9.4 Principle of the Wireless Infrastructure

In an environment consisting mainly of wireless devices, a full wireless infrastructure can be achieved using a wireless gateway (NIRC3 + NUREP) in combination with wireless repeaters (NUREP), To create a wireless gateway, a wireless repeater (NUREP) is connected via a USB cable to a room controller (NIRC3).

The wireless gateway is located at a location with access to the IP-network. Surrounding this location repeaters (NUREP) will be used to relay the wireless messages towards the wireless gateway in three subnets containing a maximum of four repeaters per subnet.

Key advantages of using a wireless infrastructure over a wired infrastructure are:

- Reduced installation costs because less cabling and labour are required.
- Higher flexibility during system planning.
- Easier to expand.
- Less or no disturbance of residents in case of renovation.

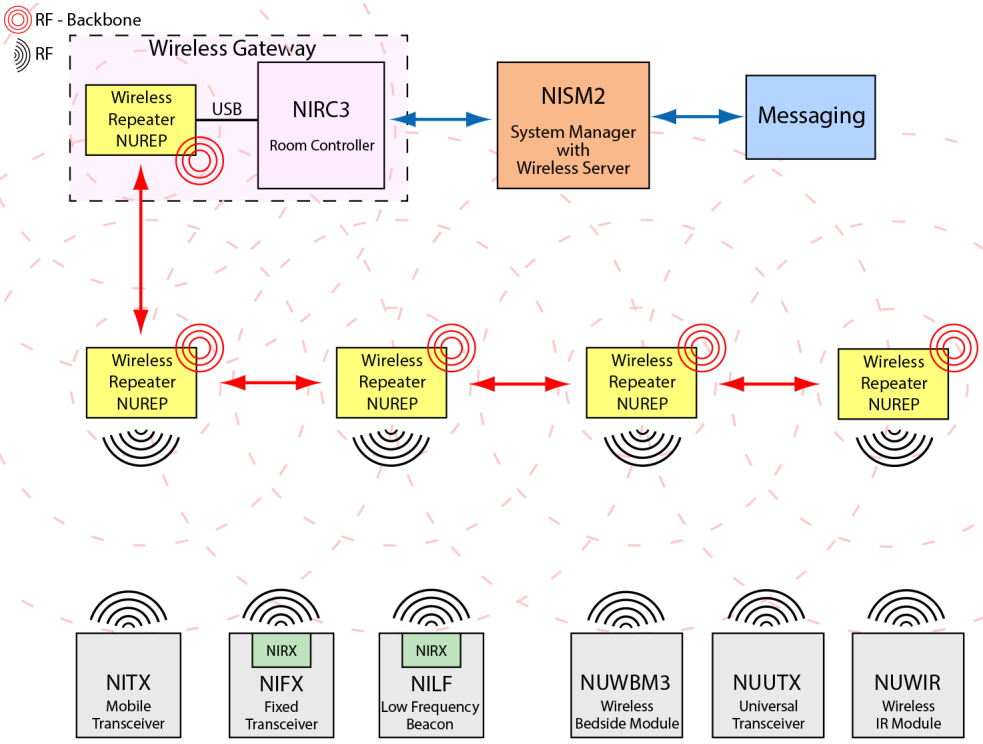


Figure 48. Wireless infrastructure principle

Note: *The wireless infrastructure is compatible with the teleCARE IP wireless functionality using room controllers (NIRC3) with NIRX mounted. Be aware that wander management requires hard wired devices to function, therefore wander management will not function when using a full wireless infrastructure only.*

9.5 Wireless Infrastructure RF Planning Considerations

A wireless device must be seen at all possible locations. To avoid an overload of RF messages from being sent to the wireless server, a message should (preferably) only end up at one wireless gateway segment, which consists of multiple wireless repeaters and a gateway. At certain overlapping segments it could be possible that a message ends up at multiple gateways, but never more than two (maximum three/four in a worse case scenario).

In each wireless segment, a wireless repeater must be able to see the next and the previous wireless repeater in the subnet at all times, all the way up to the wireless gateway. The status of the wireless repeaters in a wireless infrastructure are constantly monitored and a peripheral lost message will be generated if a section fails to respond. During configuration, the status of wireless gateway(s) and wireless repeaters are also visible through the system overview tab in the NISM, available under “Diagnostics -> System Overview”, refer to Emergency Call System Configuration Manual TD 93019US for detailed information.

If a valid message is received by multiple repeaters in one or more subnets of a single gateway segment, the gateway will directly transfer the first instance of the message it received towards the wireless server for processing. If afterwards an instance with a higher RSSI value is received, it will be transferred to the wireless server for updating the RSSI location. For RSSI location determination, RSSI values are only updated for mobile transceivers like the NITX, this is not required for fixed wireless transceivers like the universal transmitter NUUTX.

Although the wireless gateway will filter out most of the duplicate messages in its segment, it is important to carefully plan the locations of the wireless gateways and repeaters throughout a site. For example, avoid placing multiple wireless gateways too close to each other around a central location, there this will generate a lot of traffic towards the wireless server, when a wireless message is received by multiple gateways.

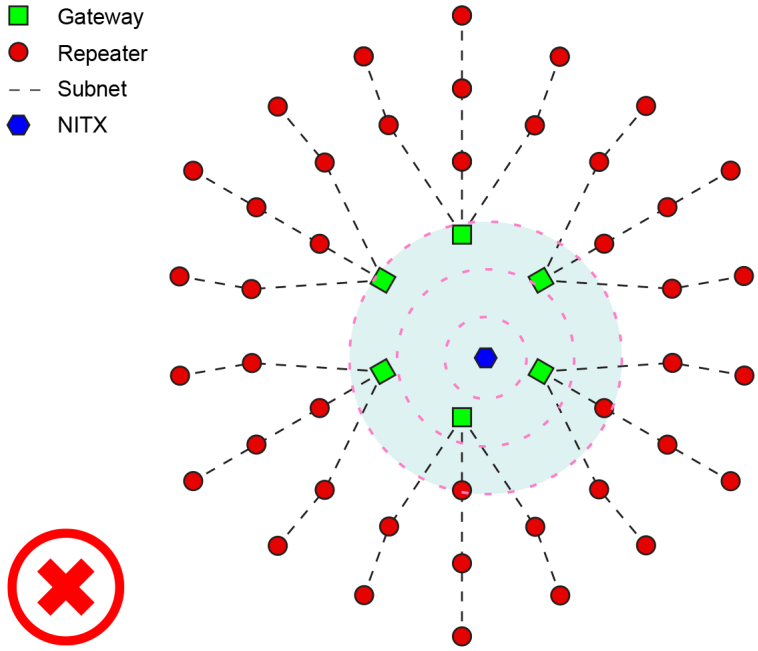


Figure 49. Wireless gateways mounted too close to each other

Setup a wireless segment in such a way that the repeaters are surrounding the gateway. This will result in wireless gateways being mounted further apart, therefore reducing the risk of overloading the wireless server.

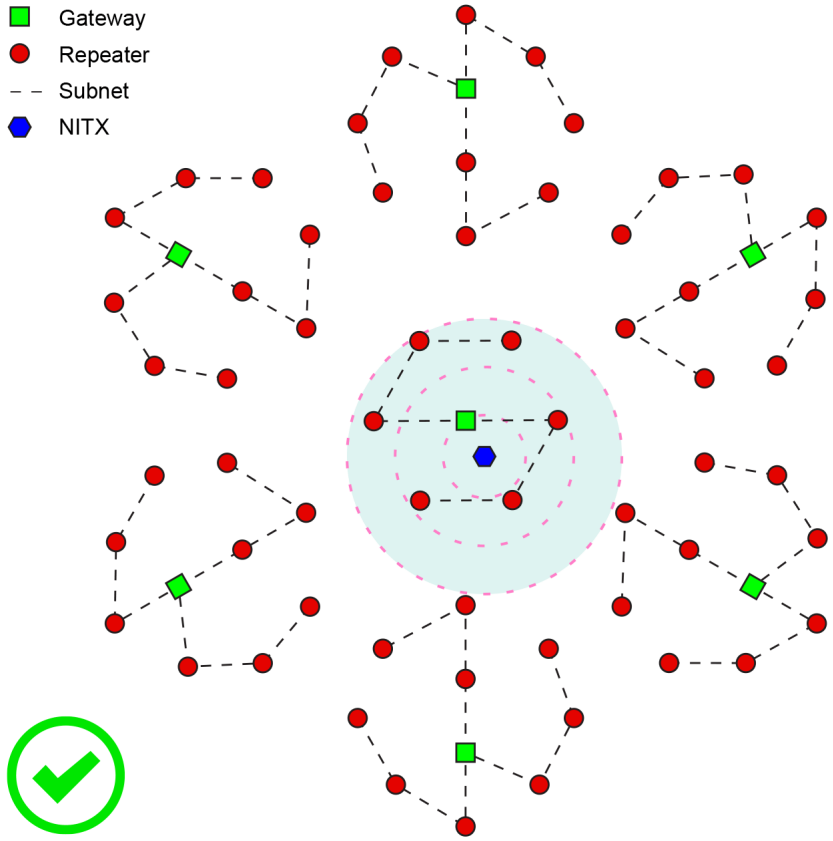


Figure 50. Correctly mounted wireless gateway segments

Multi-storey building configuration

A similar approach should be considered for multi-storey buildings. Mounting wireless gateways directly above each other on the individual floors can result in overloading the wireless server when a wireless message is received by too many gateways at the same time.

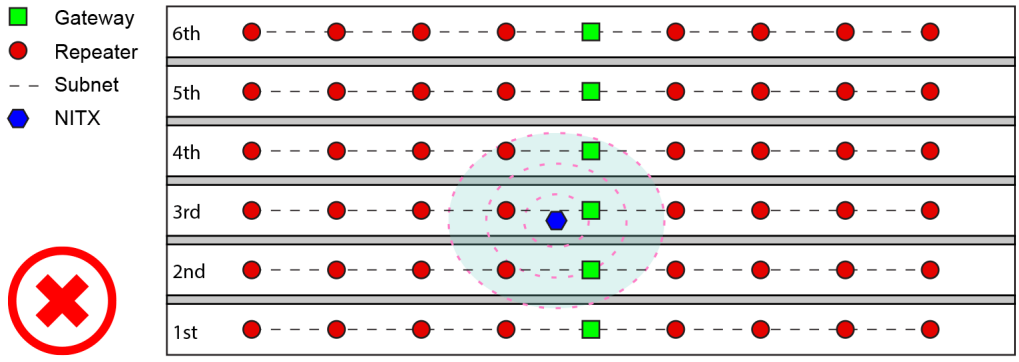


Figure 51. Wireless gateways sections mounted too close to each other

Spreading the repeaters connected to a single gateway across multiple floors will result in less traffic being forwarded towards the wireless server.

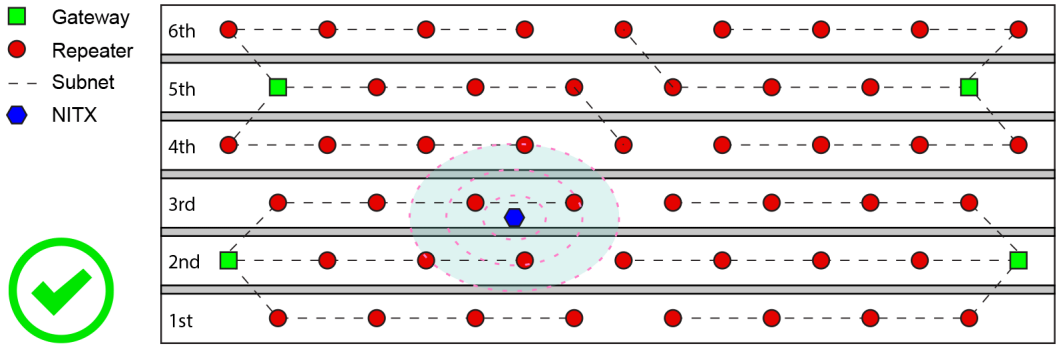


Figure 52. Correctly mounted wireless gateway segments

Note: *Be aware that walls and floor/ceilings will reduce the range of RF transmissions. So make sure that the repeaters in a subnet are able to receive messages from the next and the previous repeater/gateway in the chain.*

9.6 teleCARE IP Wireless Components

9.6.1 NUREP Wireless Repeater

The wireless repeater (NUREP) is a surface (wall) mounted teleCARE IP wireless infrastructure building-block. Wireless repeaters receive the signals from the wireless modules from residents and all the wireless modules in the resident room. Wireless repeaters also retransmit these signals to the central equipment (wireless gateway), via other wireless repeaters.

Wireless repeaters are dual RF transceivers. One RF transceiver (916 to 921 MHz) is used for the local traffic, events from the resident pendant, wrist transceiver or the fixed wireless modules in the room. A 2.4 GHz IEEE 802.15.4 transceiver (supporting channels 15, 16, 20, 21 and 25) is used for transmitting the events to the other wireless repeaters, thereby creating a wireless backbone that is capable of handling high traffic.

Wireless repeaters are used to create a wireless infrastructure that covers the whole site. Wireless repeaters are mainly used indoors, however when using a suitable weatherproof enclosure that meets local electrical code, outdoor use is possible.

Repeaters are supervised by the central equipment. Repeaters deliver a complete 2-way radio infrastructure, from the wireless device at the resident or room, to the central equipment.

Wireless repeaters are DC-powered via a 5 VDC Class II power adapter that comes included with the repeater. Wireless repeaters also have a battery backup source providing power for approximately three days, in case of mains power failure.

Figure 53. Wireless Repeater - NUREP

9.6.2 Wireless Gateway

The wireless gateway, consisting of a combination of the NIRC3 + NUREP is the interface between the wireless infrastructure and the teleCARE IP central equipment (system manager). The wireless gateway is the central receiver receiving the RF signals of the repeaters and the RF signals of the wireless devices that are in the direct vicinity of the wireless gateway.

Figure 54. Wireless repeater consisting of an NIRC3 and a NUREP

The wireless gateway is a combination of two products:

- The repeater (NUREP). To receive the RF signals from the repeaters.
- A room controller (NIRC3) to relay the signals from the repeater to the local area network and the system manager (NISM).

9.6.3 NUWBM3 Wireless Active Bedside Module

The wireless bedside module (NUWBM3-HU) is a wall mounted teleCARE IP wireless peripheral containing a 916 - 921 MHz RF transceiver. It comes with a spacer and installation kit for surface mounting.

The NUWBM3 has 3 customizable function buttons with configurable color button inserts and a magnetic SafeConnect socket. Each button has a customizable color-matching LED that lights up when pressed, for reassurance. When an (optional) 5 VDC power supply is used the LEDs are permanently back-lit for easy location in the dark. Based on the chosen configuration the buttons can activate a normal, assistance, emergency call and a staff presence.

The wireless bedside module includes a SafeConnect socket for the connection of the NUHS1B (one-button) handset. A handset connected status LED lights up for a couple of seconds to indicate that the handset is properly connected. When the bedside handset is disconnected, a disconnect alarm is generated to inform the staff.

Note: *3, 7 and 14 button handsets are not supported.*

The wireless bedside module requires 2 x 1.5V AA Alkaline batteries (not included). An automatic low battery warning is transmitted if the battery voltage falls below 2.4V. Under normal circumstances the battery life is approximately two years. Alternatively, a 5 VDC Class II power adapter (UL approved) can be used. When battery powered the LEDs stay active for a period of 36 seconds after a call has been made. When externally powered the LEDs stay active until the call has been cancelled.

The wireless bedside module is suitable for use in senior care homes and other healthcare facilities.

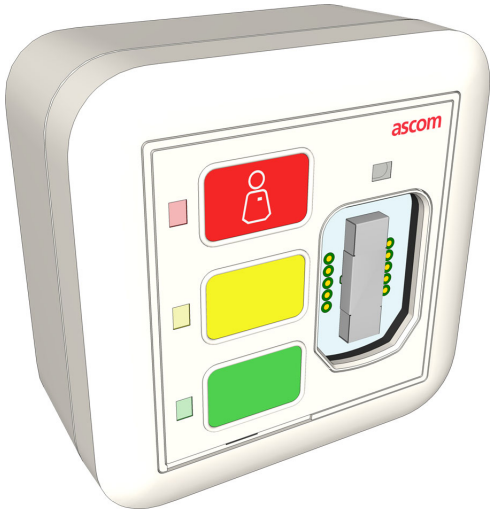


Figure 55. NUWBM3

9.6.4 NIRX teleCARE IP Transceiver

The NIRX transceiver is a printed circuit module which is piggy back mounted on the NIRC3 room controller and the NIFX fixed transceiver. Mounting the NIRX will add wireless functionality to the NIRC3 room controller and the fixed transceiver. Optionally the NIRX can also be mounted on the NILF location beacon for actively monitoring the state of the NILF, such as tamper and low battery alarm conditions.

The NIRX has a 916 MHz to 921 MHz transceiver and each NIRX has a unique identity (ID) which is transmitted with every event.

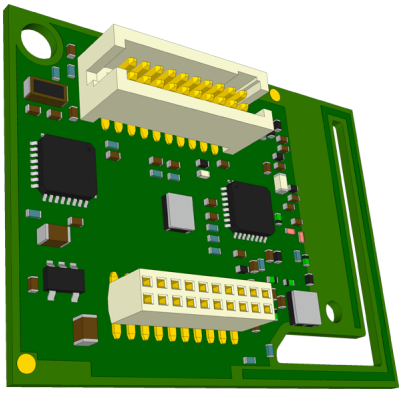


Figure 56. NIRX transceiver

The Location of the NIRX on the NIRC3

The piggyback mounting the NIRX on the NIRC3 room controller to enable wireless functionality.

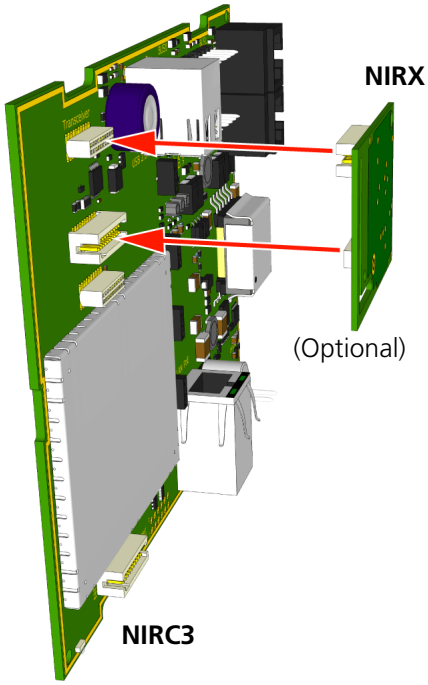


Figure 57. The location of the NIRX transceiver on the NIRC3 and NIFX

The Location of the NIRX on the NITX

The piggyback mounting the NIRX on the NIFX room controller enables wireless functionality.

Note: *The NIFX is delivered with an NIRX mounted from the factory.*

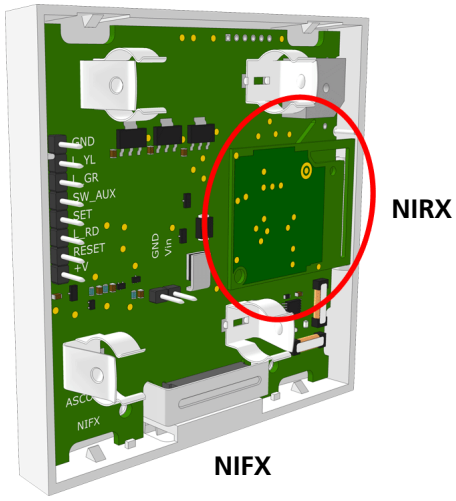


Figure 58. The Location of the NIRX on the NITX

Mounting the NIRX on the NILF

If monitoring the LF beacon (NILF) through an RF heartbeat signal is required then the NIRX must be mounted on the NILF circuit board. The NIRX can also send an alarm upon front cover removal detection (tamper alarm) or to send a low battery alarm.

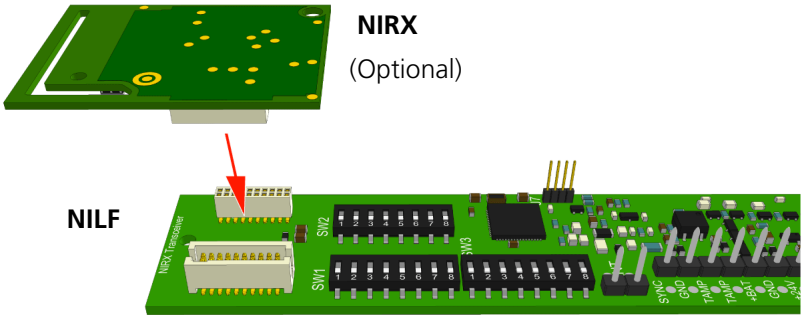


Figure 59. Piggyback mounting the NIRX module on the NILF

9.6.5 NIFX Fixed Transceiver

The NIFX series fixed transceiver is a wireless teleCARE IP switch module which is available as socket module or pull cord module. It has 3 function buttons, a white plastic body and includes a spacer for surface mounting. The pull cord version includes the cord with two red balls but no socket. It is capable of functioning as a stand-alone fixed transceiver or in combination with standard hard-wired teleCARE IP switch modules when external power supply is used.

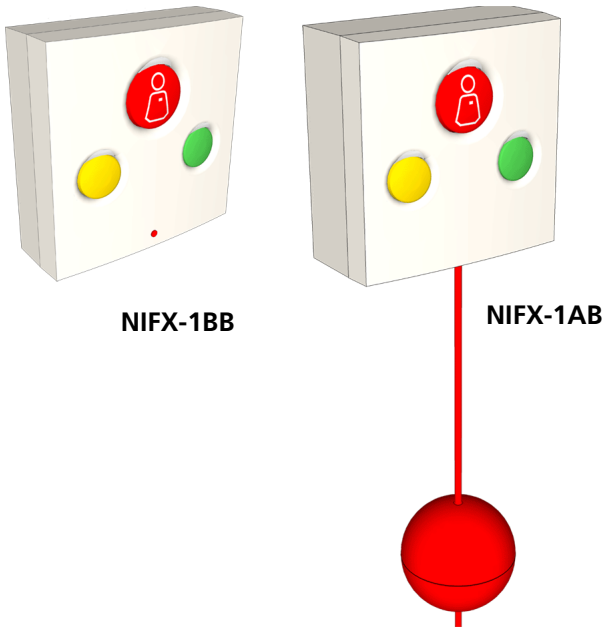


Figure 60. NIFX wireless switch module and pull-cord module

Every fixed transceiver requires an NIRX transceiver which is piggyback mounted on the NIFX board. Each NIRX has a unique identity (ID) and this ID is transmitted with every event from the fixed transceiver.

The fixed transceiver requires 2 x 1.5V AA disposable batteries. An automatic low power warning is transmitted by the fixed transceiver if the battery voltage falls below an acceptable level of 2.4V.

The battery voltage is continually monitored and if low voltage is detected a “low battery” alarm is transmitted as part of the heartbeat transmission of the unit. Under normal circumstances the battery life is approximately one year.

The fixed transceiver sends a “Heartbeat” signal at 4 minute intervals. If the wireless server does not receive the heartbeat signal within a predetermined period then it is assumed that the transceiver has failed or is missing and an alarm will be automatically generated.

The fixed transceiver includes 1 red button, 1 yellow button, 1 green button and 1 pull cord switch. The buttons can activate a normal, assistance, emergency call and a staff presence.

The pull cord version generates a bathroom call and is supplied with a permanently attached 50mm length of pull cord. The pull cord is supplied as a kit consisting of a 2m length of red plastic covered nylon cord and two red balls.

The pull cord balls are designed so that the two halves of the ball break apart if the cord is pulled with excessive force. This prevents injury and damage to the switch. The two halves of the ball can be simply snapped back together.

The fixed transceiver includes an 8-pole connector for a hard wire of a conventional teleCARE M switch modules, or a dome lamp, or an external technical alarm contact (N/O).

The fixed transceiver LEDs stay active for a period of 30 seconds after a call has been made, except for staff presence indication which stays active until it is cancelled by the staff.

Note: *Leaving a fixed transceiver in staff presence state will have a negative impact on the battery life time and therefore it is advised to power the NIFX externally when using an NIFX template that includes staff presence functionality.*

When externally powered, the red, yellow and green LEDs will permanently emit a low intensity light for locating and identification in the dark.

The socket module version of the fixed transceiver includes a teleCARE Safe Release socket for connecting the NIPH or NIPH2-B1A handset with handset disconnect alarm functionality. Speech/Entertainment handsets are not supported.

9.6.6 NITX Mobile transceiver

The NITX mobile transceiver is a wireless call unit for residents. It is robust and water resistant (IP 65).

The NITX mobile receiver is available in two versions:

- NITX-AAB for residents
  containing an 916-921 MHz RF transceiver, a call button and a reassurance LED
- NTX-BAB for residents
  containing an 916-921 MHz RF transceiver, a call button and a reassurance LED. It also contains a 125 kHz LF receiver used for call cancellation by a staff transceiver and for location determination using LF beacons.

Figure 61. teleCARE IP mobile transceiver (wrist and pendant)

The mobile transceiver is delivered with a plastic wrist strap so that it can be worn like a wrist watch. Alternatively, it can be placed in a pendant holder and attached to a lanyard so that it can be worn around the neck. The pendant holder and lanyard must be ordered separately.

The mobile transceiver is powered by a 3 volt lithium replaceable battery. The battery voltage is continually monitored and if low voltage is detected a “low battery” alarm is transmitted as part of the heartbeat transmission of the unit. Under normal circumstances the battery life is 1 to 1½ year.

A normal call is activated by a short press on the button, an assistance call is activated by pressing the button for longer than 3 seconds. When a call has been made, a delay of one minute will prohibit the NITX from sending updates (of the same call type) to prevent draining the internal buffer capacitor too fast, this will prevent triggering false battery low alarms.

A call can be cancelled locally by 1 long press followed by 3 short presses within 3 seconds. Remote cancelling can be done by a 3 button doorside module or a portable messaging device, such as an Ascom handset.

The mobile transceiver sends a "Heartbeat" signal at regular intervals (default 4 minutes). If the system fails to receive the heartbeat signal within a predetermined period then it is assumed that the transceiver has failed or is missing and an alarm will automatically be generated.

An infrared proximity detector which monitors the correct attachment of the mobile transceiver on the wrist is located at the back of the mobile transceiver.
If the mobile transceiver is removed from the wrist the infrared proximity detector will detect and automatically activate a "mobile transceiver detached" alarm.

A motion detector detects when the mobile transceiver is in motion. If a mobile transceiver stays motionless for more than two hours it will automatically activate a no-motion alarm.

9.6.7 NITX Staff Transceiver

The NITX-BBB staff transceiver is for staff members. It is robust and water resistant (IP 67).

Figure 62. teleCARE IP staff transceiver (wrist and pendant)

The NITX-BBB staff transceiver contains an 916-921 MHZ RF transceiver, a call button and a reassurance LED. It also contains a125 kHz LF transceiver used for cancelling calls from other NITX (BAB) and NIFX (1AB and 1BB) transceivers and for location determination using LF beacons.

The NITX-BBB staff transceiver cancels calls initiated from other NITX (BAB) and NIFX (1AB and 1BB) transceivers through an LF transmission and provides the identification of the staff member cancelling the call. A staff member can also initiate an assistance call from the staff transceiver when in need of assistance. It is used in the teleCARE IP system.

A call cancellation (LF transmission) is activated by a short press on the green button when in close proximity (up to 30cm) of a wireless call device that includes an LF receiver. An assistance call (RF transmission) is activated by a long press (more than 3 seconds) on the green button.

Mobile transceiver Accessories

Interchangeable rings, buttons and strap loops make it possible to customize the mobile transceiver body. The four types of rings, six buttons and four strap loops are available as accessories in a variety of colours which can be ordered separately. A special tool is supplied for removing the ring.

Figure 63. Mobile transceiver accessories

Replacement Rings

Dark gray

Metallic

Light gray

White

Ring mounting tool

Colored Buttons

Dark gray

Red

Metallic

Green

White

Orange

Continued on the next page

Colored Loops

Orange

Aqua

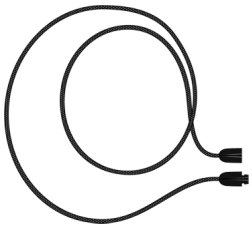
Orchid

Lime

Wrist Straps and Pendant Kit

Pendant holder

Pendant lanyard



Wrist straps

9.6.8 NUUTX Universal Transceiver

The universal transceiver module (NUUTX-HU) is a wall mounted teleCARE IP wireless peripheral containing a 916 - 921 MHz RF transceiver which can be mounted on walls, door or window posts.

The NUUTX has two independent inputs that can be used to interface external alerts coming from a wide variety of detectors and alarm contacts.
The inputs support:

- Normally open and normally closed contacts
- Flashing signals from 1 to 5 Hz
- A DC voltage from 10VDC to 30VDC

The NUUTX features a bi-polar magnetic sensor which in combination with the included magnet can be used to detect the open or closed state of doors and windows.

The NUUTX comes in a white plastic body with a mounting bracket and installation kit for surface mounting and is suitable for use in senior care homes and other healthcare facilities.

The NUUTX requires 2 x 1.5V AA Alkaline batteries (not included) with a battery lifetime of > 5 years. An automatic low battery warning is transmitted if the battery voltage falls below 2.4V.

Each NUUTX has a unique identity (ID) and this ID is transmitted with every event.

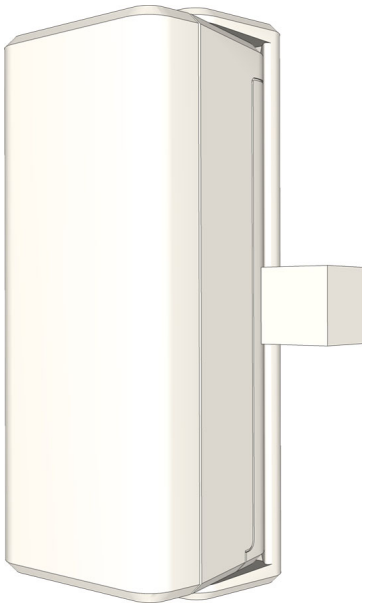


Figure 64. NUUTX Universal Transceiver

9.6.9 NUWIR Wireless PIR Module

The wireless infrared transceiver module (NUWIR-HU) is a wall mounted teleCARE IP wireless peripheral containing a 916 - 921 MHz RF transceiver.

The NUWIR contains a passive infrared sensor (PIR) with an adjustable 20 degrees (narrow) or 90 degrees (wide) field of view, covering a maximum distance of 6 meters / 20 feet.

A motion detected status LED is included on the circuit board, but this is only available for installation purposes. In order not to disturb the residents, this LED will not function during normal operation.

Based on the software configuration the NUWIR can be used to indicate that a resident is for example in the toilet in order to alert the caregivers after a preset amount of time. The NUWIR can also be used as an automatic resident check-in trigger, simply allowing the resident to check-in by motion detection when the resident is up and about.

The NUWIR comes in a white plastic body with a mounting bracket and installation kit for surface mounting and is suitable for use in senior care homes and other healthcare facilities.

The NUWIR requires 2 x 1.5V AA Alkaline batteries (not included) with a battery lifetime of > 3 years. An automatic low battery warning is transmitted if the battery voltage falls below 2.4V.

Each NUWIR has a unique identity (ID) and this ID is transmitted with every event.

Figure 65. NUWIR PIR (Passive Infra-Red) sensor

9.6.10 NILF Low Frequency Beacon

The low frequency beacon NILF is contained in a white plastic enclosure with a slim design that is suitable for surface mounting on walls or at a door post.

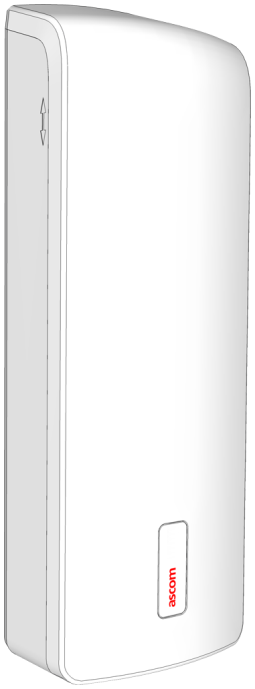


Figure 66. NILF - Low Frequency Beacon

The NILF consists of an LF transmitter with a ferrite antenna. The NILF gives real-time location information to teleCARE IP wireless devices enabling location based wireless call functionality including wander Management.

The NILF transmits an LF ID signal which will be received and retained by any teleCARE IP mobile transceiver which enters the coverage area. The NILF ID is transmitted by the mobile transceiver with every event to determine the location of the mobile transceiver.

The NILF is powered by three 1.5V "C" (R14) alkaline batteries. When battery power is not suitable a 24Vdc external power supply can be used.

The NILF operates at 125 kHz producing a spherical magnetic field with a range of up to 2.7 meters. The magnetic field strength can be adjusted to suit the requirements. A master/ slave configuration can be used to extend the range of the LF field.

An optional transceiver module NIRX can be mounted on the NILF circuit board used to monitor the NILF through a heartbeat signal indicating that the NILF is still alive, it can send out an alarm upon front cover removal detection (tamper alarm) or to send a low battery alarm. A red LED will indicate low battery status (1 flash per minute) and tamper alarm (continuous rapid flashing).

DIP switches are used to set the 12bit ID code, to select the transmission rate allowing a suitable interval between 0.1 - 2s and to set the output power, ranging from 12 inches/ 0.30m to 8.86 feet/2.7m.

9.7 Examples of teleCARE IP Wireless Applications

The following diagram shows an example of an area which is to be covered by a wireless installation. The area consist of a corridor, 6 bed rooms, a dining room and a lounge.

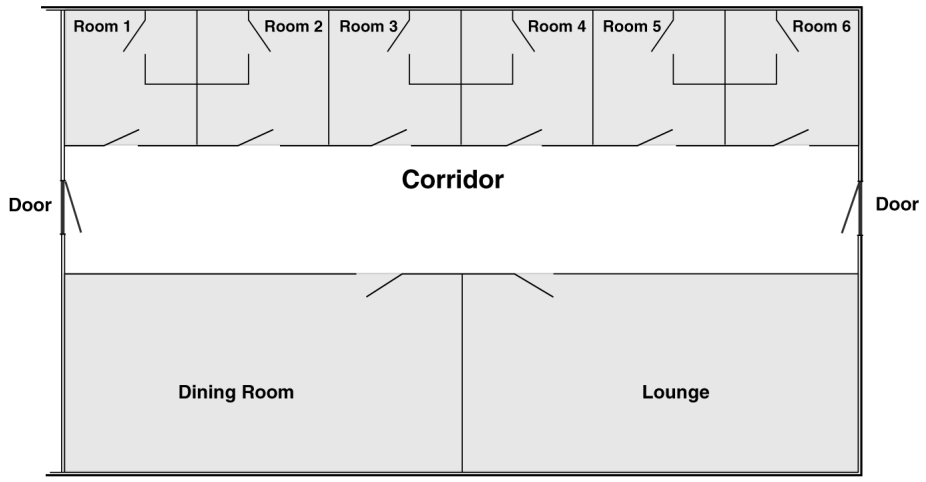


Figure 67. teleCARE IP wireless

The following examples show the teleCARE IP wireless system in different configurations.

9.7.1 Basic Wireless Coverage

In this example the area is equipped with three NIRC3 room controllers and six NICL2 dome lamps. To have full RF coverage of the area the two NIRC3's are equipped with a transceiver module (NIRX) functioning as a base station. Any transmission in this area will be received by one or both of the base stations.

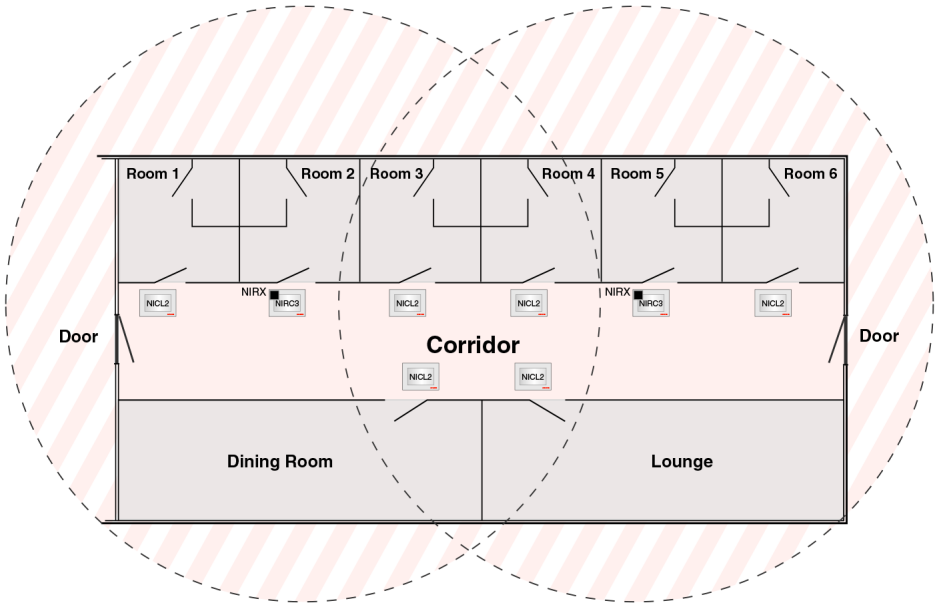


Figure 68. Basic wireless coverage

9.7.2 telecare IP Wireless with Positioning

The following example shows the same area as in the previous example, covered by base stations and in addition there are 10 passive location beacons (NILF) installed.

The NILF intermittently transmits an LF location update message (NILF ID) which is received by the wireless devices (NITX and NIFX) that come in range of the LF field. The wireless devices store the location update message of the last detected NILF until it receives a location update of another NILF.

When a call is made from a wireless device the location of the last detected NILF is transmitted together with the identity of the wireless device. The last known location determines where the call will be linked to, resulting in flashing patterns shown on the dome lamp or room controller lamp at that location.

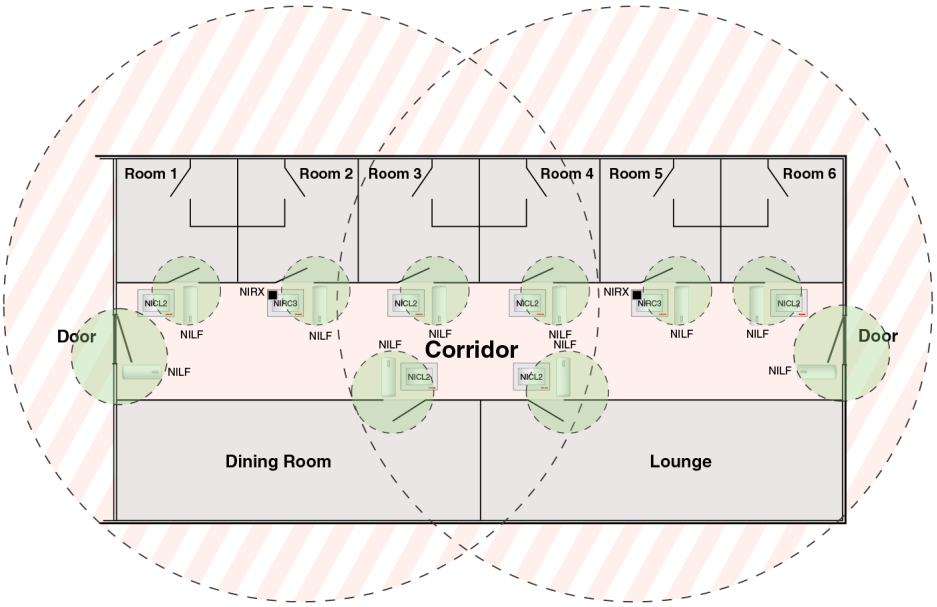


Figure 69. teleCARE wireless with positioning

9.7.3 teleCARE IP Wireless Combined with Wander Management

Wander management includes access control, wander alarm, loiter alarm and exit detection.

For wander management an active location beacon (NILF) and a card reader (NICR) are required to control each supervised entrance/exit. Each supervised door must be covered by one active location beacon NILF, or an NILF master with an NILF slave to cover a larger area. Card readers (NICR) are used to control an electric door locking mechanism.

Wireless transceivers (NITX) carried by residents generally prevent access to secured locations by locking an access door.

Wireless transceivers (NITX - staff transceivers) carried by staff can be programmed to grant access to secured locations.

When wireless devices come in range of an active location beacon, the location will be stored in the wireless device as the last known location and a location update message is transmitted to the wireless server (NISM2) which processes the received information. The wireless server will respond by locking the associated door and sending wander or loiter alarm messages when required.

If there is an existing active call on the wireless device, the wireless server will also update location information for corridor lamp flashing patterns and sending messaging updates to portable devices and displays.

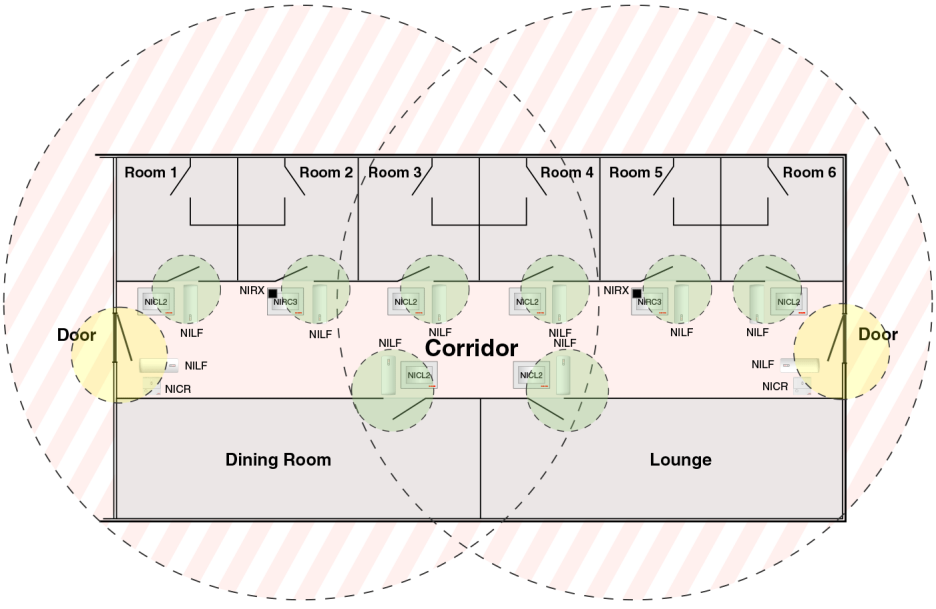


Figure 70. teleCARE wireless with wander management

The following block diagram shows the sequence of a wander alarm event.

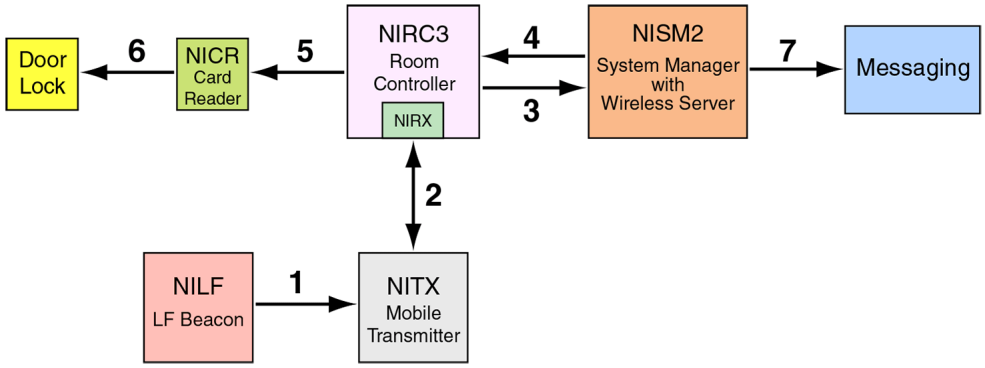


Figure 71. Wander alarm functionality example

9.7.4 Buddying

teleCARE IP with wireless and wander management normally ensures that certain doors are locked when residents are detected in the proximity of the door. teleCARE IP can be configured to allow staff members to be assigned as a "buddy" to selected residents so that when the resident is accompanied by the assigned staff member "buddy", the door will not lock (or will unlock) thus allowing the resident and the staff member to pass through the door.

9.7.5 Wander Alarm

teleCARE IP with wander management (using active NILF beacons) includes the option of automatically sending a wander alarm via messaging to the staff. When a resident is detected at a door, a wander alarm message will only be sent if the door has been opened. At locations that only include an active location beacon (without card reader), a wander alarm message will be sent immediately when the resident enters the LF field of the active location beacon.

9.7.6 Loiter Alarm

Loiter alarm functionality can be enabled to detect if residents are hanging around a location for a prolonged amount of time. Loiter alarm messages are generally not generated immediately after a wireless module is detected at a (loiter enabled) location, and therefore a loiter alarm will be generated after a programmable delay time expires.

9.7.7 Override Facility

Local regulations, such as those covering fire and emergency procedures, could require doors which are normally locked or which have restricted access, to unlock (automatically, centrally or manually) in emergencies to allow evacuation and access for emergency services etc.

If such doors are covered by teleCARE IP with wander management, then it will be necessary to provide an override facility to wander management to allow the unlocking of the doors in emergencies. The manner in which the override works will depend on the type of door locking mechanism and the local requirements.

IMPORTANT: *This type of override facility is not supplied by Ascom and it must function completely independent of the teleCARE IP wander management system. Such override facilities are not part of the teleCARE IP wander management system, therefore Ascom cannot accept any responsibility for these facilities.*

9.7.8 Exit Detection

With exit detection functionality enabled, a resident carrying a mobile transceiver can be allowed to leave an area that is covered by the wireless system. Exit detection functionality can be achieved by placing exit beacons (active location beacons with "Exit Beacon" functionality enabled) at the entrance to a site or building.

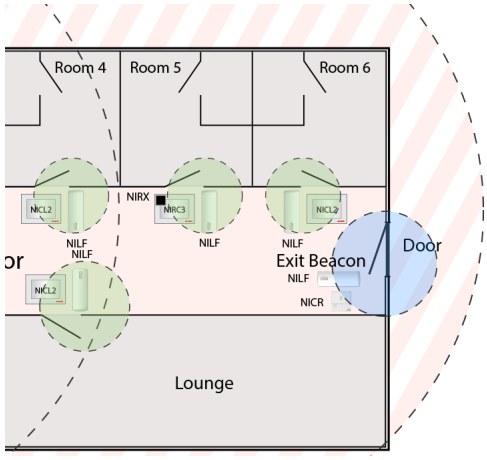


Figure 72. Exit beacon example

When a resident that is allowed to leave the site or building is passing an exit beacon, the presence state of the resident changes to indicate that he or she is absent. For mobile transceivers that are marked as being absent, the "device lost" messages and the "Check-in" functionality will be suppressed for as long as the device is absent.

Note: *Staff calls generated from a mobile transceiver that is marked as absent will still be handled according the applicable assignments, provided that the mobile transceiver is in range of the wireless system at the moment the call button is pressed.*

The presence state of a mobile transceiver will refer back to "present" at the moment the mobile transceiver comes into proximity of any other "Active" location beacon that is not an exit beacon. The "device lost" and the "Check-in" functionality will be automatically restored if the mobile transceiver becomes present again.

Unsupervised

If a resident is allowed to leave on its own, without the supervision of a staff member, the mobile transceiver carried by the resident is configured to allow the presence state to change when passing an exit beacon.

Supervised

If a resident is only allowed to leave under the supervision of a staff member (buddying), the presence state of the mobile transceiver carried by the resident can only change to "absent" if accompanied by a buddy.

Note: *A buddy that is assigned to the resident can be an individual staff member or all staff members.*

Exit detection can be combined with access control, wander alarm and loiter alarm, for example when the buddy is not present, the resident will be denied access to the door and a wander or loiter alarm message can be sent to a staff member.

For some basic examples see “Typical example of teleCARE Wireless with Exit Detection” on page 93

9.8 teleCARE Wireless with Speech

For speech in teleCARE IP Wireless, the room controller (NIRC3) is required and each NIRC3 must include a transceiver module (NIRX) and a voice piggyback module (NIVP).

The wireless mobile transceiver (NITX) is required. The NITX is carried by residents and staff and used to generate calls and other signals that are sent as RF transmissions and received by the NIRC3s.

A speech module (NISP), hard-wired to the NIRC3, must be installed in each room which requires speech. Each NISP is assigned a telephone number in the system configuration. That telephone number is automatically dialled when a staff member responds to a call and selects to speak.

In dynamic location mode an LF beacon (NILF) is needed at each room (see "Dynamic Location Mode Example" on page 80) in order to identify the location of the NITX.

9.8.1 "Static" and "Dynamic" Modes

teleCARE IP with speech can function in "Static" or "Dynamic" modes depending on the configuration in the system manager of the of the mobile transceivers (NITX) (see the teleCARE IP Configuration Manual TD92610US).

Static Mode

In "Static" mode, speech is always linked to the location that is set in the configuration of the mobile transceiver (NITX) and speech communication is always directed to the speech module (NISP) at that location.

Static Location Mode Example

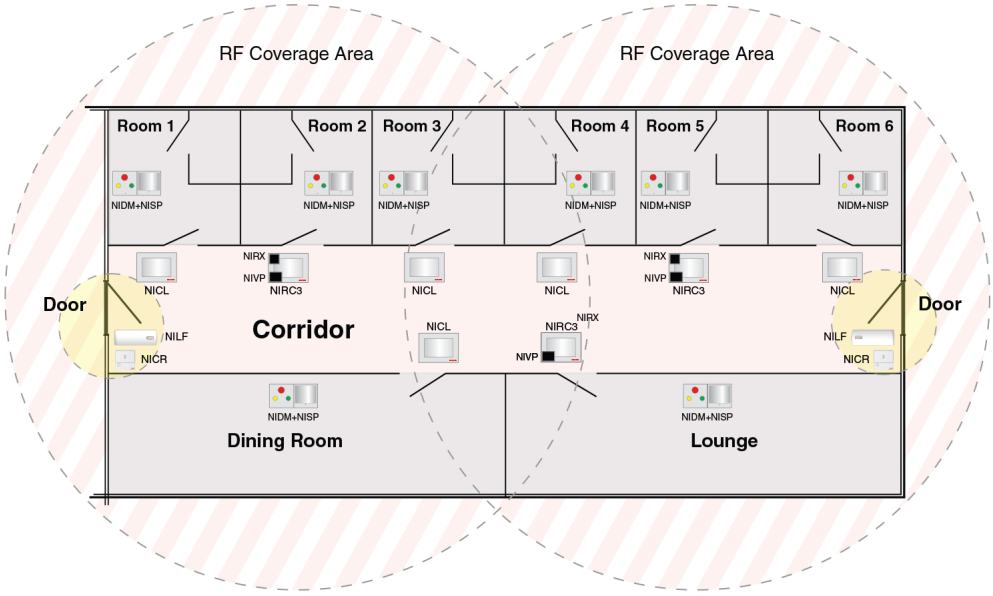


Figure 73. Wireless call example with speech - static mode

The example consists of three room controllers (NIRC3), each with a transceiver module (NIRX) and a voice piggyback module (NIVP), and five corridor lamps. Each location has a doorside module (NIDM) combined with a speech module (NISP). The two main entrance doors have a location beacon (NILF) and a card reader module (NICR) for access control (yellow area).

Dynamic Mode

In "Dynamic Location" mode, the NITX can move around the coverage area and speech will be automatically directed to the current location of the NITX when a call is received.

The real-time location of the NITX is determined by LF beacons (NILF) mounted at the entrance to each room. The NILF transmits an LF location signal which is received by the NITX. The NITX memorizes its' current location until it receives a new LF location signal. The memorized (last known) location information is included in all transmissions from the NITX. The phone number to be called is automatically updated to the current location of the NITX when a call is received and the speech response will be directed to the telephone number of the NISP at the location of the call.

Dynamic Location Mode Example

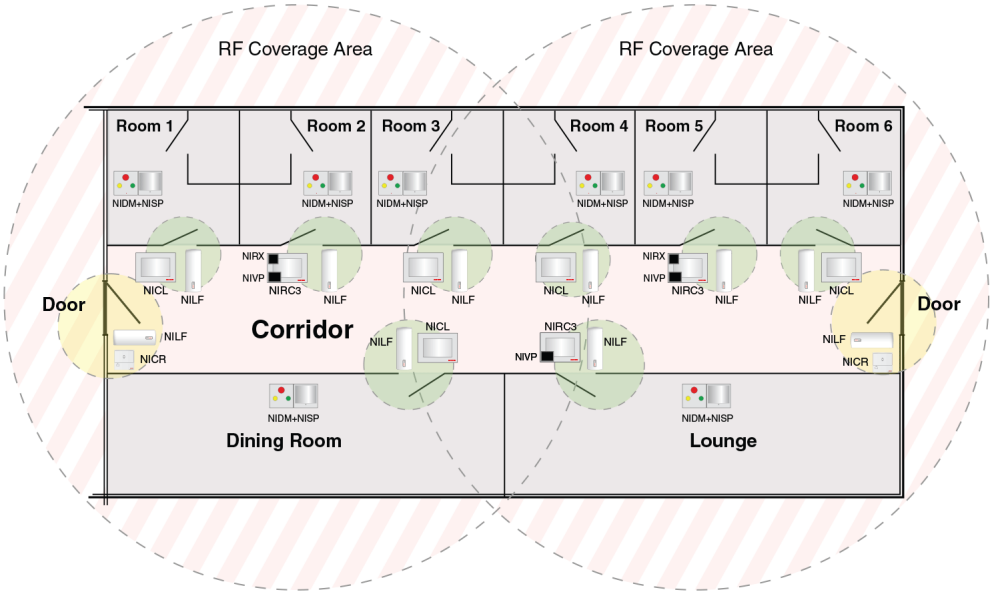


Figure 74. Wireless call example with speech - dynamic mode

The example consists of three room controllers (NIRC3) and five corridor lamps, Each NIRC3 has a transceiver module (NIRX) and a voice piggyback module (NIVP). In each room there is a doorside module (NIDM) combined with a speech module (NISP). At the door to each room an LF location beacon (NILF) is mounted. The LF location coverage (green area) includes the door to the room. The two main entrance doors have a location beacon (NILF) and a card reader module (NICR) for access control (yellow area).

9.8.2 NILF Beacon Modes

The LF beacon (NILF) can be configured as a "Passive" beacon or an "Active" beacon using DIP switches situated in the NILF housing (described in the teleCARE IP Installation Guide TD93021US).

Passive Location Beacon

When passive mode NILF beacons are used the NISP telephone number will not be updated if the NITX subsequently moves between passive locations after a call is received. The speech location will remain at the location where the call was first received.

Active Location Beacon

When dynamic mode NILF beacons are used the NISP telephone number will be updated and the speech location will change to the new location if the NITX subsequently moves between locations after a call is received.

Speech Handling Overview

The table below shows the speech handling based on their static or dynamic location mode setting in combination with passive or active location beacons.

Transceiver Location mode	LF beacon mode	Location at the start of a new call	Speech location change update		
			Before speech	During speech	After speech
Static	NA	Configured location	No	No	No
Dynamic	Passive	Last known	No	No	No
	Active	Last known	Yes	No	No

The wireless staff call examples described in the following sections are based on wired teleCARE IP with wireless functionality using base stations (NIRC3 + NIRX).

However it is also possible to use the wireless infrastructure using wireless repeaters for all except the wander control examples. Since wander control combined with access control requires hard wired modules like the card reader (NICR) and the room controller (NIRC3) to control the locking or opening of doors, a base station (NIRC3 + NIRX) would be the preferred configuration.

9.9 Wireless Speech Using Phones

In a full wireless infrastructure consisting only of wireless devices, setting up a speech session with a resident cannot be done through the known wired teleCARE IP speech devices, since they are not part of the installation.

In such an installation, corded or cordless (DECT/Wifi), phones connected to a landline or mobile GSM (3G/4G) phones can be used at the resident's side, allowing the caregiver to set up a speech session with the resident using the dial back principle.

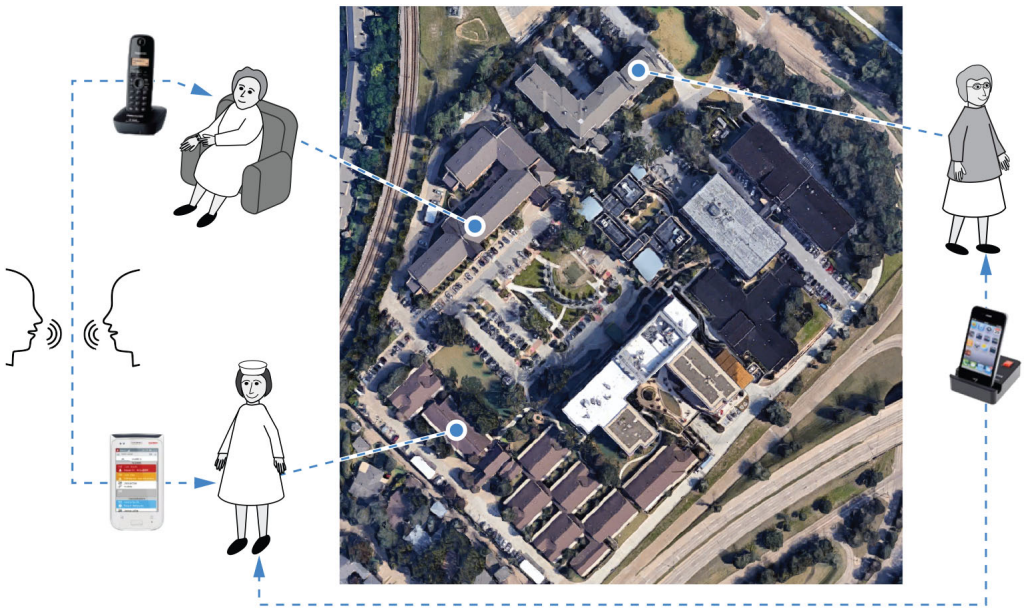


Figure 75. Wireless speech using phones

Other than the resident's phone, no additional hardware is required, so there will be no or almost no installation work to be performed.

The resident's phone number is registered in the teleCARE IP system through the Messaging, Assignments, and Reporting Interface (MARi) or the teleCARE IP Staff GUI. The phone number can be assigned to a location, for example the resident's room. Whenever the resident makes a call using one of the wireless devices, like an NITX or NIFX, the caregiver will be notified. The caregiver receives a message including the interactive messaging "Speech" option which can be pressed to setup a speech session with the resident.

During the speech session, the caregiver will be presented with two interactive messaging options, "Park" for parking the call in case a follow up of the conversation is required and "Cancel" in order to cancel the resident call.

9.9.1 Static or Dynamic Locations

The teleCARE IP Wireless Transceivers can be programmed to operate in a static or dynamic location environment.

Static Location

When using a static configuration for the wireless device, speech will always be towards the phone number that is assigned to the (home) location. With a corded phone speech will only be possible if the resident is present at the home location. However if the resident is carrying a cordless phone, for example a GSM, he or she can still be reached even if they are not present at their home location. This is also partially applicable for DECT and Wifi, however note that DECT and Wifi have a limited range.

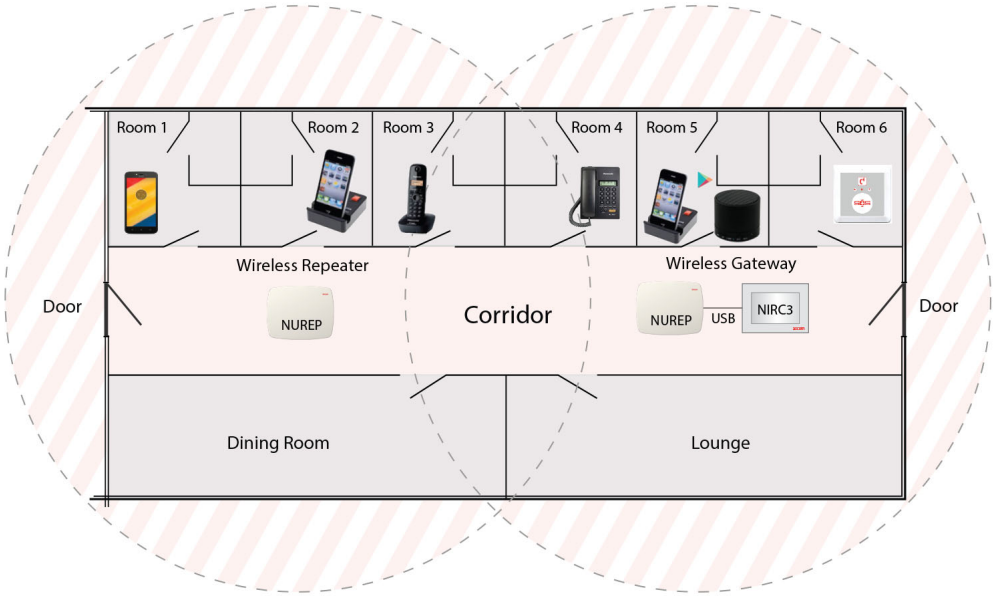


Figure 76. Static location example

Note: *Be aware that the range of the NITX is also limited based on the coverage area of the wireless system. Therefore a resident call from an NITX might not be coming through when being outside of the coverage area.*

Dynamic Location

Dynamic locations should only be used if there are active location beacons installed which will update the location of a resident whenever he or she passes such a location. If a phone (number) is assigned to that location, the interactive messaging "Speech" option sent to the caregiver will use the phone number. If no phone number is assigned to the location, the phone number of the resident's home location will be used.

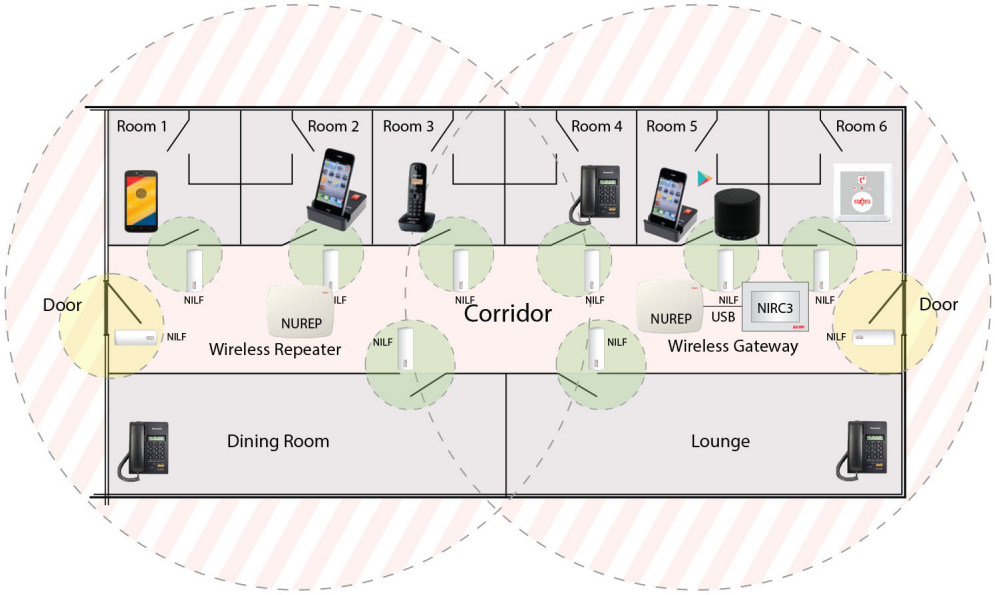


Figure 77. Dynamic location example

9.9.2 White List with Auto Answer

If a resident makes a call on for example the NITX, it would be a nice feature if the resident's phone would be able to automatically answer the phone call coming from the caregiver. This way the resident does not have to take any actions other than initiating the resident call on the wireless device (NITX).

Depending on the phone type, it might be equipped with a white list feature. Through the phone's white list one or more numbers can be programmed for which auto answer is allowed. In case GSM smart phones are used, for example android phones, there are options to install an app that is capable of supporting this functionality.

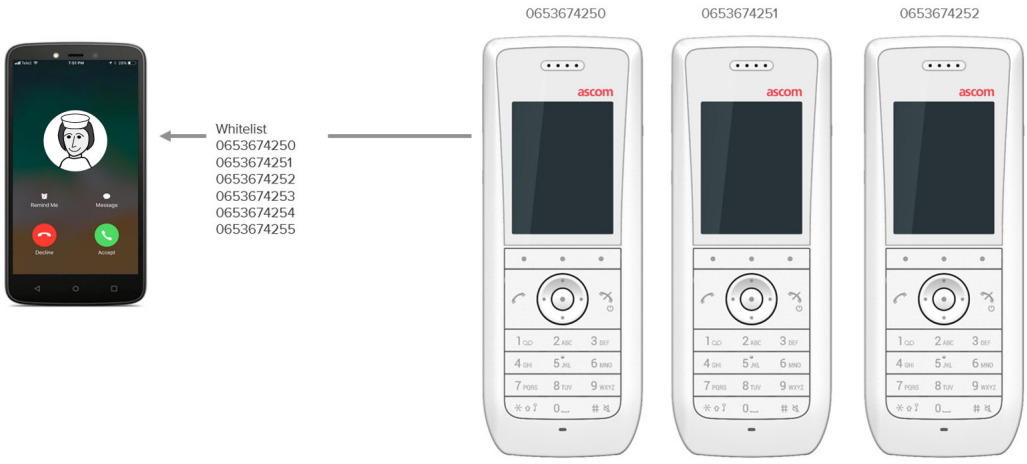


Figure 78. App on android with white list and auto answer

9.9.3 Wireless Speech Combined Configuration

The use of phones at the residents' side can be combined with the hard-wired teleCARE IP speech modules if required. If for example the phone number of the resident's phone is registered using MARi or via the Staff GUI, that number will be used for speech sessions. If however no phone number is registered, the hard-wired teleCARE IP speech module will be used instead.

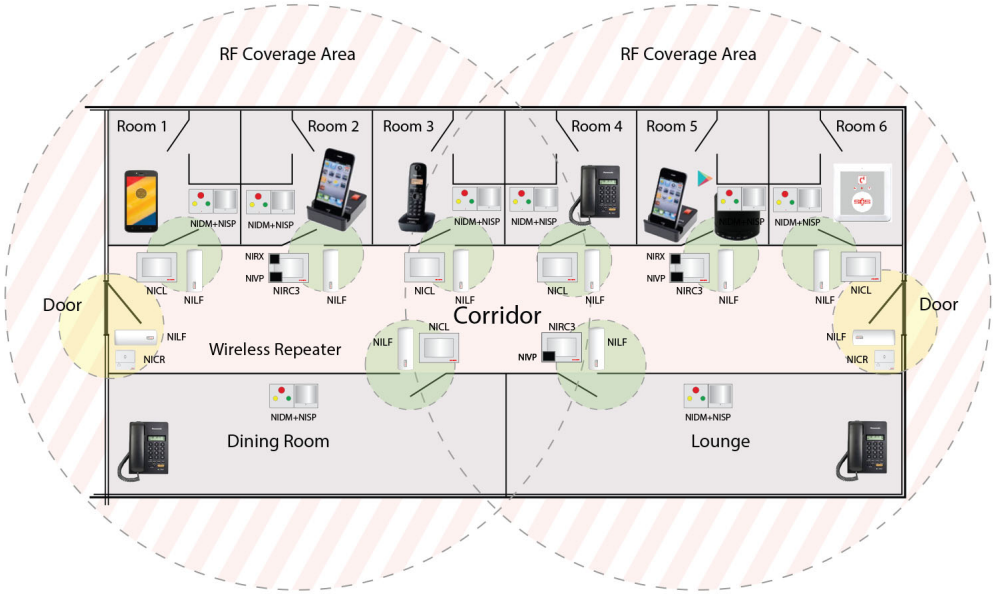


Figure 79. Phones combined with hard-wired speech modules

9.9.4 PBX Configuration

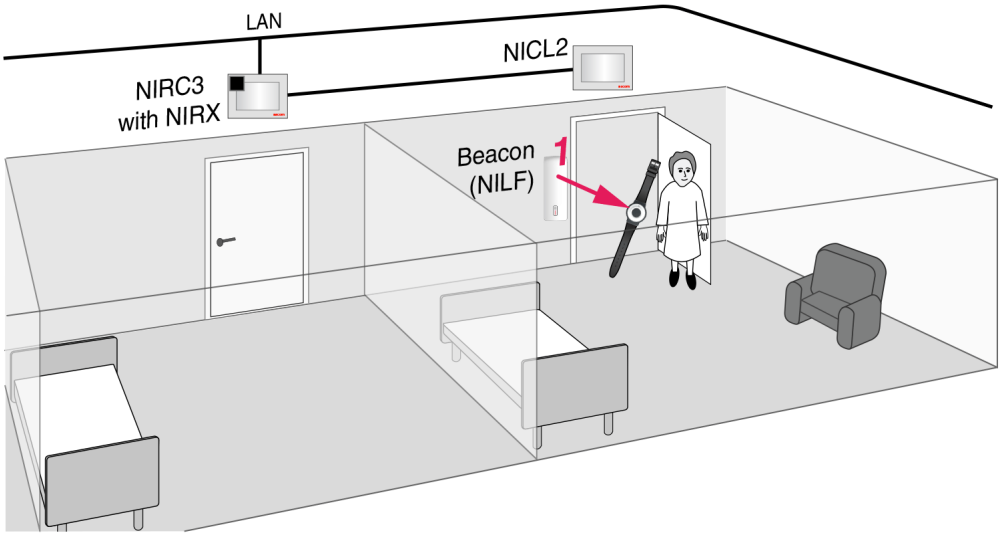
Wireless Speech using phones is depending on the ability to contact outside landline or mobile phone numbers through a PBX. The PBX must be properly configured to allow for such a connection.

9.9.5 License for Speech Using Phones

The wireless speech option supporting the use of phones at the resident side is licensed and will only function if the proper license is obtained. For specific licensing details refer to the "teleCARE IP License Table Data Sheet" TD 93124EN.

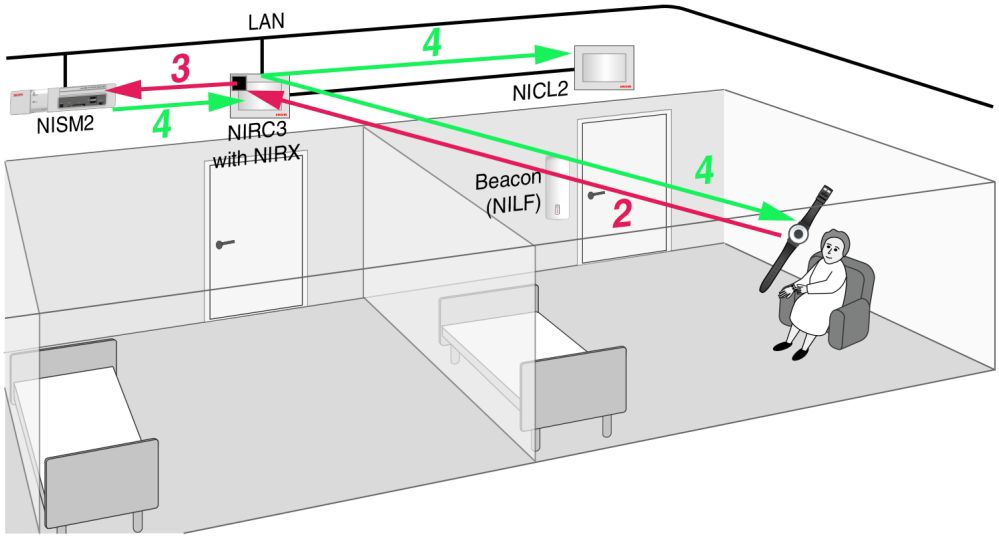
9.10 Typical Call Sequence of teleCARE IP Wireless

- **The ID of the NILF is received by the resident's wireless transceiver:**



1 The NILF intermittently transmits an LF signal containing the NILF ID. The resident's mobile transceiver NITX receives the NILF identity signal and stores it. This ID represents the location of the resident.

- **The resident needs assistance and makes a call:**

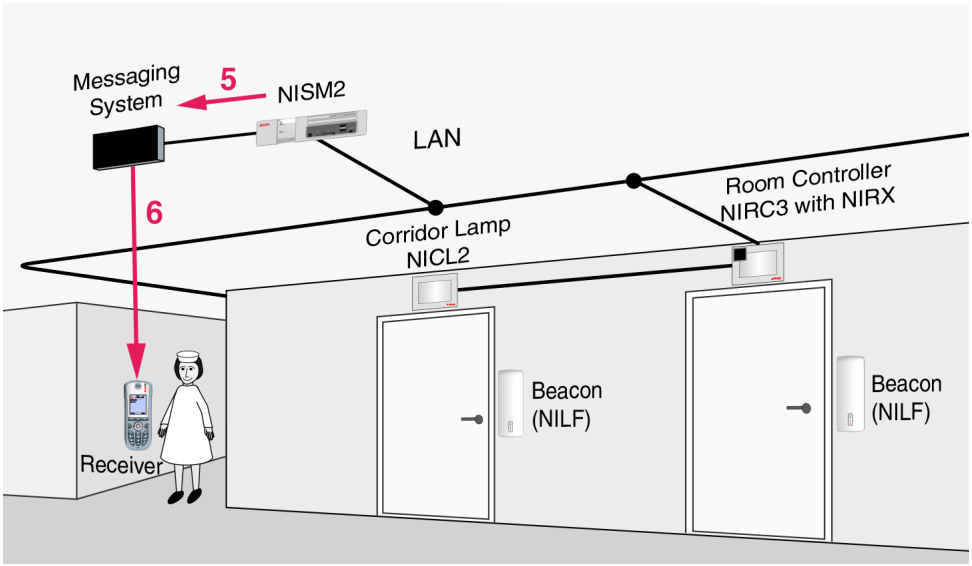


2 When the resident presses the call button of the NITX an RF signal is transmitted which contains the call message, the NITX ID and the last seen NILF ID. This message is received by the NIRX that is mounted on the NIRC3 room controller.

3 The NIRC3 sends the information to the wireless server (NISM2) for processing.

4 The wireless server returns a flashing pattern to the NITX and dome lamp (NICL2) for signalling.

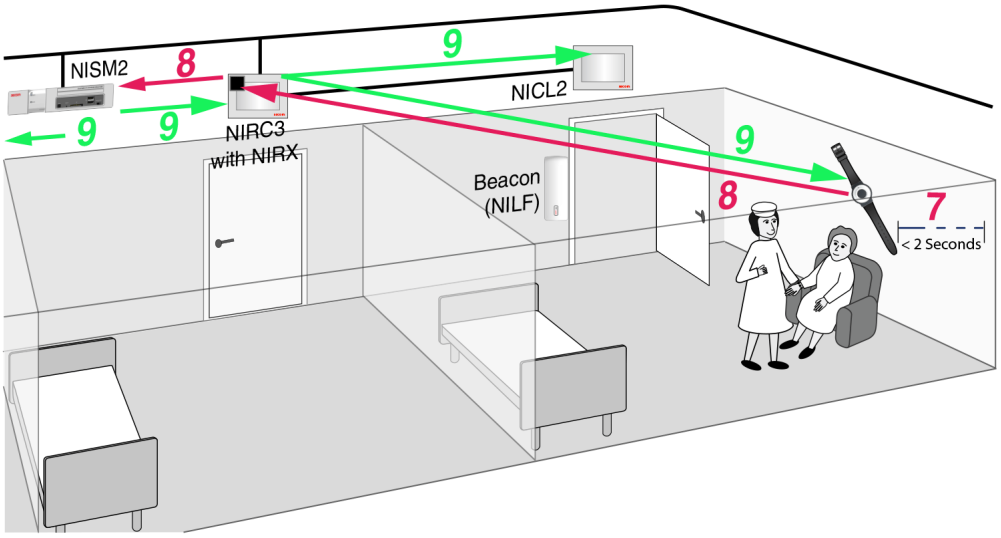
- **The resident call is sent to the pager of the caregiver:**



5 The wireless server (NISM2) sends a message containing the call type and the location of the resident to the messaging system.

6 The messaging system sends the call message, together with the location of the resident, to the relevant messaging receiver. The caregiver goes to the resident in response to the message.

- **The caregiver attends to the resident and cancels the call:**



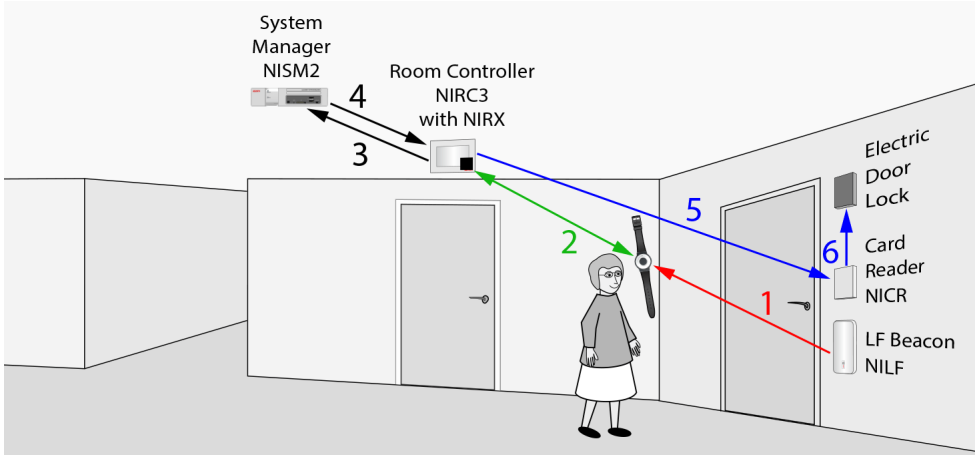
7 The caregiver cancels the call by pressing the call button on the NITX using the cancel sequence. (one long press followed by three short presses within two seconds).

8 The NITX then transmits a message which includes the identity of the NITX and the identity of the NILF to the wireless server for processing.

9 The wireless server processes the message and cancels the call from NITX, NICL2 and the messaging system.

9.11 Typical Examples of teleCARE Wireless with Wander Alarm

9.11.1 Wander Control Sequence with Door Control (Closed Door)



1 A resident approaches a normally unlocked door that is closed. The NILF periodically transmits an LF signal containing the NILF ID which is received by the resident's NITX mobile transceiver.

2 When the NITX receives the active NILF's ID signal it transmits an RF signal which contains the NITX ID and the ID of the active NILF. This message is received by the NIRX that is mounted on the NIRC3 room controller.

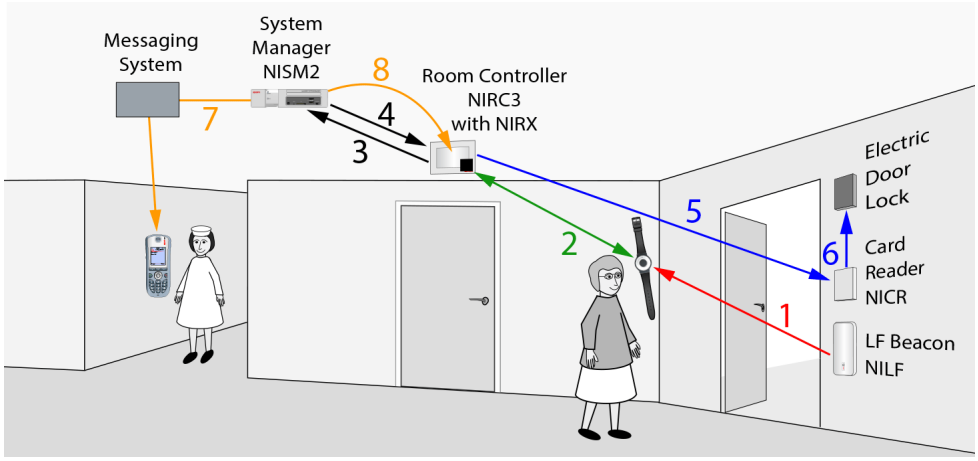
3 The NIRX then transmits a message which includes the identity of the NITX and the identity of the NILF to the wireless server (NISM2) for processing.

4 If the NITX ID is not authorized to pass through that door the NISM2 sends a message to the NIRC3 room controller to lock the door.

5 The NIRC3 room controller sends a "lock door" signal to the NICR card reader.

6 The NICR card reader activates the electric door lock and locks the door.

9.11.2 Wander Control Sequence with Door Control (Open Door)



1 A resident approaches a normally unlocked door that is open. The NILF periodically transmits an LF signal containing the NILF ID which is received by the resident's NITX mobile transceiver.

2 When the NITX receives the active NILF's ID signal it transmits an RF signal which contains the NITX ID and the ID of the active NILF. This message is received by the NIRX that is mounted on the NIRC3 room controller.

3 The NIRX then transmits a message which includes the identity of the NITX and the identity of the NILF to the wireless server (NISM2) for processing.

4 If the NITX ID is not authorized to pass through that door the NISM2 sends a message to the NIRC3 room controller to lock the door.

5 The NIRC3 room controller sends a "lock door" signal to the NICR card reader.

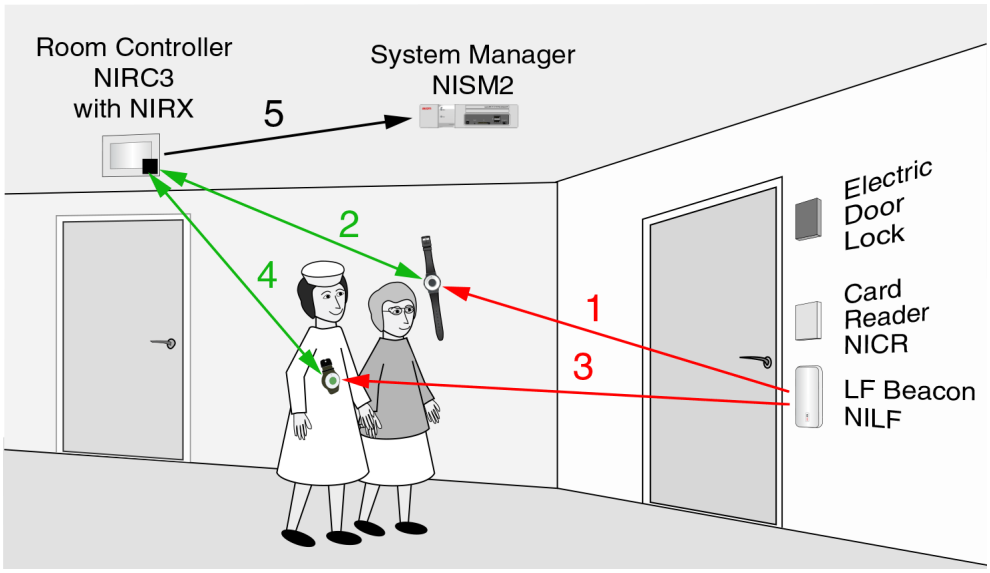
6 The NICR card reader activates the electric door lock and attempts to lock the door.

7 Because the teleCARE IP system detects that the door is open, a wander alarm message will be initiated to inform the responsible staff member.

8 If Configured, the wander alarm message can also be signalled on linked devices like doorside modules, corridor lamps and text displays.

9.11.3 Wander Control Sequence with Buddying

The wireless module of a resident can be configured to allow "All staff members" or just one single staff member to act as buddy.



1 A resident approaches a normally unlocked door which has an "active" NILF beacon. The NILF periodically transmits an LF signal containing the NILF ID which is received by the resident's NITX mobile transceiver.

2 When the NITX receives the active NILF's ID signal it transmits an RF signal which contains the resident's NITX ID and the ID of the active NILF. This message is received by the NIRX that is mounted on the NIRC3 room controller.

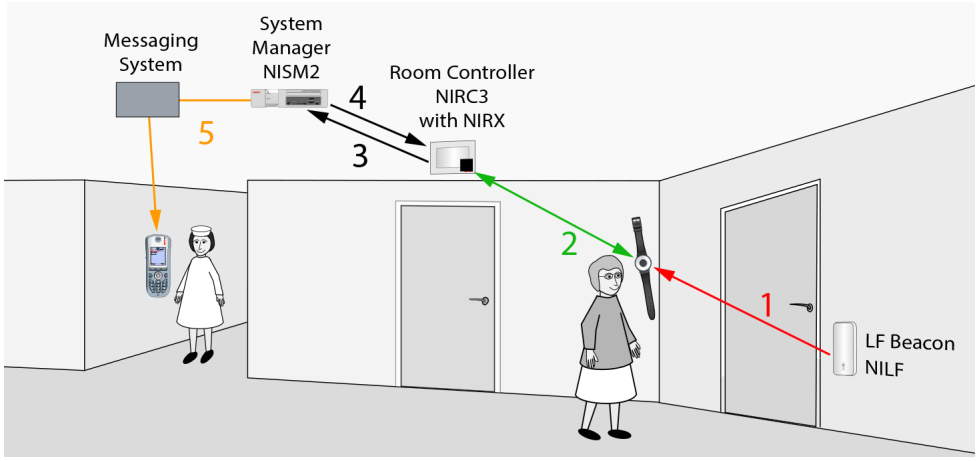
3 A caregiver accompanies the resident in the area of the normally unlocked the door with the "active" NILF beacon. The LF signal containing the NILF ID is received by the caregiver's NITX mobile transceiver.

4 When the NITX receives the active NILF's ID signal it transmits an RF signal which contains the caregiver's NITX ID and the ID of the active NILF. This message is received by the NIRX that is mounted on the NIRC3 room controller.

5 The NIRX then transmits a message which includes the identity of both NITXs and the identity of the NILF to the wireless server (NISM2) for processing. If the residents NITX ID and the caregiver's NITX ID is recognized as a "Buddying" combination then the NISM2 does not send a message to the NIRC3 room controller to lock the door. The NIRC3 room controller does not send an "unlock door" signal to the NICR card reader. The door remains unlocked and the resident accompanied by the caregiver can pass through the door.

Note: *If the resident is not accompanied by a caregiver, or the resident and caregiver are not recognized as a "Buddying" combination (in a single buddy configuration only), then the NISM2 will send a message to the NIRC3 room controller to lock the door (as shown in example 9.11.1 on page 88).*

9.11.4 Wander Control Sequence without Door Control



1 A resident approaches a location without door control (NILF only). The NILF periodically transmits an LF signal containing the NILF ID which is received by the resident's NITX mobile transceiver.

2 When the NITX receives the active NILF's ID signal it transmits an RF signal which contains the NITX ID and the ID of the active NILF. This message is received by the NIRX that is mounted on the NIRC3 room controller.

3 The NIRX then transmits a message which includes the identity of the NITX and the identity of the NILF to the wireless server (NISM2) for processing.

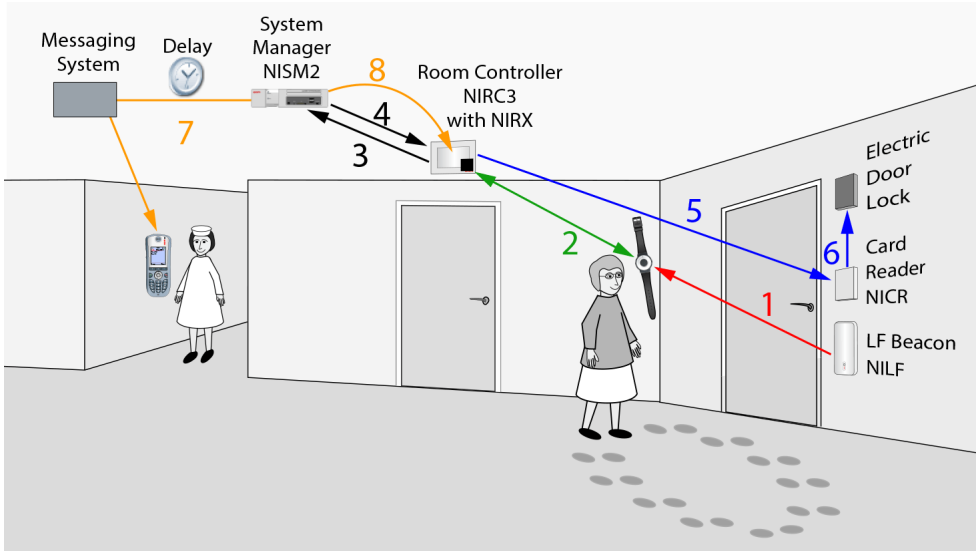
4 If the NITX ID is not authorized to be at that location, the NISM2 sends a message to the NIRC3 room controller to start a flashing pattern on the corridor lamp.

5 A wander alarm message will be initiated to inform the responsible staff member.

9.12 Typical Examples of teleCARE Wireless with Loiter Alarm

Loiter alarm messages are generally not generated immediately after a wireless module is detected at a (loiter enabled) location, and therefore a loiter alarm will be generated after a predefined delay time (between 30 and 600 seconds) expires.

9.12.1 Loiter Control Sequence



1 A resident approaches a normally unlocked door that is closed. The NILF periodically transmits an LF signal containing the NILF ID which is received by the resident's NITX mobile transceiver.

2 When the NITX receives the active NILF's ID signal it transmits an RF signal which contains the NITX ID and the ID of the active NILF. This message is received by the NIRX that is mounted on the NIRC3 room controller.

3 The NIRX then transmits a message which includes the identity of the NITX and the identity of the NILF to the wireless server (NISM2) for processing.

4 If the NITX ID is not authorized to pass through that door the NISM2 sends a message to the NIRC3 room controller to lock the door.

5 The NIRC3 room controller sends a "lock door" signal to the NICR card reader.

6 The NICR card reader activates the electric door lock to lock the door.

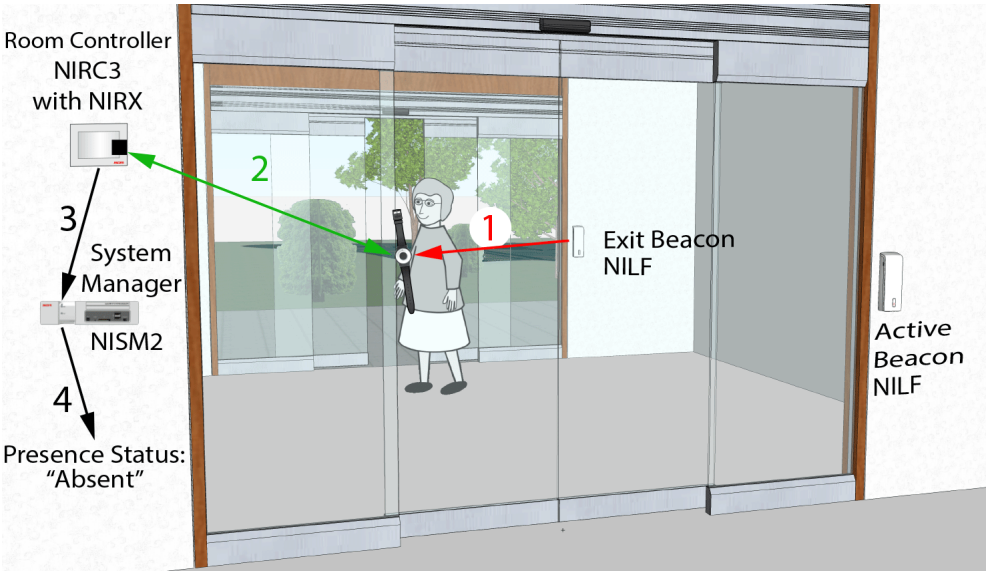
7 After a predefined delay time (between 30 and 600 seconds) a loiter alarm message will be initiated to inform the responsible staff member.

8 If Configured, the loiter alarm message can also be signalled on linked devices like doorside modules, corridor lamps and text displays.

Note: *If meanwhile the door is opened by a staff member, who has access to the location, a wander alarm message will be initiated if the resident is still hanging around the location and the responsible staff member will be informed.*

9.13 Typical example of teleCARE Wireless with Exit Detection

9.13.1 Unsupervised Exit Detection



1 A resident approaches a door that has an exit beacon (Active NILF). The NILF periodically transmits an LF signal containing the NILF ID which is received by the resident's NITX mobile transceiver.

2 When the NITX receives the exit beacons ID signal it transmits an RF signal which contains the NITX ID and the ID of the exit beacon. This message is received by the NIRX that is mounted on the NIRC3 room controller.

3 The NIRX then transmits a message which includes the identity of the NITX and the identity of the exit beacon to the wireless server (NISM2) for processing.

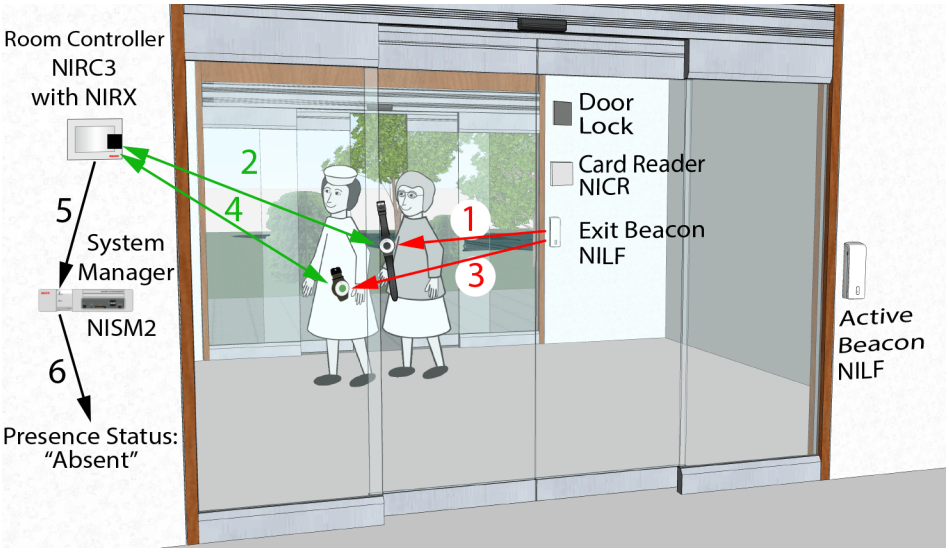
4 If the NITX ID is authorized to pass through that door the NISM2 changes the presence state of the NITX to "Absent". "Device lost" messages and the "Check-in" functionality will be suppressed when the NITX is absent.

Note: *If a resident is not authorized to pass through the door, the exit beacon can also function as loiter and/or wander alarm beacon supporting access control, which means the door will be locked and a loiter and/or wander alarm will be generated.* *See "Typical Examples of teleCARE Wireless with Wander Alarm" on page 88.* *and "Typical Examples of teleCARE Wireless with Loiter Alarm" on page 92.*

Note: *An exit beacon cannot be used to return the state back to "Present" when a resident arrives back at the site. For returning to the "Present" state, an active location beacon that is not configured as exit beacon is required.* *See "Returning at the Site" on page 95.*

9.13.2 Supervised Exit Detection (Buddying)

The wireless module of a resident can be configured to allow "All staff members" or just one single staff member to act as buddy.



1 A resident approaches a normally unlocked door which has an exit beacon (Active NILF). The NILF periodically transmits an LF signal containing the NILF ID which is received by the resident's NITX mobile transceiver.

2 When the NITX receives the exit beacon ID signal it transmits an RF signal which contains the resident's NITX ID and the ID of the exit beacon. This message is received by the NIRX that is mounted on the NIRC3 room controller.

3 A carer accompanies the resident in the area of the normally unlocked door with the exit beacon. The LF signal containing the NILF ID is received by the carer's NITX mobile transceiver.

4 When the NITX receives the exit beacon ID signal it transmits an RF signal which contains the carer's NITX ID and the ID of the exit beacon. This message is received by the NIRX that is mounted on the NIRC3 room controller.

5 The NIRX then transmits a message which includes the identity of both NITXs and the identity of the NILF to the wireless server (NISM2) for processing. If the residents NITX ID and the carer's NITX ID is recognized as a "Buddying" combination then the NISM2 does not send a message to the NIRC3 room controller to lock the door. The door remains unlocked and the resident accompanied by the carer can pass through the door.

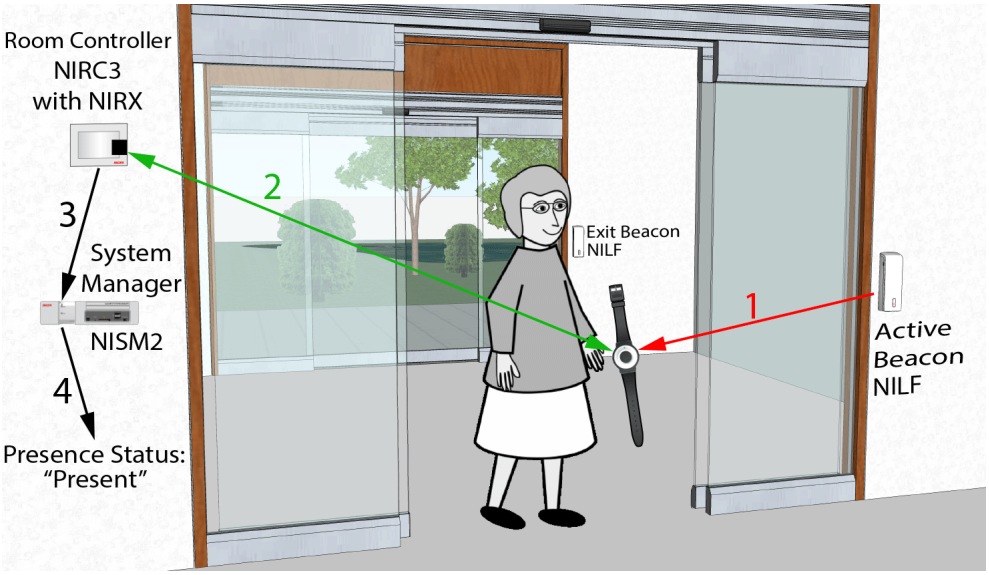
6 If the carer's NITX has exit detection configured for this location, the presence status of the NITX of both the carer and resident will be set to "absent".

Note: *If the resident is not accompanied by a carer, or the resident and carer are not recognized as a "Buddying" combination (in a single buddy configuration only), then the NISM2 will send a message to the NIRC3 room controller to lock the door (as shown in example* *"Wander Control Sequence with Door Control (Closed Door)" on page 88**).*

Note: *An exit beacon cannot be used to return the state back to "Present" when a resident arrives back at the site. For returning to the "Present" state, an active location beacon that is not configured as exit beacon is required.* *See "Returning at the Site" on page 95.*

Note: *If a system only consists of a teleCARE wireless infrastructure, access control will not be possible since locking or unlocking doors requires hard wired peripherals.*

9.13.3 Returning at the Site



1 A resident returns at the site and passes a door that has an active beacon (NILF). The NILF periodically transmits an LF signal containing the NILF ID which is received by the resident's NITX mobile transceiver.

2 When the NITX receives the active beacons ID signal it transmits an RF signal which contains the NITX ID and the ID of the active beacon. This message is received by the NIRX that is mounted on the NIRC3 room controller.

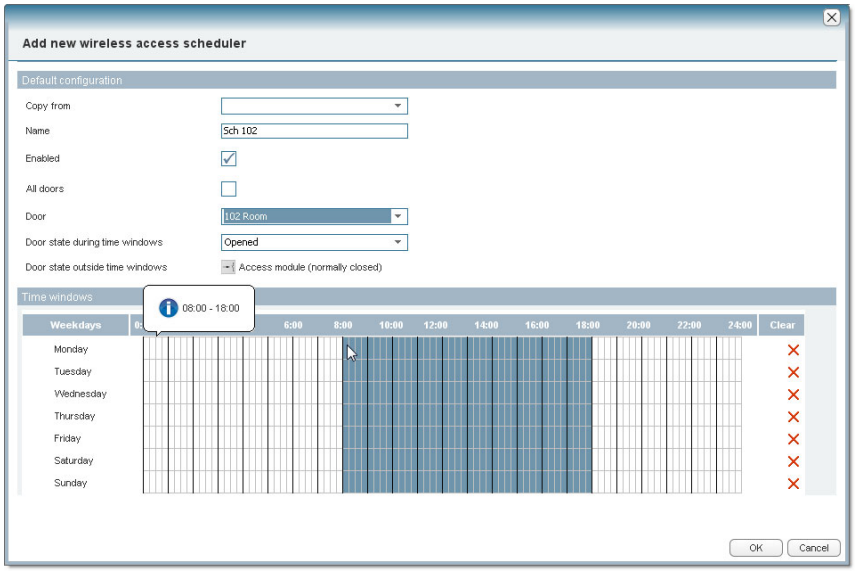
3 The NIRX then transmits a message which includes the identity of the NITX and the identity of the active beacon to the wireless server (NISM2) for processing.

4 The NISM2 changes the presence state of the NITX to "Present". Automatically the "Device lost" messages and the "Check-in" functionality are no longer suppressed.

Note: *When a resident that requires a buddy returns at the site for which access control is configured, the resident will not be able to enter the site without their buddy being present. When the beacons at the doors are only used for wander / loiter alarm, the resident will be able to enter, however a wander alarm will be generated since the residents buddy is not present.*

9.14 Access Schedulers

Access schedulers can be used to control the time of day that access to a location is granted or denied. For example a door that is normally denied (locked) can be unlocked during an active time window of the scheduler.



Outside the selected active time window the state of a door lock will refer back to its default state, meaning normally granted (unlocked) doors will be unlocked and normally denied (locked) doors will be locked.

A scheduler can be created for an individual door or for “all doors”. When an “all doors” scheduler is active, all the individual single door schedulers will be disabled. Also note that there can be only one access scheduler with the “All doors” option active. If the system consists of a combination of normally granted (unlocked) and normally denied (locked) doors that requires a combination of unlocking and locking doors during active time slots, the “All doors” option cannot be used and separate time windows have to be created for each individual door.

9.15 RSSI-based Location Determination

RSSI (Received Signal Strength Indication) is a measure of strength of a received radio frequency signal. RSSI-based location determination functionality enables you to use the RSSI value received by the teleCARE IP base stations (NIRC3 + NIRX), wireless gateways (NIRC3 + NUREP) and wireless repeaters (NUREP) to roughly determine the location of a wireless device. The following equipment is required for RSSI-based location determination:

- - Base Station(s) - The "base station" referred to in this section consist of the room controller - NIRC3 with a piggyback mounted transceiver module - NIRX.
  AND / OR
  - Wireless gateway(s) - The "wireless gateway" referred to in this section consist of the room controller - NIRC3 with a wireless repeater (NUREP) connected via USB.
  - Wireless repeaters (NUREP) as part of the wireless infrastructure using wireless gateways.
- LF Beacons - If required, LF beacons can be installed at strategic locations to further increase the accuracy of the RSSI-based location determination functionality.
- NITX with LF - Wireless mobile transceiver module that supports LF.
- NIFX with LF - Wireless fixed transceiver module that supports LF.
  Although an NIFX is a fixed device, it can become mobile when mounted to a movable bed or wheelchair for example. Therefore the NIFX comes included with an LF receiver and RF transceiver in order to support RSSI location determination functionality.

The aim is that RSSI does not require changes in the physical system setup, however the location of the room controllers (NIRC3) that function as a base station or wireless gateway and the wireless repeaters have to be selected carefully. The location of the receiver with the strongest RSSI signal will be used for messaging, linking and forwarding.

Be aware that RSSI-based location determination will only give a rough estimation of the location of the wireless device. The accuracy depends on the placement of receivers that cover the detection area. The received RSSI signal strength will also be influenced by other factors, such as the building structure / materials, orientation of the receiver and the orientation of wireless devices.

The example below shows the layout of a site with only one floor and six receivers.

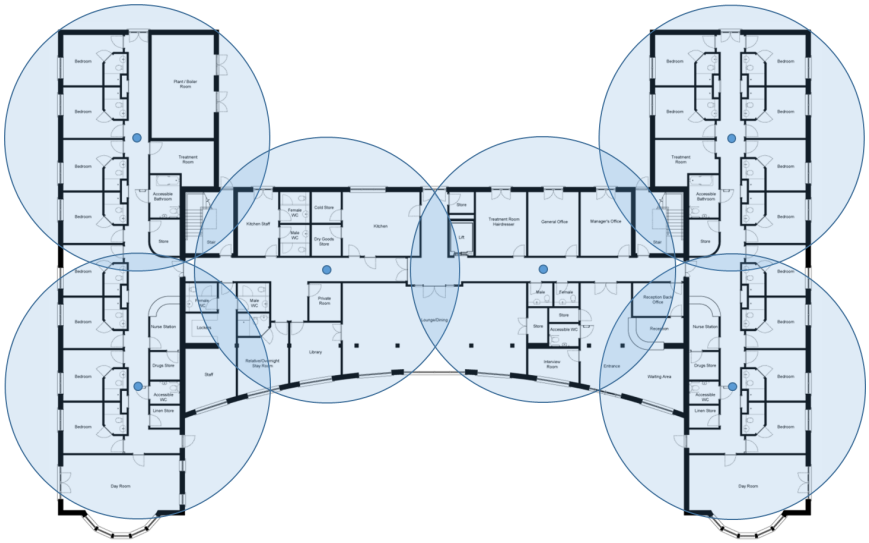


Figure 80. Location determination using RSSI

When using RSSI-based location determination at a site with only one floor the coverage area of each of the receivers will roughly determine the location of the wireless device.

Previously location determination was done by adding LF beacons to the system. When only using LF beacons for the same layout with only one floor, about eight LF beacons would be required to determine the location.

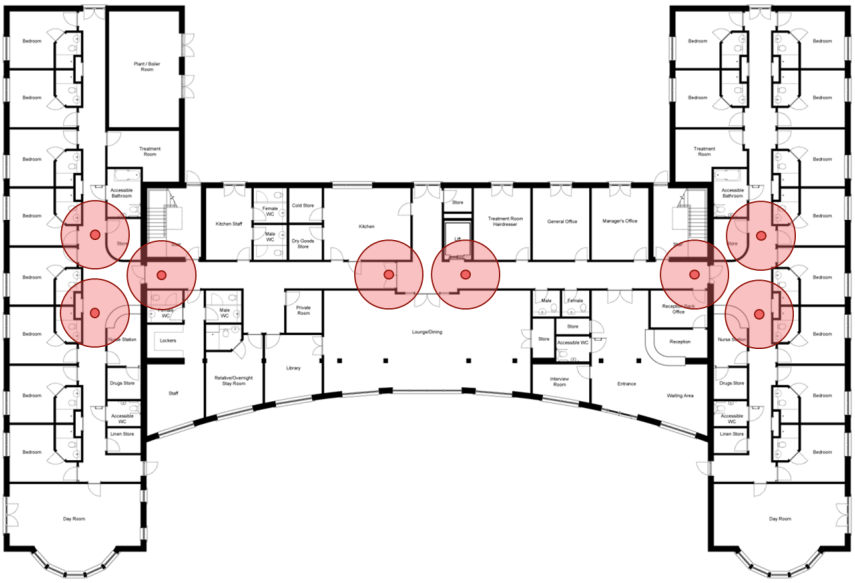


Figure 81. Location determination using LF beacons

By combining LF beacons with receivers using the RSSI-based location determination functionality, fewer LF beacons are required to cover the floor. In the example, LF beacons would only have to be installed near the staircases. This will also allow for a more accurate location determination in a multi story building.

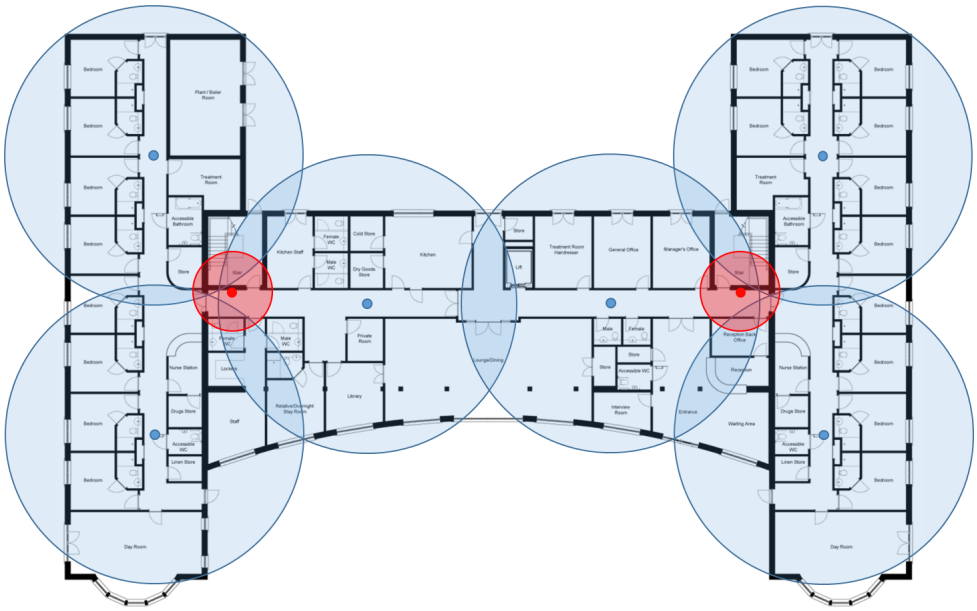


Figure 82. Location determination using LF and RSSI

10 Resident Check-In

10.1 General

teleCARE IP with Resident Check-In functionality is intended for use in nursing homes and in assisted living facilities.

The resident check-in functionality requires the resident to do a certain activity in the emergency call system, during a predefined time window. When the resident has not done such activity, the resident is not checked-in. Staff can view and print a list of not-checked-in residents for further follow-up. Not-checked-in residents can be reported automatically on room displays and portables.

10.2 Intended use of resident check-in

The intended use for resident check-in is to present an overview of residents being present in the facility, who did not check-in.

10.3 Medical device

Resident check-in is not a medical device.

10.4 Principle of Resident Check-In

Residents are registered at locations. Certain wired as well as certain wireless devices are connected to those locations.

The resident check-in functionality works by registering certain triggers generated by the specific devices. The triggers are then filtered by a time window. Only triggers within the time window are considered. Another filter is the absence registration of the residents. Residents without any registered trigger or absence registration are listed as not checked-in. Staff can view a list of these residents and take action. Also the system can be configured for automatic sending of calls to display devices such as portables, room displays and text displays.

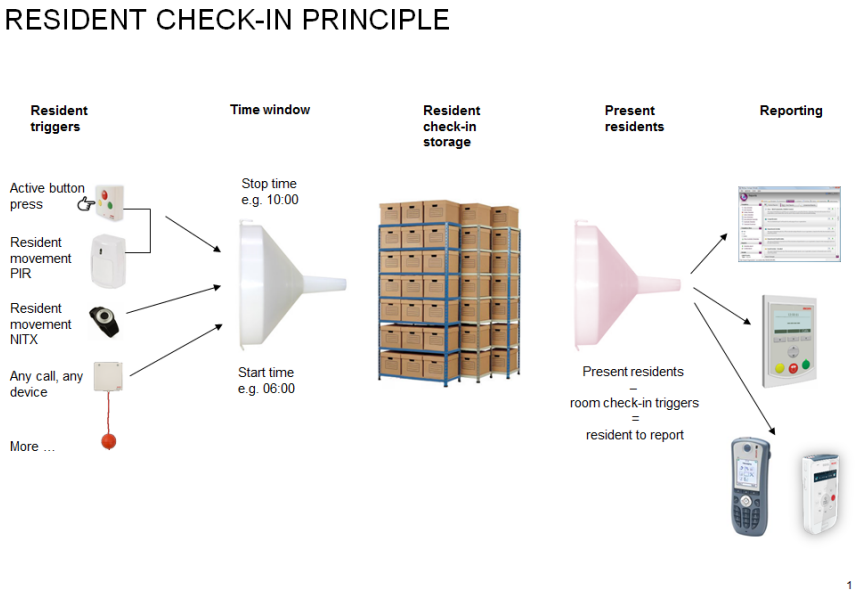


Figure 83. Resident Check-In principle

10.5 Triggers for check-in

Residents can check in via a number of methods. These generate triggers for the system. Some triggers are actively generated by the resident, others can be automatic. The following triggers are supported.

- Resident presses a button on the NITX.
- Resident presses a button on an NIFX.
- Resident presses a button on a teleCARE IP (wired) peripheral
- NITX sends a movement message to the system.
- A PIR sensor connected to an NIFX detects a movement, the NIFX forwards the detection.
- A PIR sensor has an NITX and detects a movement, the NITX forwards the detection.

10.6 Time Window

The time window during which the residents can trigger their presence, has a minimum duration of 2 hours and a maximum duration of 23 hours. The window can be set with a precision of one minute.

10.7 System Setup

The resident check-in functionality needs several components of the teleCARE IP system to work properly.

Residents are registered in the system. Each resident is registered with their name and location. If the resident uses a wireless device, this is registered as well.

In the configuration GUI of the NISM a time frame is set for the whole site. At the beginning of a new time frame the NISM compiles a list of all residents being present in the facility, and not being absent.

Every resident uses a wired or wireless peripheral at their specific location to trigger a message to the teleCARE IP system. The trigger is send as a call to the NIRC3. The NIRC3 sends a resident check-in message to the NISM. The NISM determines the location of the Resident Check-In call. The NISM removes the resident from the list.

When the time frame expires the NISM has a list ready with only non-checked-in residents who are present in the facility. This list can be viewed and printed by the staff. The staff can only view the list for their assignment area. The list can also be sent automatically to display devices such as room displays, LED signs and portables.

10.8 Licensing

A license is needed to use the Resident Check-In functionality.

11 System Monitoring

The teleCARE IP system continuously monitors the state of any connected devices. The monitoring is performed on three levels:

- UNITE server level - As part of the UNITE system the UNITE CM module continuously monitors the state of the System Manager (NISM) and the Integrated Message Server (IMS).
- teleCARE IP controllers level - The NISM monitors all room controllers.
- Peripherals level - The teleCARE IP controllers (NIRC3) monitor the state of all connected active peripherals. Peripherals are monitored for line breaks and hardware malfunctioning.

Faults that are detected at peripherals level are also signaled by the related NIRC3 or on a NICL2 corridor lamp, see See "Room Controller (NIRC3)" on page 15., or Corridor Lamp (NICL2), see See "Corridor Lamp (NICL2)" on page 18.

All detected faults are transmitted and reported to the UNITE CM module, from where the faults are further handled. The example in the illustration below shows the UNITE CM module connected to a PC which logs any faults which the UNITE CM detects.

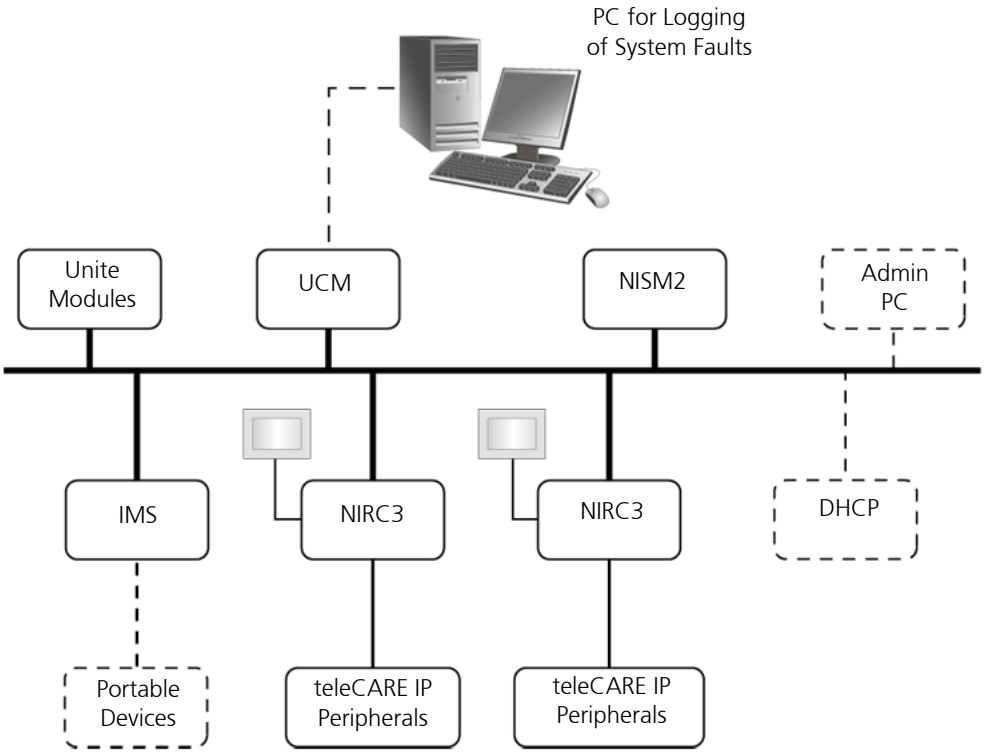


Figure 84. UNITE CM monitoring the system with logging of system faults by a PC

12 Installation Examples

12.1 General

The teleCARE IP room controller has three room buses and typically these can be arranged to serve:

- One Room
  In this basic installation all three room buses and any connected peripherals are applied in one and the same room. The signaling of the room is handled by one corridor lamp which is typically integrated into the room controller.
- Three Rooms
  In this master-slave installation each of the three room buses and any connected peripherals are dedicated to a separate room. The signaling of the rooms is handled by three corridor lamps; one for each room. In this architecture two of the corridor lamps connect as slaves to the room controller which typically has an integrated corridor lamp.

12.2 Basic Installation Without Speech

The basic installation of a teleCARE IP system without speech consists of one room controller with integrated corridor lamp to which only active peripherals
are connected. The room controller handles all the signaling of the related room.

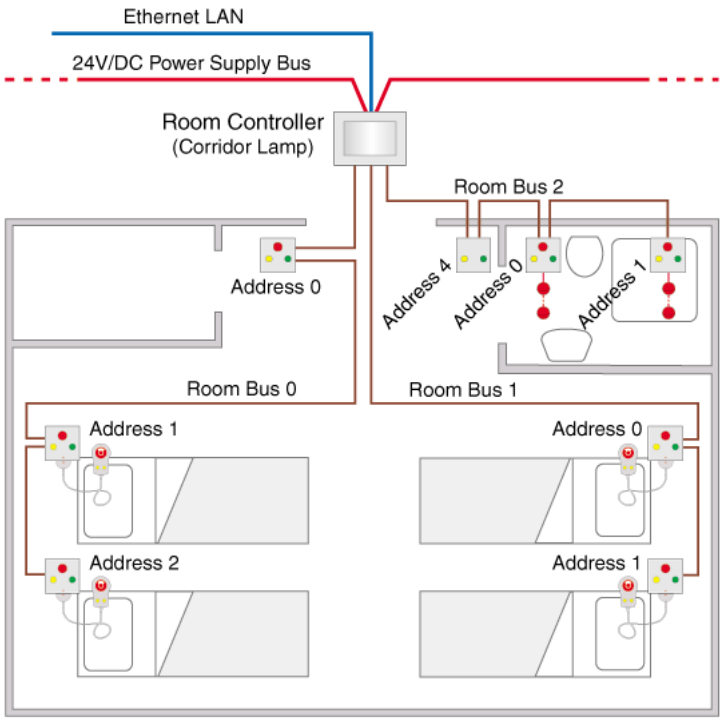


Figure 85. Basic system installation without speech

Note: *In a basic configuration the system power supply can be provided by one or more external power supply units. See "24Vdc / 3 Amp Power Supply (Standard)" on page 14 for details.*

12.3 Master-Slave Installation Without Speech

The master-slave installation of a teleCARE IP system without speech consists of one room controller with integrated corridor lamp to which two slave corridor lamps and various active and passive peripherals are connected. The room controller handles all the signaling of the (typically three) related rooms.

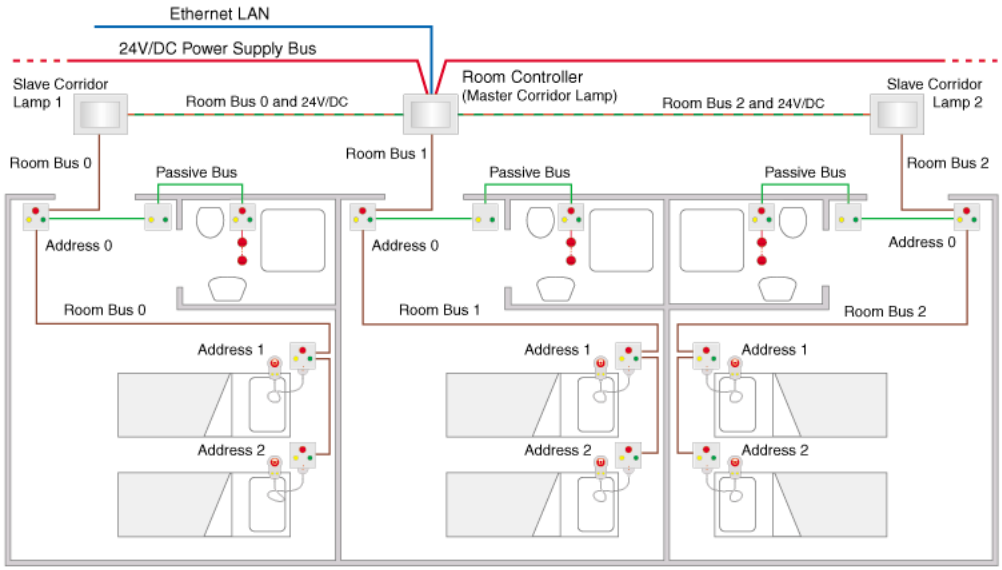


Figure 86. Master-slave system installation without speech

Note: *In a master/slave configuration the system power supply can be provided by one or more external power supply units. See "24Vdc / 3 Amp Power Supply (Standard)" on page 14 for details.*

12.4 Basic Installation With Speech

The installation of a teleCARE IP system with speech is basically the same as without speech except that the teleCARE IP Speech Module is added at each active peripheral where speech communication is required.

The speech module can only be used in combination with the following active teleCARE IP peripherals: the doorside module (NIDM), the bedside module (NIBM) and the pull cord module (NIPC).

The example shown consists of one room controller with integrated corridor lamp to which only active peripherals are connected. The room controller handles the speech communication and all the signaling of the related room. Each bed location has a speech module.

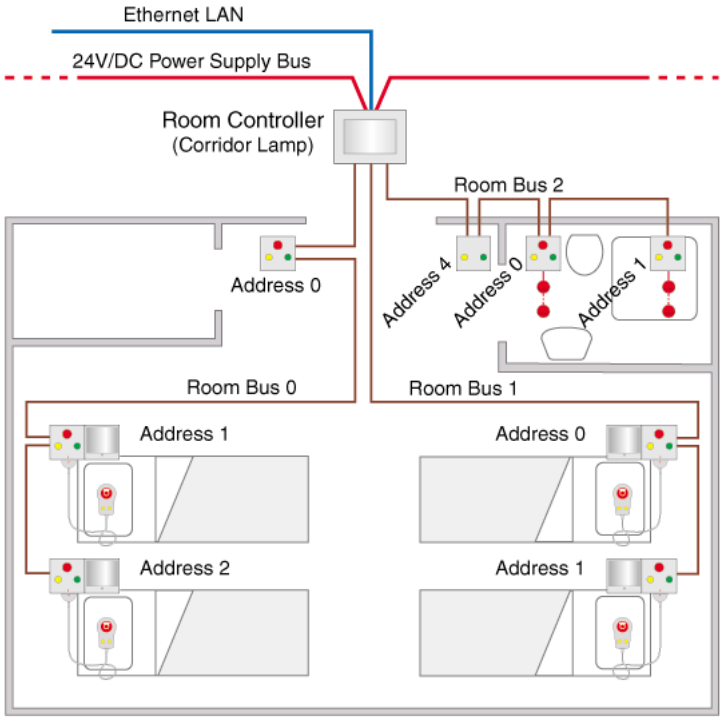


Figure 87. Basic system installation with speech

Note: *In a basic configuration with speech the system power supply can be provided by one or more external power supply units. See "24Vdc / 3 Amp Power Supply (Standard)" on page 14 for details.*

12.5 Master-Slave Installation With Speech

The master-slave installation of a teleCARE IP system with speech is basically the same as without speech except that the teleCARE IP Speech Module is added at each active peripheral where speech communication is required.

The speech module can only be used in combination with the following active teleCARE IP peripherals: the doorside module (NIDM), the bedside module (NIBM) and the pull cord module (NIPC).

The example shown consists of one room controller with integrated corridor lamp to which two slave corridor lamps and various active and passive peripherals are connected. The room controller handles the speech communication and all the signaling of the (typically three) related rooms. Each bed location has a speech module.

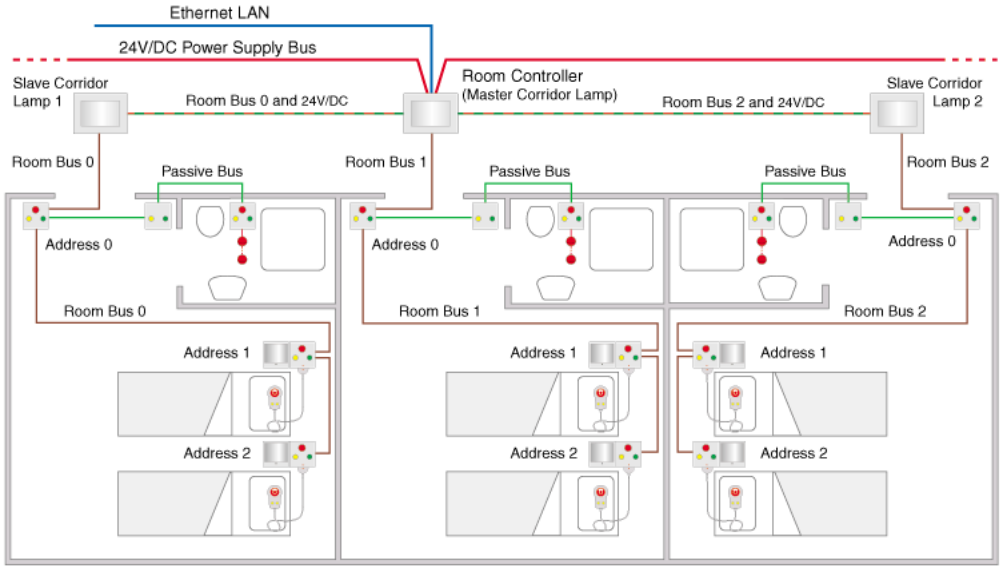


Figure 88. Master-slave system installation with speech

Note: *In a master/slave configuration the system power supply can be provided by one or more external power supply units. See "24Vdc / 3 Amp Power Supply (Standard)" on page 14 for details.*

12.6 Installation With Speech at Each Bed

The installation of a teleCARE IP system with speech is basically the same as without speech except that the teleCARE IP Speech Module is added at each active peripheral where speech communication is required.

The speech module can only be used in combination with the following active teleCARE IP peripherals: the doorside module (NIDM), the bedside module (NIBM) and the pull cord module (NIPC).

The example shown consists of one room controller with integrated corridor lamp to which only active peripherals are connected. Each bed location has a speech module. The room controller handles the speech communication and all the signaling of the related room.

Also shown in this example is the possibility of installing the speech module at the doorside module.

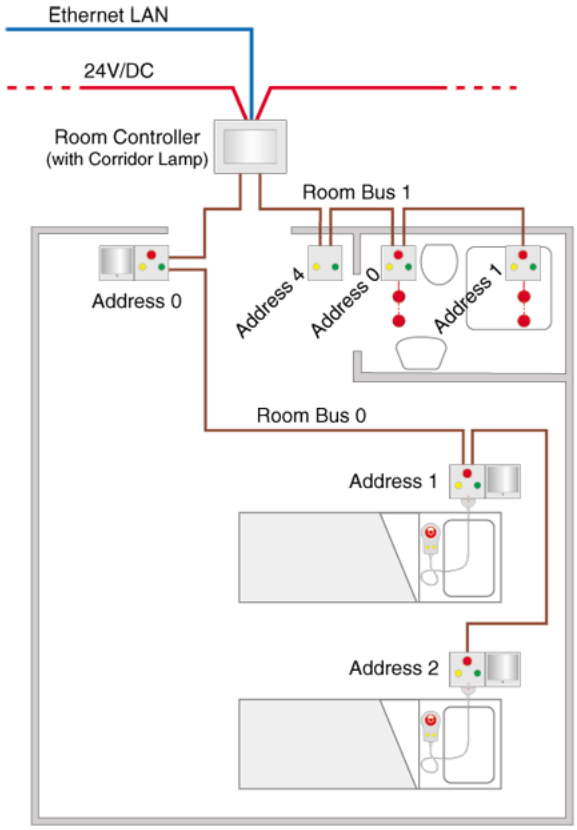


Figure 89. Basic system installation without speech

Note: *In a configuration with speech the system power supply can be provided by one or more external power supply units. See "24Vdc / 3 Amp Power Supply (Standard)" on page 14 for details.*

Appendix

Appendix A: Duty Selector Functions

The Duty Selector (NIDS) enables calls from rooms or beds to be organized in pre-determined groups and sent as call forwarding signals or pager messages. Configuring a system with duty selectors is done with the teleCARE IP System Manager GUI.

The groups can be joined in various combinations through the duty selector to coincide with varying situations in the area, such as daytime and night-time shifts. The duty selector offers ten settings ranging from 0 to 9.

The example below shows an area with 12 rooms divided into 4 sections (A, B, C and D). Three positions on the duty selector have been defined as follows:

1 = day shift, 2 = evening shift and 0 = night shift.

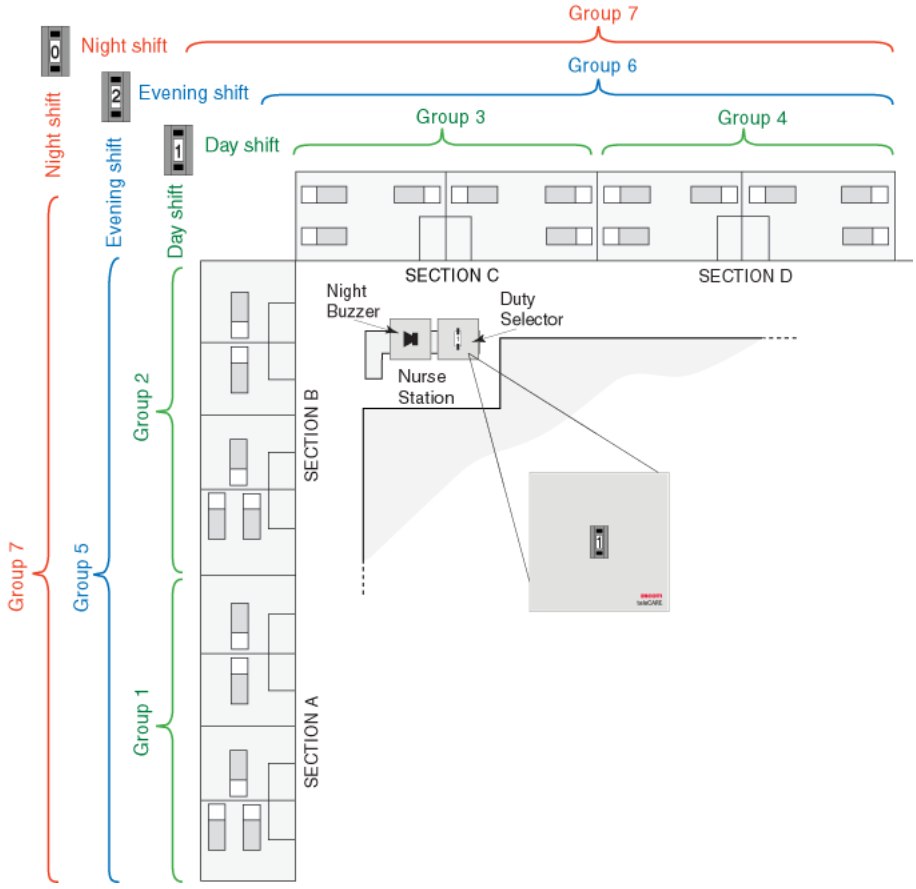


Figure 90. Duty selector and call forwarding groups

With the duty selector in position 1, calls from section A will be signaled to group 1, section B will be signaled to group 2, section C to group 3 and section D to group 4.

With the duty selector is in position 2, calls from section A and B are signaled to group 5. Calls from section C and D are signaled to group 6.

With the duty selector in position 0, calls from sections A,B,C and D are all signaled to group 7. The duty selector position 0 also switches off the buzzers of the doorside modules in the rooms and re-directs the buzzer output to the input of the "night buzzer" at the attendants station.

Appendix B: Connecting and disconnecting the Safe Release Plug

Connecting the Safe Release Plug

The teleCARE switch modules with socket have a "Red Dot" on the cover plate, at the bottom in the middle. The safe release plug on the teleCARE hand sets has a corresponding "Red Dot" which must line up with the red dot on the switch module and face outwards when plugging in the handset.

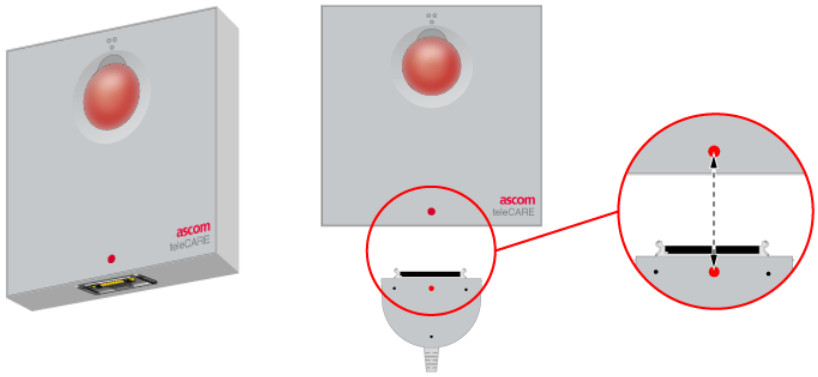


Figure 91. Aligning the red dots on switch module and the Safe Release plug

The recommended and easiest way to plug the Safe Release plug into the socket is shown in the illustration below.

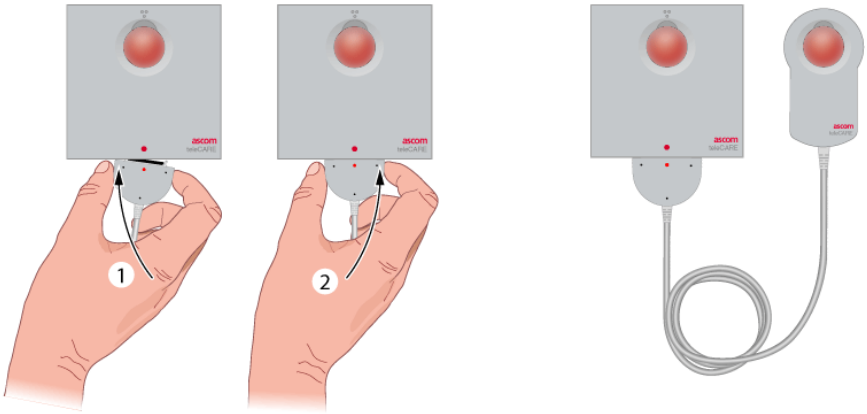


Figure 92. Connecting the Safe Release plug into the socket

To plug in the "Safe Release" plug, carefully insert one side of the plug connector into the socket. Hold that side firmly in place and at the same time, push the other side of the plug up into the socket until it locks in with a "click".

Disconnecting the Safe Release Plug

The recommended and easiest way to remove the Safe Release plug from the socket is shown in the illustration below:

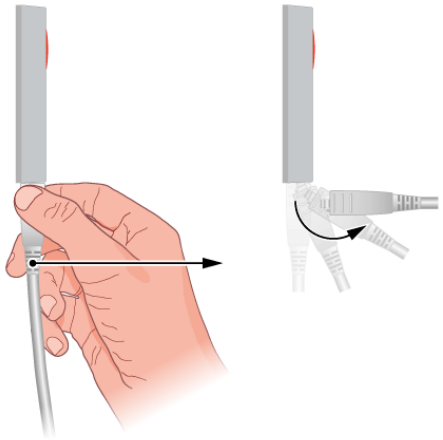


Figure 93. Disconnecting the Safe Release plug from the socket

To unplug the "Safe Release" plug hold the cable restrainer just below the handset and pull it firmly towards you. This will release the plug from the socket.

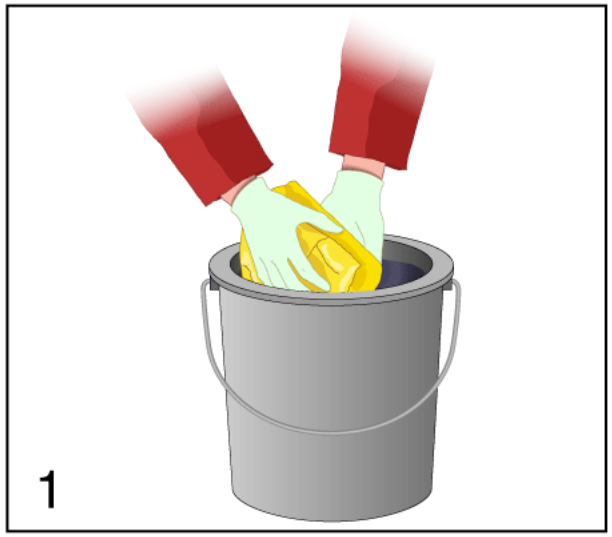
Appendix C: Cleaning the Switch Modules

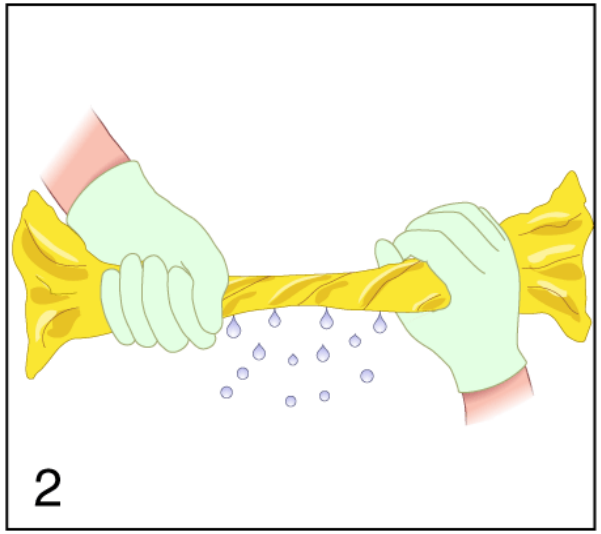
Clean the switch modules by wiping them with a moistened (not dripping) soft cloth which is soaked in a solution of mild detergent and water.

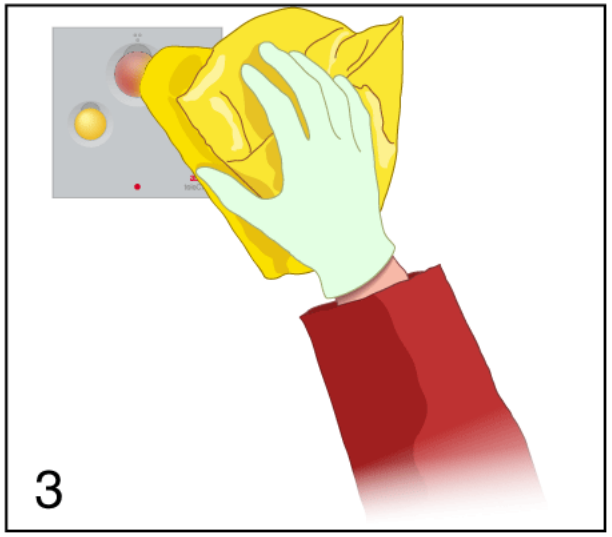
A solution of 1% sodium hypochlorite (NaOCl) and water can be used to disinfect the switch modules.

Do not use aggressive or abrasive cleaning agents.

Do not immerse the switch modules in liquids or use water spray to clean switch modules.







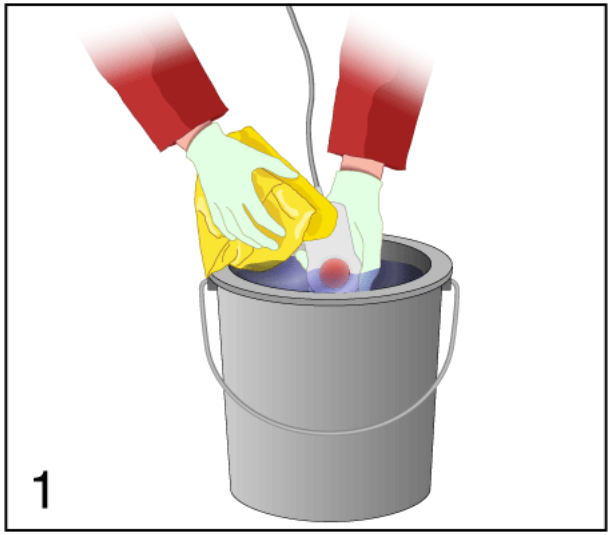
Appendix D: Cleaning the teleCARE Handsets

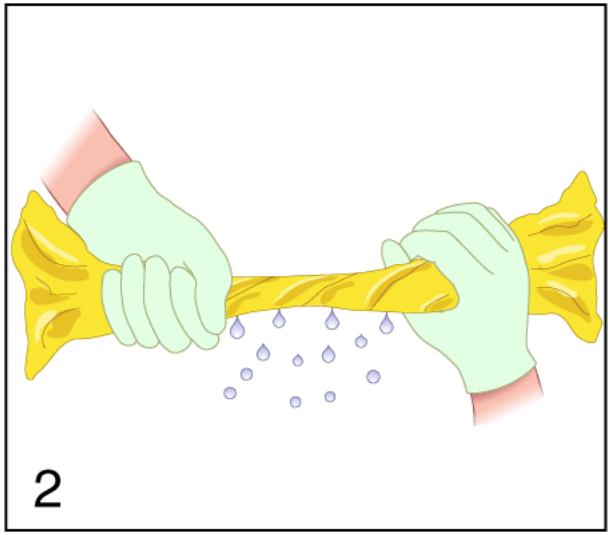
All undamaged teleCARE handsets can be briefly immersed in water or a solution of mild detergent.

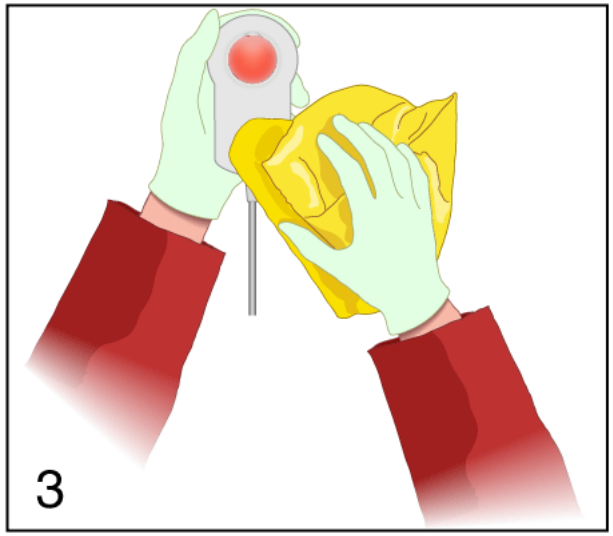
Clean the handset by washing it in a solution of mild detergent and water then wiping it with a moistened (not dripping) soft cloth.

A solution of 1% sodium hypochlorite (NaOCl) and water can be used to disinfect teleCARE handsets.

Do not use aggressive or abrasive cleaning agents.

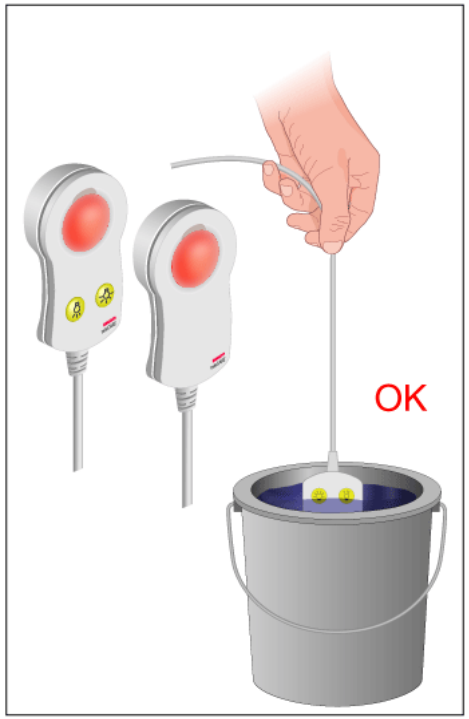


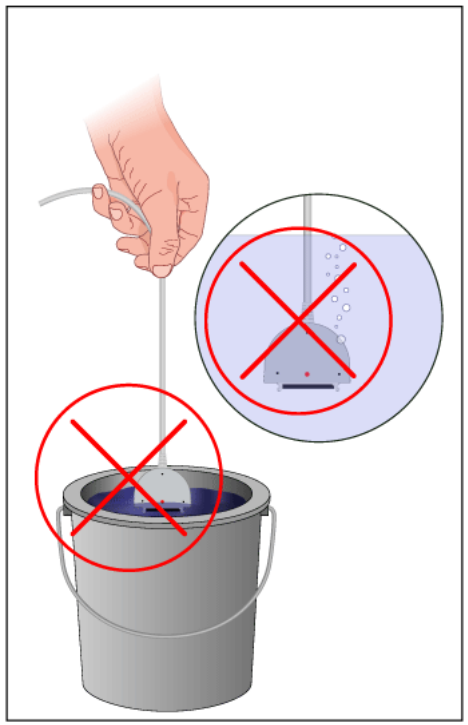




Special Precautions when Cleaning the teleCARE Handsets

Do not immerse or wet the teleCARE plug on the handsets.





Appendix E: Support for Stuck Button Detection

From NISM version 7.0.0 or later, support for stuck button detection is included. The teleCARE IP system is able to detect and send out an alarm if a call button gets stuck.

If for example the pull cord of a pull cord module gets stuck because of a damaged or worn out cord, the teleCARE IP system will automatically generate a stuck button alarm after 15 seconds.

Passive Modules not Supported

IMPORTANT: *Due to hardware restrictions, it will not be possible to implement stuck button detection functionality for passive modules. Therefore stuck button detection functionality will not be available for passive modules.*

Restoring a site backup

When restoring a site backup created with a NISM prior to version 7.0.0, be aware that the backup file will not include the triggers for stuck button detection. If stuck button support is required, the triggers responsible for the stuck button detection will have to be added manually to the "Module Definitions" of the "Site Modules" template.

Button Hold Time

Due to the implementation of the support for stuck button detection, the maximum button hold time that can be configured for the triggers of the switch buttons, has been reduced to a maximum of 10 seconds, instead of the maximum of 60 seconds in NISM versions prior to version 7.0.0. Therefore be aware that when restoring a backup file that was created in a NISM version prior to version 7.0.0, any button hold times that were configured to be longer than 10 seconds, will be set back to 10 seconds.

Appendix F: UTF-8 Support

For the support of multiple languages throughout the system, UTF-8 is supported by modules, handsets and unite components. The release notes of each module, handset or component will declare the exact support for the released version.

Not all code points as defined by the Unicode organization will be supported. The Handsets have a wider range of support than the NIRD, where as the NICD and NUCD12IP do not support UTF-8.

Supported modules/handsets

	Module/handset	Version (if applicable)
	NISM2	6.2.0 or higher
	NIRC3	1.20.0 or higher
	NIWC	5.2.0 or higher
	NIRD	2.20 or higher
	Myco handset	
	i-series handsets	
	d-series handsets	

Supported Unicode characters by the NIRD

	Unicode code points	Description
	U+0020-007F	ASCII
	U+00A0-00FF	Latin-1 supplement
	U+0100-017F	Latin Extended-A
	U+0300-033F	Diacritical marks
	U+0380-03D0	Greek
	U+0400-0450	Cyrillic
	U+05D0-05EA	Hebrew

Unsupported modules

The corridor displays NICD and NUCD12IP only support ASCII (Unicode code points U+0020-007F) and Latin-1 extended (Unicode code points U+00A0-00FF). Both displays can be uploaded with a font file within the range 0x00-0xFF for displaying a different font set.

Document History

Version	Date	Description
A	28 Oct 2013	• First US release
B	01 July 2014	• Control Equipment chapter updated: "Room Controller (NIRC3)" on page 15 "Corridor Lamp (NICL2)" on page 18 "LED Lamp Board (NILD2)" on page 19 • Wireless functionality added "teleCARE IP with Wireless Functionality" on page 49 See "NILF Low Frequency Beacon" on page 72. See "Examples of teleCARE IP Wireless Applications" on page 73. • Wireless Call with Speech functionality added. See "teleCARE Wireless with Speech" on page 79. • Wanderer Control added to Wireless Call See "teleCARE IP Wireless Combined with Wander Management" on page 75. • also:"Typical Examples of teleCARE Wireless with Wander Alarm" on page 88 • Voice piggyback module NIVP added See "Voice Piggyback (NIVP)" on page 17. • Numerous changes throughout the document relating to the document reviews of April 2014. • Maximum number of call locations added to section 1.2 on page 2 • Connection of a paging system added to Chapter 5.6 on page 21
C	12 February 2015	• Connection of an ESPA (or a TAP) paging system. See "System Manager (NISM2)" on page 21. • Staff Transceiver item numbers added. See "NITX Staff Transceiver" on page 67. • Content referring to NIRC, NICL and NILD has been removed.
D	2015-12-08	• Check Infrared TV control compatibility statement for 14 button handset added, see "Handset NIPH3-AES" on page 47. • Added chapter Practical Engineering Parameters, See "Practical Engineering Parameters" on page 5. • Added chapter Resident Check-In. See "Resident Check-In" on page 99. • Added links to the Ascom Partner Website and the Innovaphone Website for licenses for the Innovaphone Gateway. See "VoIP Gateway" on page 13.
E	19 September 2016	• Added chapter External Inputs. See "External Inputs" on page 40. • Added RSSI to chapter teleCARE IP with Wireless Functionality. See "RSSI-based Location Determination" on page 97.

Version	Date	Description
F	25 September 2017	• teleCARE IP with Wireless Functionality updated. See "teleCARE IP with Wireless Functionality" on page 49. • Wireless chapter extended with wireless infrastructure. See "Wireless Infrastructure" on page 54. • Principle of the Wireless Infrastructure: See "Principle of the Wireless Infrastructure" on page 56. • Wireless modules added: NUREP - See "NUREP Wireless Repeater" on page 60. Wireless Gateway (NIRC3 + NUREP) - See "Wireless Gateway" on page 61. NUWBM3 - See "NUWBM3 Wireless Active Bedside Module" on page 62. NUUTX - See "NUUTX Universal Transceiver" on page 70. NUWIR - See "See "NUWIR Wireless PIR Module" on page 71. • Practical Engineering Parameters updated: See "Practical Engineering Parameters" on page 5.
G	14 February 2018	• "Exit Detection" functionality description added to the NILF section: See "Exit Detection" on page 77. • Typical example of teleCARE Wireless with Exit Detection added: See "Typical example of teleCARE Wireless with Exit Detection" on page 93. • NIPC removed from list of modules supporting sensors. • Please note that normally closed (NC) contacts cannot be used when using an NICB connected to the Door Side Module (NIDM) or the Toilet Cancel Module - Active (NITC-XXA). See "External Inputs" on page 40. • A one minute delay added to NITX calls: "NITX Mobile transceiver" on page 66
H	20 September 2018	• Wander Management updated: See "teleCARE IP Wireless Combined with Wander Management" on page 75. • *See "Typical Examples of teleCARE Wireless with Wander Alarm" on page 88.* • See "Typical Examples of teleCARE Wireless with Loiter Alarm" on page 92. • See "Access Schedulers" on page 96. • A VDE requirement to support "Stuck Button" detection has been implemented. See "Support for Stuck Button Detection" on page 113. • UTF-8 Support has been added to the Appendix. See "UTF-8 Support" on page 114. • RSSI Location Determination Functionality only works when using Wireless modules with LF (NITX and NIFX with LF). See "RSSI-based Location Determination" on page 97. • Wireless Infrastructure RF Planning Considerations added. 9.5, Wireless Infrastructure RF Planning Considerations on page 57
I	9 May 2019	• Section describing wireless speech using phones (landline and mobile 3G/4G) added. See "Wireless Speech Using Phones" on page 82.