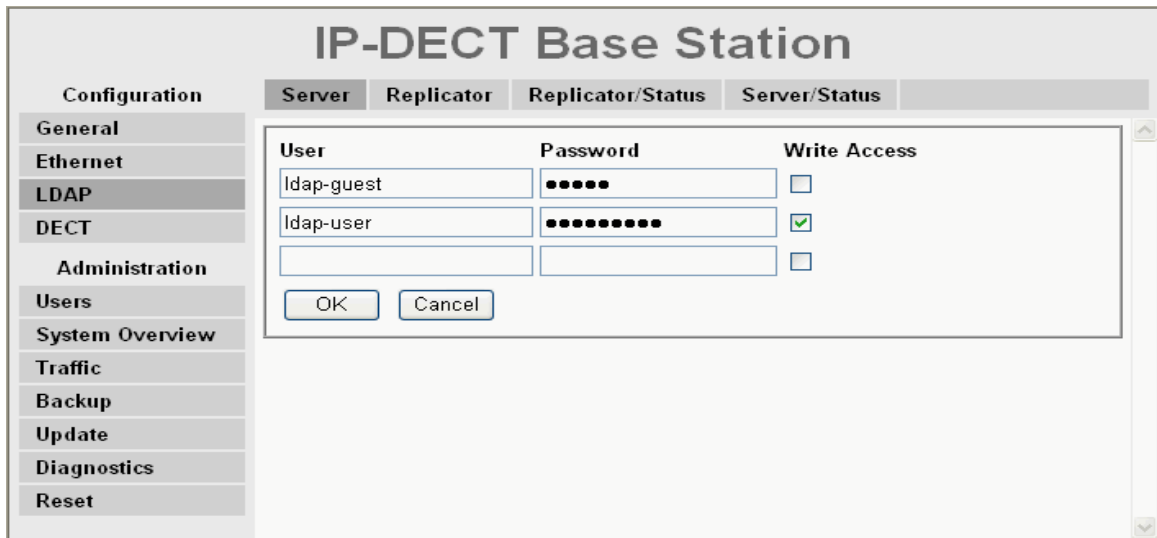
Figure 22. Setting LDAP User Name and server

6.3.2   Configure LDAP Replicator

The slave IPBSs must be setup as LDAP replicators.

1   Select LDAP > Replicator.

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

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

4   Enter the LDAP User name and Password in the *User* and *Password* text fields

5   Click "OK"

6.3.3   Check LDAP Replicator/Server status

1   Select LDAP.

2   Select Replicator/Status or Server/Status.

6.4   DECT

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

- Change DECT user name and password
- Set Authentication Code
- Change Subscription Method
- Select tone system
- Set Frequency Band
- Enable/Disable Carriers
- Enbloc Dialing
- Supplementary Services
- Coder
- Select IPBS mode
- Configure gatekeeper
- Enter IP Address to the Master and the Backup IPBSs
- Assign PARI

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- Configure Air Synchronization
- Configure SMS Settings
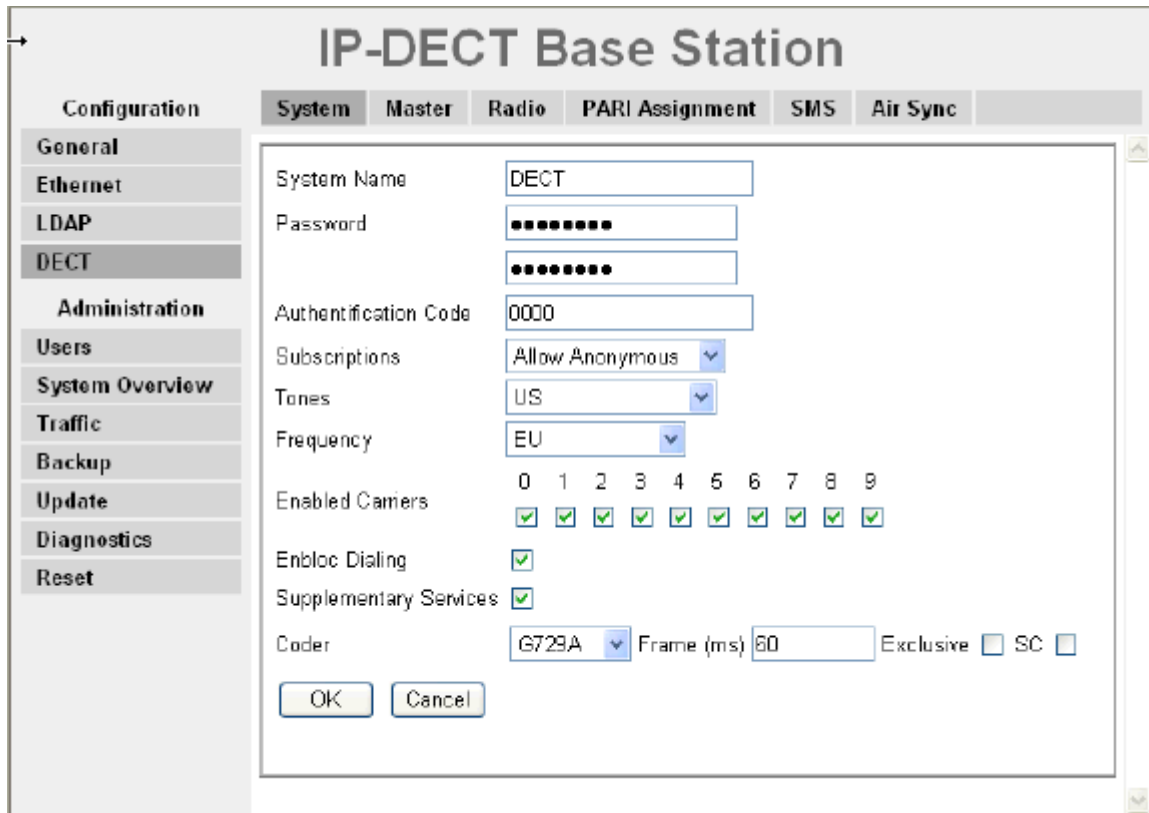
Figure 23. The DECT System configuration page.

6.4.1 Change System Name and Password

The system name and password must be the same for all IPBSs throughout the system. Reset the IPBS in order to make the changes take effect, see 6.11 *Reset* on page 56.

1 Select DECT > System.

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".

6.4.2 Configure Authentication Code

The IP-DECT system must have an authentication code configured, select a code consisting of 4 to 8 numbers (0-9)

1 Select DECT > System.

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

3 Click "OK".

6.4.3 Change Subscription Method

There are two ways to subscribe users to the IP-DECT system.

The IPBS can be set to use the following subscription methods:

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- With User AC Only
- Allow Anonymous
- Disable

Select subscription method:

1   Select DECT > System.

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

3   Click "OK".

6.4.4   Select Tones

1   Select DECT > System.

2   Choose tones in the *Tones* drop-down list.

3   Click "OK".

6.4.5   Set Frequency Band

The IPBS can operate in the following frequency bands:

- 1880 - 1900 MHz, EU
- 1910 - 1930 MHz, South America
- 1920 - 1930 MHz, North America

1   Select DECT > System.

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

3   Click "OK".

4   Reset the IPBS in order to make the changes take effect, see 6.11 *Reset* on page 56.

6.4.6   Enable Carriers

TBD

6.4.7   Enbloc Dialing

With this option enabled the keystrokes on the handsets stays in the IPBS, if it is disabled the keystrokes are immediately sent to the IP-PBX.

1   Select DECT > System.

2   To enable, mark the *Enbloc Dialing* check box.

3   Click "OK".

6.4.8   Supplementary Services

With this option enabled TBD

1   Select DECT > System.

2   To enable, mark the *Supplementary Services* check box.

3   Click "OK".

6.4.9   Configure Coder

Select the preferred coder, and enter the desired frame length. If exclusive is selected for the coder the IPBS 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.

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

1   Select DECT > System.

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

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

4   Choose Exclusive enabled or disabled by checking/unchecking the *Exclusive* check box.

5   Choose Silence Compression enabled or disabled by checking/unchecking the *SC* check box.

6   Click "OK".

6.4.10   Select IPBS Mode

The IPBS can operate in three different modes: master, strandby master and slave.

1   Select DECT > Master.

2   Select in the *Mode* drop-down list:
   • ACTIVE, if this IPBS is the Master IPBS.
   • STANDBY, if this IPBS is the standby master IPBS.
   • OFF, if this IPBS is a Slave IPBS.

3   Click "OK".

4   Reset the IPBS in order to make the changes take effect, see 6.11 *Reset* on page 56.

6.4.11   Configure Gatekeeper

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

1   Select DECT > Master.

2   Enter the address to the gatekeeper in the *GK* text field.

3   Enter the address to the alternative gatekeeper in the *Alt-GK* text field.

4   Click "OK".

5   Reset the IPBS in order to make the changes take effect, see 6.11 *Reset* on page 56.

6.4.12   Enter IP Address to the Master and the Standby IPBSs

All IPBSs need to know the IP address of the master IPBS and the standby master IPBS.

1   Select DECT > Radio.

2   Enter the address to the Master IPBS in the *Master* text field. If this is the Master IPBS enter 127.0.0.1.

3   Enter the address to the standby master in the *Alt-Master* text field. If this is the standby master, leave this field empty.

4   Click "OK".

5   Reset the IPBS in order to make the changes take effect, see 6.11 *Reset* on page 56.

6.4.13   Assign PARI

If more than one DECT system operates within the same coverage area, the systems need to have a PARI assigned in order to differentiate the systems.

1   Select DECT > PARI Assignment.

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2 Select a number between 1 and 36. If this is not done the IPBS will randomly select a number.

3 Click "OK".

4 Reset the IPBS in order to make the changes take effect, see 6.11 *Reset* on page 56.

6.4.14 Configure Air Synchronization

The IPBSs uses the DECT interface to synchronize, one IPBS is assigned the role as "Air Sync Master". It is not necessary to configure which IPBS to synchronize with, this is handled automatically. For more information on air synchronisation, see 1.2.1 *Air Synchronisation* on page 6.

Normally only one air sync master is allowed in one site. If however the site contains for example two buildings and no base station in one building is possible to synchronize to any base station in the other building, in this situation a air sync master may be used in each building. But if there is air sync coverage between the buildings only one master is allowed in one of the buildings. If two masters are configured within the same coverage area two different sync systems will be created instead of one. This will make handover and roaming between the systems impossible. As a result the air sync slaves will loose synchronization frequently.

Configure Air Sync mode of the IPBS:

1 Select DECT > Air Sync.

2 Select in the *Sync mode* drop-down list:

 • Master, if this IPBS is the Air Sync Master.
 • Backup Master, if this IPBS is the Air Sync Backup Master.
 • Slave, if this IPBS is an Air Sync Slave.

3 Click "OK".

Enable LED Indication of Air Sync

LED indication of air sync quality is enabled by marking the LED Indication check box. This indication is used to indicate the air sync quality when planning the system, see 3.7.1 *Verifying the Air Sync Coverage* on page 25.

Configure Synchronization to Another DECT System

An IPBS that is configured as a sync master can be configured to synchronize to another DECT system. If the site contains multiple DECT systems disturbance between the systems can be avoided if the systems are synchronized. Synchronization between the systems is done by configuring an alien RFPI in the sync master.

The synchronization using alien RFPI is done on a "best effort" basis. If the alien system is powered down during operation of the IP-DECT system the IP-DECT system will still continue to operate. Also if the alien system is not found during startup of the sync master it will start to operate anyway. When configuring an alien RFPI at least all carriers that are enabled in the alien RFPI must be enabled in the IP-DECT system.

When configuring an alien RFPI and an alternative alien RFPI this must be different RFPIs on the same alien system, not different RFPIs on different alien DECT systems.

Configure an alien RFPI in the air sync master:

1 In the air sync master IPBS, select DECT > Air Sync.

2 Enter the alien RFPI in the *Alien RFPI* text field.

3 Enter an alternative alien RFPI in the *Alt. Alien RFPI* text field (optional).

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4   Click "OK".

Configure Air Sync Backup Master

An backup air sync master may be configured to take over the air sync master role in case of failure or power down of the original air sync master. The backup master must be placed close to the original sync master. The backup master will start to operate as a sync master in case the sync master has not been heard within 5 minutes. As soon as the sync master is heard again the backup master will start to operate as a sync slave.

Note: If the IP-DECT system is configured to synchronize to another DECT system this synchronization will be lost during the time the original air sync master is not operating.

A backup master is normally not needed for short interruptions on the sync master (restart, software upload, etc.).

Normally no RFPI needs to be configured when using an backup master but if it is configured this must be the RFPI of the sync master.

Configure Air Sync Slave

Normally no configuration is needed for the air sync slaves.The air sync slaves can be configured to synchronize to a specific IPBS (a specific sync RFPI) in the IP-DECT system. This is normally not needed, but if a sync RFPI is configured care must be taken not to create sync rings.

Configure RFPI in the air sync slaves (optional):

1   In the air sync slave, select DECT > Air Sync.

2   Enter the sync RFPI in the *Sync RFPI* text field.

3   Enter an alternative sync RFPI in the *Alt. Sync RFPI* text field (optional).

4   Click "OK".

Example:

The following example is a description of a not allowed air sync ring:

- Base station A configured to listen to B
- Base station B configured to listen to C
- Base station C configured to listen to A

6.4.15 Configure IMS

If an IMS is to be used in the IP-DECT system, enter the IP address following the steps below.

1   Select DECT > SMS.

2   Enter the address to the IMS in the *IMS IP Address* text field.

3   Click "OK".

4   Reset the IPBS in order to make the changes take effect, see 6.11 *Reset* on page 56.

6.5 Users

This section describes the Users sub menu and how to do the following:

- Add a user.
- Search for user information.

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- Show all registered users in the IP-DECT system.
- Show the location of a handset.

6.5.1 Add a User

For information on how to add users to the IP-DECT system, see 5.6 *Add Users* on page 37.

6.5.2 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 name or number to search for in the text field. It is possible to enter only the beginning of the name or number.

3 Click "show".

6.5.3 Show all Registered Users in the IP-DECT System

1 Select Users > Users.

2 Click "show".

6.5.4 Show the Location of a Handset

The handsets in the IP-DECT system sends a location update on change of IPBS. The location of the handsets can be displayed following the step below:

1 Select Users > Locations

The IPBS that received the latest location update from the handset is shown in the table.

6.6 System Overview

Information about the IPBSs in the IP-DECT system is displayed in the System Overview sub menu.

Figure 24. System Overview in the master IPBS

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Name	The unique identification name of the IPBS. The name syntax is ipbs-xx-xx-xx, 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 of the IPBS, click on the IP address to go to the configuration GUI of that IPBS.
Sync	The current synchronization status. Should be "Master OK" or "Slave OK" if the IPBS is synchronized.
LDAP	The LDAP status, can be "up", "down" or "server". Should be "up" or "server".
Device Name	The name of the IPBS configured in the general menu.
Version	The current software version.
Connected Time	The elapsed time since the IPBS connected to the master IPBS.

6.7 Traffic

Traffic information is displayed in the Traffic sub menu. For the master IPBS the traffic information for the IP-DECT system is displayed as well as traffic information for the radio itself (if this radio is enabled).

6.7.1 Statistics

The Statistics page shows traffic statistics for the IPBS. If the IPBS is a master, statistics for the whole IP-DECT system is shown under the Master heading. Traffic statistics for the radio part of the IPBS is shown under the Radio heading. See the table below for information about the different statistics fields.

Master	
Paging	The Number of times the IPBSs has tried to contact the handsets registered in the system.
Calls In Ext. Connected	The number of calls that are paged within the IP-DECT system but answered outside the system, for example by voice mail or a stationary IP telephone.
Calls In Connected	The number of connected incoming calls in the system.
Calls In Busy	The number of incoming calls that received a busy tone.
Calls Out	The number of outgoing calls in the system.
Calls Out Connected	The number of outgoing calls that are connected in the system.
Handover	The number of handovers in the system.

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Handover Failed	The number of failed handovers in the system.
Radio	
Calls In	The number of incoming calls to the radio.
Calls In Connected	The number of connected incoming calls in the radio.
Calls Out	The number of outgoing calls from the radio.
Calls Out Connected	The number of outgoing calls that are connected in the radio.
Handover	The number of handovers in the radio.
Handover Failed	The number of failed handovers in the radio.

6.7.2   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 IPBS.

6.7.3   Display IPBS Calls

All ongoing calls on an IPBS can be displayed by selecting Traffic > Radio Calls in the IPBS.

6.7.4   Handover

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6.7.5   Air Sync

Air Sync status is displayed in the Traffic > Air Sync sub 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%. Should be below 80% to be able to keep the synchronization.

6.8   Backup

The IPBS configuration can be downloaded and saved on a disc or a server. This is useful when identical configuration should be applied to several IPBSs, for example when configuring the slave IPBSs in a system. For information on how to load a saved configuration on the IPBS, see 6.9 *Update* on page 55.

1   Select Backup > Config

2   Click "download"

3   Click "Save" in the dialogue window and browse to the place where the configuration should be saved.

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4   Click "Save"

6.9   Update

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

- Update Configuration
- Update Firmware
- Update the Boot File

6.9.1   Update Configuration

A previously saved configuration can be loaded and activated on the IPBS. See 6.8 *Backup* on page 54 for information on how to save a configuration.

1   Select Update > Config.

2   Click "Browse..." and browse to the saved configuration.

3   Click "OK"

4   Reset the IPBS in order to make the changes take effect, see 6.11 *Reset* on page 56.

6.9.2   Update Firmware

The software of the IPBS can be updated. Follow the steps below to update IPBS with the firmware provided by TBD.

Note: If this operation is interrupted, the firmware in the device will be defect. If a firmware upload is for any reason interrupted, the firmware must be uploaded again. Do not execute a reset before the firmware upload is complete.

1   Select Update > Firmware.

2   Click "Browse..." and browse to the firmware file.

3   Click "OK"

4   Reset the IPBS in order to make the changes take effect, see 6.11 *Reset* on page 56.

6.9.3   Update the Boot File

1   Select Update > Boot.

2   Click "Browse..." and browse to the boot file.

3   Click "OK"

4   Reset the IPBS in order to make the changes take effect, see 6.11 *Reset* on page 56.

6.10   Diagnostics

6.10.1   Logging

The IPBS 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 6.1.8 *Configure Logging* on page 42. For a description of each log, see the table below.

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Setting	Description
TCP	Logs generated upon TCP connection set-ups in the H.225 / H.245 protocol.
DECT Master	Logs generated by the DECT master software component in the IPBS.
DECT Radio	Logs generated by the DECT Radio software component in the IPBS.
H.323 Registrations	Logs generated upon RAS registration.
Config Changes	Logs generated upon configuration changes in the IPBS or the IP-DECT system.
DECT Stack	A low level DECT log, intended for support departments.

1   Select Diagnostics > Logging.

2   Select which logs to generate by marking 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.

6.10.2   Tracing

The information gathered from the trace functionality is mainly used to troubleshoot the IPBS in case of failure in the system. The trace information is intended for the support departments.

6.10.3   Config Show

Config Show displays the IPBS configuration as a text output.

6.10.4   Ping

The ping function is used to determine the response time from the IPBS 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.

6.11   Reset

Some configuration changes requires a reset in order to take effect. A reset reboots the IPBS software. There are two ways to reset the IPBS:

• Idle reset - waits until there are no active calls in the IPBS.
• Immediate reset - clears all calls and resets the IPBS.

6.11.1   Idle Reset

1   Select Reset > Idle Reset.

2   Click "OK" to reset the IPBS.

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3   The IPBS will reset when there are no active calls.

6.11.2 Immediate Reset

1   Select Reset > Reset.

2   Click "OK" to reset the IPBS.

3   The IPBS will terminate all active calls and reset.

6.11.3 TFTP Mode

Note: When the IPBS is in TFTP mode it can only be reached using the gwload utility. This mode should not be used during normal operation of the IPBS.

6.12 Reset Using the Reset Button

It is possible to do a hardware reset of the IPBS by pressing the reset button on the back. For a description of the different reset options, see the table below.

Note: Use a pointed object in an non conducting material to reset the IPBS.

Short press < 1 sec	Restarts the IPBS.
Medium press ~3 sec	Restarts the IPBS in TFTP mode. In TFTP mode the IPBS can be accessed only through the gwload application. This mode is intended for support and development S departments
Long press ~ 10 sec	Factory reset - all configuration parameters will be set to default values.

7   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 (i.e.: no cabling faults, no configuration faults), the technician must consult the maintenance section included in this manual for fault finding.

7.1   Visual inspection and tests

Describes the items that can be checked visually and all the tests that must be executed to verify that the system functions correctly.

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7.1.1 Visual inspection

7.1.2 Availability of all IPBSs

7.2 Radio coverage verification tests

7.2.1 General

The radio coverage verification consists of two tests:

- IPBS test
- Area coverage test

Note:
Be sure that all batteries in the cordless phones are charged before executing the tests.

7.2.2 IPBS test

The purpose of this test is to check if all IPBSs are operational.

Test

1. Put a cordless phone in the service display mode (refer to the section 'Maintenance' in this manual).

2. Take ground plan (map) of the building where the IPBSs are indicated with their corresponding IPBS number or use the IPBS identification and location sheet in the section 'Installation instructions' in this manual.

3. Move close to each IPBS and check that the cordless phone locks to it (the service display should display the correct IPBS number).

   After having checked that all IPBSs are operational proceed with the area coverage test.

7.2.3 Area Coverage 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 cordless phones and requires two persons.

Test

1. Place the cordless phone in the service display mode and call the other cordless phone. One user of the cordless phone 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 RQI is not stable on 20_{hex} and where cracking sounds or mutes are heard.

7.2.4 Evaluation

After having performed the IPBS and the area coverage test, the results should be evaluated. If the coverage is not sufficient you should review the IPBS planning and move or add IPBSs.

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7.3 Cordless Phone Test

This test checks for each cordless phone the complete connection from system board to PBX. Furthermore it checks that the cordless phones' numbers have been correctly programmed. The test is performed by calling all cordless phone from one and the same cordless phone.

Test

1. Put all cordless phone together in order of extension number on a table.

2. Go off-hook with each cordless phone and check that the dial tone is heard.

3. Call with a cordless phone (cordless phone A) all other cordless phones sequentially and check that the cordless phone with the corresponding number on its display rings when called.

4. Call cordless phone A and check if it rings.

8   Troubleshooting - TBD

- If the client subsequently complains of 'crackling' during calls in a particular area or if the client is being troubled by calls being dropped, this is very probably attributable to coverage problems.
- Assign PARI if more Ascom IP-DECT systems are whithin the same coverage area.