Function Description

Ascom IP-DECT System

2007-12-10/ Ver. D

Contents

1 Introduction

The Ascom Voice over Internet Protocol (VoIP) system provides wireless IP-telefony and messaging to enterprise LANs. The VoIP system can also interact with Unite and other systems. This document gives a brief description of the functions supported in the Ascom IP-DECT System.

For maximum performance in the system, see the recommendations in *Considerations for Ascom IP-DECT System Planning, TD 92422GB*.

For information about Ascom VoIP Gateway, see *Installation and Operation Manual, VoIP Gateway, TD 92326GB*.

1.1 Abbreviations and Glossary

DECT	Digital Enhanced Cordless Telecommunications: global standard for cordless telephony.
ESS	Enhanced System Services: Unite module that supports advanced message routing and centralised fault handling and logging.
IMS	Integrated Message Server: Unite module that enables messaging to and from the connected cordless telephone system.
IP	Internet Protocol: global standard that defines how to send data from one computer to another over the Internet
IPBS	IP-DECT Base Station
IPBL	IP-DECT Gateway
LAN	Local Area Network: a group of computers and associated devices that share a common communication line.
LDAP	Lightweight Directory Access Protocol
PBX	Private Branch Exchange: telephone system within an enterprise that switches calls between local lines and allows all users to share a certain number of external lines
PoE	Power over Ethernet
QoS	Quality of Service
PSTN	Public Switched Telephone Network: the world's collection of interconnected voice-oriented public telephone networks
RFP	Radio Fixed Part. DECT base-station part of the DECT Infrastructure.
SIP	Session Initiation Protocol
VoIP	Voice over Internet Protocol: the technology used to transmit voice conversations over the internet protocol.
Unite	Generic term for messaging system that unites different systems, for example System 900, System 9d, and teleCARE M.

2 Technical Solution

The Ascom IP-DECT system is built by Ascom developed hardware and software as well as third-party products. The following components are developed by Ascom and provides voice, messaging and alarm functions in an Ascom IP-DECT system:

- DECT cordless handset
- IP-DECT Base Stations (IPBS)
- IP-DECT Gateway (IPBL)
- Ascom VoIP Gateway (IP-PBX)
- Integrated Message Server (IMS)
- Unite

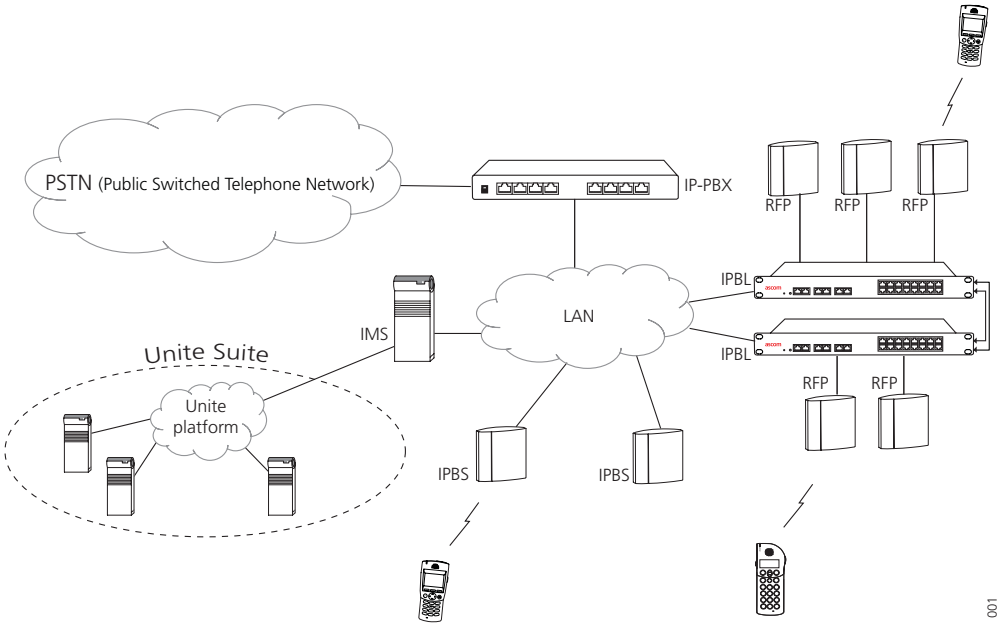

Figure 1. Overview of the IP-DECT system.

For more information about system components, see *System Description, Ascom IP-DECT System, TD 92375GB*.

Messages and alarms can be sent between the IP-DECT system and other Ascom messaging systems via the IMS. Communication with traditional telephony systems is enabled through the IP-PBX.

2.1 System Size

The IP-DECT system has support for 100 IPBL, 1000 IPBSs and 2000 handsets. All handsets have the same telephony access regardless of which base station it is connected to.

2.2 LDAP Server

The LDAP protocol is used in the IP-DECT system to let all IPBL/IPBSs in the system to have access to a joint user database.

The joint user database contains information about the users registered in the system. It also contains the system configuration.

2.3 Supported Protocols

The Ascom IP-DECT system supports H.323 and SIP. The following supplementary services are supported by H.323/H.450 and SIP protocol.

H.323/H.450	SIP	Description
x		Supplementary Services
x	x	Call Transfer
x	x	Call Diversion
x	x	Do Not Disturb
x	x	Call Hold
x	x	Call Waiting
x	x	Message Waiting Indication
x	x	Calling Party Name Presentation
x		Completion of Calls to Busy Subscriber

2.4 Power the Base Stations

If the IPBSs are using PoE, the classifications must be considered. The PoE power source (for example the ethernet switch) will allocate power according to the PoE classification and not according to the real power usage.

The IPBL power supply will allocate power to both the IPBL and the connected RFPs.

As an alternative, the base stations can use a local AC-adapter for individual power supply.

For more information, see *Installation and Operation Manual, IP-DECT Base Station & IP-DECT Gateway, TD 92372GB*.

3 DECT Handset

3.1 Voice Functions

The IP-DECT system uses Voice over Internet Protocol (VoIP) as the technology for transmission of voice. The voice packets are divided and compressed by the IPBS/IPBL before they are sent over the network.

The transmission of voice packets between the IPBS/IPBL and the VoIP Gateway/ Gatekeeper/SIP proxy is handled by the LAN.

The gatekeeper manages the so called H.323 zone which is a logical collection of all the H.323 endpoints within the IP-DECT system. The SIP Proxy manages the so called SIP zone which is a logical collection of all the SIP endpoints withing the IP-DECT system.

They both provide address translation (routing) between internal and external numbering plans and also provides admission control, specifying which device can call which number.

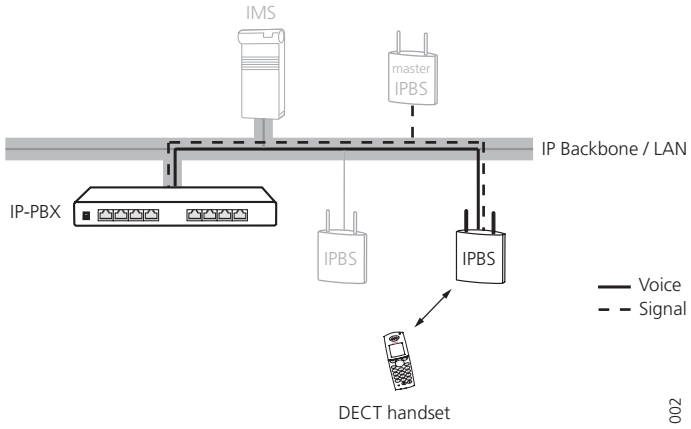

Figure 2. Voice/signal transmission

External Call to/from the DECT Handset

1 The DECT handset associates with the closest base station (the base station with the best signal quality and strength).

2 The base station establishes a signalling connection to the master.

3 A call setup request is sent to the IP-PBX.

4 The IP-PBX finds the receiving part and sets up the call.

5 The voice packets are sent directly between the base station and the IP-PBX.

3.1.1 Roaming and Handover

The IP-DECT system supports roaming between all base stations in the system. It also supports handover if there is overlapping speech coverage between base stations.

Roaming and handover is supported by all Ascom DECT Handsets.

3.2 Messaging Functions

A message to a cordless handset can be generated either from the message tool in the IMS, contact inputs directly on the IMS, or SMS between the handsets. The message can be initiated by, for example closing (or opening) a contact.

Cordless handsets supporting messaging functions are required. Messaging functions in cordless handset are described in respective User Manual

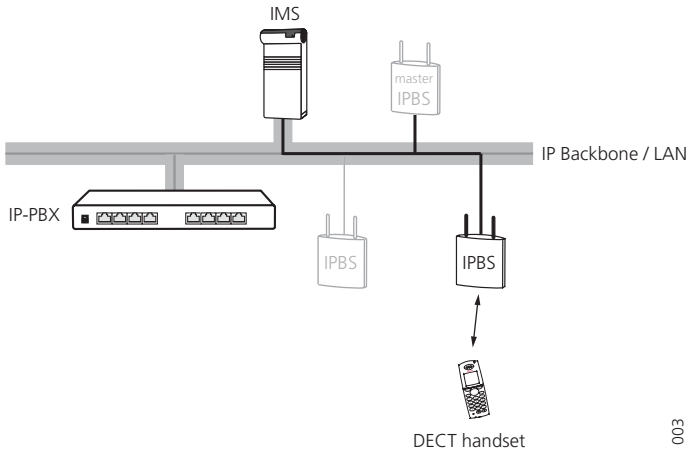

Figure 3. Message transmission

Send Message to/from the DECT Handset

1 The DECT handset associates with the closest base station.

2 The base station establishes a connection to the master.

3 The DECT handset sends the message to the IMS via the Master.

4 The IMS forwards the message.

3.2.1 Customized Groups

IMS has an integrated Group Handler enabling the creation of 30 groups with up to 15 users in each group, and 1 group with up to 50 users. By adding an ESS to the system larger and more groups with enhanced functions are enabled.

3.2.2 Messages with Manual Acknowledge Request

Messages with a manual acknowledge request must be acknowledged by the user of the cordless handset. A message with a manual acknowledge request can be sent from the Alarm Module, a Serial Interface connected to external equipment. It can also be sent from the IMS (BAM), NetPage, or a customized application via the OAS, in the Unite System.

If the module or external equipment sending the message does not receive the manual acknowledge, it can send the message to other cordless handsets or take other actions.

3.2.3 Messages with Delivery Receipt Request

When a message with a delivery receipt request is sent to a handset, the handset automatically sends an acknowledge when the message is received. Messages with a delivery receipt request can be sent from an Alarm Module, a Serial Interface connected to external equipment. It can also be sent from the IMS (BAM), NetPage, or a customized application via the OAS, in the Unite System.

3.2.4 SMS (Short Message Service)

SMS can be sent between handsets within the system, and it is also possible to send an SMS to a pre-defined destination address. For more information see the User Manual for respective Cordless Handset.

3.2.5 Interactive Messaging

Interactive messaging makes it possible for a client application to have a two-way communication in plain language with a user of a cordless handset.

For more information see *Function Description, Interactive Messaging (IM)*, *TD 92168GB*.

3.2.6 Broadcast Messaging

With Broadcast messaging it is possible to deliver one message to all users in the system simultaneously. When a message is sent as a broadcast all handsets in the coverage area can receive the message. The system does not get a delivery receipt from the handsets, but the message is sent three times to increase the reliability of the transmission.

An ESS with basic licence and cordless handsets 9d24 Messenger or Protector versions are required.

3.2.7 Absence Handling

Three different types of absence are supported by the system; Automatic-, Manual- and Late absence. When absent, messages can be diverted to another cordless handset.

Automatic Absence is an option that can be set in the cordless handset. Information is then sent to the IMS when the cordless handset is placed in or removed from the charger.

Manual Absence is a function programmable in the handset as a "Hot Key". Absent on/ off can be selected and sent to the IMS.

Late Absence is a function that is used when the cordless handset can not be reached, for example when it is out of coverage

For more information see *Function Description, Number Planning and Message Routing in Unite*, *TD 92554GB* and *Function Description, Absence Indication*, *TD 92101GB*.

3.2.8 Data from Handset

It is possible to send user data from the cordless handset as *"Data Send"*. This data is defined by the user and is transmitted by pressing a hot key on the handset. The data is sent to the Unite System for distribution to interface modules, for example the Alarm Module, the Output Module, the AMS, or via the OAS to a customized application.

User data can for example be used for opening/closing a door by activating an output connected to a relay on the Output Module, or activate the Alarm Module to send a pre-programmed text message to other cordless handsets.

For more information see, *Function Description, Applications based on Sending Data from handset*, *TD 92095GB*.

3.2.9 DECT Phonebook Service

DECT Phonebook Service is delivered together with the IMS. The function enables access to a centralized telephone number directory from the cordless handset. The telephone directory may be located in the site database or in any MSSQL-compliant database.

DECT Phonebook Service has the same function as the IMS Phonebook. The difference is that the DECT Phonebook service has support for a database that contains more entries. IMS Phonebook and DECT Phonebook service can be used at the same time as long as they have separate addresses.

3.3 Alarm

Alarm messaging includes all types of alarm from handsets, location etc. Cordless handsets equipped with alarm functions can send different types of alarm messages to the Unite System. The data can be sent to interface modules, for example an Alarm Module or Output Module. The Alarm Module is used to generate group messages to other cordless handsets while the Output Module activates outputs connected to signal lamps or sirens.

Alarm messages can also be sent to an Alarm Manager Server (AMS) for further actions. The AMS can for example activate an output connected to a signal lamp or siren, or present the alarm on a PC with equipped with the AMC software (an Alarm Management Client). The PC can besides the identity, alarm type and time also display the location graphically.

For more information see the document: *Function Description, Alarm from Handsets, TD 92099GB*.

3.3.1 Alarm with data

Additional data for, example a location code, can be sent along with an alarm. The data and type of alarm can be presented on an Alarm Management Client, but it can also be indicated by an Alarm- or Output Module.

For more information see the document: *Function Description, Alarm from Handsets, TD 92099GB*.

3.3.2 Alarm with Base Station Location

An approximate location of the cordless handset is possible to add to an alarm sent from the handset. The handset evaluates at alarms the field strength ratio of the individual radio IPBSs and sends the best-rated base station as a location of where the alarm was activated. However, positioning based on radio field strength measurements must be regarded as an indication only.

The type of alarm and the location of the handset can be presented on an Alarm Management Client (AMC). The AMC client can besides the identity, alarm type and time also display the location graphically. The alarm can also be indicated by an Alarm- or Output Module.

For more information see the document: *Function Description, Alarm from Handsets, TD 92099GB*.

3.3.3 DECT Location

With DECT Location it is possible to send an alarm with the two latest location codes. This makes it possible to decide in which part of a building a person is located, and in which direction he is moving. It does not give an exact location from where an alarm is transmitted but, depending on how many location devices 9dLDs that are used, a high precision of the location can be achieved.

For more information see the document: *Function Description, DECT Location*, *TD 92177GB*.

3.4 Priorities in the IMS

Messages are distributed first-hand in priority order and secondly, for messages with same priority, in time order. If distribution of a message fails it returns to the queue but is now the last in time order. A message can be sent three times.

The different priority levels have reserved places of the max. 10 places for active messages. Alarm has 2, high priority has 3, and normal priority has 5 reserved places. But, Alarm is allowed to use all ten places and high priority is allowed to use the five places used for normal priority.

3.5 Capacity

Alarm Messages from Cordless Handset

Time until received in the Unite system:	*~ 2 sec*

Incoming Messages to Cordless Handset 9d24 (version 3.0 or later)

The time for a message to be delivered differ dependent on how many characters the message contain and if it is delivered to a single handset or a group of handsets.

Number of message characters:	*No of Cordless Handsets:*	*Time in seconds until **one handset** is paged:*
20 characters	1	*~ 3*
120 characters	1	*~ 3*
240 characters	1	*~ 4*
500 characters	1	*~ 7*

Number of message characters:	*No of Cordless Handsets:*	*Time in seconds until **all handsets** are paged:*
20 characters	1 10 30 100	*~ 3* *~ 4* *~ 11* *~ 32*
120 characters	1 10 30 100	*~ 3* *~ 4* *~ 13* *~ 39*

Incoming Messages to Cordless Handsets in a Broadcast Group

Number of message characters	*No of Cordless Handsets:*	*Time in seconds until **the group** is paged:*
20 characters	Unlimited	*~ 3*
120 characters	Unlimited	*~ 4*
240 characters	Unlimited	~ 7
500 characters	Unlimited	*~ 13*

3.6 Channel Distribution

When a handset is used for speech, message, or alarm it always occupies one channel. However, when a handset is used for speech it can send or receive a message or an alarm on the same channel.

3.6.1 BS3x0 Connected to the IPBL

The BS3x0 that is connected to the IPBL has in total twelve channels used for communication with the user of a handset. One channel is reserved for broadcast messages. Alarm from handset can occupy eleven channels. Messages to/from handsets can occupy ten channels but only eight speech calls can be handled simultaneous, see figure 4.

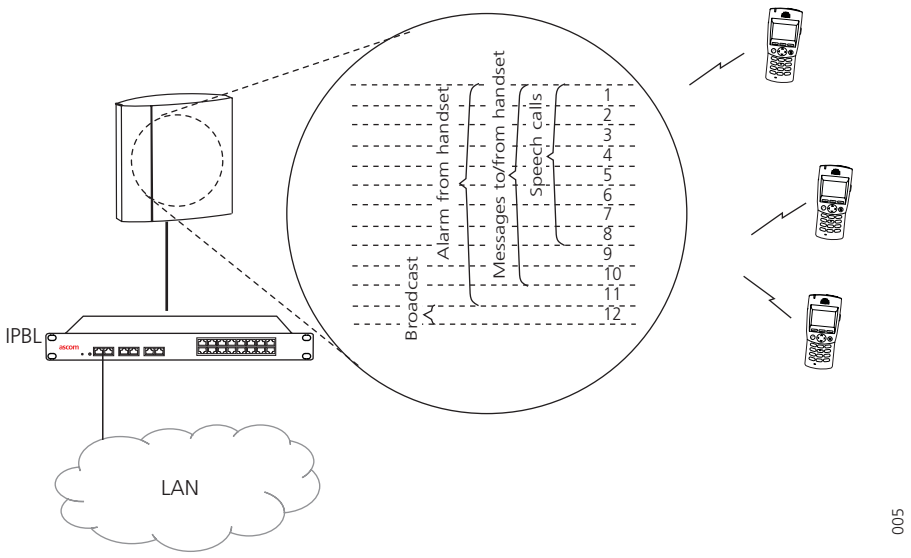

Figure 4. Channel distribution in the BS3x0 connected to the IPBL.

This means that even if a BS3x0 reports that it is busy i.e. fully occupied with speech calls and/or messaging, there are always channels free for alarm from handset and broadcast messages.

3.6.2 IPBS

The IPBS has in total twelve channels used for communication with the user of a handset. One channel is reserved for broadcast messages and two channels are reserved for

synchronization. Alarm from handset can occupy nine channels but only eight speech and/or messaging can be handled simultaneously, see figure 5.

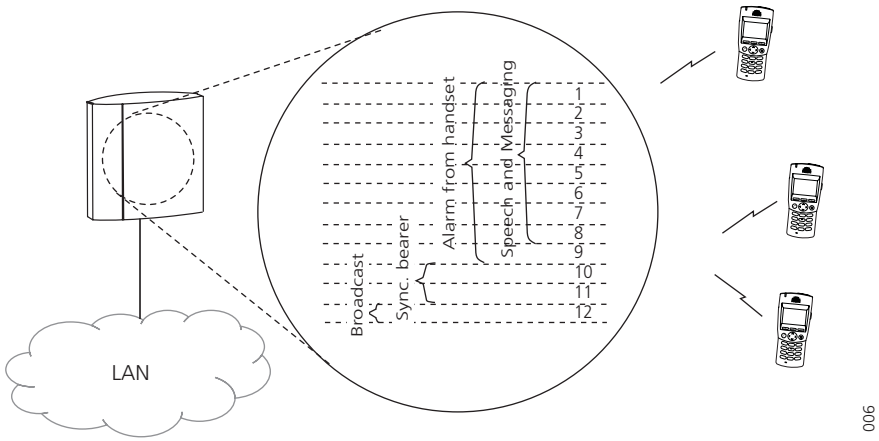

Figure 5. Channel distribution in the IPBS.

This means that even if a IPBS reports that it is busy i.e. fully occupied with speech calls and/or messaging, there are always channels free for alarm from handset and broadcast messages.

4 Configuration notes for Ascom VoIP Gateway

The following configurations must be done for an IP-DECT system using the Ascom VoIP Gateway as a gatekeeper. For all other configuration settings see the installation manuals for the IPBS/IPBL and the VoIP Gateway.

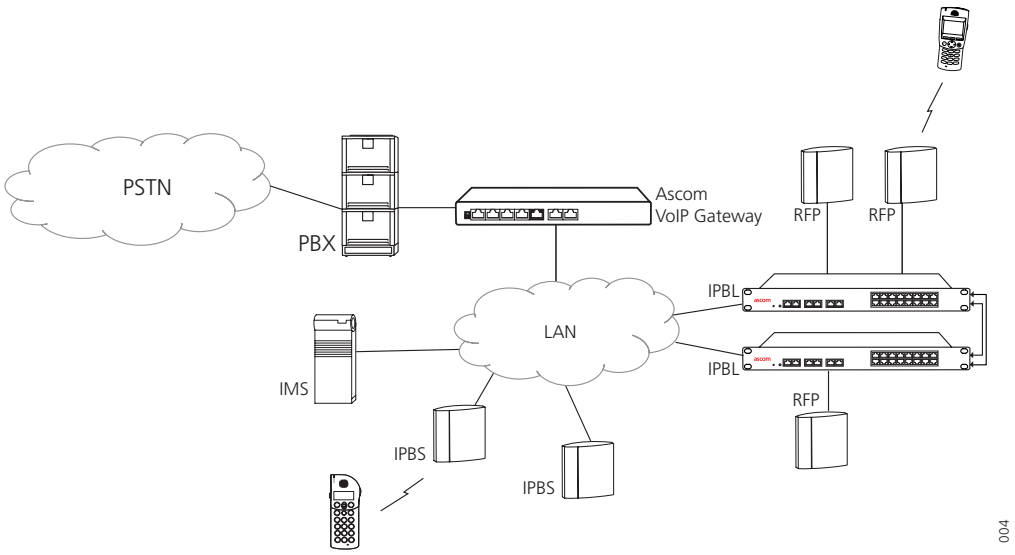

Figure 6. Ascom IP-DECT system overview

4.1 Configure LDAP

It is recommended to use the VoIP Gateway as an LDAP server.

Create an LDAP user in the VoIP Gateway:

1 Select LDAP.
2 Enter a user name and a password in the *User* and *Password* text fields respectively.
3 Select the *Write Access* check box.
4 Click "OK".

Set all IPBS/IPBLs to be LDAP replicators:

1 Select LDAP -> Replicator.
2 Enter the VoIP Gateway IP address in the *Server* text field.
3 Enter the user name and password in the *User* and *Password* text fields respectively.
4 Click "OK".
5 Repeat for all IPBS/IPBLs in the system.

4.2 Set PBX Password in the VoIP Gateway

Set PBX password in the VoIP Gateway:

1 Select PBX -> Password.
2 Enter and retype a password in the text fields.
3 Click "OK".

4.3 Add System Object in the VoIP Gateway

A system object need to be added in the VoIP Gateway:

1 Select PBX -> Objects.

2 Select "DECT System" in the drop-down list and click "New".

3 Enter the IP-DECT system name in the *Long Name* and the *Name* text fields. Leave all other fields empty.

4 Click "OK".

4.4 Enter system name in the IPBS/IPBL

1 Select DECT -> System.

2 Enter the system name in the *System Name* text field. This must be the same name used as *Long Name* and *Name* in 4.3 *Add System Object in the VoIP Gateway* on page 12.

3 Enter a password in the *Password* text field. This must be the PBX password selected in 4.2 *Set PBX Password in the VoIP Gateway* on page 11.

4 Repeat for all IPBS/IPBLs in the system.

4.5 Handset Features

The following features are supported by IP-DECT system using the Ascom VoIP Gateway as a gatekeeper:

- Calling Line Identification Presentation (CLIP) or Calling Name Identification Presentation (CNIP)

  The number or name of the calling party is shown in the cordless handset display.
- Call Transfer (CT)

  The call is handed over to another subscriber.
- Call Forwarding Unconditional (CFU)*
- Call Forwarding on Busy (CFB)*

  The call is forwarded to another subscriber, an external number, or voice mail, when subscriber is busy.
- Call Forwarding No Reply (CFNR)*

  The call is forwarded to another subscriber, an external number, or voice mail, after a delay.
- Do Not Disturb (DND)

  The call is forwarded to another subscriber, an external number, or voice mail, when set.
- Call Waiting (CW)
- Call Completion Busy Subscribers (CCBS)*

  On encountering a busy line, it notifies the caller when the line becomes free.
- Message Waiting Indication (MWI)

  MWI is used to notify the end user that there is a message waiting in a voice mail system.
- Enquiry

  A call is put on hold while setting up a call to another subscriber.
- Brokering

  Switching back and forth between two calls.
- DTMF dialling
- Ring signals

  Different signals for internal and external calls. Calls from extensions within the main PBX will be treated like internal calls.
- Idle display/In call display

  *) Normally invoked from the handset but can also be programmed in the Ascom VoIP Gateway.

5 Related Documents

System Description, Ascom IP-DECT System	TD 92375GB
Considerations for Ascom IP-DECT System Planning	TD 92422GB
Function Description, Configuration Notes for Cisco Call Manager in Ascom IP-DECT System	TD 92424GB
Installation and Operation Manual, IP-DECT Base Station & IP-DECT Gateway	TD 92372GB
Installation and Operation Manual, VoIP Gateway	TD 92326GB
Function Description, Interactive Messaging (IM)	TD 92168GB
Function Description, Number Planning and Message Routing in Unite	TD 92554GB
Function Description, Absence Indication	TD 92101GB
Function Description, Applications based on Sending Data from handset	TD 92095GB
Function Description, Alarm from Handsets	TD 92099GB
Function Description, DECT Location	TD 92177GB

Document History

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

	Date	Description
A	2006-06-02	First released version.
B	2007-01-15	New structure.
C	2007-04-20	IP-DECT Gateway added.
D	2007-12-10	Channel Distribution added.