

System Planning for Broadcast and Multicast in DECT Systems

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1 Introduction

This document covers the special requirements that need to be considered when planning a system for broadcast and multicast messaging. A background is given to explain why special requirements apply.

2 Quality of Service with regard to Broadcast and Multicast messaging

2.1 Individual messaging

Individual messaging is the main messaging method used in the Ascom 9d, Ericsson DECT and Aastra Intelligate DECT systems. When using individual messaging a message is sent to each individual handset at a time regardless if the individual receiving user is part of a group or not. The message is sent to the handset and, if received, confirmed on a technical protocol layer. If it is not received it will be retransmitted a number of times. If it still does not find the handset, (the handset may be out of reach or in interfered environment) a negative response will be sent back to the sending application. This ensures that the sending application can rely on the system and that the sender knows that the alarm or message always is delivered and thus ensures a high Quality of Service.

Individual messaging can be seen as an open link/pipe between the sending application and the receiving handset, see [figure 1](#). The same method of handshaking is used in the opposite direction, that is when a handset sends an alarm or message towards an application.

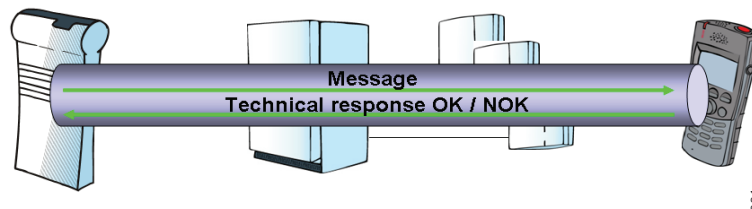


Figure 1. Individual messaging

Advantage of sending individual messages:

- Safe transmission.

Disadvantage of sending individual messages:

- Limited number of handset users that can receive a message within a certain time period, since it reserves radio, call and messaging capacity.

2.2 Broadcast and Multicast messaging

The Ascom 9d system is capable of sending so called broadcast and multicast messages. The broadcast or multicast message can be sent in the application to handset direction only. These messages are without any handshake procedure between the base stations and the handsets (see [figure 2](#)), instead a number of retransmissions are being made to increase the probability of a complete transmission. The sending application receives a confirmation that the message has been sent and received by the radio exchange/base stations but not the handsets.

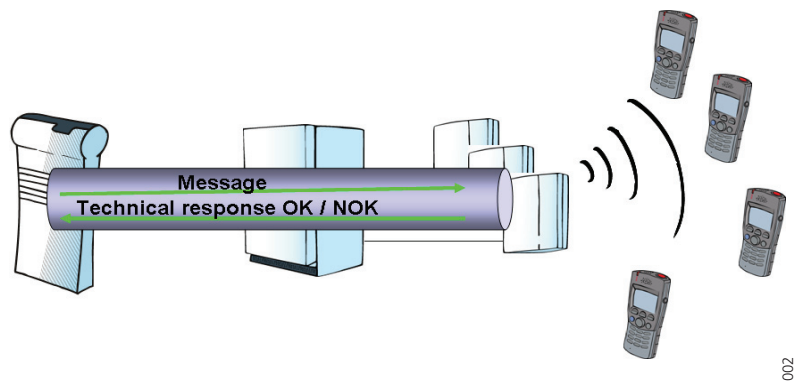


Figure 2. Broadcast and Multicast messaging

Advantage of sending broadcast/multicast messages:

- Quick transmission to a large number of users
- Low system capacity usage

Disadvantage of sending broadcast/multicast messages:

- No individual technical confirmation, thus lower security

2.3 Quality of Service factors

The main factors determining Quality of Service for broadcast and multicast messaging are:

- Signal strength - at low signal strength errors will occur in the transmission.
- Message length - the risk that errors occurs during message transmission increases with the length of the message.
- Radio reflections - reflective environment increases the risk of errors during the transmission.
- Other unsynchronised DECT systems - other DECT systems may interfere, this increases the risk of errors during the transmission.
- High traffic load on the system - high load increases the risk of errors during the transmission

If these factors are considered when planning the system, the broadcast or multicast messaging will have a high Quality of Service. See [2.5 How to Achieve a High QoS](#) on page 3 for a step by step plan to reach high QoS.

2.4 Signal Strength Impact on QoS

The following example illustrates the impact signal strength has on the QoS in a system planned for broadcast or multicast messaging.

To ensure a QoS of 99.9% (based on default three transmissions) for a message with 140 characters a field strength higher than -89dBm is needed. This field strength is then without safety margin for directional differences, fading, bit errors, body absorption or other environmental factors.

For the field strength the following environmental factors should be considered:

- The field strength is reduced up to 15dB due to the different directions a handset can be positioned in,
- The field strength is reduced up to 16dB due to body absorption and

- The field strength is reduced up to 20dB due to fading.

The worst case is when a message is received in a situation when all these factors are present simultaneously. To ensure that a message can be received in the worst case situation the field strength needs to be -34dBm (-89+15+16+20). In this case the ear piece is directed towards the hip with the body between the base station and the handset.

There is a probability that all these environmental factors are present at the moment of a broadcast or multicast message, but the probability is very small and high QoS can be achieved at lower field strengths. It is important to understand that broadcast and multicast messaging has a strong requirement on the field strength and that broadcast and multicast messaging should be used to send out messages to a big crowd quickly instead of using it as a method for critical alarms for smaller groups.

An appropriate value for installations where broadcast and multicast shall be used is to always have field strength above -65dBm.

2.5 How to Achieve a High QoS

Follow the steps below to achieve a high Quality of Service for broadcast and multicast messaging:

- Do a site survey for broadcast and multicast messaging. This will ensure coverage and radio link quality suitable for broadcast and multicast messaging. Included in the site survey is elimination of disturbing alien base stations as well as identifying and avoiding reflective environments, see [4 Site Survey for Broadcast and Multicast Messaging](#) on page 4.
- Activate the "Base station positioning" functionality in the 9d24 and 9d24MkII handsets in order to ensure synchronization with nearest base station. The handset will evaluate the environment more often and make sure it is locked to the strongest base station; this will in turn increase the QoS. The functionality is controlled by a SIM parameter named "Base station positioning" found in the Settings folder in the SIM Card Programmer. Note: This will reduce the stand by time with up to 20%.
- The size of the message will affect the QoS. Keep the messages short; a recommendation is below 140 characters. For example are complex Interactive Messages not suitable to send as broadcast and multicast.
- Do not use multicast for groups with less than 10 members. In that case individual messaging is superior.
- Repetition of the message from the sending application is strongly recommended for broadcast messages with high priority, for example fire alarm.

3 Summary

Correctly used in a correctly configured system, broadcast and multicast messaging is a powerful way of distributing messages quickly to a large number of receptors. But always bear in mind the special requirements compared to individual messaging. Failing to take those in consideration will affect the QoS. Note that a message transmission that fails during the air transmission can not be identified by the system nor will the handset show any sign of the failure.

In order to avoid a lot of subsequent problems, it is essential to inform the client of the pros and cons of broadcast and multicast messaging as well as the need to meet the special requirements attached. Ensure that he/she in an early state is aware of that all areas or sites are not suitable for broadcast and multicast messaging since the radio quality requirements can not always be reached.

It is also important to understand that broadcast and multicast messaging shall not be used for critical messages.

4 Site Survey for Broadcast and Multicast Messaging

For information on how to make a site survey for broad- and multicast messaging, see *User Guide, Site Survey Tool, TD92220GB* in chapter *Site Survey for Broadcast and Multicast Messaging*.

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	Date	Description
A		First version