

SYSTEM DESCRIPTION

teleCARE IP Nurse Call System – vNISM

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Abbreviations and Glossary

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Ascom-WS System	An Ascom-WS system is an onsite wireless communications infrastructure providing mission critical services.
Assistance Call	A manually generated staff call for assistance. How to make an assistance call is freely configurable from the teleCARE IP System Manager.
Base Station	A base station is a carrier device that can be part of an Ascom-WS system.
Bedside Handset	A Bedside Handset is an end user device that can be connected to various modules with socket.
Call	A call is the general term for the various types of alarms that can be generated by patients, staff or equipment.
Call Cancel	The termination of a call and removal of the signals relating to that call.
Call Forwarding	The automatic directing of calls to locations where staff is present.
Call Level	A call level is assigned to a specific event. The teleCARE IP nurse call system supports a maximum of 255 call levels. The assignment of call levels to events is freely programmable from the teleCARE IP System Manager.
Call Priority	The priority of a call describes the nature of the call and determines the urgency of the response to the call.
Call Transfer	The automatic redirecting of calls that have been unattended for a predetermined period of time.
Cardiac Pull Switch	The Cardiac Pull Switch (NUCPS) is an active peripheral (switch module) that can be used as an end user device in a teleCARE IP system.
Card Reader	The Card Reader (NUCR) is an RFID card reader used as an access and action control module in a teleCARE IP system.
Caregiver	A person responsible for the care of residents in a nursing home for the elderly.
Carrier Device	Carrier devices are the top level IP and UNITE enabled components that can be part of an AHP system.
Code Blue Call	A manually or automatically generated call signalling a cardiac arrest or similar critical situation.
Corridor Lamp	The Corridor Lamp (NICL4 / NICL) is an active peripheral that can be used as an end user device in a teleCARE IP system for signalling purposes.
Customizable Bedside Module	The Customizable Bedside Module (NUBM3) is an active peripheral (switch module) that can be used as an end user device in a teleCARE IP system.
Customizable Button Module	The Customizable Button Module (NUDM3) is an active peripheral (switch module) that can be used as an end user device in a teleCARE IP system.
Customizable Pull Cord Module	The Customizable Pull Cord Module (NUPC3) is an active peripheral (switch module) that can be used as an end user device in a teleCARE IP system.

DECT	Digital Enhanced Cordless Telecommunications Global standard for cordless telephony.
DHCP	Dynamic Host Configuration Protocol A protocol for automating the configuration of computers and handsets that use TCP/IP.
Duty	A duty assigns nursing staff to (a group of) rooms, for a certain period of time. These duty periods, or work shifts, can be controlled by either a (physical) duty selector or a (digital) duty scheduler.
Elise	Embedded Linux server, hardware platform for Elise modules.
Emergency Call	A manually or automatically generated highest priority call signalling an emergency situation. How to initiate an emergency call is freely configurable by the teleCARE IP System Manager.
Emergency Pull Switch	The Emergency Pull Switch (NUEPS) is an active peripheral (switch module) that can be used as an end user device in a teleCARE IP system.
End User Application	An end user application is an end user component offering end user level functionality to portable devices and peripherals. Examples of end user applications are the instant messaging application and the alarm management client.
Event	In the teleCARE IP nurse call system an event indicates that something has happened. An event can be a call, system fault, medical alarm, technical alarm, cancellation, etc.
External Input Module	The External Input Module (NUMI2A) is the interface between primary medical equipment from third parties and the teleCARE IP nurse call system with two medical alarm inputs for the secure monitoring of two primary medical devices.
IP	The Internet Protocol standard is used for communicating data across and beyond the IP network that connects all teleCARE IP devices in the nurse call system.
LAN	Local Area Network
Line Break Detection	Line breaks are detected by the Room Controllers, signalled on the associated Corridor Lamp(s) and forwarded to Unite PS or Unite CM.
Linking	Linking of carrier and end user devices is defined in the location tree of the teleCARE IP System Manager. Calls will be forwarded to linked devices.
Logging	Logging in the teleCARE IP system is performed by Unite PS or Unite CM, which centrally logs all calls, faults, alarms and cancellations. All logged information is time stamped and available to authorized staff members.
MAC	A Media Access Control address uniquely identifies the Ethernet network adapter of an IP device.
Medical Alarm	A medical alarm is an automatically generated call from an electromedical device which is connected to the teleCARE IP system.
Medical Disconnect	A high priority call automatically triggered by the unintentional disconnection of an electromedical device.

Medical Line Break	An alarm automatically triggered at the detection of a break in the connection to an electromedical device.
Messaging	Messaging is the exchange of information using text messages. Messaging in the teleCARE IP system is enabled by applying the required messaging systems of the Ascom Healthcare Platform (AHP).
Mission Critical Service	Mission critical services require planned and timely responses to events that can happen at a customer's site. An AscomWS system provides the infrastructure to support organizations with their mission critical services. Examples of mission critical services are: nurse call, fault handling and activity logging.
Normal Call	A normal call is generated by pressing the red button on a handset or switch module. A normal call is typically a call from a patient or resident.
NITX	Wireless mobile transceiver.
Nurse	A qualified health care professional looking after patients in a hospital.
Nurse Call	Notification to Nursing Staff about a call via audible and / or optical signals through buzzers, corridor lamps, pagers, IP/DECT phones etc.
Nurse Call System	An electronic system for signalling and handling calls in a hospital or care home.
Patient	A person receiving medical attention or treatment in a hospital.
PCB	Printed Circuit Board.
Peripheral	A peripheral is an end user device that can be part of an Ascom-WS system. There are active and passive peripherals.
PIR	Passive Infrared sensor for movement detection.
PoE	Power over Ethernet enables a teleCARE IP Room Controller to retrieve power from the Ethernet network.
Portable Device	A portable device is an end user wireless device that can be part in an Ascom-WS system.
Presence	Nurse / Staff presence indication in a teleCARE / Telligence system.
Remote Management	Remote management allows the System Manager (NISM) to be managed via a standard serial interface, modem or VPN from a remote PC or laptop.
Resident	A person in the care of a care home or similar institution.
Room Bus	A teleCARE IP Room Controller (NIRC3 / NIRC4) provides four digital room buses for the connection of peripherals.
Room Controller	The Room Controller (NIRC) is a teleCARE IP controller device establishing a decentralized node on the IP network.
Room Bus Tester	A Room Bus Tester (NIRT) connects to a digital room bus and is used to test the functionality and address settings of all connected (active) peripherals.

Room Display	The Room Display (NURD / NIRD) is an active peripheral (switch module) combined with Ascom interactive messaging (IM) and card reader functionality that can be used as an end user device in a teleCARE IP system.
SafeConnect socket	A SafeConnect socket can be found in various modules. SafeConnect sockets prevent a module from being damaged by the unintentional and uncontrolled disconnection of a handset or medical device cable.
Signalling	Calls generated within the teleCARE IP system can be visually and acoustically signalled on various modules.
Speech Module	The Speech Module (NUSPM) is an active peripheral (speech module) that can be used as an end user device in a teleCARE IP system.
Sunblind Control Module	The Sunblind Control Module (NUSB2) is used in combination with the NUHS-series bedside handsets to raise and lower sun blinds.
Switch Module	Switch modules are peripherals that can be used as end user devices in a teleCARE IP system.
System Fault	Application status report which is automatically generated by the teleCARE IP system when a line break or system malfunction is detected. The application status is reported to Unite PS or Unite CM, allowing for logging and further fault handling.
System Infrastructure	The system infrastructure structure is composed by the AHP systems that participate in an AscomWS system solution.
System Manager	The System Manager (NISM) is a teleCARE IP carrier device forming the logistical heart of the teleCARE IP system. The NISM contains control logic and a client web application enabling remote GUI access from a web browser.
System Manager GUI	The teleCARE IP System Manager Graphical User Interface is the installation, management and administration tool for the teleCARE IP system.
System Service	A system service adds specific functionality to an Ascom-WS system. A system service integrates into an Ascom-WS system through UNITE.
teleCARE IP	The teleCARE IP nurse call system is intended for use in hospitals, psychiatric hospitals, elderly care homes, nursing homes and medical rehabilitation centers.
teleCARE IP controller	A teleCARE IP controller is a carrier device that can be part of an Ascom-WS system. An example of a teleCARE IP controller is the teleCARE IP room controller.
Technical Alarms	Technical alarms are automatically generated signals from equipment within the building and which are transmitted within teleCARE IP. Technical alarms can be detected by the teleCARE IP Room Controller. Technical alarms can originate from electrical or mechanical devices such as, for example, a heating system, an elevator, a medical gas monitoring system, or a security system.
UDP	The User Datagram Protocol is a standard IP protocol that enables two hosts to establish a connection and exchange data with limited services regarding data delivery.

Unite	Unified IP-based Telecommunication Environment. Name of the Ascom IP-based system for handling system services. Unite allows third parties to develop their own customer specific Windows and Java applications to integrate with the ACP systems.
Unite CM	Unite Connectivity Manager A gateway that handles communication interfaces, message routing, activity logging, and other essential messaging services. It is installed on ELISE3 hardware.
Unite Module	A Unite module is a carrier device offering specific system services.
Unite PS	Unite Platform Server A server that handles communication interfaces, message routing, activity logging, administration of systems, and other essential messaging services. It is a software-only product installed on a Windows server.
UNS	Unite Name Server Contains the number plan that translates the numbers used by the users and applications to destination addresses.
UPS	An Uninterruptible Power Supply can be used for maintaining a continuous supply of electrical power in case the normal power supply fails.
User	A user uses the end user devices of an Ascom system. Examples of teleCARE users are: nursing staff, caregivers, service personnel and patients.
UTP	Unshielded Twisted Pair
VDE	Verband der Elektrotechnik, Elektronik und Informationstechnik. VDE is a German Association for Electrical, Electronic & Information Technologies. VDE standards 0834-1 and 0834-2 describe regulations regarding nurse call systems.
VPN	Virtual Private Network enables the remote connection to the teleCARE IP System Manager (NISM) or to the Enhance System Services (ESS) module by using an Internet browser.
WAC	A Wet Area Cover can be used as a water resistant membrane to protect switch modules against the risk of ingress of water in humid rooms such as bathrooms or toilets.
Ward	A group of rooms in a hospital comprising patient rooms, treatment rooms and staff rooms which form an organizational unit.

Contents

1 Introduction	1
1.1 teleCARE IP Intended Application Area	1
1.2 System Structure.....	1
1.3 IP Infrastructure Requirements	2
1.4 Stand Alone teleCARE IP System	3
1.5 Integration With Other Ascom Systems	3
1.5.1 Ascom Healthcare Platform.....	3
1.5.2 UNITE.....	3
1.5.3 System Enhancement.....	3
1.6 Typical Installation.....	3
1.6.1 Room Bus	3
1.6.2 Power Supply	3
1.6.3 Security	3
1.6.4 Modularity.....	4
1.7 System Configuration	4
2 VDE Compliance	5
2.1 General.....	5
2.1.1 DIN-VDE Compliant System Requirements	5
2.1.2 System Configuration	5
2.2 Inspections.....	5
2.2.1 Quality Inspection for Acceptance	5
2.2.2 Visual Inspection	6
2.2.3 Functional Inspection	6
2.2.4 Inspection after alteration	6
2.3 Delivery to the operator	6
2.4 Operation.....	6
2.5 General Inspection	7
2.6 Repair	7
2.7 Maintenance Operation	7
3 Practical Engineering Parameters	9
3.1 General Limitations	9
3.2 DHCP Requirements	11
3.3 Network Expectations.....	12
3.4 VoIP Requirements.....	12
3.5 teleCARE IP Compatible Ascom Handsets.....	13
3.6 Startup Availability Timing	13
3.7 Software Update Timing	13
4 System Structure	14
4.1 System infrastructure.....	14
4.1.1 IP Medium.....	15
4.1.2 DHCP Server	15
4.1.3 UNITE.....	15
4.1.4 Messaging Services	15
4.1.5 System Management	15
4.1.6 Scalability.....	16
4.1.7 Decentralized System Intelligence.....	16
4.1.8 Fail Safe	16
4.2 System Overview teleCARE IP Without Speech	16

4.3	teleCARE IP With Speech	17
4.3.1	Compatible Ascom IM Handsets.....	17
4.3.2	System Overview teleCARE IP with Speech.....	17
4.3.3	Innovaphone VoIP Gateways	17
5	System Power Supply	19
5.1	VDE compliancy	19
6	Control Equipment	20
6.1	Room Controller.....	20
6.1.1	Room Controller - NIRC4	20
6.2	Wireless Transceiver Module - NIRX	21
6.3	Voice Module - NIVP4.....	22
6.4	Blank Front Cover for the Room Controller	23
6.5	Corridor Lamp - NICL4	24
6.6	LED Lamps	25
6.6.1	LED Lamp - NILD2.....	25
6.6.2	RGB Workflow LED Lamp - NILD4.....	26
7	Peripherals.....	28
7.1	General	28
7.2	Room Display - NURD-Hx.....	29
7.3	Doorside Module - NUDM3-HE	30
7.4	Bedside Module - NUBM3-HE	31
7.5	Bedside Extension Module - NUBM3X-HE	32
7.6	Pull Cord Module - NUPC3-HE.....	33
7.7	Pull Switch Module - NUXPS-HE.....	34
7.8	External Input Module - NUMI2A-HE	35
7.9	Card Reader Module - NUCR-HE	36
7.10	Speech Module - NUSPM-HE	37
7.11	Input Output Module - NUIOM-H.....	38
7.12	Sun Blind Control Module - NUSB2-H.....	39
8	Bedside Handsets	40
8.1	NUHS-Series Bedside Handset	40
9	Corridor Equipment	42
9.1	Corridor Display	42
9.1.1	Corridor Display Network Requirements	42
9.1.2	NUCD12IP-H.....	42
9.1.3	NICD	43
10	teleCARE IP with Wireless Functionality.....	44
10.1	General	44
10.2	Principle of teleCARE IP with Wireless Functionality.....	46
10.2.1	Location Based Wireless Nurse Call Using LF Beacons	47
10.3	Wireless Infrastructure	48
10.4	Principle of the Wireless Infrastructure	50
10.5	Wireless Infrastructure RF Planning Considerations	51
10.5.1	Multi-storey building configuration.....	53
10.6	teleCARE IP Wireless Components	54
10.6.1	NUREP Wireless Repeater	54
10.6.2	Wireless Gateway	55
10.6.3	NUWBM3 Wireless Active Bedside Module	56
10.6.4	Wireless Pull Cord Module - NUWPC3-Hx.....	57

10.6.5	NIRX teleCARE IP Transceiver.....	58
10.6.6	NITX Mobile transceiver	59
10.6.7	NITX Staff Transceiver.....	60
10.6.8	NITX Mobile / Staff Transceiver Accessories.....	61
10.6.9	NUUTX Universal Transceiver.....	63
10.6.10	NUWIR Wireless PIR Module	64
10.6.11	NILF Low Frequency Beacon	65
10.7	Examples of teleCARE IP Wireless Applications.....	67
10.7.1	Basic Wireless Nurse Call Coverage	67
10.7.2	Wireless Nurse Call with Positioning	68
10.7.3	Wireless Nurse Call Combined with Wander Management.....	68
10.7.4	Buddying	69
10.7.5	Wander Alarm	70
10.7.6	Loiter Alarm.....	70
10.7.7	Override Facility	70
10.7.8	Exit Detection	70
10.8	Wireless Nurse Call with Speech	71
10.8.1	“Static” and “Dynamic” Modes	72
10.8.2	NILF Beacon Modes.....	73
10.9	Wireless Speech Using Phones	74
10.9.1	Static or Dynamic Locations	75
10.9.2	White List with Auto Answer.....	76
10.9.3	Wireless Speech Combined Configuration	76
10.9.4	PBX Configuration	77
10.9.5	License for Speech Using Phones	77
10.10	Typical Call Sequence of Wireless Nurse Call	77
10.11	Typical Examples of teleCARE Wireless with Wander Alarm	79
10.12	Typical Examples of teleCARE Wireless with Loiter Alarm	82
10.13	Typical example of teleCARE Wireless with Exit Detection	83
10.14	Access Schedulers.....	86
10.15	RSSI-based Location Determination	86
Appendix A Cleaning the Switch Modules.....		89
Appendix B UTF-8 Support		91
Appendix C Unite SmartSense - Deep Link Functionality.....		92
Appendix D Document History		93

1 Introduction

The purpose of this document is to give you a general overview of the teleCARE IP system, including the basic system infrastructure, the most important devices and services, and typical installation examples. Throughout this document you will find cross-references in the text which indicate further details that can be found in other sections of this document. The cross-references are colored blue and linked to the relevant place in the document. Positioning your cursor over the cross-reference text and clicking the left mouse button will take you to the relevant section. To return to the original page after viewing a cross-referred page, click on the “Previous View” arrow of Adobe Acrobat or Adobe Reader.

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The product illustrations in this document represent the products when the illustrations were created. The actual appearance of the products may vary due to subsequent technical modifications and component changes.

1.1 teleCARE IP Intended Application Area

The intended application area for teleCARE IP nurse call systems is in hospitals, psychiatric hospitals, elderly care homes, nursing homes and medical rehabilitation centres.

The primary functions of the teleCARE IP system include the generation, transmission and the signalling of calls made by patients and nursing personnel.

For teleCARE IP Nurse Call System specifications and limitations, refer to the [3 Practical Engineering Parameters, page 9](#) for detailed information.

teleCARE IP components are not to be installed in areas where the air pressure is below 850 millibar (approximate maximum altitude 2000m).

teleCARE IP components, including all bedside handsets, are not intended for use in oxygen enriched environments.

teleCARE IP components, including all bedside handsets, are not intended for use in rooms where flammable (anesthetic) gasses are used.

Ascom cannot accept any responsibility nor liability for teleCARE IP systems and components used in situations other than those stated above.

1.2 System Structure

teleCARE IP is a Local Area Network (LAN) system, based on Internet Protocol (IP) built on a 10/100 Mbit/s IP network.

A teleCARE IP system is centrally managed by the teleCARE IP system manager (vNISM), which is a virtual application running in a virtual environment on a PC or server.

Examples of a virtual environment:

The virtual NISM software can be integrated into a virtual server environment, for example in a commonly used VMware ESXi server environment used for medium to large scale sites.

Figure 1. virtual NISM running directly from a VMware ESXi server environment



At small scale sites, the virtual NISM software can also be installed on a dedicated Windows computer, for example the Advantech stand-alone PC ARK-1220, using Microsoft Hyper-V.

Figure 2. virtual NISM running on an Advantech PC



Note that the graphics used in this document are based on the vNISM installed on the Advantech ARK-1220 PC.

The system manager contains an on-board Java based web application which can be remotely accessed over the IP network using a dedicated NISM GUI application.

The decentralized nature of a teleCARE IP system makes it fail safe in such a way that in case of IP network failure the system will continue locally functioning at room level.

teleCARE IP systems are versatile and scalable to any required system layout.

1.3 IP Infrastructure Requirements

For details of the IP infrastructure requirements please refer to the “IP Infrastructure Requirements for teleCARE IP” document TD 92636EN.

1.4 Stand Alone teleCARE IP System

Depending on the scale of the teleCARE IP system required, teleCARE IP can be configured as a stand alone system that does not require the complete Unite infrastructure. For example in small scale systems like the ones used in elderly care and nursing facilities, that only require basic assignments and messaging capabilities towards room displays and corridor displays, teleCARE IP can be configured in combination with the Messaging, Assignment and Reporting interface (MARi) to run as a stand alone system.

1.5 Integration With Other Ascom Systems

1.5.1 Ascom Healthcare Platform

The teleCARE IP system is part of the Ascom Healthcare Platform. By combining the various Ascom communication systems, a customer specific system solution can be provided, which can include speech, interactive messaging, local positioning, personal alarm and nurse call services. The Ascom communication systems integrate through Unite.

1.5.2 UNITE

The Unite system integrates the AHP devices by offering an application level integration layer. Unite adds messaging, alarm handling, positioning, logging, fault handling, supervision, message routing, group handling, number planning and other mission critical services.

Unite allows the integration of third party equipment. Third party integration can be done via a defined open access protocol (OAP) or other available API's.

1.5.3 System Enhancement

The features of a teleCARE IP system can be enhanced using Unite PS or Unite CM. Unite PS or Unite CM adds features like remote management, system supervision, error logging, and message routing.

1.6 Typical Installation

1.6.1 Room Bus

A typical teleCARE IP installation consists of a teleCARE IP System Manager (vNISM) and a number of teleCARE IP Room Controllers (NIRC4). Each Room Controller provides four 8-wire digital room buses. Each room bus has 12 addresses for connecting active peripherals such as: corridor lamps, room displays, customizable button modules, customizable bedside modules, customizable pull cord modules.

The peripheral modules on the room bus are constantly monitored and all outputs are short circuit protected.

1.6.2 Power Supply

System power is supplied through PoE, using a PoE enabled LAN switch, or an auxiliary power supply via PoE Midspan.

1.6.3 Security

teleCARE IP supports UDP for performance with security aspects handled in the application, the allocation of static IP addresses from a DHCP server in reservation mode and encryption of all data, using a 128 bit algorithm.

1.6.4 Modularity

The modularity of teleCARE IP allows for extension and addition of new services to already installed systems. The IP technology allows easy installation of new room controllers and peripheral modules so to extend the existing teleCARE IP system.

1.7 System Configuration

The functionality and configuration of a teleCARE IP system are set up using the teleCARE IP System Manager. The teleCARE IP Configuration Manual (TD 93442EN) gives full details of how to set up the system using the teleCARE IP System Manager.

2 VDE Compliance

2.1 General

teleCARE IP is certified as compliant with the German standards DIN-VDE 0834 part 1 and DIN-VDE 0834 part 2. These standards relate to “call systems for use in hospitals, care homes and similar institutions” and cover all aspects of equipment design, safety, installation, usage and functionality, as well as influences on other equipment and the environment.

The following is based on the requirements as described in VDE 0834, June 2016, Part 1.

2.1.1 DIN-VDE Compliant System Requirements

In order for a teleCARE IP installation to comply with the requirements of the DIN-VDE:

- The power supply of the PoE capable network switches that provide power to the teleCARE IP controller modules must be fed from a maintained mains supply with a recommendation of using uninterrupted power supply units.
The switch connection must be secured and cables labelled to prevent unintentional disconnection.
- The configuration of the peripherals must use the appropriate “VDE” peripheral types in the teleCARE IP system manager (as described in the teleCARE IP Configuration Manual vNISM (TD 93442EN)).

2.1.2 System Configuration

The System is configured through the System Manager (vNISM) with a special Software Application. The access to the vNISM is made through a dedicated IP-address. The Graphical User Interface (GUI) allows the programming of the system according to the customer requirements.

Every page of the System Manager GUI (Graphical User Interface) shows “Notes” and “Help” in a window, that guide the user through the configuration.

For a complete configuration instruction of the teleCARE IP System, see the document teleCARE IP Configuration Manual vNISM (TD 93442EN)

2.2 Inspections

The following requirements are based on the requirements as described in VDE 0834, June 2016, Section 10.

2.2.1 Quality Inspection for Acceptance

Before operating the teleCARE IP system an acceptance test must be carried out by a specialist for nurse call systems. The acceptance test shall comprise:

- A visual and functional test of the teleCARE IP system.
- Review of documents required for teleCARE IP operation, to make sure that documentation is complete and in compliance with clause 9.
- Initial Test according to DIN VDE 0100-600
- An acceptance certificate signed by the person responsible for the acceptance test.

Quality inspections may also be carried out on individual sections of the teleCARE IP system during the course of the installation.

2.2.2 Visual Inspection

The visual inspection shall cover the appropriate installation and assembly of equipment, the intended use of the devices and comparison of equipment with the technical documentation.

2.2.3 Functional Inspection

The functional inspection shall be in accordance with the proper interaction of the system parts, according to section 4, and the Instruction Guide.

2.2.4 Inspection after alteration

An acceptance test according to section 10.1 shall be done after changes are made to the teleCARE IP system or a scope change. The inspection may be limited to the affected parts of the system if it can be safely assumed that the alterations do not affect the rest of the teleCARE IP system.

2.3 Delivery to the operator

The acceptance certificate, the operating instructions and the system documentation will be handed over to the operator upon the delivery of the teleCARE IP system. The operator or any person authorized by the operator shall be instructed by the installer in the function and operation of teleCARE IP system.

2.4 Operation

2.4.1

The operator of the teleCARE IP system must be a trained person, or appoint a trained person. The operator or the authorized trained person shall take responsibility that functional tests are performed at signs of impairment of permanent readiness or irregularities.

2.4.2

The operator must take appropriate measures such as training for adequate knowledge of its staff on operation and use of teleCARE IP system. These measures should be repeated as required.

2.4.3

Connecting of non-teleCARE IP system equipment and resources according to section 8 of VDE 0834 part 1 (e.g. medical devices) must be performed by specially trained staff.

2.4.4

The operator must instruct the staff to report all irregularities of functions, all failures and malfunctions.

2.4.5

Connectable devices, such as bedside handsets, must be checked for proper function after each connection.

2.4.6

All the necessary maintenance and modification of the teleCARE IP system shall promptly be arranged by the operator or by the trained person authorized by the operator.

2.4.7

The teleCARE IP system must be maintained by professionals for teleCARE IP systems. Professionals responsible for teleCARE IP systems shall inspect and repair in case of malfunctions.

The planning and professional execution of this work must be regulated between the operator and maintenance staff, for instance by a maintenance contract. The maintenance engineer must begin with the elimination of faults within 24 hours of notification.

All repair work must be carried out in such a way that the time of interruption to the system is kept as short as possible. After completion of repair work, all repaired equipment shall be subjected to functional inspection.

2.5 General Inspection

General inspections shall be performed at least four times a year at approximately identical intervals.

During such inspections, the following equipment and systems shall be tested and reviewed:

- Call buttons and movable devices for call release which are intended for patients' use
- Signal lamps and acoustic signal indicators
- Power supply system

In addition, the following equipment and systems shall be tested for due and proper functionality at least once a year:

- All other equipment intended for call releasing, call cancelling and presence indicating
- All other signalling facilities
- All facilities for call answering
- All connected devices designed for recording, forwarding and display of the calls, e.g. plug and socket device for connection of call raising devices.

2.6 Repair

Repairs may be performed only by a call system specialist. Repairs shall be performed promptly, if impermissible deviations from the nominal condition of the teleCARE IP system are detected during inspection.

2.7 Maintenance Operation

Maintenance work may be performed only by a call system specialist.

Maintenance work shall be performed in accordance with manufacturer's instructions, however at least once a year. Maintenance work includes, if applicable:

- Servicing of system elements
- Replacing of construction elements with limited service life (e.g. batteries)
- Adjustment
- Readjusting and aligning of construction elements and equipment

2.7.1

Whenever the teleCARE IP system is shut down as a whole or in part, the operator shall arrange for the related rooms to be provided with other control means until the system is switched on again.

2.7.2

Alterations of the teleCARE IP system may only be performed by experts of teleCARE IP systems. After each alteration, the nominal condition of the teleCARE IP system shall be re-established, and an inspection after alteration shall be performed as provided in [2.2.4 Inspection after alteration, page 6](#).

2.7.3

All events of faults occurring in the teleCARE IP system, including details on the cause and, if applicable, the causer of each fault, as well as all necessary maintenance and alteration activities performed shall be recorded continuously by the operator, the instructed person advised by the operator, or the expert of the teleCARE IP system instructed to perform such activities, in an operations record book kept available with the teleCARE IP system.

3 Practical Engineering Parameters

In order to ensure the optimal performance of a teleCARE IP system it is important to consider certain parameters and limitations. The following tables show the most important practical values which can have an influence on the teleCARE IP system performance.

WARNING: Any deviation from the values and recommendations shown in the following tables can significantly reduce the performance of the teleCARE IP system.

3.1 General Limitations

Practical engineering parameters (hardwired)	Min.	Max.	Unit
NIRC4s per vNISM		100	#
Locations per vNISM		2000	#
Active peripherals per room bus		12	#
Total cable length of an NIRC4 IP room bus		30	meters
Minimum IP room bus voltage (Measured at the last module on the room bus)	4.3		Vdc
Peripherals of type per room bus  A combination of any of the modules listed below can be connected, with a limit of maximum 12 modules per room bus			
NICL4 - Corridor Lamp		4	#
NUBM3 - Customizable Bedside Module		4	#
NUCPS-HK - Cardiac Pull, UK		4	#
NUCR - Card Reader		1	#
NUDM3 - Customizable Button (doorside)		8	#
NUEPS-HK - Emergency Pull, UK		4	#
NUMI2A - External Input Module		8	#
NUPC-HE - Pull Cord IP44, EU (tCIP NI-Design)		8	#
NUPC3, Pull Cord		8	#
NURD - Room Display		2	#
NUSB2 - Sun Blind Control		2	#
NUSPM - Speech Module		8	#

Practical engineering parameters (hardwired)	Min.	Max.	Unit
Other			
Number of Corridor Displays per vNISM		50	#
Number of teleCARE IP Nurse Call Gateways - NIGW per vNISM		1	#
Number of RFID cards per vNISM		2500	#
Number of LF Beacons NILF per vNISM (without NIRX)		500	#

Practical engineering parameters (wireless)	Min.	Max.	Unit
Coverage planning			
Number of NIRX's or gateways a wireless PD "should see" (without RSSI locationing)	1	2	#
Number of NIRX's or gateways a wireless PD "should see" (with RSSI locationing)	2	3	#
Range (Depending on building construction and frequency band)			
NITX (indoor)		30	meters
NUWBM3		30	meters
NUWPC3		30	meters
NUUTX		30	meters
NUUTX input: dry-contact or DC voltage	10	30	Vdc
NUUTX distance to magnet from center		5	mm
NUWIR		30	meters
NUWIR PIR angle	20	90	degrees
NUWIR PIR range	4	6	meters
NUREP 2.4GHz (indoor)		20	meters
NUREP 2.4GHz (outdoor)		300	meters
NILF (for LF)	0.3	2.7	meters
NILF (for NIRX in NILF)		30	meters

Practical engineering parameters (wireless)	Min.	Max.	Unit
Planning and capacity			
Number of wireless PD's per vNISM (This is including NIRX units in an NILF, but excluding the wireless infrared module NUWIR and Universal Transceiver NUUTX) Note: When wireless infrared modules "NUWIR" and / or Universal Transceivers (NUUTX) are included, the maximum amount of wireless PD,s that can be connected to the vNISM will decrease significantly, depending on the amount of NUWIRs / NUUTXs and the wireless traffic they generate.		1000	#
Number of repeaters per wireless gateway Note: gateway requires 1 repeater and supports 3 strings of 4 repeaters each		1+3*4	#
Number of wireless gateways per vNISM		50	#
Number of transceivers per Base Station (NIRC4 with NIRX).		50	#
Number of transceivers per NUREP.		50	#
Number of calls per second vNISM		2	#
Supervision heartbeat			
Heartbeat wireless call modules (default)		240	seconds
Heartbeat repeaters (fixed default)		5	seconds
Wireless modules lost report timing (default)		60	minutes
Retries			
Number of retries wireless call modules		4	#
Number of retries repeaters		10	#

3.2 DHCP Requirements

DHCP Requirements
The teleCARE IP system requires a DHCP server
The teleCARE IP system should be in one broadcast domain
When an vNISM is not included a permanent IP address assignment is required with DHCP reservation

3.3 Network Expectations

Network Expectations
The LAN installation must be certified and tested in accordance with ANSI/TIA/EIA-568-B
LAN cable type: Category 5 (or higher)
Maximum LAN cable length: 100 meters
The LAN should be completely switched with no hubs or repeaters
A switch port is required for each Room Controller
Existing customer LANs must be assessed by Ascom before committing
For details of the teleCARE IP load and performance see document TD92636EN (IP Infrastructure Requirements)

3.4 VoIP Requirements

VoIP Considerations
An Innovaphone VoIP Gateway is required for teleCARE IP with speech, as the interface to the PBX.
An inter-operability test between the VoIP Gateway and the main PBX must be performed
The VoIP Gateway should have the same QoS and VLAN settings as the IP DECT or the VoWiFi system.
The connection between the PBX and the Innovaphone can be BRI or SIP Trunk
teleCARE IP only supports CODEC G.711 (a-law)
SIP trunk to the VoIP Gateway must be set to "Early offer"
Wherever possible firewalls within the LAN should be avoided
A backbone of at least 100Mb/s is recommended
To ensure the required End-to-End Quality of Service the complete Ascom environment, including all teleCARE IP Room Controllers and the vNISM, should be isolated from all other traffic in a separate VLAN.
The maximum capacity of the network used for voice should not exceed 25% of the total network capacity
The maximum capacity of the network used for used for data and voice together should not exceed 75% of the total network capacity
Ascom Testimonials: Delay - less than 50 ms is good Jitter - less than 30 ms is good Packet Loss - 1% is good (up to 4% is acceptable)



See document TD92636EN (IP Infrastructure Requirements) for complete Ascom network requirements:

3.5 teleCARE IP Compatible Ascom Handsets

For the best features the use of Ascom handsets supporting interactive messaging is recommended.



Always use the latest available software versions for the handsets.

3.6 Startup Availability Timing

After connecting the teleCARE IP system to the general power supply, the teleCARE IP system needs a certain time to become fully functional.

Given the availability of the network, the network switches, the DHCP server, the teleCARE IP system will be fully functional within 5 minutes of connecting to the general power supply.

3.7 Software Update Timing

Updating the teleCARE IP system with new software will take time during which the teleCARE IP system is not fully functional.

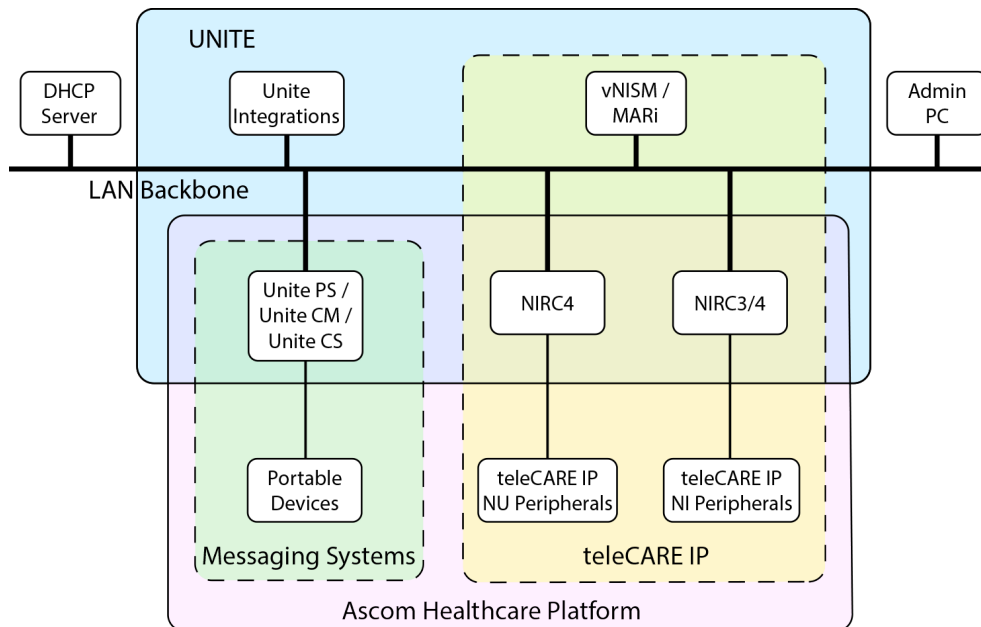
The teleCARE IP system needs to reload the configuration parameters after an update, each Room Controller or vNISM will be fully functional again within 30 minutes. Depending on the number of Room Controllers and the number of vNISMs, the teleCARE IP system will be updated and fully functional after the last Room Controller has been updated.

4 System Structure

4.1 System infrastructure

The teleCARE IP system is part of the Ascom Healthcare Platform providing nurse call services. The figure below shows the infrastructure around the teleCARE IP system.

Figure 3. teleCARE IP system infrastructure



In a typical configuration the infrastructure comprises the teleCARE IP system and one or more messaging systems of the Ascom healthcare platform. The teleCARE IP carrier devices (vNISM, NIRC4) integrate with the other carrier devices through the Ascom Services Application Protocol (ASAP). All carrier devices require an appropriate IP medium for carrying data, voice and messages.

teleCARE IP end user devices (doorside modules, bedside modules etc.) connect as active peripherals to the teleCARE IP Room Controllers (NIRC4).

In the teleCARE IP infrastructure, Unite PS or Unite CM adds remote management, system supervision, logging, fault handling, group handling, number planning, message routing capabilities and other system services. The logged information can be viewed by accessing the Unite PS or Unite CM log viewer.

teleCARE IP supports deep link functionality. Through an external resource / application the deep link information can be made available on mobile devices that support the required functionality. For example to access location based camera footage from a camera observation system. See [Appendix C Unite SmartSense - Deep Link Functionality, page 92](#).

The Messaging, Assignment, Reporting interface (MARI) web application is an enhancement to the existing graphical user interface. It is designed to improve the efficiency of the caregivers' work.

The teleCARE IP system requires a DHCP server for the assignment of IP addresses to the carrier devices.

For full details of the IP infrastructure requirements please refer to the "IP Infrastructure Requirements" document TD 92636EN.

4.1.1 IP Medium

teleCARE IP can use any IP medium. An IP medium could for example be a LAN network. The physical connection of the vNISM, NIRC4 is Ethernet LAN using Cat-5 (or above) 10/100 Base-T or Unshielded Twisted Pair wiring (UTP).

Through WLAN Ethernet adapters teleCARE IP can integrate into a customer's wireless local area network (WLAN).



For VDE compliant installations, all devices in a protected area have to be connected to switches that use a glass fibre backbone. If the switches with connections in the protected area are not connected to a glass fibre backbone, the switches have to be connected via a coupling device which provides at least 2 MOPP (Means Of Patient Protection) according to EN 60601-1 for mains.

4.1.2 DHCP Server

The teleCARE IP network infrastructure requires a Dynamic Host Configuration Protocol (DHCP) server to operate in reservation mode. In DHCP reservation mode the DHCP server assigns to each IP client a permanent IP address.

In the virtual NISM (vNISM) DHCP Server functionality is not supported, therefore a teleCARE IP system using a vNISM requires a dedicated DHCP Server.

A dedicated DHCP Server can be:

- A software solution running on the Advantech (Windows 10) computer.
- An (existing) Innovaphone VoIP Gateway.

For detailed information on DHCP Server configuration examples, refer to the *Installation Guide vNISM - Virtual NISM - TD 93399EN*

4.1.3 UNITE

Ascom's unified IP-based telecommunication environment (Unite) serves to integrate the various systems of the Ascom healthcare platform. Unite offers system level services such as nurse call, messaging, alarm handling, logging, fault handling, supervision, message routing, group handling, number planning, and other mission critical services.

4.1.4 Messaging Services

Messaging services can be provided to a teleCARE IP system by adding Ascom messaging systems such as IP-DECT, VoWiFi and System 900 to the system infrastructure. The Room Display serves as an Ascom interactive messaging device which can be included as part of any teleCARE IP system. The resulting integrated infrastructure provides the nurse call system with speech, interactive messaging and alarm services.

4.1.5 System Management

The teleCARE IP system is centrally managed by the teleCARE IP System Manager (vNISM). This is a virtual machine that contains the configurations of all teleCARE IP controllers that are part of the teleCARE IP system. The vNISM contains a Java based client application.

4.1.6 Scalability

The scalability of teleCARE IP gives significant freedom when deciding the mix of system services. The options range from basic nurse call, with light guidance and call forwarding, up to hunting chain, nurse and staff assignment services.

4.1.7 Decentralized System Intelligence

The teleCARE IP system intelligence is decentralized and contained in teleCARE IP controllers that connect as autonomous nodes to the IP medium. Each teleCARE IP controller has an interface with Unite. teleCARE IP controllers have an associated IP address giving them a unique identity at room level in the teleCARE IP system.

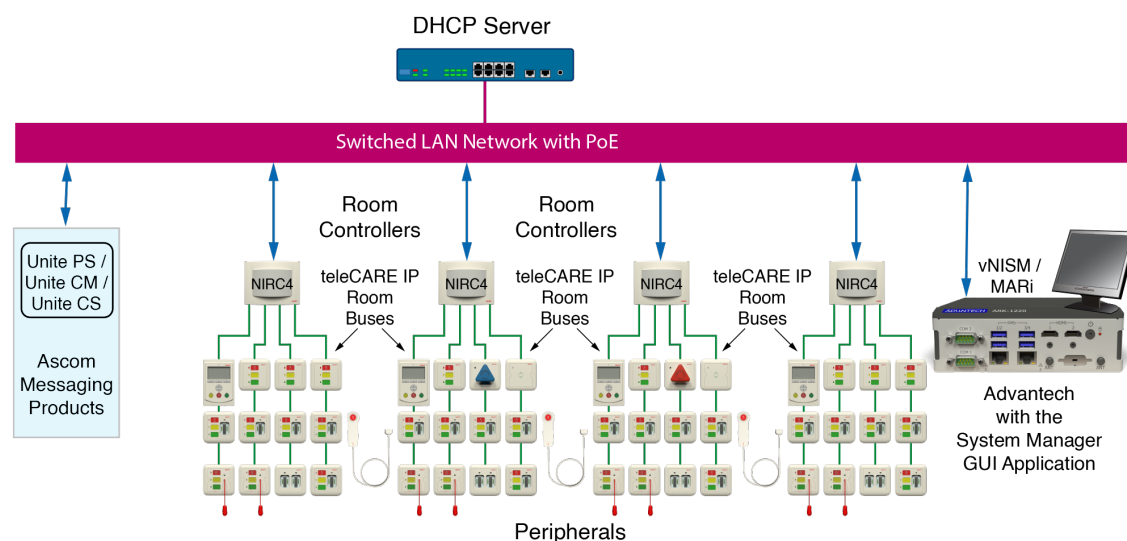
4.1.8 Fail Safe

In case of failure of the IP network the teleCARE IP controllers will continue locally controlling the connected peripherals. During an IP network failure all existing calls will continue to be locally registered and signalled. As soon as the IP network is available to the teleCARE IP controller again, the decentrally stored calls will be fully restored.

4.2 System Overview teleCARE IP Without Speech

The following illustration shows a typical example of a teleCARE IP non-speech system. The options and system components depend on the specific project requirements.

Figure 4. teleCARE IP system overview without speech



For VDE compliant installations, all devices in protected area B have to be connected to switches that use a glass fibre backbone. If the switches with connections in protected area B are not connected to a glass fibre backbone, the switches have to be connected via a coupling device which provides at least 1 MOPP (Means Of Patient Protection) according to EN 60601-1 for mains.

teleCARE IP without speech is designed to work with Ascom Interactive Messaging, which includes the Ascom interactive handsets and pagers.

The system is configured with the project specific requirements using the teleCARE IP System Manager (see the teleCARE IP Configuration Manual TD 93442EN).

4.3 teleCARE IP With Speech

The basic installation for a teleCARE IP system with speech is the same as for teleCARE IP without speech. To have the speech functionality the Room Controllers (NIRC4) require a voice piggyback module (NIVP4) and each location where speech is required must have a teleCARE IP speech module (NUSPM). In a teleCARE IP system consisting only of wireless devices, speech can be established using corded or cordless phones connected to a landline or mobile network, see [10.9 Wireless Speech Using Phones, page 74](#) for detailed information.

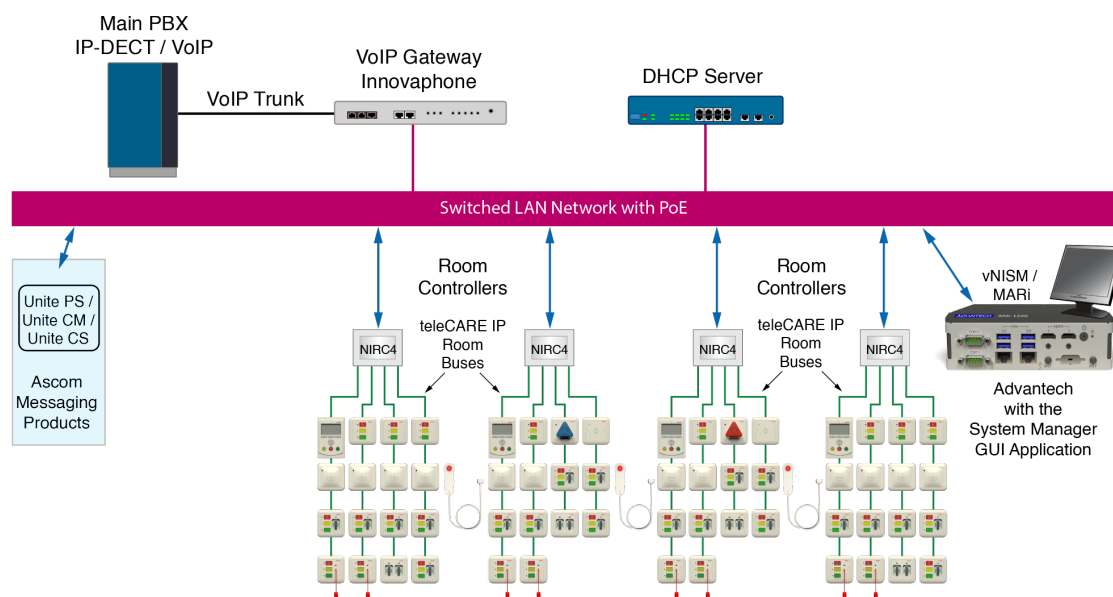
4.3.1 Compatible Ascom IM Handsets

teleCARE IP with speech is designed to work with Ascom Interactive Messaging using the Ascom handsets which support multi-layer interactive messaging. For a list with compatible handsets, [3.5 teleCARE IP Compatible Ascom Handsets, page 13](#).

4.3.2 System Overview teleCARE IP with Speech

The following illustration shows a typical example of a teleCARE IP speech system. The options and system components depend on the specific project requirements.

Figure 5. teleCARE IP system overview with speech



For VDE compliant installations, all devices in a protected area have to be connected to switches that use a glass fibre backbone. If the switches with connections in the protected area are not connected to a glass fibre backbone, the switches have to be connected via a coupling device which provides at least 2 MOPP (Means Of Patient Protection) according to EN 60601-1 for mains.

4.3.3 Innovaphone VoIP Gateways

The teleCARE IP system has been tested and approved for use with the Innovaphone Gateways to support VoIP speech functionality. It has not been tested with any other VoIP gateway therefore its performance with any other VoIP gateway than Innovaphone cannot be guaranteed and will not be supported by Ascom.

The Innovaphone Gateway is an IP based gateway providing the VoIP based solution which supports all the features of a traditional PBX. For the teleCARE IP VoIP the SIP Trunk must be used for the interface to the main PBX. The SIP trunk must be set to “Early offer”.

When used with teleCARE IP each model of the Innovaphone Gateway can support a specific maximum number of objects (subscribers). In the Speech Gateway objects are created when assigning numbers (from the module ranges) to the teleCARE IP modules with speech.

The Innovaphone Gateway is connected and integrated in the existing telephone system network directly using SIP protocol. It is configured with the project specific requirements using the teleCARE IP System Manager (see the teleCARE IP Configuration Manual TD 93442EN).

A license is required for the Innovaphone Speech Gateway. For this an activation code has to be ordered from Ascom through the [Ascom Partner Website](#) before downloading the license from the [Innovaphone Customer Portal](#).

The Speech Gateway is connected and integrated in the existing telephone system network directly using SIP protocol. It is configured with the project specific requirements using the teleCARE IP System Manager (see the teleCARE IP Configuration Manual TD 93442EN).

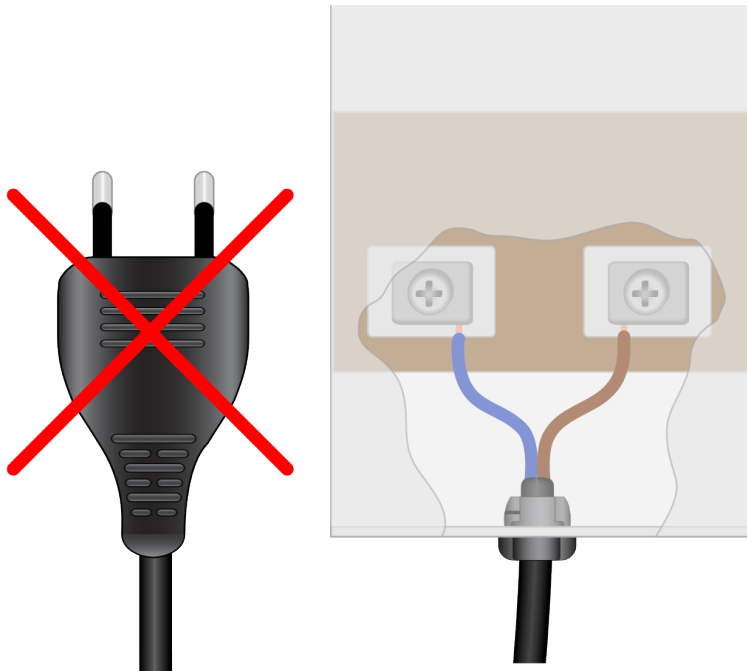
5 System Power Supply

The teleCARE IP system power supply can be sourced from Power over Ethernet (PoE).

5.1 VDE compliancy

In VDE compliant installations the mains power plug must not be used. The mains power leads should be screw-connected to the “Essential” mains power.

Figure 6. VDE 0834-1 compliance required mains power connection



In VDE compliant installations the power supply shall be connected to an approved UPS in accordance with EN 60601-1. All mains connected devices of the teleCARE IP system must be powered through this UPS and the mains connected devices of the teleCARE IP system shall comply with EN 60950-1. The UPS shall take over the power supply of the call system within 15 seconds after failure of normal power supply and maintain normal operation for at least 1 hour. Any failure of the normal power supply shall be indicated. An all-pole switching device shall be provided for system shutdown.

6 Control Equipment

This section describes the following products:

[6.1 Room Controller, page 20](#)

[6.3 Voice Module - NIVP4, page 22](#)

[6.5 Corridor Lamp - NICL4, page 24](#)

[6.6 LED Lamps, page 25](#)

6.1 Room Controller

The Room Controller is available in white and it has a translucent dome cover which accepts up to four LED boards which must be ordered separately. The LEDs are used for the signalling of calls, nurse presence and faults. The LED board (NILD2) is available in five colors: red, green, yellow, white and blue. The RGB LED board (NILD4) contains RGB LED's supporting the main colors: red, green, blue, yellow, orange, cyan, purple, pink and white (see [6.6 LED Lamps, page 25](#)).

6.1.1 Room Controller - NIRC4

Description

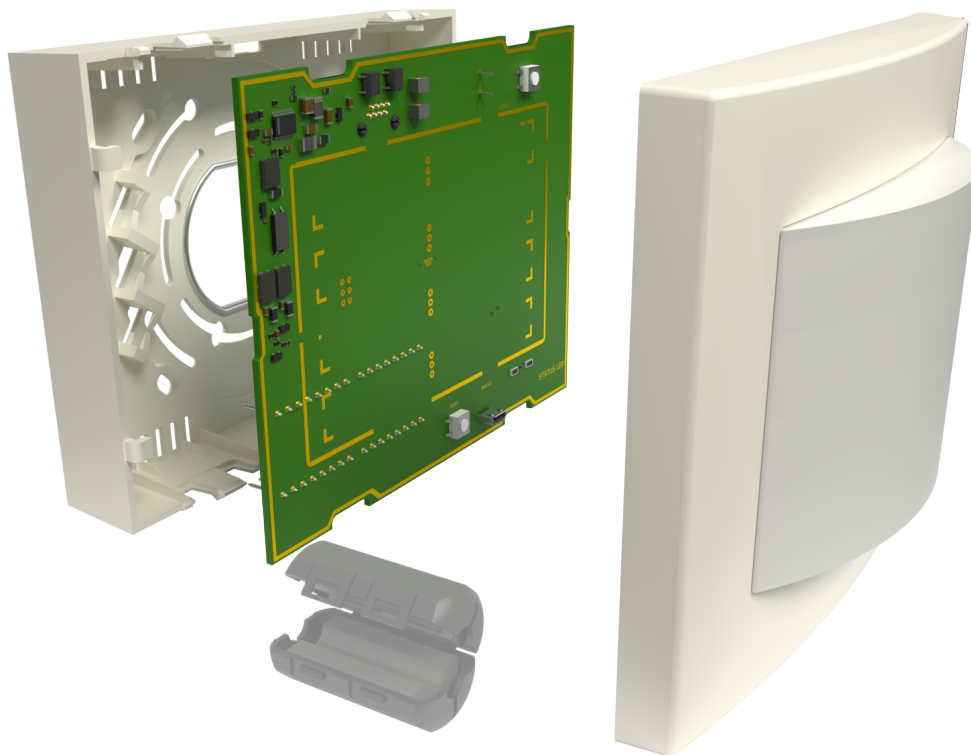
The Room Controller (NIRC4) is an IP controller establishing a decentralized node on the IP network. An IP Room Controller acts as a gateway between the four digital room buses and the IP network. The NIRC4 is compatible with the NU-series and NI-series modules, allowing 12 NU-series or 8 NI-series modules per room bus.



On a single Room Controller it is not possible to mix NU-series with NI-series modules.

It has a connection for an optional wireless transceiver (NIRX) that supports wireless nurse calls and a connection for an optional voice module (NIVP4) that supports speech for NI and NU-series modules. The NIRC4 can also serve as a corridor lamp supporting up to four LED boards behind a translucent dome cover. The LED boards supported are the NILD2 and the dedicated workflow LED board (NILD4–RGB). The NIRC4 has an integrated USB 2.0HS Host Port and Device Port with integrated support for the connection of the Wireless Gateway.

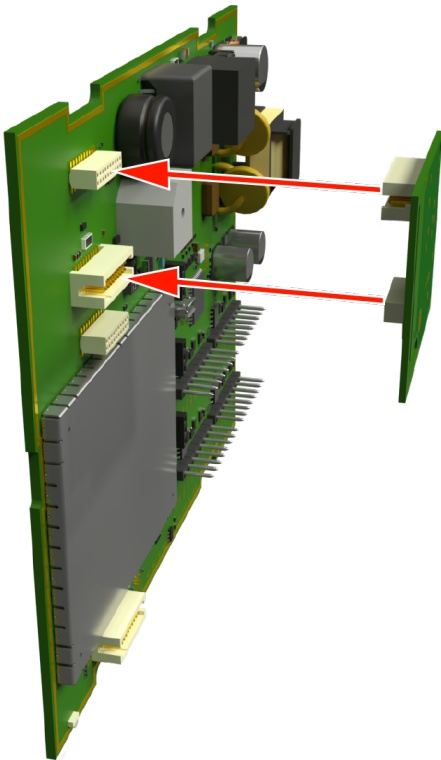
The NIRC4 connects to the IP network using a 100Mb Ethernet connection. The input power can be provided through the LAN port using power over ethernet (PoE), or through an auxiliary power supply via a PoE Midspan. The NIRC4 includes firmware upgrade support for connected NU-series modules.



For room controllers NIRC4 with hardware revision F or later, the ferrite cable clamp is no longer required, and therefore it is not included in the delivery package.

6.2 Wireless Transceiver Module - NIRX

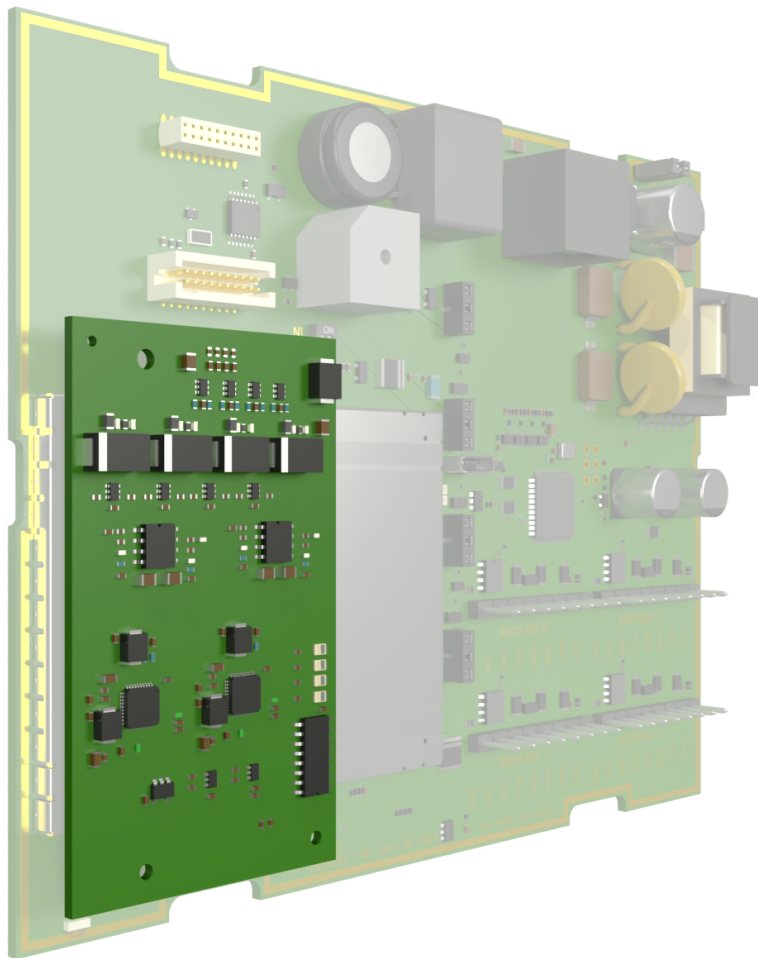
Piggyback mounting the NIRX on the NIRC4 Room Controller to enable wireless functionality.



For detailed information refer to [10.6.5 NIRX teleCARE IP Transceiver, page 58](#).

6.3 Voice Module - NIVP4

The teleCARE IP Voice Module (NIVP4) is a printed circuit module which is piggyback mounted on the teleCARE IP Room Controller (NIRC4).

Figure 7. Voice Module - NIVP4

The NIVP4 is backwards compatible with the Room Controller (NIRC3).

The NIVP4 has four half duplex speech channels allowing four speech sessions at the same time, one speech session for each room bus. Each speech channel includes Intelligent voice switching with nurse priority speech direction with an LED to indicate when the speech direction is switched towards the speech module on the room bus.

With the addition of the NIVP4, the Room Controller supports acoustic call functionality, allowing one speech module per room bus to act as an acoustic call module.

Depending on the audio codec used by the SIP server, the NIRC4 with NIVP4 will automatically adapt to use the correct A-law or μ -law algorithm.

The NIVP4 allows existing Room Controllers NIRC3 and NIRC4 to be upgraded to teleCARE IP with speech using VoIP.

6.4 Blank Front Cover for the Room Controller

A blank solid plastic front cover for the Room Controller is available in white. The blank front cover is fitted to the Room Controller in place of the standard front cover with a translucent dome. It is used when there is no requirement for LED lamps on the Room Controller.

Figure 8. Room Controller with blank front cover



6.5 Corridor Lamp - NICL4

Description

The Corridor Lamp (NICL4) is controlled by the Room Controller (NIRC4 only). Each room bus of the Room Controller (NIRC4) can support up to four NICL4 corridor lamps.

The NICL4 corridor lamp supports up to 4 LED boards (NILD2, NILD4–RGB) behind a translucent dome cover.

The NICL4 is connected to the room bus with an RJ45 cable using the Ethernet standard (T-568B) color coding. The corridor lamp has two RJ45 room bus connectors for daisy chaining with the NU-series peripheral devices (PDs).

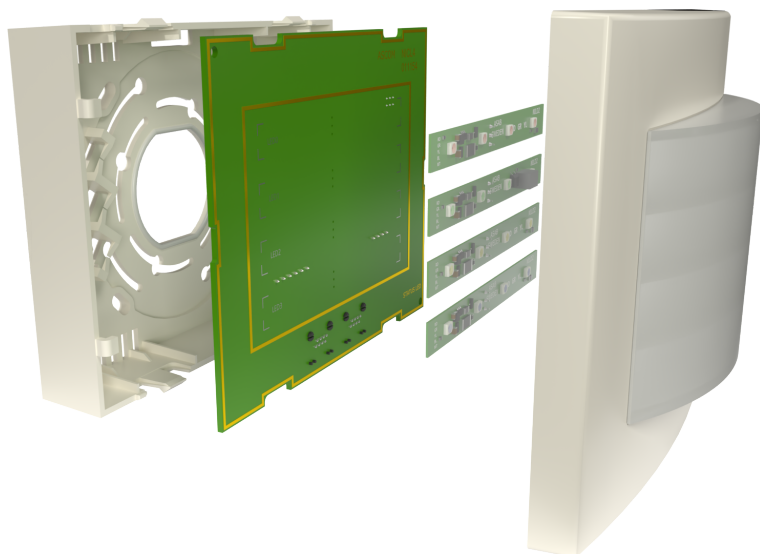
The input power (5.5 Vdc) of the corridor lamp is supplied through the room bus connection.

Packing list:

- 1 x Cover Front + Lamp Dome
- 1 x NICL4 circuit board
- 1 x Cover Rear



Accessories (NILD2 and / or NILD4 LED boards) are not included and must be ordered separately.



Accessories

Accessories	NILD2-RAA - LED lamp - red
	NILD2-GAA - LED lamp - green (with auxiliary lamp connection)
	NILD2-YAA - LED lamp - yellow
	NILD2-BAA - LED lamp - blue
	NILD2-WAA - LED lamp - white
	NILD4-RGB - RGB LED lamp (dedicated workflow LED board)

6.6 LED Lamps

The LED lamp board contains four high intensity LED lamps which are used in the Room Controller and the Corridor Lamp. The three pins in the back side of the board are used to connect the LED lamp board through holes in the back side of the Room Controller or Corridor Lamp printed circuit board. The Room Controller and the Corridor Lamp each accept up to four LED lamp boards.

6.6.1 LED Lamp - NILD2

The LED lamp board is available in five colors: red, green, yellow, white and blue. The LEDs are used for the signalling of various types of call, as well as nurse presence and faults. The functions of the LEDs are determined by the system setup.

The green LED board (NILD2-GAA) has a galvanically separated output that can be used to connect to an auxiliary lamp. It has a maximum switching capacity of 0.4A at 60V peak.

Figure 9. NILD2 - LED lamp boards: white, red, green, yellow and blue



The color of the LEDs is determined during manufacturing and cannot be changed. A resistor on the component side (front) of the board indicates the color of the LEDs, as shown in the illustration.

The LED lamp boards can be plugged into any of the LED connection points on the Room Controller board and the Corridor Lamp, but it is normal to have each color in the same position. The functioning of the LEDs colors is determined by the system setup.

Available LED Boards:

- NILD2-RAA - LED lamp - red
- NILD2-GAA - LED lamp - green (with auxiliary lamp connection)
- NILD2-YAA - LED lamp - yellow
- NILD2-BAA - LED lamp - blue
- NILD2-WAA - LED lamp - white



The LED lamp boards are not delivered as part of the Room Controller or the Corridor Lamp and therefore must be ordered separately.

6.6.2 RGB Workflow LED Lamp - NILD4

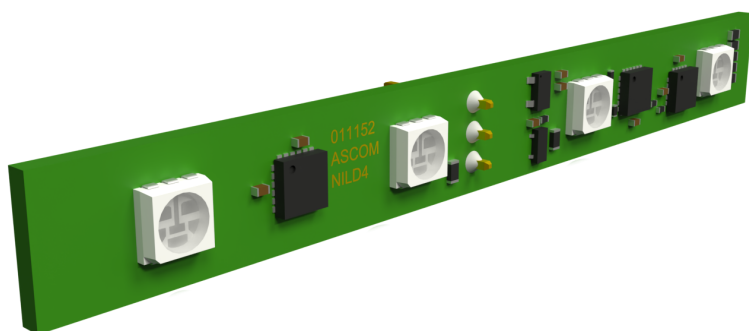
The RGB Workflow LED board (NILD4-RGB) for the teleCARE IP Room Controller (NIRC4) and Corridor Lamp (NICL4) is specifically designed for the signalling of workflow events.



Caution: A single NILD4-RGB board only supports single color (flashing) patterns. Using synchronized alternating flashing patterns between two NILD4-RGB boards, or between an NILD4-RGB and NILD2 board is not recommended, since the alternating colors can run out of sync.

The RGB LED board consists of 4 surface mount high intensity RGB LED's supporting the main colors: red, green, blue, yellow, orange, cyan, purple, pink and white.

Figure 10. RGB Workflow LED Board - NILD4-RGB



7 Peripherals

7.1 General

A peripheral is an end user device that can be part of teleCARE IP System. This section describes the following peripheral devices:

- [7.9 Card Reader Module - NUCR-HE, page 36](#)
- [7.8 External Input Module - NUMI2A-HE, page 35](#)
- [7.4 Bedside Module - NUBM3-HE, page 31](#)
- [7.5 Bedside Extension Module - NUBM3X-HE, page 32](#)
- [7.3 Doorside Module - NUDM3-HE, page 30](#)
- [7.6 Pull Cord Module - NUPC3-HE, page 33](#)
- [7.10 Speech Module - NUSPM-HE, page 37](#)
- [7.12 Sun Blind Control Module - NUSB2–H, page 39](#)
- [7.7 Pull Switch Module - NUxPS-HE, page 34](#)
- [7.2 Room Display - NURD-Hx, page 29](#)

7.2 Room Display - NURD-Hx



Features

- Interactive Messaging (IM) display
- Module is an RFID device with a 13.56 MHz carrier frequency
- Supported cards: Mifare Classic / Ultralight / DesFire
- Proximity smartcards for nurse / staff presence
- Audible and optical confirmation of card reader response
- Backlit LCD graphical display with large, easy to read characters
- UTF-8 support, regional agreed Chinese characters
- 3 function keys and an up / down scroll button for controlling the display and speech
- Speaker for acoustic signalling of calls and a tri-color LED to indicate the type of call
- Icons support for events texts
- Easy to clean membrane covering the display and incorporating the buttons, keys and LEDs
- Customizable call buttons with integrated LEDs
- Customizable button insert kits available (Version 1G or newer)
- An active module connecting to an active room bus via RJ-45 connectors
- System supports up to two room display modules per room bus
- Bus address set using a jumper shunt on a 3-pole pin header
- Daisy-chain with other active room modules

7.3 Doorside Module - NUDM3-HE



Features

- Fits in single, double, and triple frames ¹
- Three buttons with configurable colors including three white LEDs with matching lens colors
- Buzzer for acoustic call signaling
- Backbox or surface mounting options
- Sealed membrane covers ensure easy cleaning
- Customizable button insert kits available
- An active module connecting to an active room bus via RJ-45 connectors
- System supports up to eight customizable button modules on the same room bus
- Bus address set using DIP switches
- Daisy-chain with other active room modules

1. Frames are not included and are available as accessories which must be ordered separately

7.4 Bedside Module - NUBM3-HE



Features

- Fits in single, double, and triple frames ²
- Three buttons with configurable colors including three white LEDs with matching lens colors
- SafeConnect socket for bedside handset with disconnect alarm, including a green LED for handset connect status
- Supports NUHS-series bedside handsets
- Supports two light control buttons in the handset
- Integrated speech interface through the handset
- Supports stereo TV audio via the TV Interface Module and the NUBM3X Extension Module
- Backbox or surface mounting options
- Sealed membrane covers ensure easy cleaning
- Customizable button insert kits available
- An active module connecting to an active room bus via RJ-45 connectors
- System supports four bedside modules on the same room bus
- Bus address set using DIP switches
- Daisy-chain with other active room modules

2. Frames are not included and are available as accessories which must be ordered separately

7.5 Bedside Extension Module - NUBM3X-HE

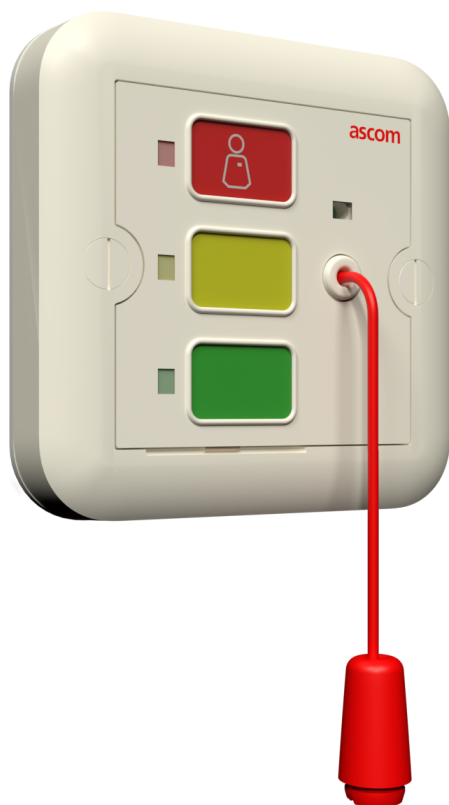


Features

- Fits in single, double, and triple frames ³
- External button contact (NO) with 24 Vdc external LED support
- Supports Line break detection
- Supports stereo TV audio via the TV Interface Module (NIAT)
- Backbox or surface mounting options
- Connects to an NUBM3–HE

3. Frames are not included and are available as accessories which must be ordered separately

7.6 Pull Cord Module - NUPC3-HE



Features

- IP44 splash-proof making it suitable for use in toilet and shower areas
- Call activated by a 2 m (6.5 ft.) long pull cord with a breakaway barrel
- Three buttons with configurable colors including three white LEDs with matching lens colors
- Red LED call indicator above pull cord for call assurance
- Optional blank button insert included with module
- Sealed membrane covers ensure easy cleaning
- Customizable button insert kits available
- An active module connecting to an active room bus via RJ-45 connectors
- System supports up to eight pull cord modules on the same room bus
- Bus address set using DIP switches
- Daisy-chain with other active room modules

7.7 Pull Switch Module - NUxPS-HE



NUCPS-HK



NUEPS-HK

Features

- Pull-push switch to alert staff to code blue and emergency events
- Reassurance LED illuminates to assure staff that a call was raised
- Pull to trigger call; push to reset
- Mounts to a single backbox
- An active module connecting to an active room bus via RJ-45 connectors
- System supports up to four of each pull switch module types per room bus
- Bus address set using DIP switches
- Daisy-chain with other active room modules

7.8 External Input Module - NUMI2A-HE



Features

- Fits in single, double, and triple frames ⁴
- Two SafeConnect sockets to connect medical and non-medical equipment
- Bedside Handset support, basic call and service button functionality only
- Monitoring of the dry contact closures with disconnect alarm
- LED lights colors to match priority settings
- An active module connecting to an active room bus via RJ-45 connectors
- System supports eight NUMI2A modules on the same room bus
- System supports at least two modules per bed
- Bus address set using DIP switches
- Daisy-chain with other active room modules

4. Frames are not included and are available as accessories which must be ordered separately

7.9 Card Reader Module - NUCR-HE



Features

- Module is an RFID device with a 13.56MHz carrier frequency
- Supported cards: Mifare Classic / Ultralight / DesFire
- Proximity smartcards for presence and / or access control
- Relay for access control of doors (NO / NC)
- 2 Dry contact inputs e.g. for monitoring door status
- Audible and optical confirmation of card reader response
- Audible feedback can be disabled
- Tamper alarm switch which detects removal from back plate
- An active module connecting to an active room bus via RJ-45 connectors
- System supports one card reader module per room bus
- Daisy-chain with other active room modules

7.10 Speech Module - NUSPM-HE



Features

- Fits in single, double, and triple frames ⁵
- Speech module for the teleCARE IP System
- Single speaker for high quality voice transmission and tones
- Electret microphone for two-way duplex speech
- Selection of microphone sensitivity
- LED shows status of speech connection and speech direction
- Acoustic monitoring support
- An active module connecting to an active room bus via RJ-45 connectors
- System supports up to eight speech modules per room bus
- Bus address set using DIP switches
- Daisy-chain with other active room modules

5. Frames are not included and are available as accessories which must be ordered separately

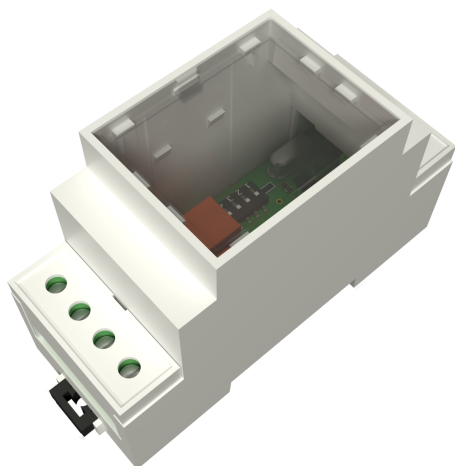
7.11 Input Output Module - NUIOM-H



Features

- General purpose I/O module
- Sleek and compact design
- Four dry contact inputs, with matching solid state relay outputs that can be used for input status feedback (reassurance)
- DIP switches for bus addressing
- Connects to an active room bus and daisy-chain via RJ45
- Backbox or surface mounting options compatible for US-style, EU-style, and UK-style backboxes
- Blue status LED
- System supports up to four I/O modules per active room bus

7.12 Sun Blind Control Module - NUSB2-H



Features

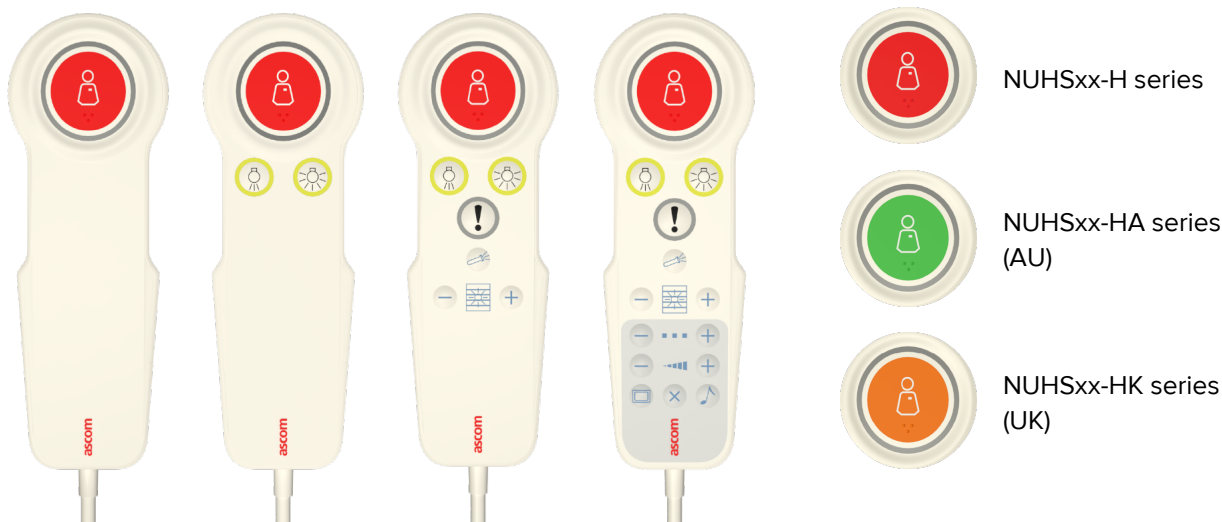
- Compatible with the NUHS-series bedside handsets
- Two heavy duty relays to control the Sun Blind motors
- Mounts on a standard clip-on DIN rail
- An active module connecting to an active room bus via 4-pole connector
- System supports two Sun Blind modules per active room bus
- Bus address set using DIP switches

8 Bedside Handsets

8.1 NUHS-Series Bedside Handset

The NUHS-Series bedside handsets are suitable for use in the teleCARE IP system.

Using the Ascom SafeConnect Plug, the NUHS-Series bedside handsets can be connected to the applicable NU-Series modules.



The tables below give an overview of the NUHS-Series bedside handset features of each handset model.

Table 1 Bedside Handset Features

	NUHS1B	NUHS3B	NUHS3B6	NUHS7B	NUHS14B
Call Button	.	.	.	.	.
2 Light Buttons		.	.	.	.
Service Call				.	.
Flashlight				.	.
Sunblind Control				.	.
Radio					.
Speech					.

Following are the part numbers of the available NU-Series bedside handsets.

- NUHS1B-H Handset 1 button
- NUHS1B-HA Handset 1 button (AU)
- NUHS1B-HK Handset 1 button (UK)
- NUHS3B-H Handset 3 button
- NUHS3B-HA Handset 3 button (AU)
- NUHS3B-HK Handset 3 button (UK)

- NUHS3B6-H Handset 3 button 6.0m cable
- NUHS3B6-HK Handset 3 button 6.0m cable (UK)
- NUHS7B-H Handset 7 button
- NUHS7B-HA Handset 7 button (AU)
- NUHS7B-HK Handset 7 button (UK)
- NUHS14B-H Handset with TV remote control
- NUHS14B-HA Handset with TV remote control (AU)
- NUHS14B-HK Handset with TV remote control (UK)



All handsets come with a 3 meter cable, except for the NUHS3B6-H and NUHS3B6-HK which come with a 6 meter cable.

9 Corridor Equipment

9.1 Corridor Display

The corridor display is suitable for use as a messaging display in Ascom systems. It contains a LAN interface, and is connected directly to the LAN network.

The corridor display NUCD12IP-H and NICD can be powered using Power over Ethernet (PoE) through a PoE switch or through an external 24Vdc power supply using a shielded PoE injector.

Shielded Ethernet cables (Cat5e or higher) should be used to connect the corridor display to the network.

From the build-in web interface the basic configuration of the corridor display can be adjusted, for example the IP address, host name and communication port.

General text display settings can be set in the vNISM. Up to 50 corridor displays can be added to a single vNISM.

The vNISM is used to define such things as message display time, number of stored messages, the color of the displayed message depending on message priority and buzzer options.

The display mode can be set to constant (with short blank period in between), to scrolling (from bottom to top) when there are two or more active calls to be displayed or to rotate (from right to left) for displaying messages with up to 100 characters. The corridor can display up to 30 different messages. If the maximum number of messages is reached, the oldest message with the lowest priority will be cleared first. When the display is not showing any messages (idle), it can be configured to show the time or any other type of welcome message.

The corridor display can be ceiling mounted using a wire suspension kit, or wall mounted using a special wall mounting bracket.

9.1.1 Corridor Display Network Requirements

- Ethernet 10 BaseT
- Half duplex
- No auto-crossing
- No auto-negotiation
- No auto-polarity



The corridor display will not work on non-standard (reversed polarity) switches using a normal straight cable. Reversed polarity switches require a special Reverse Polarity Cable.

9.1.2 NUCD12IP-H

The NUCD12IP-H display has a large character (height 50 mm), white LED message display with a large RGB priority color (Red / Green / Amber / Blue / Magenta / Cyan / White) indicator and a signalling buzzer. It is only available as a single sided unit with a 12-character display (up to 14 characters proportional).

Figure 11. 12 character Corridor Display (NUCD12IP-H)

The display is suitable for use as a messaging display in Ascom systems. It contains a LAN interface, and is connected directly to the LAN network (using shielded network cables). It is addressed with a unique call ID.

The display can be ceiling mounted using a wire suspension kit, or wall mounted using a special wall mounting bracket.

9.1.3 NICD

The NICD is an IP based corridor display suitable for use as a messaging display in Ascom systems. It contains a LAN interface and is connected directly to the LAN network.

The NICD is prepared for wall mounting using a special wall mounting bracket which is available as an accessory. It also can be ceiling mounted on wires.

The NICD has a large character, three color (Red / Green / Amber) message display and a signalling buzzer. It is available as a single or double sided unit with a 6-character or a 12-character display.

Figure 12. 6 and 12 character Corridor Display (NICD)

10 teleCARE IP with Wireless Functionality

[10.1 General, page 44](#)

[10.2 Principle of teleCARE IP with Wireless Functionality, page 46](#)

[10.3 Wireless Infrastructure, page 48](#)

[10.4 Principle of the Wireless Infrastructure, page 50](#)

[10.5 Wireless Infrastructure RF Planning Considerations, page 51](#)

[10.6 teleCARE IP Wireless Components, page 54](#)

[10.7 Examples of teleCARE IP Wireless Applications, page 67](#)

[10.8 Wireless Nurse Call with Speech, page 71](#)

[10.9 Wireless Speech Using Phones, page 74](#)

[10.10 Typical Call Sequence of Wireless Nurse Call, page 77](#)

[10.11 Typical Examples of teleCARE Wireless with Wander Alarm, page 79](#)

[10.12 Typical Examples of teleCARE Wireless with Loiter Alarm, page 82](#)

[10.13 Typical example of teleCARE Wireless with Exit Detection, page 83](#)

[10.14 Access Schedulers, page 86](#)

[10.15 RSSI-based Location Determination, page 86](#)

10.1 General

teleCARE IP with wireless functionality is intended for use in hospitals, nursing homes and assisted living facilities.

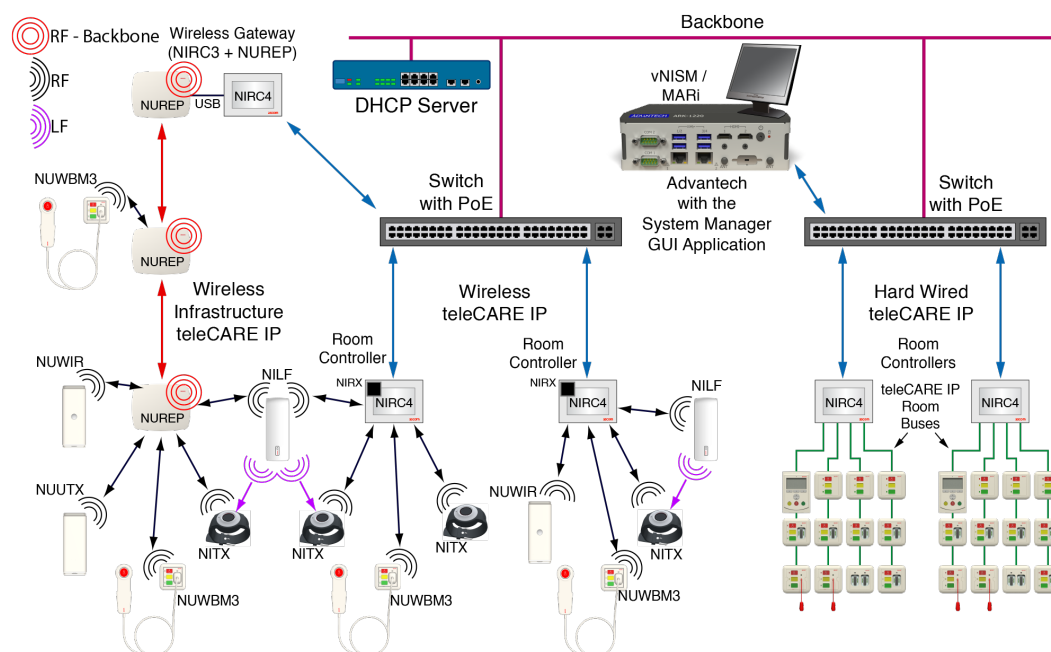


Always refer to the appropriate local standards to determine if wireless nurse call (869MHz) is allowed in your country / region.

teleCARE IP is able to support wireless functionality through the NIRC4 teleCARE IP Room Controller combined with the NIRX transceiver, which is piggy-back mounted on the circuit board of the NIRC4. refer to [10.2 Principle of teleCARE IP with Wireless Functionality, page 46](#)

teleCARE IP also supports a wireless infrastructure based on a wireless gateway and multiple wireless repeaters. The wireless gateway consists of the NIRC4 connected via USB to a wireless repeater NUREP. For detailed information refer to [10.3 Wireless Infrastructure, page 48](#).

Figure 13. Wireless teleCARE IP and hard-wired teleCARE IP



A wireless call system can consist of the NUWBM3 wireless bedside module, NUWPC3 wireless pull cord module, NUUTX universal transceiver, NUWIR wireless passive infrared module, the NITX mobile transceiver, NITX Staff transceiver, and an optional low frequency beacon NILF.

Each transceiver sends a “Heartbeat” signal at regular 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 wireless bedside module (NUWBM3) is a customizable three-button wall mounted switch module. It comes with an Ascom SafeConnect socket used for the connection of the NUHS-series bedside handsets. It contains a 869 MHz transceiver. The wireless bedside module can be powered by two AA disposable alkaline batteries, or connected to an external 5VDC power supply. See [10.6.3 NUWBM3 Wireless Active Bedside Module, page 56](#).

The universal transceiver module (NUUTX) is designed to be mounted on walls or onto window / door posts. It contains a 869 MHz transceiver, two inputs for the connection of external contacts and a magnetic window / door alarm detector. The NUUTX universal transceiver is powered by two AA disposable alkaline batteries. See [10.6.9 NUUTX Universal Transceiver, page 63](#).

The wireless passive infrared module (NUWIR) is a motion detector designed to be mounted on walls. It contains a 869 MHz transceiver and a passive infrared sensor with a range of approximately 6 meters with a two level selectable sensitivity. The NUWIR wireless passive infrared module is powered by two AA disposable alkaline batteries. See [10.6.10 NUWIR Wireless PIR Module, page 64](#).

The NITX mobile call transceiver can be attached to a wrist strap, or to a neck pendant. It can also be used as a mobile alarm transmitter connected to third party equipment. The NITX is powered by an internal three volt replaceable lithium battery. It includes a 869 MHz transceiver and the NITX with LF also contains a 125 kHz LF receiver for receiving the location update information from LF beacons. See [10.6.6 NITX Mobile transceiver, page 59](#).

The NITX staff transceiver is identical to the NITX mobile call transceiver except for the button functionality. The staff transceiver is carried by nurses or staff members and allows the nurse to cancel calls initiated from wireless transceivers (NITX-BAB) through an LF transmission, initiated by pressing the green button, when

in close proximity of the wireless transceiver. It also provides the identification of the staff member cancelling the call. See [10.6.6 NITX Mobile transceiver, page 59](#).

The NILF low frequency beacon includes a 125 kHz transmitter, tamper detection functionality, and can be extended with a piggy-back mounted NIRX 869 MHz transceiver. The LF 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. The NILF can be powered by three C size disposable alkaline batteries, or connected to an external 24Vdc power supply. See [10.6.11 NILF Low Frequency Beacon, page 65](#).

10.2 Principle of teleCARE IP with Wireless Functionality

The system is configured using the teleCARE IP System Manager - vNISM. The wireless server is a Unite application on the vNISM serving as the central controller for all wireless devices in the teleCARE IP system with wireless nurse call functionality.

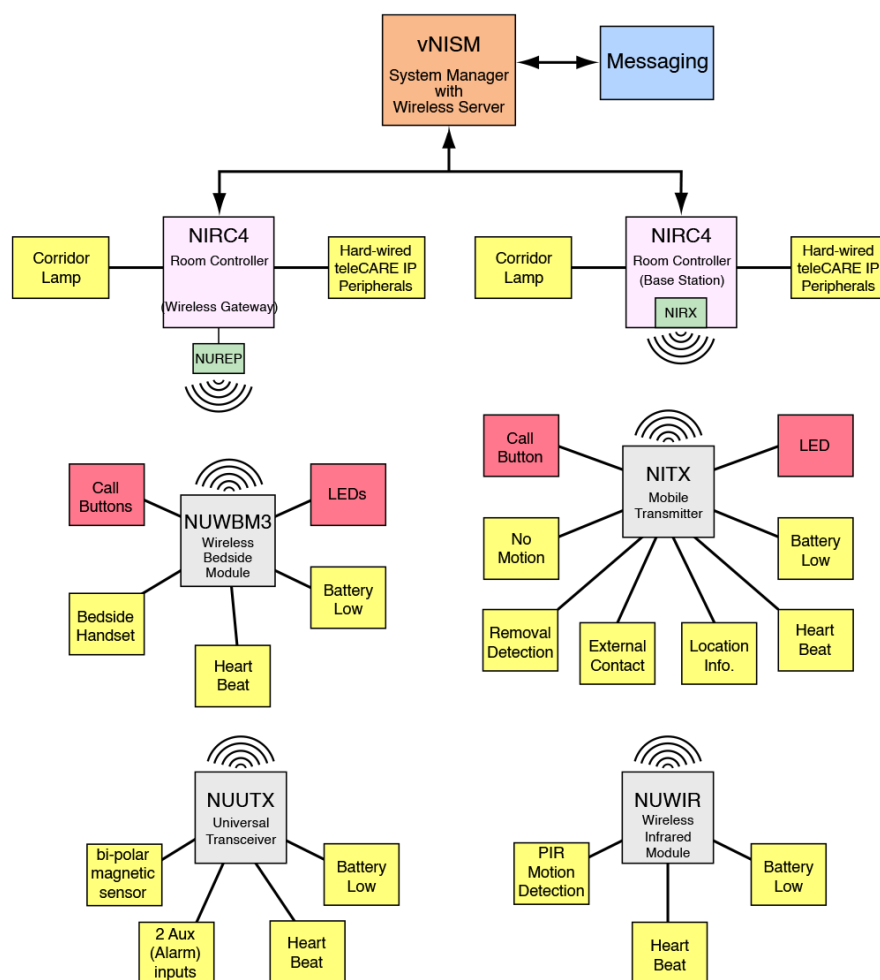
The wireless server has similar functions to those found in the teleCARE IP Room Controller, such as event handling, assignment handling and linking, with additional functions such as signal strength comparison. The main difference between the teleCARE IP Room Controller and the wireless server is that each Room Controller is responsible for only the devices which are hard-wired to it, while the Wireless Server is responsible for all wireless devices in the whole system.

To add wireless functionality to a system, a Room Controller can be configured two ways:

- As a wireless gateway NUWGTW, consisting of an NIRC4 + wireless repeater NUREP.
- As a base station through a piggy back mounted NIRX transceiver module.

All wireless modules have an internal transceiver. For the NILF, wireless functionality is optional, and can be extended by adding a piggy back mounted NIRX transceiver module.

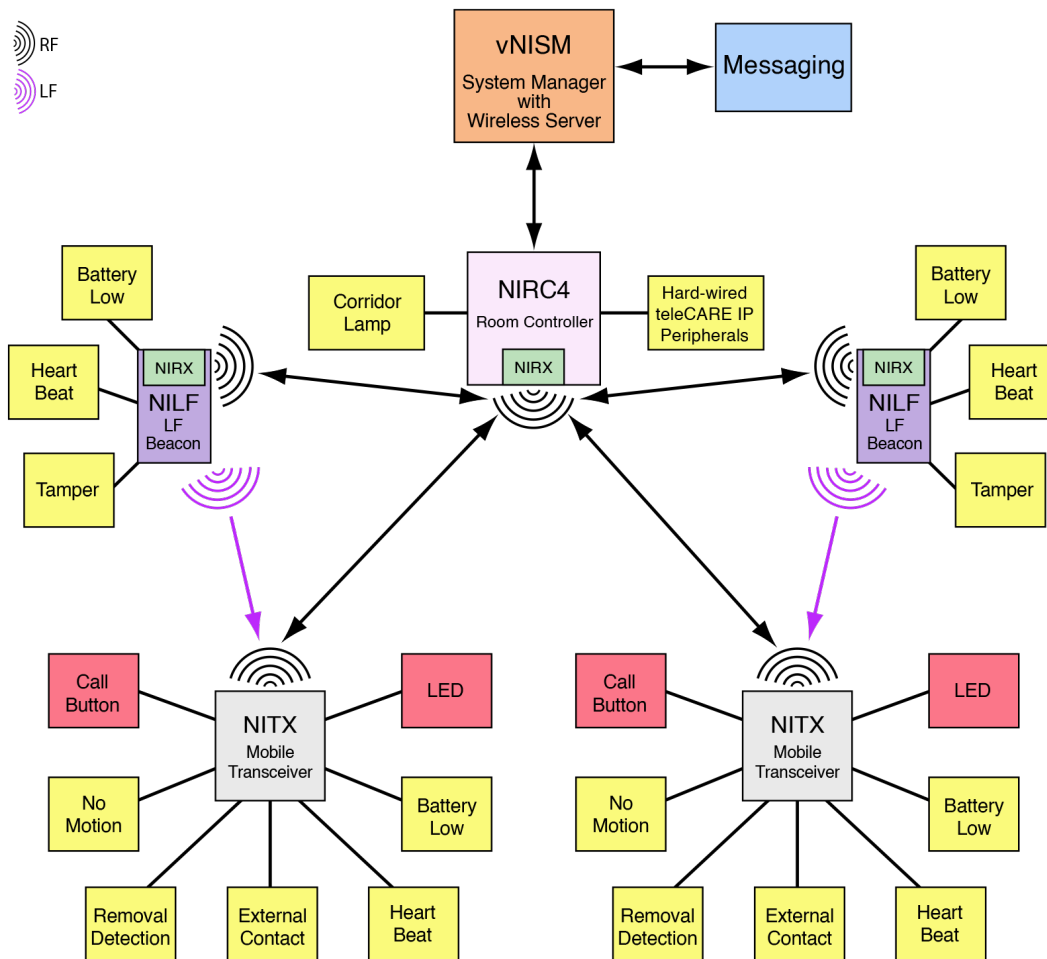
Figure 14. Principle diagram of teleCARE IP with wireless functionality



10.2.1 Location Based Wireless Nurse Call Using LF Beacons

The addition of the NILF low frequency beacons gives location based wireless nurse call functionality available including wander management. The NILF will send out its ID, including location information, at regular intervals using a low frequency 125kHz signal that will be picked up by the wireless transceiver modules that pass by the NILF.

Figure 15. Location based wireless functionality



The range of an LF beacon is adjustable and can be up to approximately 2.7 meters.

When a wireless device enters the LF field of a passive location beacon, it will receive the beacon ID with location information, which it will store as *current location*. When the device leaves the LF field, the previously stored *current location* will be stored as *previous location*, and a new location (when in range of a beacon) or unknown location (when not in range of any beacon), will be set as the *current location*. The stored location information (current and previous) will be added to the next event that is transmitted from the wireless device, like a button press, battery low alarm etcetera.

When a wireless device enters the LF field of an active location beacon, it also sends the location information (current and previous) to the wireless server. In addition, based on the received location information, the wireless server can check to see if the person carrying the wireless device is allowed to access that location. Doors can be opened or stay closed depending on the access rights. Automatic wander and loiter alarms can be generated when a person enters a certain location.

10.3 Wireless Infrastructure

The use of a full wireless infrastructure is an extension on the existing wireless functionality and is intended for use in independent living and in assisted living facilities.

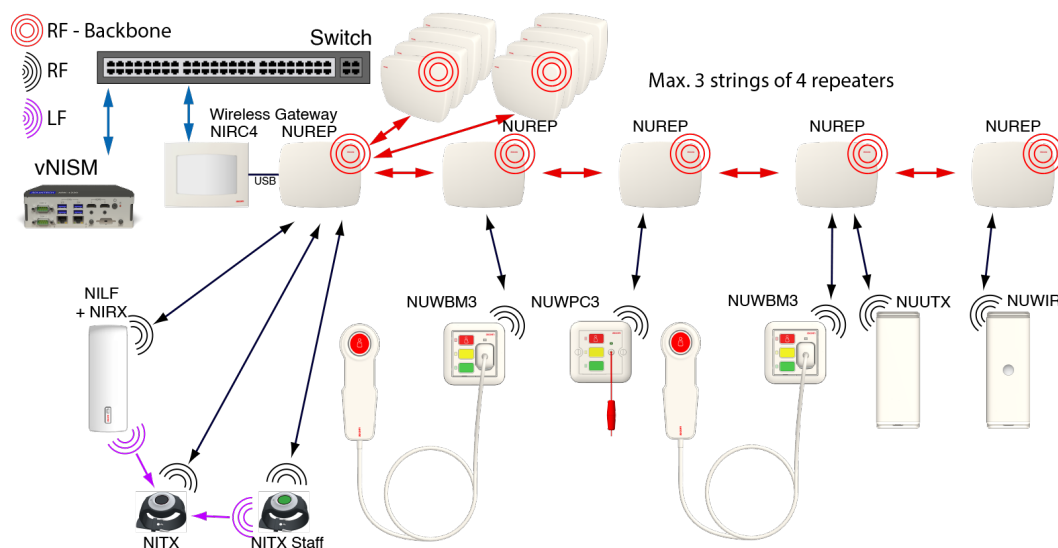
In an environment consisting mainly of wireless devices, a full wireless infrastructure can be achieved using a wireless gateway (NIRC4 + NUREP) in combination with wireless repeaters (NUREP).

The wireless gateway can serve up to 12 repeaters divided into three subnets each containing a maximum of four wireless repeaters (nodes). In a subnet, a node must always be installed in such a way that it is able to contact the next and previous node in the subnet in sequential order of installation / configuration. The first node added to a subnet must be able to contact the wireless gateway.



A wireless repeater (node) can only communicate with the previous and next node in a subnet, communication from node to node between subnets is not possible.

Figure 16. Full wireless infrastructure example



The wireless repeaters communicate with each other through a secondary transceiver operating on the 2.4GHz band (IEEE 802.15.4).

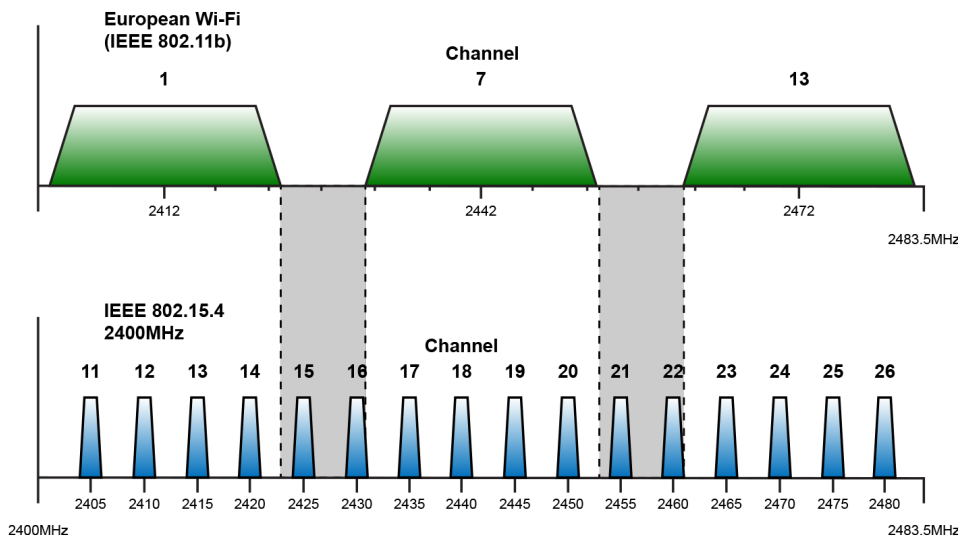


To minimize the risk of interference with other wireless networks in the 2.4GHz range, for example Wi-Fi, a site survey should be performed to evaluate the RF environment.

For Wi-Fi the 802.11b standard recommends the use of non-overlapping operating channels 1, 7 and 13 for Europe. Although this operating practice is not mandatory, it is often employed where multiple access points are in use.

When deploying a teleCARE wireless infrastructure in an environment where resource planning and bandwidth allocation can be guaranteed, a proper wireless repeater channel clear of Wi-Fi interference can be selected to ensure acceptable co-existence with Wi-Fi.

Figure 17. IEEE 802.15.4 versus 802.11 (Wi-Fi)



Wireless Repeaters (NUREP) can be mounted outdoors using a suitable weatherproof enclosure that meets local electrical code. By placing a repeater in an outdoor box, the range of a wireless system can be extended outdoors, for example at a campus style facility or when outdoor coverage is required to capture calls from residents when outside.

10.4 Principle of the Wireless Infrastructure

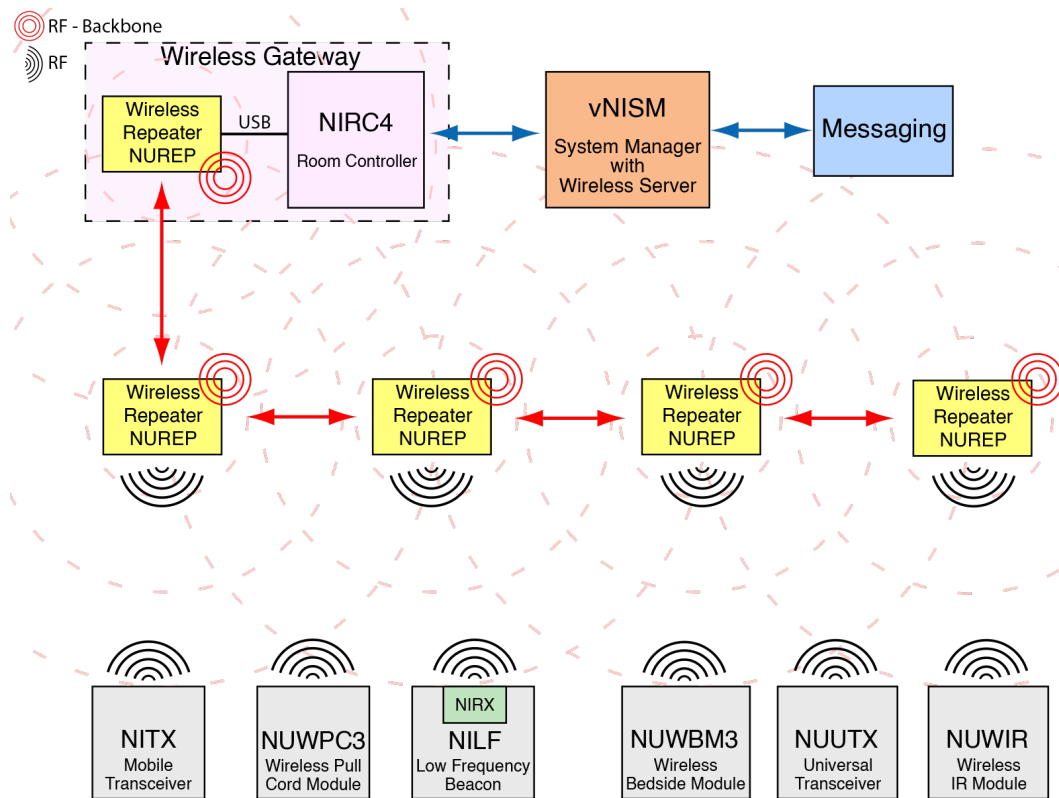
In an environment consisting mainly of wireless devices, a full wireless infrastructure can be achieved using a wireless gateway (NIRC4 + NUREP) in combination with wireless repeaters (NUREP). To create a wireless gateway, a wireless repeater (NUREP) is connected via a USB cable to a Room Controller (NIRC4).

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 18. Wireless infrastructure principle



The wireless infrastructure is compatible with the teleCARE IP wireless functionality using Room Controllers (NIRC4) 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.

10.5 Wireless Infrastructure RF Planning Considerations

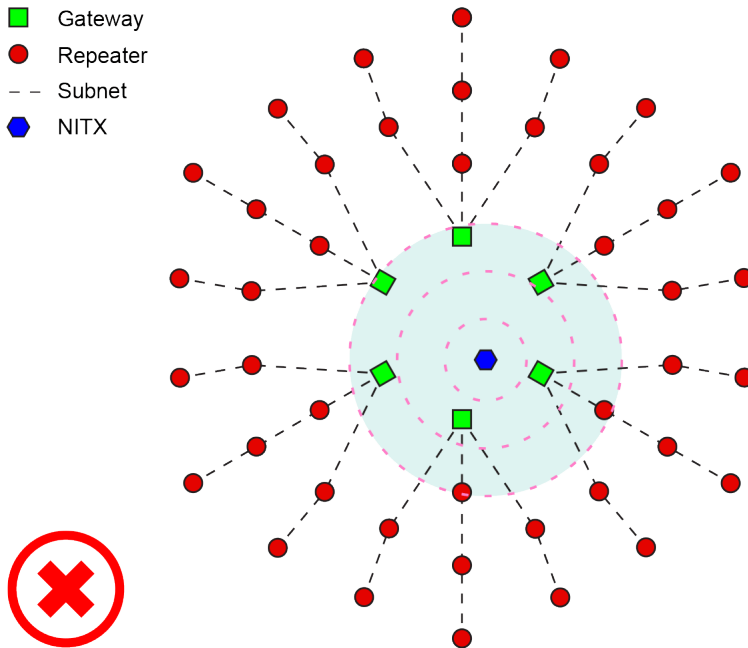
A wireless device must be seen at all possible locations. To avoid an overload of RF messages from being sent to the wireless server, a message should (preferably) only end up at one wireless gateway segment, which consists of multiple wireless repeaters and a gateway. At certain overlapping segments 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 teleCARE IP Configuration Manual TD 93442EN 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.

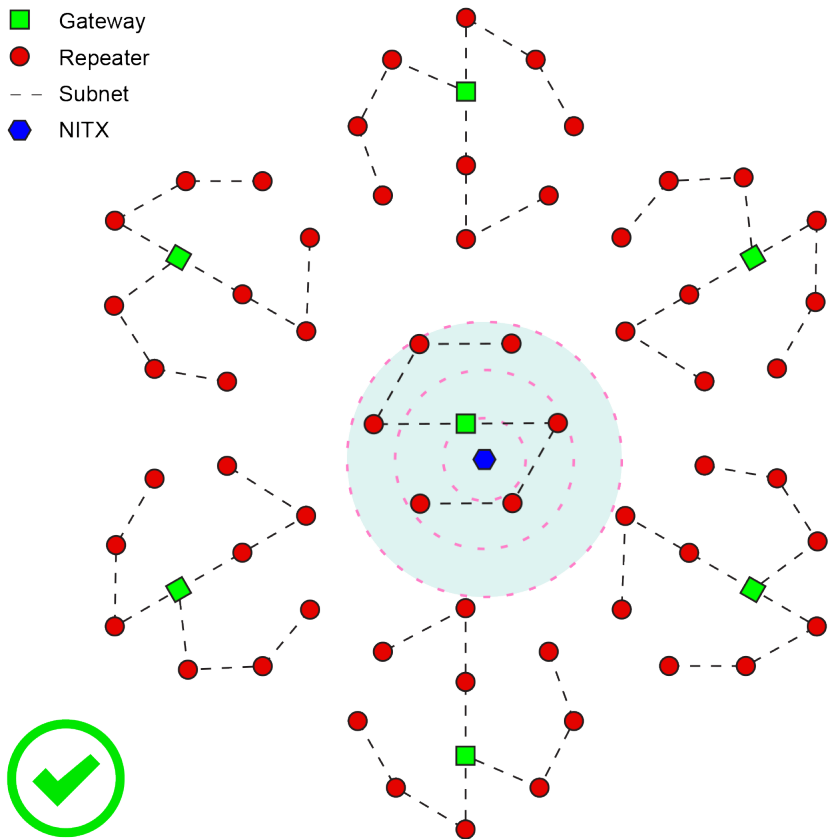
Although the wireless gateway will filter out most of the duplicate messages in its segment, it is important to carefully plan the locations of the wireless gateways and repeaters throughout a site. For example, avoid placing multiple wireless gateways too close to each other around a central location,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

Figure 19. 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.

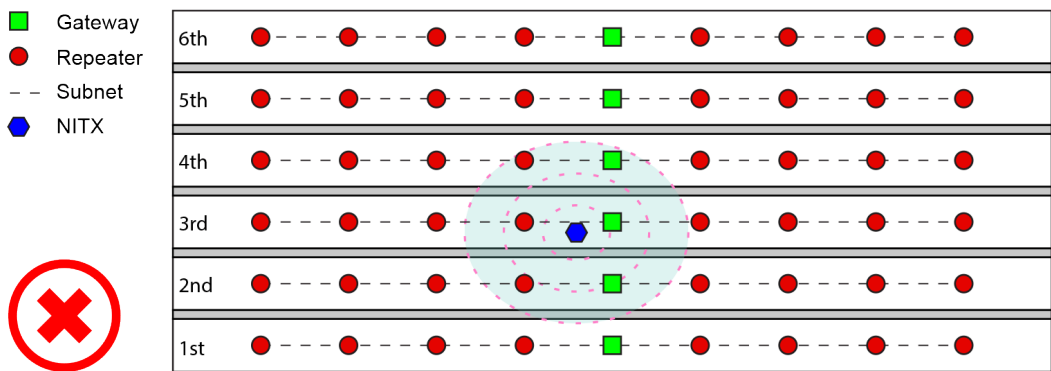
Figure 20. Correctly mounted wireless gateway segments



10.5.1 Multi-storey building configuration

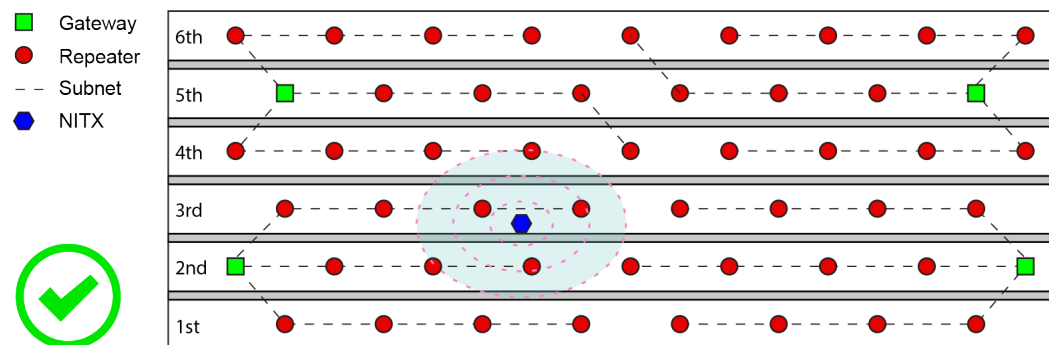
A similar approach should be considered for multi-storey buildings. Mounting wireless gateways directly above each other on the individual floors can result in overloading the wireless server when a wireless message is received by too many gateways at the same time.

Figure 21. Wireless gateway 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 22. Correctly mounted wireless gateway segments



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.

10.6 teleCARE IP Wireless Components

10.6.1 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 nurse call modules. Wireless repeaters also retransmit these signals to the central equipment (wireless gateway), via other wireless repeaters. Therefore a wireless repeater must be able to reach the previous and next wireless repeater in the chain.

Wireless repeaters are dual RF transceivers. One RF transceiver (EU 869 MHz) is used for local traffic, events from the patient / resident pendant, wrist transceiver or the fixed wireless nurse call 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 nurse call modules, 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 23. Wireless Repeater - NUREP



Accessories

Accessories:	660464: USB to micro USB Cable – for Wireless Gateway functionality (NUREP → NIRC3)
	660622: Micro USB to Micro USB (OTG) cable – for Wireless Gateway functionality (NUREP → NIRC4)
	660352: Outdoor box (EU)
	A suitable weatherproof enclosure (outdoor box) that meets local electrical code (US) ¹
	2 x 1.5 V AA Alkaline batteries

1. Not an Ascom listed accessory.

10.6.2 Wireless Gateway

The wireless gateway, consisting of a combination of the NIRC3 / NIRC4 + 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 nurse call modules that are in the direct vicinity of the wireless gateway.

Figure 24. Wireless repeater consisting of an NIRC3 / NIRC4 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 / NIRC4) to relay the signals from the repeater to the local area network and the system manager (vNISM).

10.6.3 NUWBM3 Wireless Active Bedside Module

The wireless bedside module (NUWBM3) is a wall mounted teleCARE IP wireless peripheral containing a 869 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 nurse presence.

Through wireless linking, the wireless bedside module is able to cancel calls from other wireless modules that cannot cancel their calls themselves, for example a universal transceiver (NUUTX).

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.

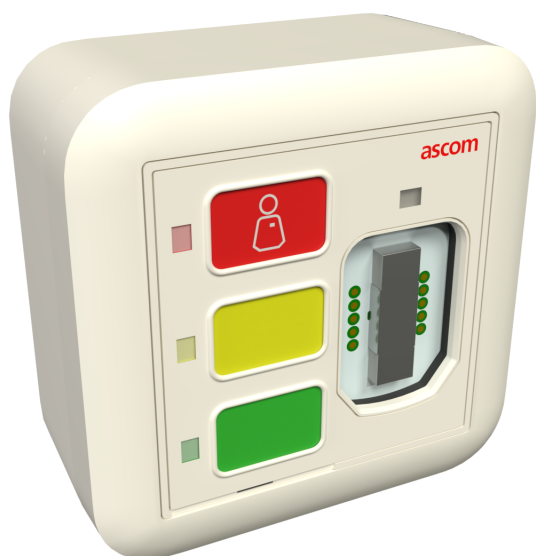


The use of the 3, 7, and 14 button handsets is not recommended, since only the call button of the handset will be functional when connected to the NUWBM3.

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 can be used. When battery powered the LEDs stay active for a period of 30 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 25. NUWBM3 - Wireless Bedside Module



10.6.4 Wireless Pull Cord Module - NUWPC3-Hx



Features

- Wireless RF module communicating with a room controller or repeater
 - 869 MHz (EU) or 916 - 921 MHz (US) band
 - 920.2125 MHz for THA/CHN/SGP/MAC/HKG/MYS, achieved by initial scanning through the 916-921 MHz band and locking onto the 920.2125 MHz

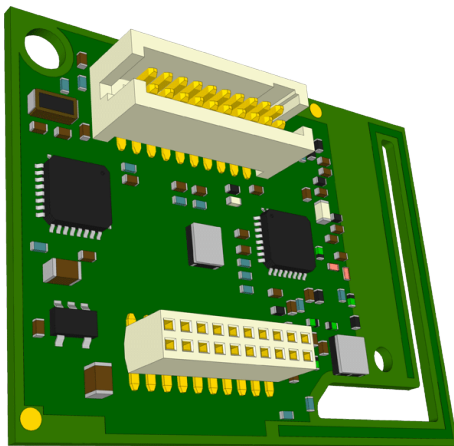
- Designed for use in bathrooms, toilets, and similar wet areas
- IP44 rating
- Call activated by a 2 m (6.56 ft) long pull cord or by pressing the call button
- Pull cord barrels break apart when excessive force (80 N or higher) is applied
- Pull cord barrels can be easily snapped back together
- Battery powered up to 2 years on 2 AA Alkaline batteries ⁶
- Batteries easily replaced via removable battery pack
- Battery level monitoring
- 3 Function buttons with LED
- Replaceable key insert
- Wall or ceiling mount

10.6.5 NIRX teleCARE IP Transceiver

The NIRX transceiver is a printed circuit module which is piggy back mounted on the NIRC4 Room Controller. Mounting the NIRX will add wireless nurse call functionality to the NIRC4 Room Controller. 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 869 MHz transceiver and each NIRX has a unique identity (ID) which is transmitted with every event.

Figure 26. NIRX transceiver

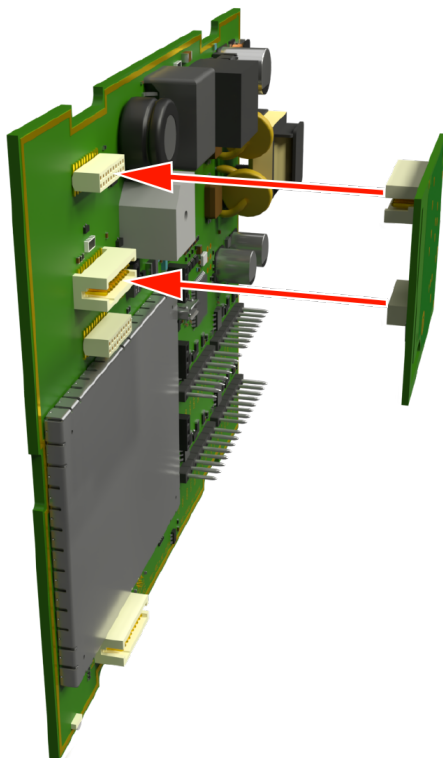


The Location of the NIRX on the NIRC4

Piggyback mounting the NIRX on the NIRC4 Room Controller to enable wireless functionality.

6. Batteries are not included

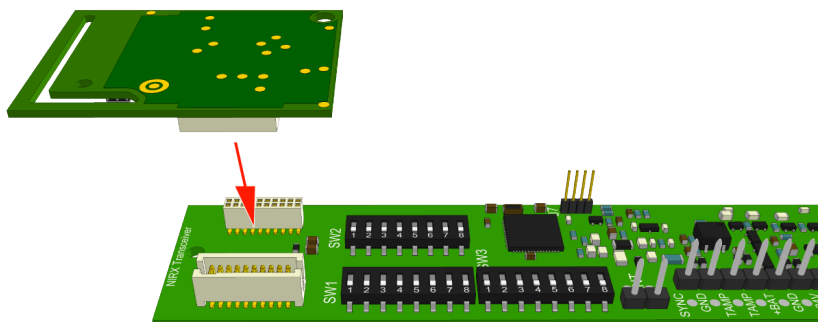
Figure 27. The location of the NIRX transceiver on the NIRC4



Location of 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 28. Piggyback mounting the NIRX module on the NILF



10.6.6 NITX Mobile transceiver

The NITX mobile transceiver is a wireless call unit for residents or patients. It is robust and water resistant (IP 67).

The NITX mobile receiver is available in two versions:

- NITX-AAA for residents or patients containing an 869.25 MHz RF transceiver, a call button and a reassurance LED

- NTX-BAA for residents or patients containing an 869.25 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 29. 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. 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 variety of wired/wireless call modules, or portable messaging devices.

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 will detect 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.

10.6.7 NITX Staff Transceiver

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

Figure 30. teleCARE IP staff transceiver (wrist and pendant)



The NITX-BBA staff transceiver contains an 869.25 MHz RF transceiver, a call button and a reassurance LED. It also contains a 125 kHz LF transceiver used for cancelling calls from other NITX (BAA) transceivers and for location determination using LF beacons.

The NITX-BBA staff transceiver cancels calls initiated from other NITX (BAA) 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.

A call cancellation (LF transmission) is activated by a short press on the green button when in close proximity (up to 30 cm) 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.

10.6.8 NITX Mobile / Staff Transceiver Accessories

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

Figure 31. Mobile transceiver accessories

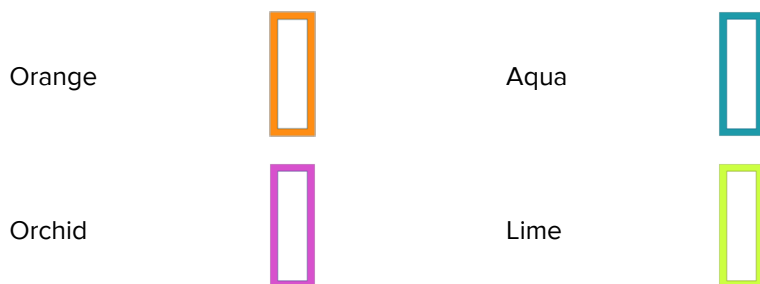
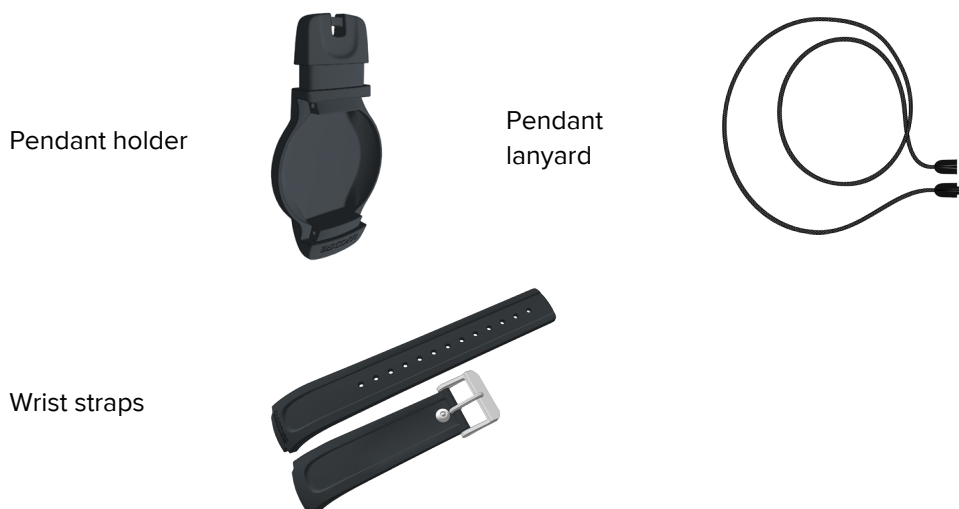


Replacement Rings

Dark gray		Metallic	
Light gray		White	
Ring mounting tool			

Colored Buttons

Dark gray		Red	
Metallic		Green	
White		Orange	

Colored Loops**Wrist Straps and Pendant Kit****10.6.9 NUUTX Universal Transceiver**

The universal transceiver module (NUUTX) is a wall mounted teleCARE IP wireless nurse call module containing an RF transceiver which can be mounted on walls, doors 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 10 Vdc to 30 Vdc

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 1.5 V 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 2.4 V.

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

Figure 32. NUUTX Universal Transceiver



Accessories:	2 x 1.5 V AA Alkaline batteries
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10.6.10 NUWIR Wireless PIR Module

The wireless infrared transceiver module (NUWIR-HE) is a wall mounted teleCARE IP wireless nurse call module containing an RF transceiver (EU 869 MHz).

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 m / 20 ft.

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.

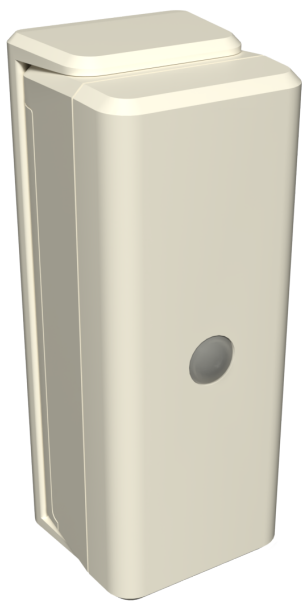
Based on the software configuration, the NUWIR can be used, for example as a delayed trigger, to warn caregivers after a preset time that a resident has been in the toilet for quite a while. The NUWIR can also be used as an automatic resident check-in trigger, simply allowing the resident to check-in 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 1.5 V 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 2.4 V.

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

Figure 33. NUWIR PIR (Passive Infra-Red) sensor



IMPORTANT: Please be advised that when mounting a NUWIR in a main living space, there can be a lot of wireless activity during the day. This will drastically reduce the life time of the battery and it can cause the wireless system to overload. It is therefore not advised to mount a NUWIR in a main living space.

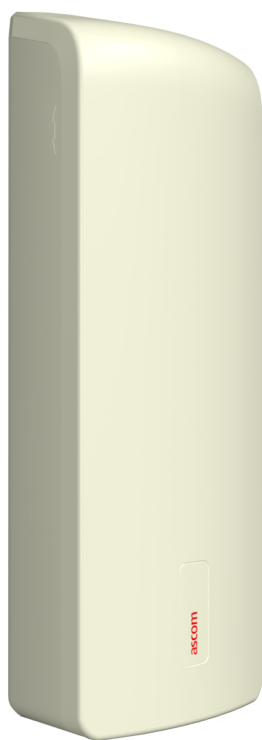
Accessories

Accessories:	2 x 1.5 V AA Alkaline batteries

10.6.11 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 34. 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 nurse call modules enabling location based wireless nurse call functionality including wander management.

The NILF transmits an LF ID signal which will be received and retained by any teleCARE IP mobile transceiver with LF support that 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 1.5 V “C” (R14) alkaline batteries. When battery power is not suitable a 12 to 24 Vdc 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 m (8.85 ft). 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 12-bit ID code, the active or passive mode, the transmission rate allowing a suitable interval between 0.1 - 2 s, and the output power, ranging from 0.30 m (12 in.) to 2.7 m (8 ft 10.32 in.).

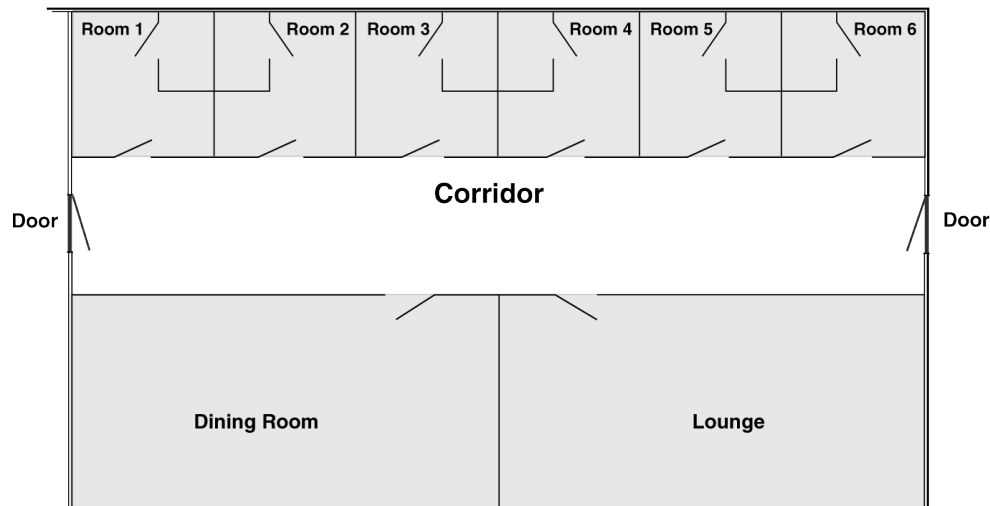
Available Accessories

Accessories:	EU/UK:NIRX-1AA transceiver piggyback module
	US/ANZ: NIRX-1AB transceiver piggyback module

10.7 Examples of teleCARE IP Wireless Applications

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

Figure 35. teleCARE IP wireless nurse call

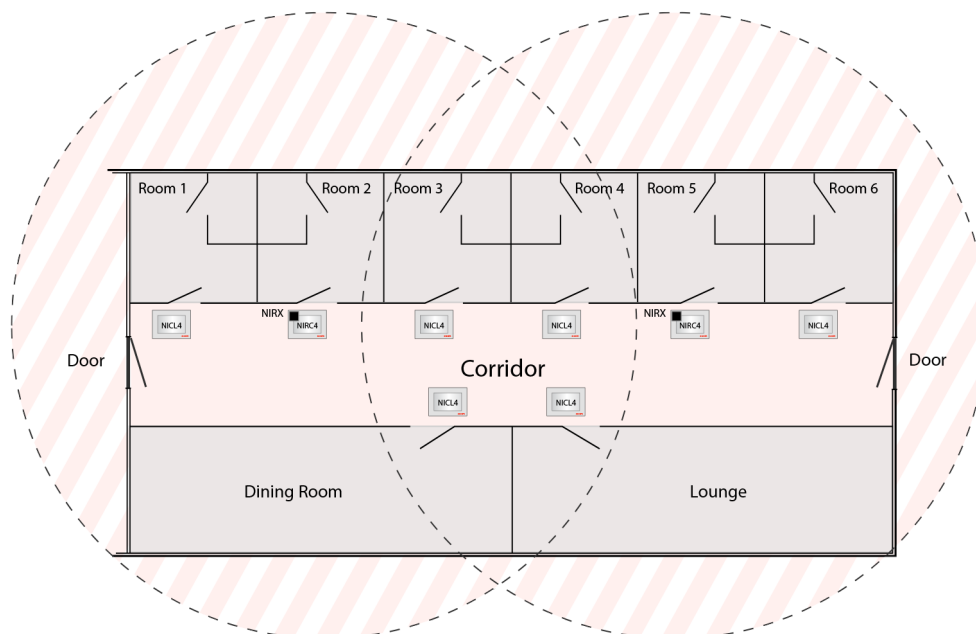


The following examples show the teleCARE IP wireless nurse call system in different configurations.

10.7.1 Basic Wireless Nurse Call Coverage

In this example the area is equipped with two NIRC4 Room Controllers and six NICL4 corridor lamps. To have full RF coverage of the area the two NIRC4'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 36. Basic wireless nurse call coverage



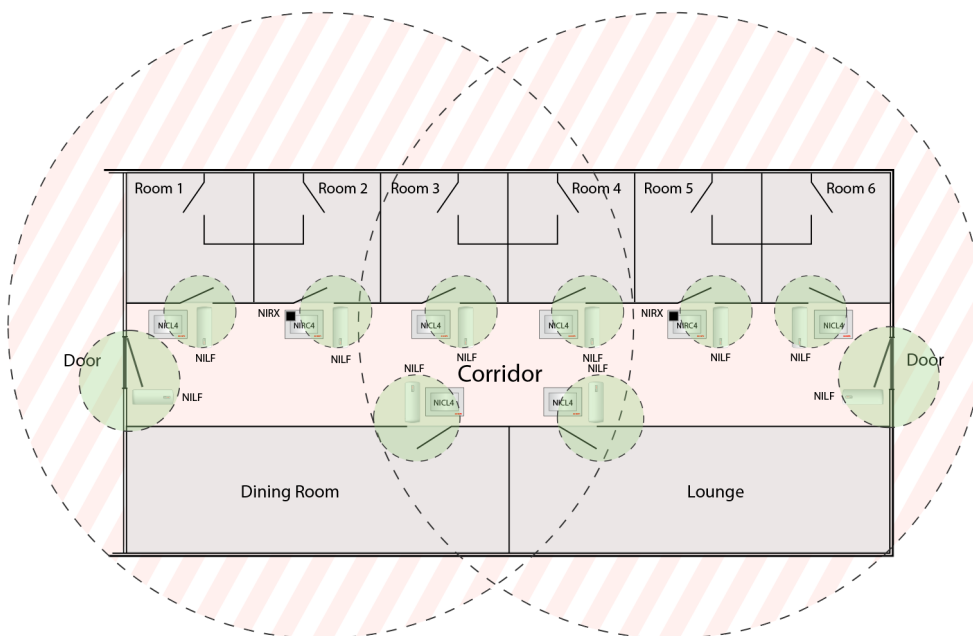
10.7.2 Wireless Nurse Call with Positioning

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) that enter the LF field. The wireless devices store the location update message of the detected NILF until it receives a location update of another NILF.

When a call is made from a wireless device, the location of the NILF is transmitted together with the identity of the wireless device. The wireless server (vNISM) determines where the call will be linked to, resulting in flashing patterns shown on the corridor lamp or Room Controller at that location.

Figure 37. Wireless nurse call with positioning



10.7.3 Wireless Nurse Call 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 optionally a card reader (NUCR) 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 (NUCR) are used to control an electric door locking mechanism.

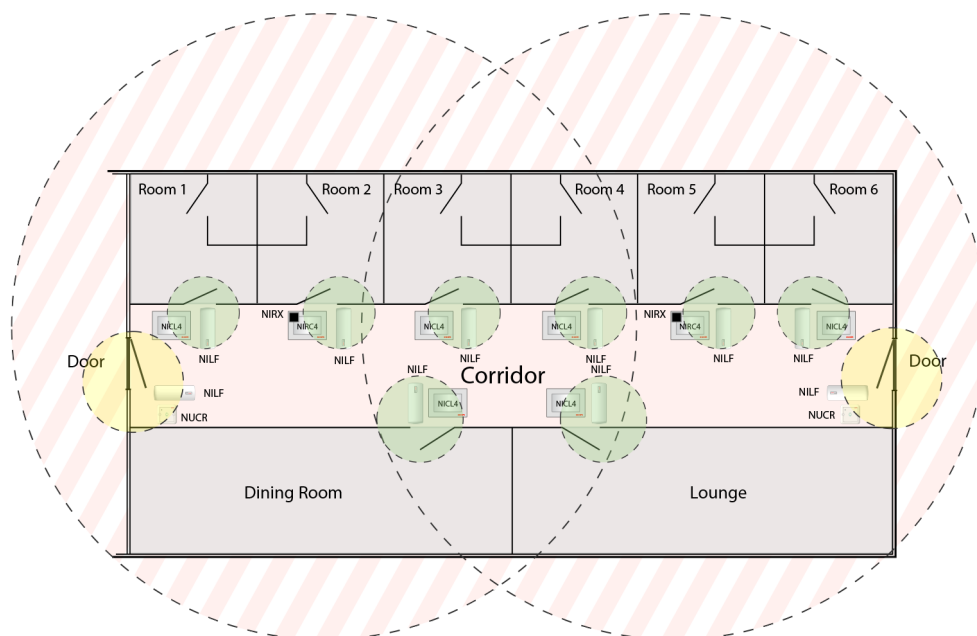
Wireless transceivers (NITX) carried by patients or residents generally prevent access to secured locations by locking an access door.

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

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

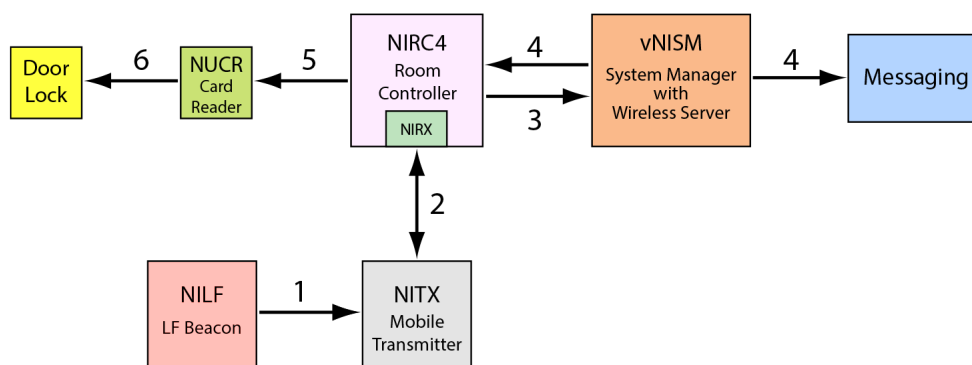
If there is an existing active call on the wireless device, the wireless server will also update location information for corridor lamp flashing patterns and sending messaging updates to portable devices and displays.

Figure 38. Wireless nurse call with wander management



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

Figure 39. Wander alarm functionality example



10.7.4 Buddying

teleCARE IP with wireless and wander management normally ensures that certain doors are locked when patients / residents are detected in the proximity of the door. teleCARE IP can be configured to allow nurses / caregivers to be assigned as a “buddy” to selected patients / residents so that when the patient / resident is accompanied by the assigned nurse / caregiver “buddy” the door will not lock (or will unlock) thus allowing the patient / resident and the nurse / caregiver to pass through the door. Also the wander and loiter alarm messages will be suppressed when the patient / resident is accompanied by a buddy.

10.7.5 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 using a card reader to monitor and control a door lock, a wander alarm message will be sent immediately when the patient or resident enters the LF field of the active location beacon.

10.7.6 Loiter Alarm

Loiter alarm functionality can be enabled to detect if patients or 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. At a card reader controlled door location, a loiter alarm will be generated only if the door is closed.

10.7.7 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.

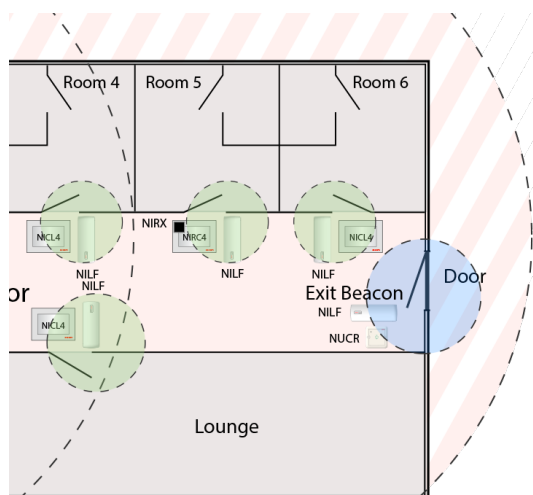
If such doors are covered by teleCARE IP with wander management, then it will be necessary to provide an override facility to wander management to allow the unlocking of the doors in emergencies. The manner in which the override works will depend on the type of door locking mechanism and the local requirements.

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.

10.7.8 Exit Detection

With exit detection functionality enabled, a resident or patient 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 40. Exit beacon example



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



Nurse calls generated from a mobile transceiver that is marked as absent will still be handled according to 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” functionality will be automatically restored if the mobile transceiver becomes present again.

Unsupervised

If a patient or resident is allowed to leave, without the supervision of a nurse or caregiver, the mobile transceiver carried by the patient or resident is configured to allow the presence state to change when passing an exit beacon.

Supervised

If a patient or resident is only allowed to leave under the supervision of a nurse or caregiver (buddying), the presence state of the mobile transceiver carried by the patient or resident can only change to “absent” if accompanied by a buddy.



A buddy that is assigned to the patient or 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 patient or resident will be denied access to the door and a wander or loiter alarm message can be sent to a nurse or caregiver.

For some basic examples [10.13 Typical example of teleCARE Wireless with Exit Detection, page 83](#)

10.8 Wireless Nurse Call with Speech

The Room Controller (NIRC4) is required for speech in teleCARE IP Wireless and each NIRC4 must include a voice piggyback module (NIVP4). In order to achieve the required RF coverage some of the NIRC4s must include a transceiver module (NIRX).

The wireless mobile transceiver (NITX) is required. The NITX is carried by patients / residents and nurses or staff members, and is used to generate calls and other signals that are sent as RF transmissions and received by the NIRC4s.

A speech module (NUSPM), hard-wired to the NIRC4, must be installed in each room which requires speech. Each NUSPM is assigned a telephone number in the system configuration. That telephone number is automatically dialed when a nurse or 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, page 73](#)) in order to identify the location of the NITX.

10.8.1 “Static” and “Dynamic” Modes

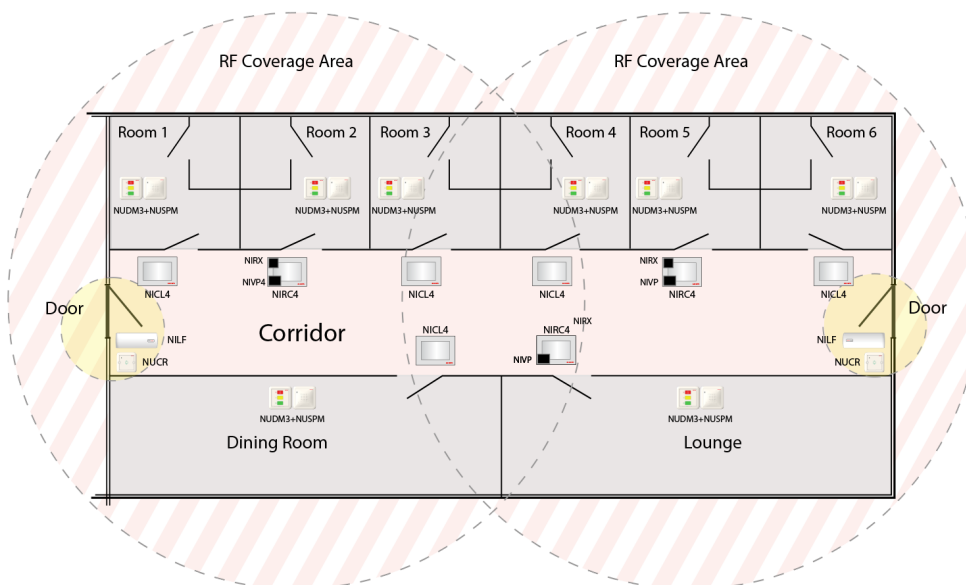
teleCARE IP with speech can function in “Static” or “Dynamic” modes depending on the configuration in the system manager of the of the mobile transceivers (NITX) (see the teleCARE IP Configuration Manual TD93509EN).

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 (NUSPM) at that location.

Static Location Mode Example

Figure 41. Wireless nurse call example with speech - static mode



The example consists of three Room Controllers (NIRC4), each with a transceiver module (NIRX) and a voice piggyback module (NIVP4), and five corridor lamps. Each location has a doorside module (NUDM3) combined with a speech module (NUSPM). The two main entrance doors have a location beacon (NILF) and a card reader module (NUCR) for access control (yellow area).

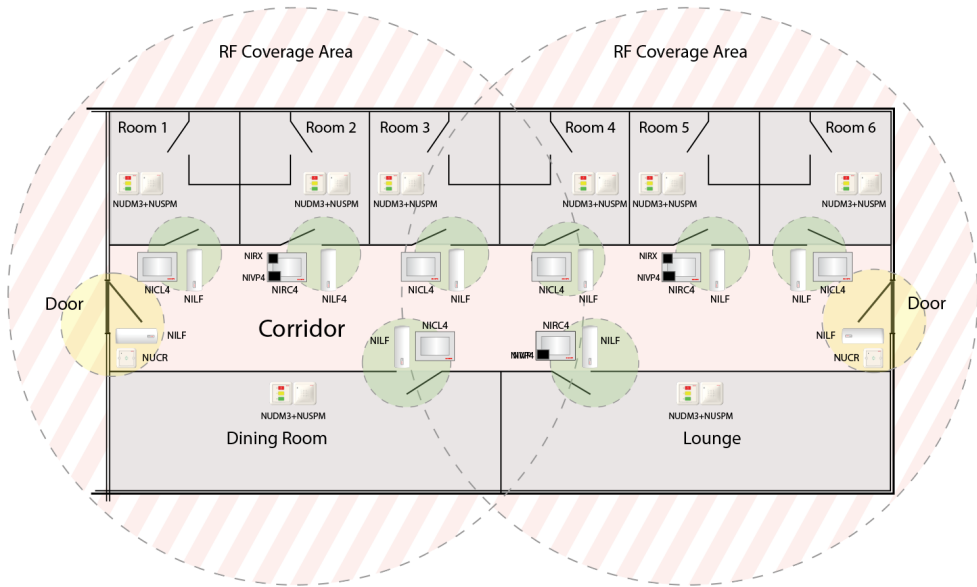
Dynamic Mode

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 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 NUSPM at the location of the call.

Dynamic Location Mode Example

Figure 42. Wireless nurse call example with speech - dynamic mode



The example consists of three Room Controllers (NIRC4) and five corridor lamps, Each NIRC4 has a transceiver module (NIRX) and a voice piggyback module (NIVP4). In each room there is a doorside module (NUDM3) combined with a speech module (NUSPM).

At the door to each room an active LF location beacon (NILF) is mounted. The active LF location coverage (green area) includes the door to the room. The two main entrance doors have a passive location beacon (NILF) and a card reader module (NUCR) for access control (yellow area).

10.8.2 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 TD92609EN).

Passive Location Beacon

When passive mode NILF beacons are used the NUSPM 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 active mode NILF beacons are used the NUSPM 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 nurse call examples described in the following sections are based on wired teleCARE IP with wireless functionality using base stations (NIRC4 + NIRX).

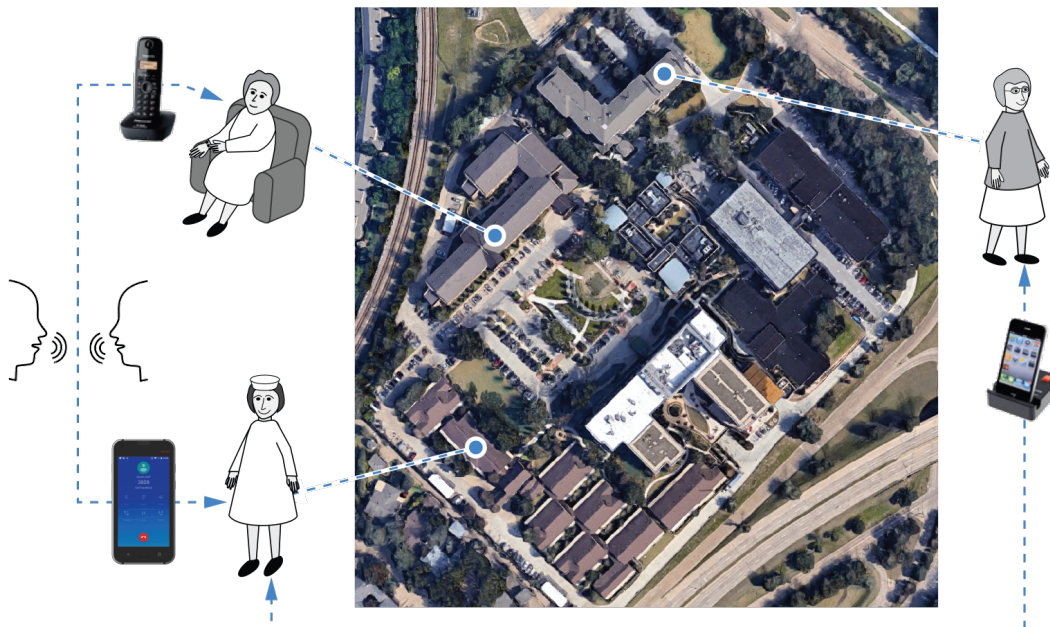
However it is also possible to use the wireless infrastructure using wireless repeaters for all except the wander control examples. Since wander control combined with access control requires hard wired modules like the card reader (NUCR) and the Room Controller (NIRC4) to control the locking or opening of doors, a base station (NIRC4 + NIRX) would be the preferred configuration.

10.9 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 phones, connected to a landline or mobile network, 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 43. 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). The phone number can be assigned to a location, for example the patient's or resident's room. Whenever the patient or resident makes a call using one of the wireless devices, like an NITX, 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 patient or 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 patient or resident call.

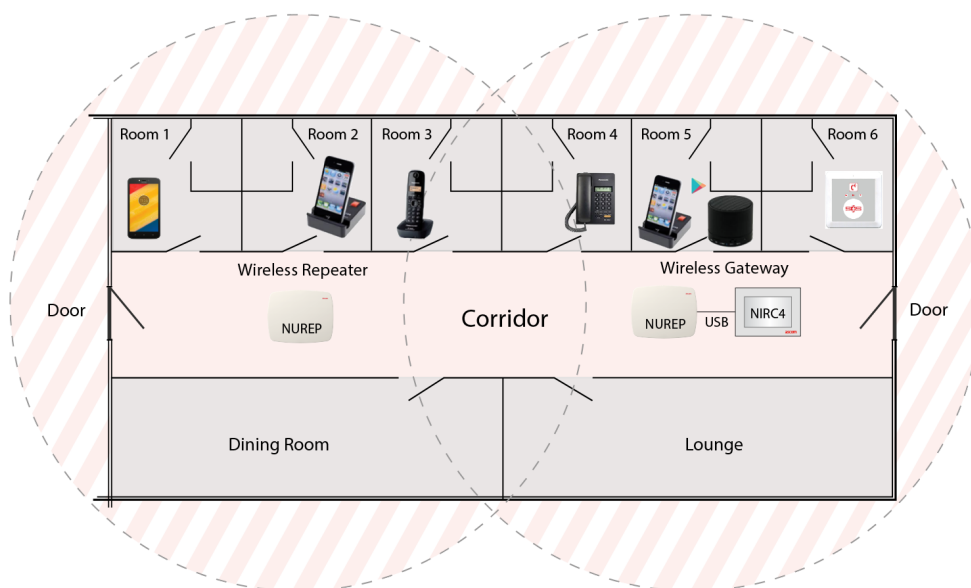
10.9.1 Static or Dynamic Locations

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 patient or resident is present at the home location. However if the patient or 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 44. Static location example

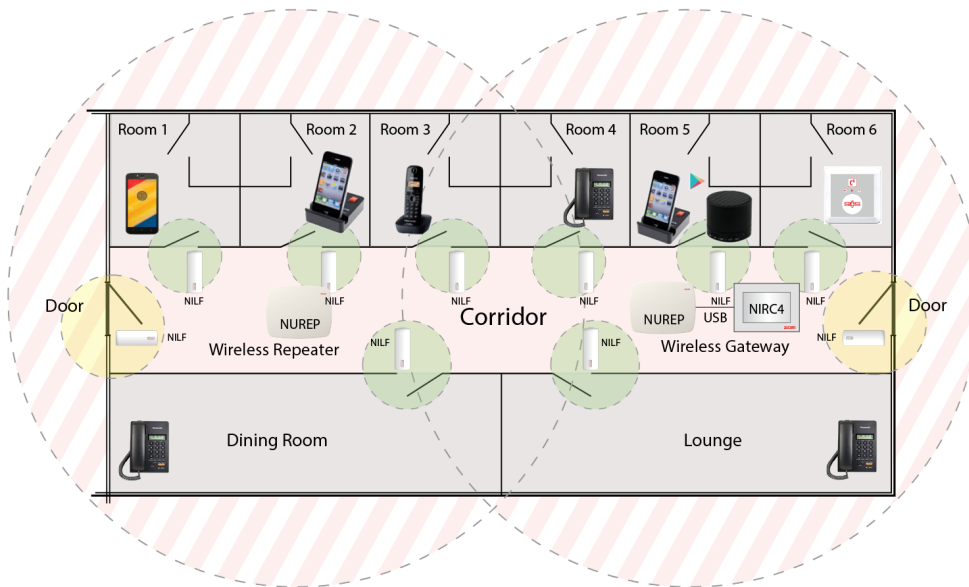


Be aware that the range of the NITX is also limited based on the coverage area of the wireless system. Therefore a patient or resident call from an NITX might not be coming through when being outside of the coverage area.

Dynamic Location

Dynamic locations should only be used if there are active location beacons installed which will update the location of a patient or 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 patient's or resident's home location will be used.

Figure 45. Dynamic location example

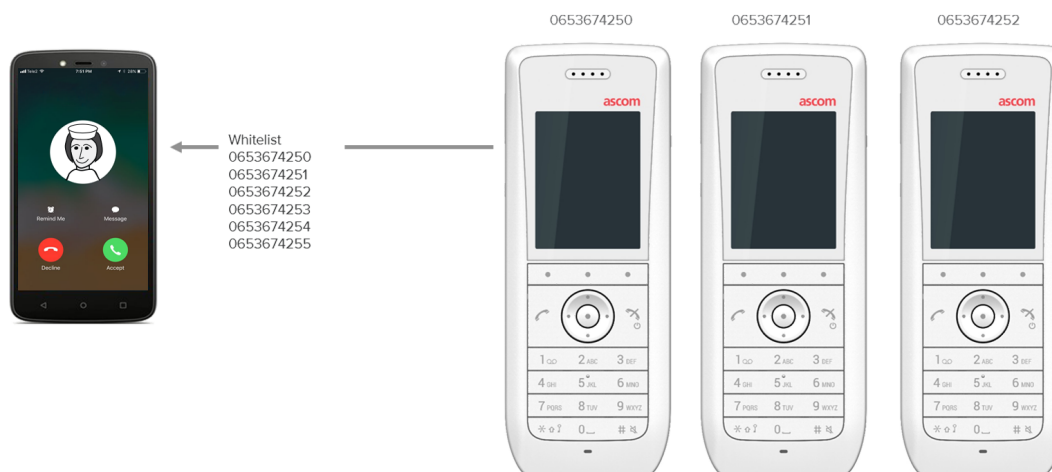


10.9.2 White List with Auto Answer

If a patient or resident makes a call on for example the NITX, it would be a nice feature if the patient's or 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 patient or 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 46. App on android with white list and auto answer

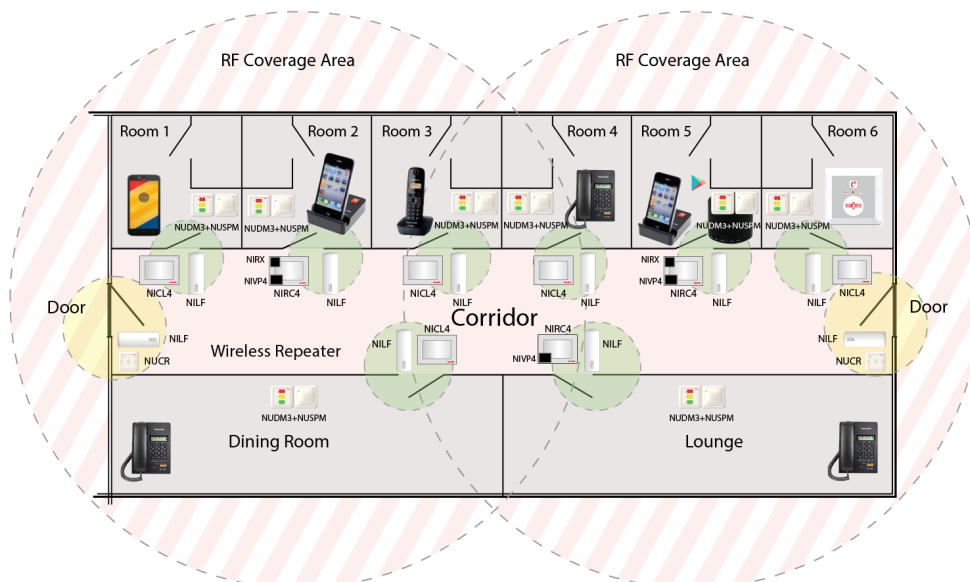


10.9.3 Wireless Speech Combined Configuration

The use of phones at the patient's or 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, 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 47. Phones combined with hard-wired speech modules



10.9.4 PBX Configuration

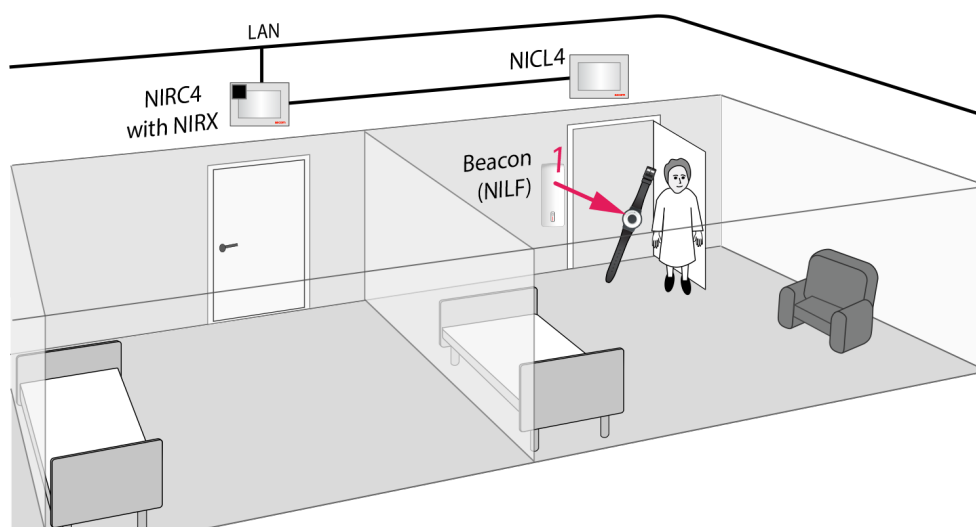
Wireless Speech using phones is depending on the ability to contact outside landline or mobile phone numbers through a PBX. The PBX must be properly configured to allow for such a connection.

10.9.5 License for Speech Using Phones

The wireless speech option supporting the use of phones at the patient or 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.

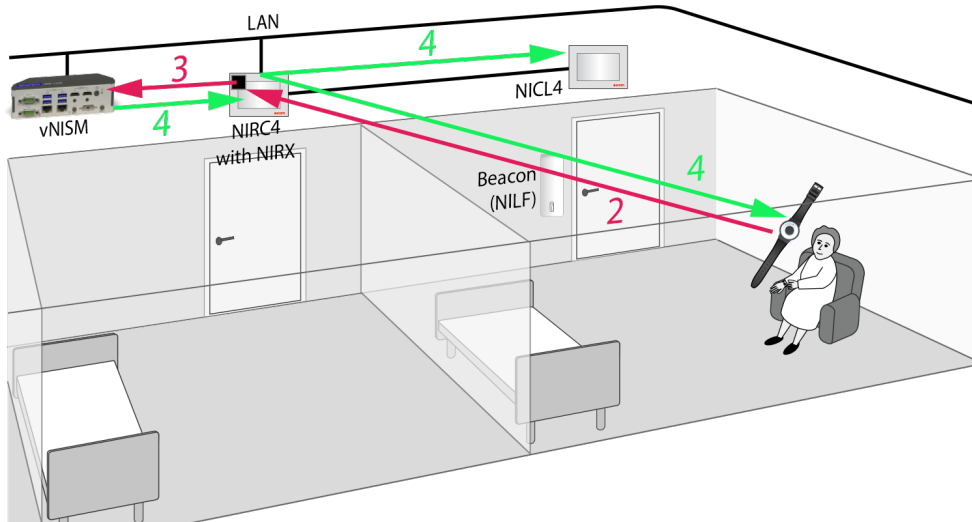
10.10 Typical Call Sequence of Wireless Nurse Call

The ID of the NILF is received by the patient’s or resident’s wireless transceiver



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

The patient or resident needs assistance and makes a call

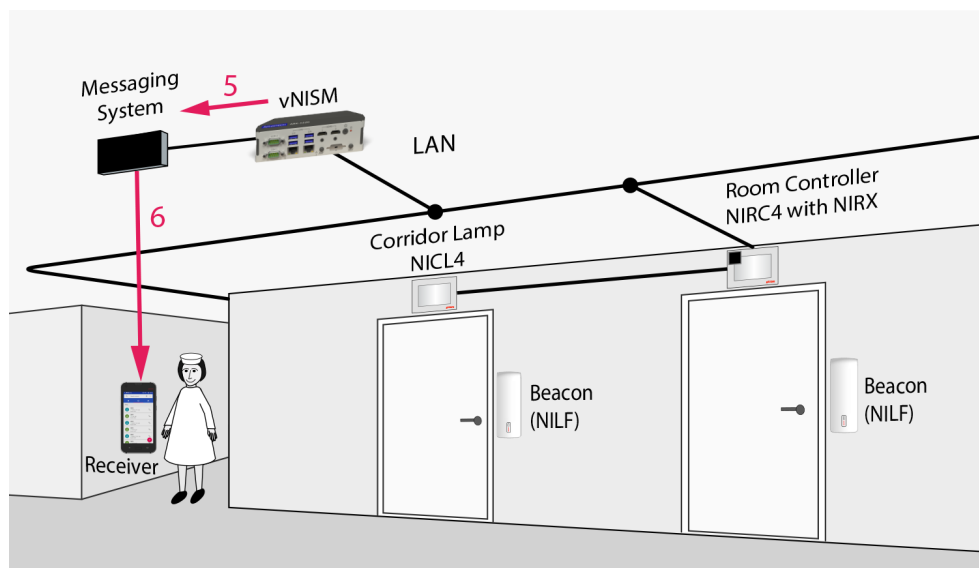


2: When the patient or resident presses the call button of the NITX an RF signal is transmitted which contains the call message, the NITX ID and the last seen NILF ID. This message is received by the NIRX that is mounted on the Room Controller NIRC4.

3: The NIRC4 sends the information to the wireless server (vNISM) for processing.

4: The wireless server returns a flashing pattern to the NITX and corridor lamp (NICL4) for signalling.

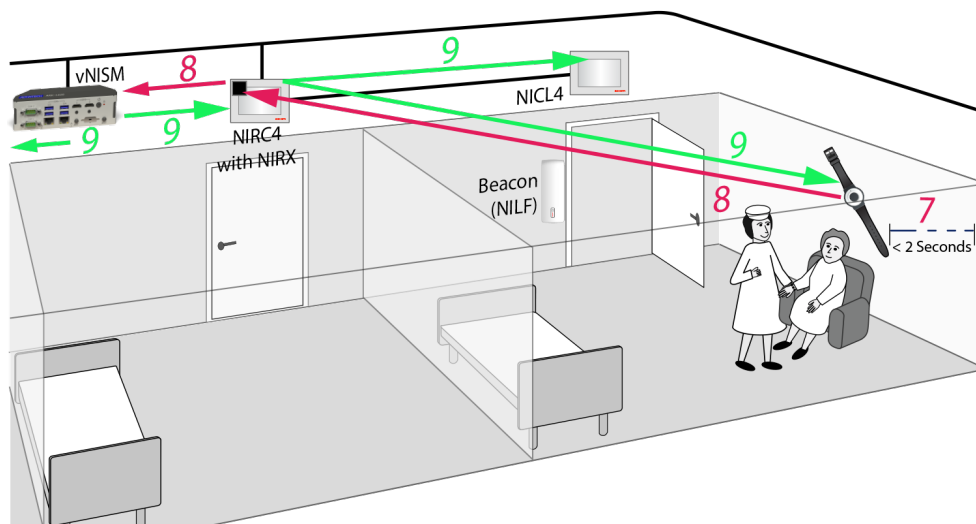
The Patient or Resident Call is sent to the Receiver of the Caregiver



5: The wireless server (vNISM) 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 patient or resident, to the relevant messaging receiver. The caregiver goes to the patient or resident in response to the message.

The caregiver attends to the patient or resident and cancels the call



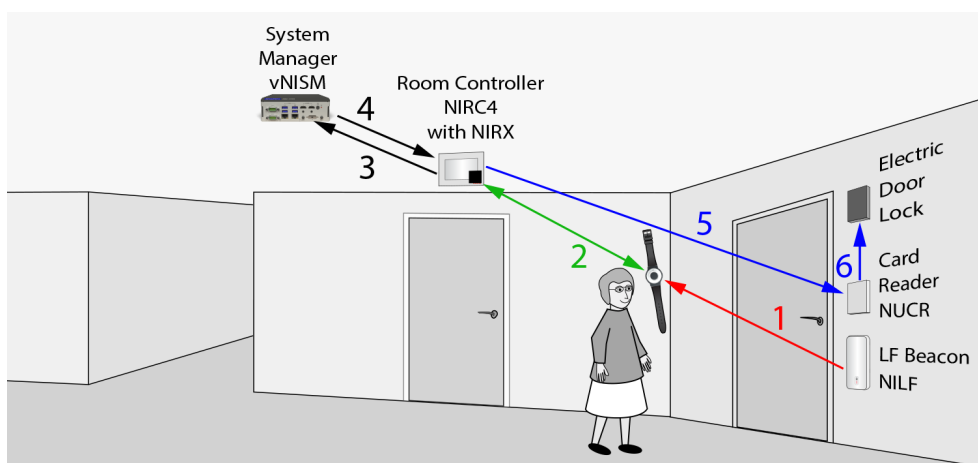
7: The caregiver cancels the call by pressing the call button on the NITX using the cancel sequence. (one long press followed by three short presses within two seconds).

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, corridor lamp and the messaging system.

10.11 Typical Examples of teleCARE Wireless with Wander Alarm

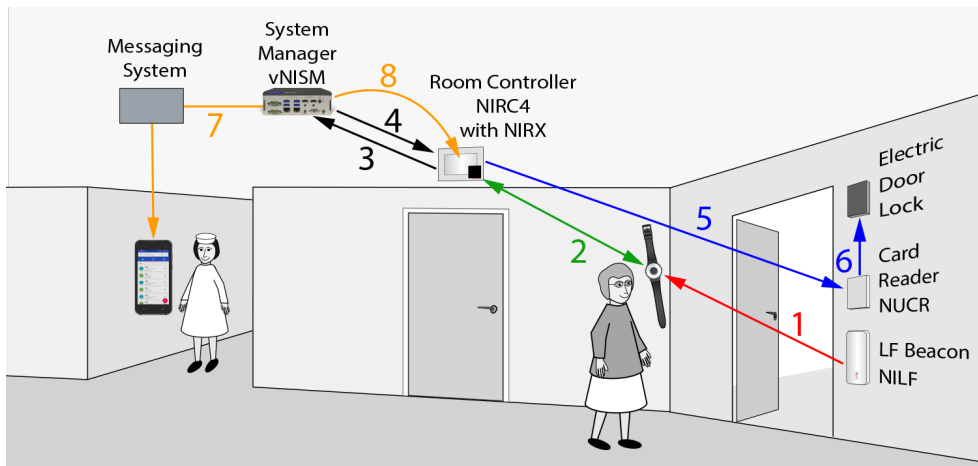
Wander Control Sequence with Door Control (Closed Door)



1. A patient or 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 patient's or 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 NIRC4 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 (vNISM) for processing.
4. If the NITX ID is not authorized to pass through that door the vNISM sends a message to the NIRC4 Room Controller to lock the door.
5. The NIRC4 Room Controller sends a "lock door" signal to the NUCR card reader.
6. The NUCR card reader activates the electric door lock and locks the door.

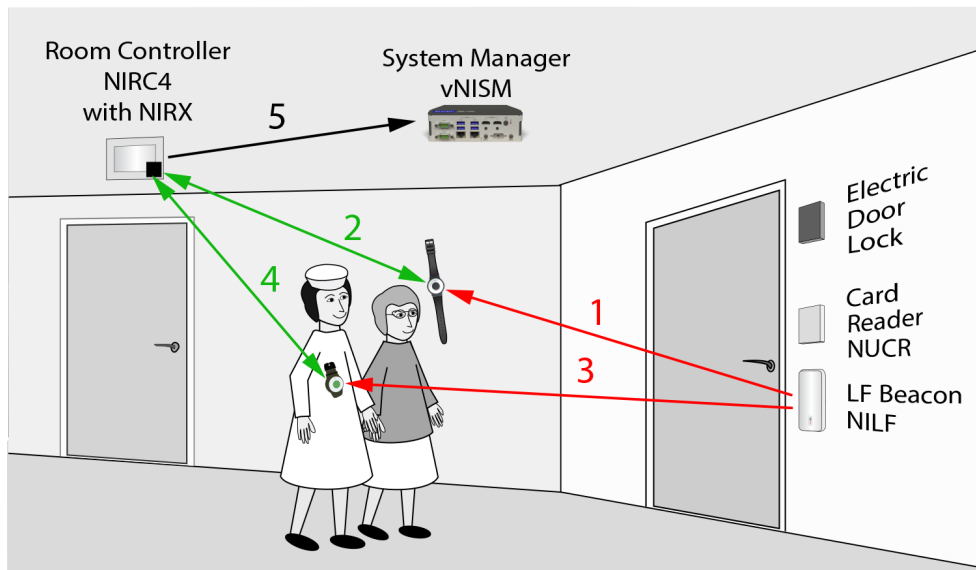
Wander Control Sequence with Door Control (Open Door)



1. A patient or 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 patient's or 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 NIRC4 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 (vNISM) for processing.
4. If the NITX ID is not authorized to pass through that door the vNISM sends a message to the NIRC4 Room Controller to lock the door.
5. The NIRC4 Room Controller sends a "lock door" signal to the NUCR card reader.
6. The NUCR 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 caregiver.
Note that if a door stays open for too long, also a door alarm message will be generated, independent of the wander alarm.
8. If Configured, the wander alarm message can also be signalled on linked devices like doorside modules, corridor lamps and corridor displays.

Wander Control Sequence with Buddying

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

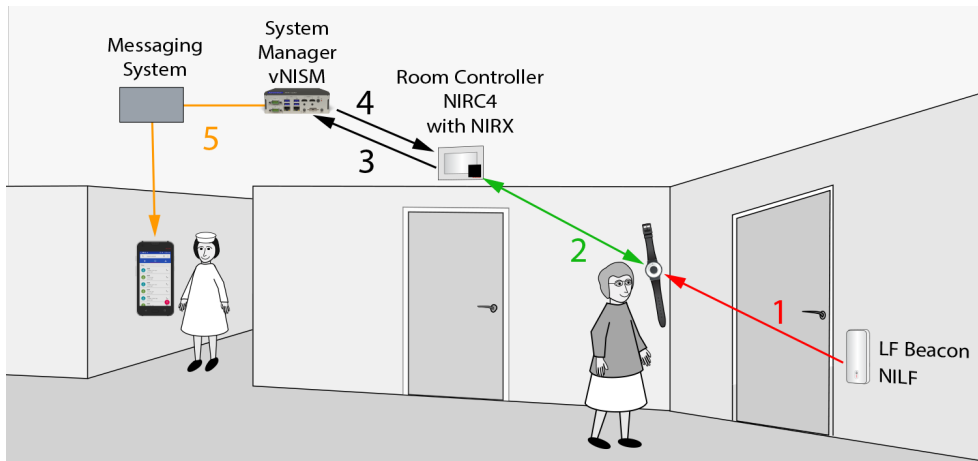


1. A patient or resident approaches a normally unlocked door which has an “active” NILF beacon. The NILF periodically transmits an LF signal containing the NILF ID which is received by the patient’s or resident’s NITX mobile transceiver.
2. When the NITX receives the active NILF’s ID signal it transmits an RF signal which contains the patient’s or resident’s NITX ID and the ID of the active NILF. This message is received by the NIRX that is mounted on the NIRC4 Room Controller.
3. A caregiver accompanies the patient or resident towards the normally unlocked 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 NIRC4 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 (vNISM) for processing. If the patient’s or resident’s NITX ID and the caregiver’s NITX ID is recognized as a “Buddying” combination, the vNISM does not send a message to the NIRC4 Room Controller to lock the door. Therefore the NIRC4 Room Controller does not send a “lock door” signal to the NUCR card reader, and the door remains unlocked and the patient or resident accompanied by the caregiver can pass through the door.



If the patient or resident is not accompanied by a caregiver, or the patient or resident and caregiver are not recognized as a “Buddying” combination (in a single buddy configuration only), then the vNISM will send a message to the NIRC4 Room Controller to lock the door (as shown in example [Wander Control Sequence with Door Control \(Closed Door\), page 79](#)).

Wander Control Sequence without Door Control

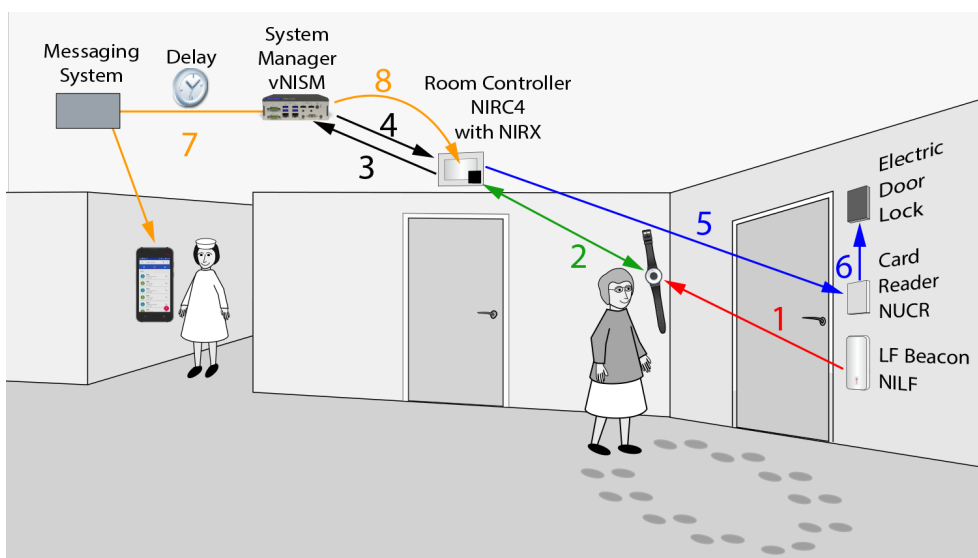


1. A patient or resident approaches a location without door control (NILF only). The NILF periodically transmits an LF signal containing the NILF ID which is received by the patient's or resident's NITX mobile transceiver.
2. When the NITX receives the active NILF's ID signal it transmits an RF signal which contains the NITX ID and the ID of the active NILF. This message is received by the NIRX that is mounted on the NIRC4 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 (vNISM) for processing.
4. If the NITX ID is not authorized to be at that location, the vNISM sends a message to the NIRC4 Room Controller to start a flashing pattern on the corridor lamp.
5. A wander alarm message will be initiated to inform the responsible caregiver.

10.12 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.

Loiter Control Sequence



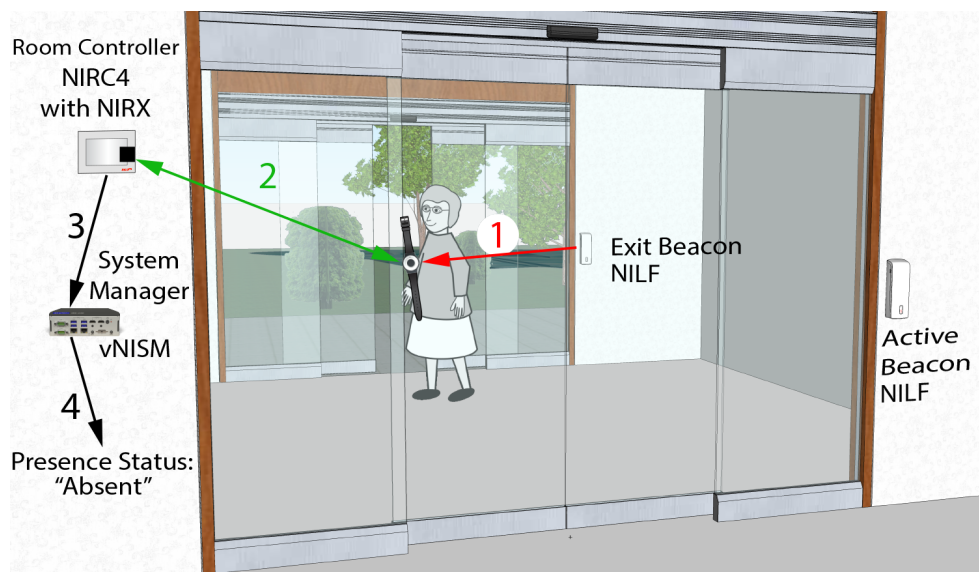
1. A patient or resident approaches a normally unlocked door that is closed. The NILF periodically transmits an LF signal containing the NILF ID which is received by the patient's or resident's NITX mobile transceiver.
2. When the NITX receives the active NILF's ID signal it transmits an RF signal which contains the NITX ID and the ID of the active NILF. This message is received by the NIRX that is mounted on the NIRC4 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 (vNISM) for processing.
4. If the NITX ID is not authorized to pass through that door the vNISM sends a message to the NIRC4 Room Controller to lock the door.
5. The NIRC4 Room Controller sends a "lock door" signal to the NUCR card reader.
6. The NUCR 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 caregiver.
8. If Configured, the loiter alarm message can also be signalled on linked devices like doorside modules, corridor lamps and corridor displays.



If meanwhile the door is opened by a caregiver who has access to the location, and who is not a buddy, a wander alarm message will be initiated if the patient or resident is still hanging around the location, and therefore the responsible caregiver will be informed.

10.13 Typical example of teleCARE Wireless with Exit Detection

Unsupervised Exit Detection



1. A patient or 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 patient's or 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 NIRC4 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 (vNISM) for processing.

4. If the NITX ID is authorized to pass through that door the vNISM changes the presence state of the NITX to “Absent”. “Device lost” messages will be suppressed when the NITX is absent.



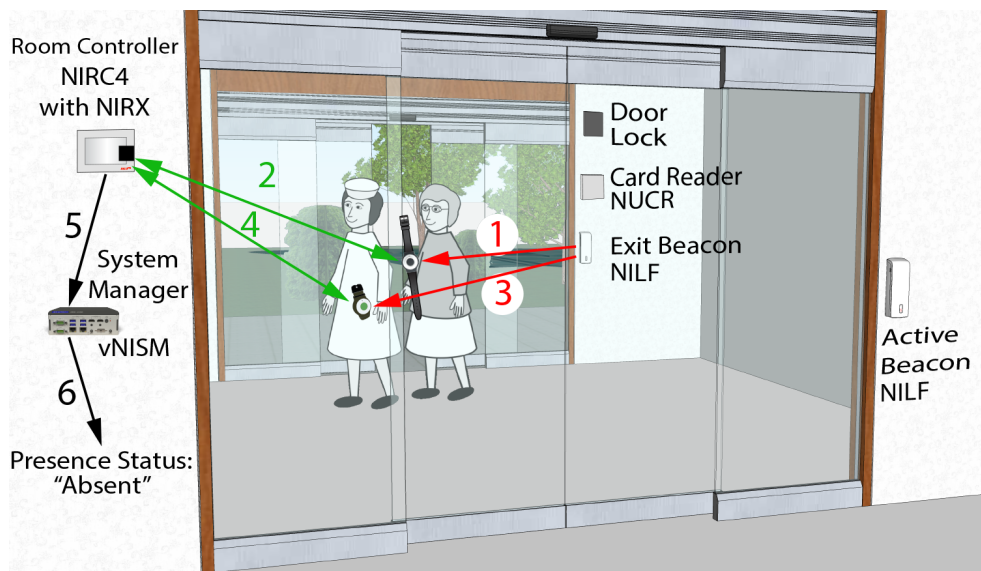
If a patient or resident is not authorized to pass through the door, the exit beacon can also function as loiter and / or wander alarm beacon *supporting access control*, which means the door will be locked and a loiter and / or wander alarm will be generated. [10.11 Typical Examples of teleCARE Wireless with Wander Alarm, page 79](#) and [10.12 Typical Examples of teleCARE Wireless with Loiter Alarm, page 82](#).



An exit beacon cannot be used to return the state back to “Present” when a patient or 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. [Returning at the Site, page 85](#)

Supervised Exit Detection (Buddying)

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



1. A patient or 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 patient's or resident's NITX mobile transceiver.
2. When the NITX receives the exit beacon ID signal it transmits an RF signal which contains the patient's or resident's NITX ID and the ID of the exit beacon. This message is received by the NIRX that is mounted on the NIRC4 Room Controller.
3. A caregiver accompanies the patient or resident in the area of the normally unlocked door with the exit beacon. The LF signal containing the NILF ID is received by the caregiver's NITX mobile transceiver.
4. When the NITX receives the exit beacon ID signal it transmits an RF signal which contains the caregiver's NITX ID and the ID of the exit beacon. This message is received by the NIRX that is mounted on the NIRC4 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 (vNISM) for processing. If the patient's or resident's NITX ID and the caregiver's NITX ID is recognized as a “Buddying” combination then the vNISM does not send a message to the NIRC4 Room Controller to lock the door. The door remains unlocked and the patient or resident accompanied by the caregiver can pass through the door.

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



If the patient or resident is not accompanied by a caregiver, or the patient or resident and caregiver are not recognized as a "Buddying" combination (in a single buddy configuration only), then the vNISM will send a message to the NIRC4 Room Controller to lock the door (as shown in example [Wander Control Sequence with Door Control \(Closed Door\), page 79](#)).

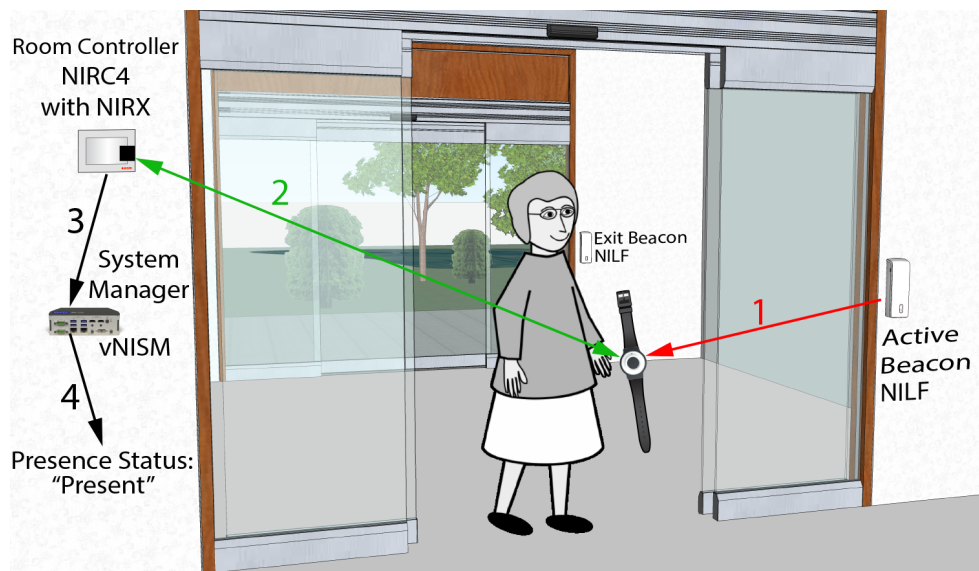


An exit beacon cannot be used to return the state back to "Present" when a patient or resident arrives back at the site. For returning to the "Present" state, an active location beacon that is not configured as exit beacon is required. [Returning at the Site, page 85](#)



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.

Returning at the Site



1. A patient or 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 patient's or 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 NIRC4 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 (vNISM) for processing.
4. The vNISM changes the presence state of the NITX to "Present". Automatically the "Device lost" messages are no longer suppressed.



When a patient or resident that requires a buddy returns at the site for which access control is configured, the patient or 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 patient or resident will be able to enter, however a wander alarm will be generated since the patient's or resident's buddy is not present.

10.14 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.

Figure 48. Wireless access scheduler configuration example in the vNISM GUI

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.

10.15 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 (NIRC4 + NIRX), wireless gateways (NIRC4 + NUREP) and wireless repeaters (NUREP) to roughly determine the location of a wireless device. The following equipment is required for RSSI-based location determination:

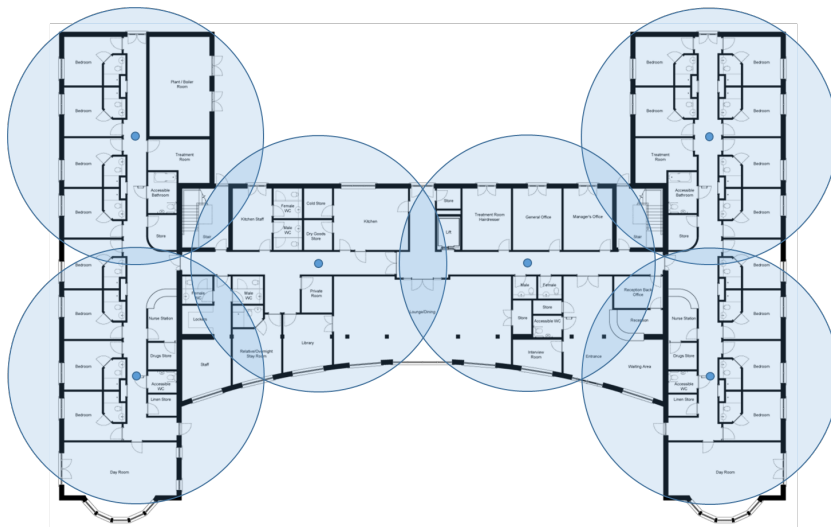
- - Base Station(s) - The “base station” referred to in this section consist of the Room Controller - NIRC4 with a piggyback mounted transceiver module - NIRX.
AND / OR
- - Wireless gateway(s) - The “wireless gateway” referred to in this section consist of the Room Controller - NIRC4 with a wireless 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.

The aim is that RSSI does not require changes in the physical system setup, however the location of the Room Controllers (NIRC4) 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.

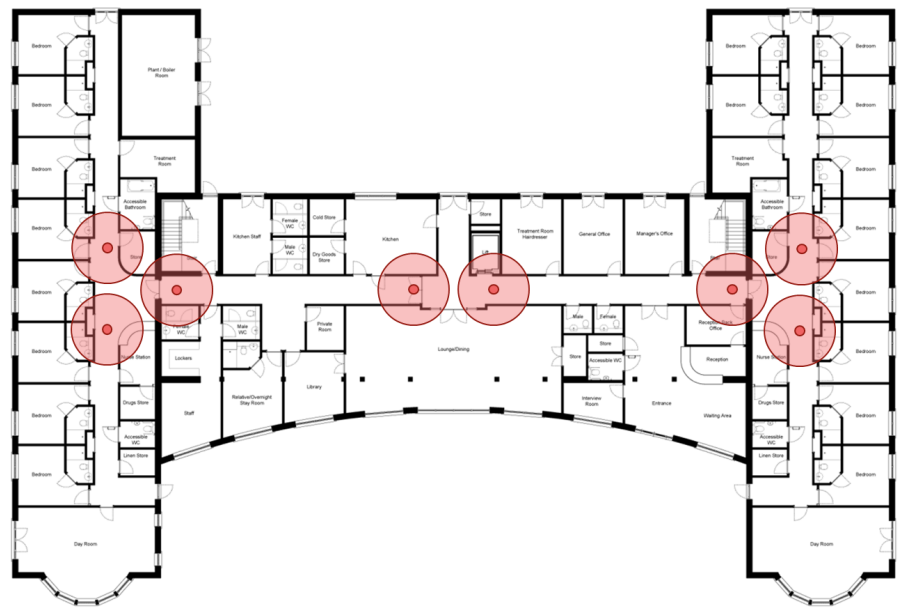
Figure 49. Location determination using RSSI



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.

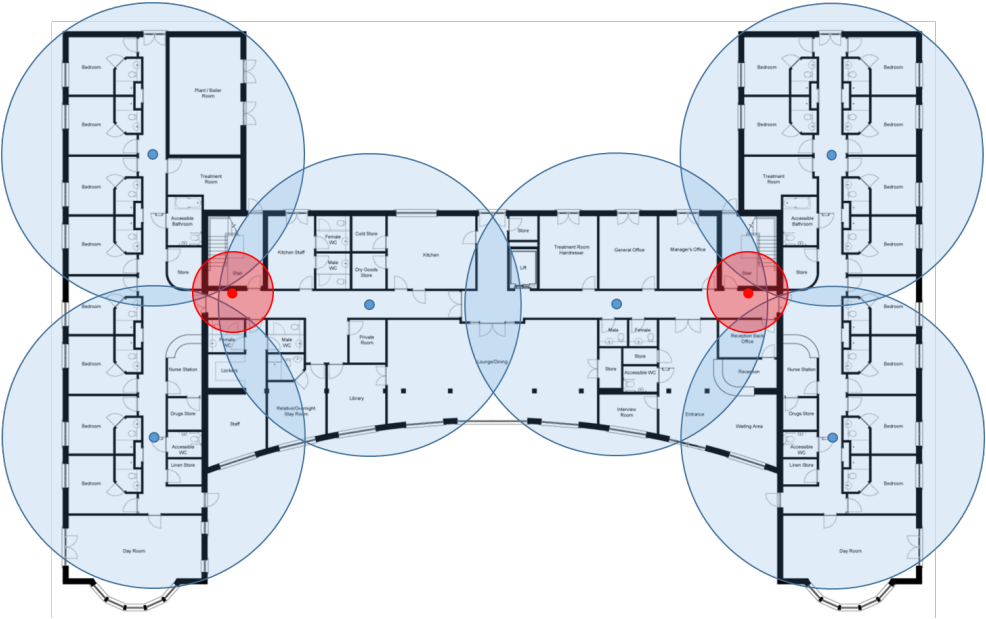
Previously location determination was done by adding LF beacons to the system. When only using LF beacons for the same layout with only one floor, about eight LF beacons would be required to determine the location.

Figure 50. 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 51. Location determination using LF and RSSI



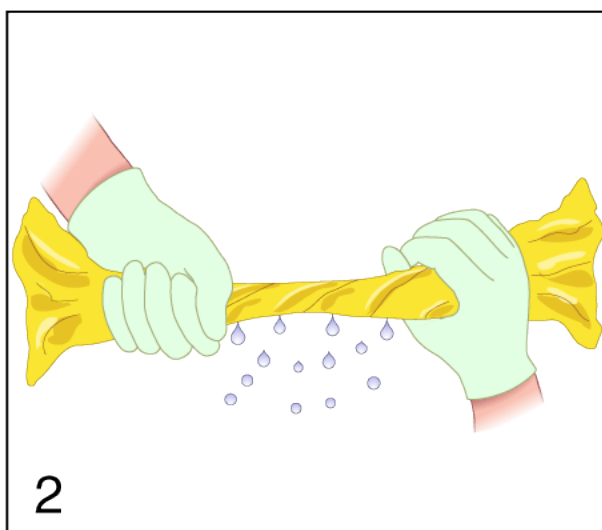
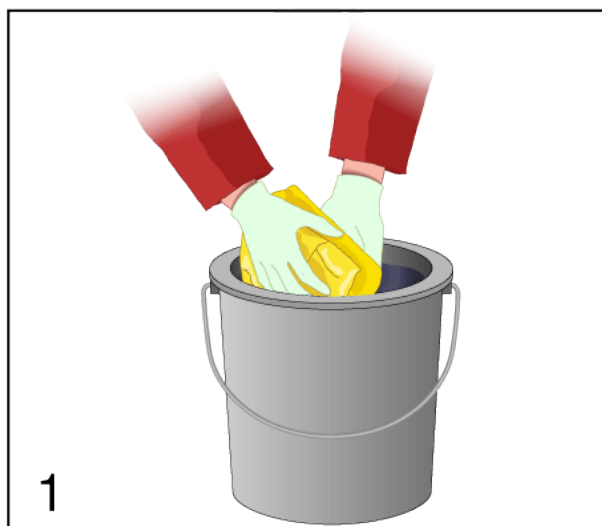
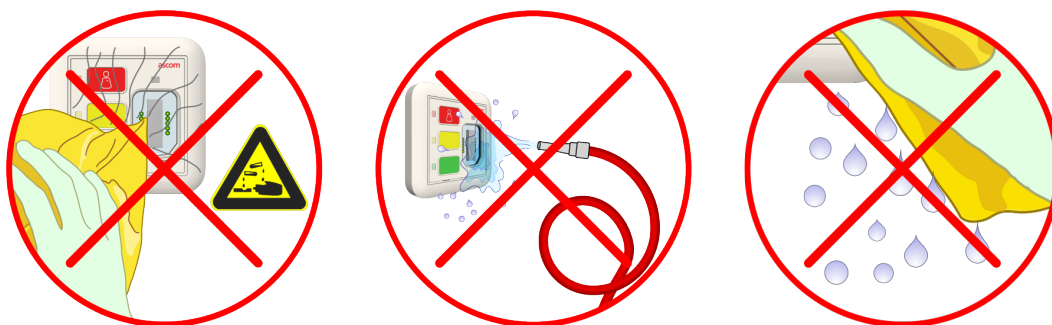
Appendix A Cleaning the Switch Modules

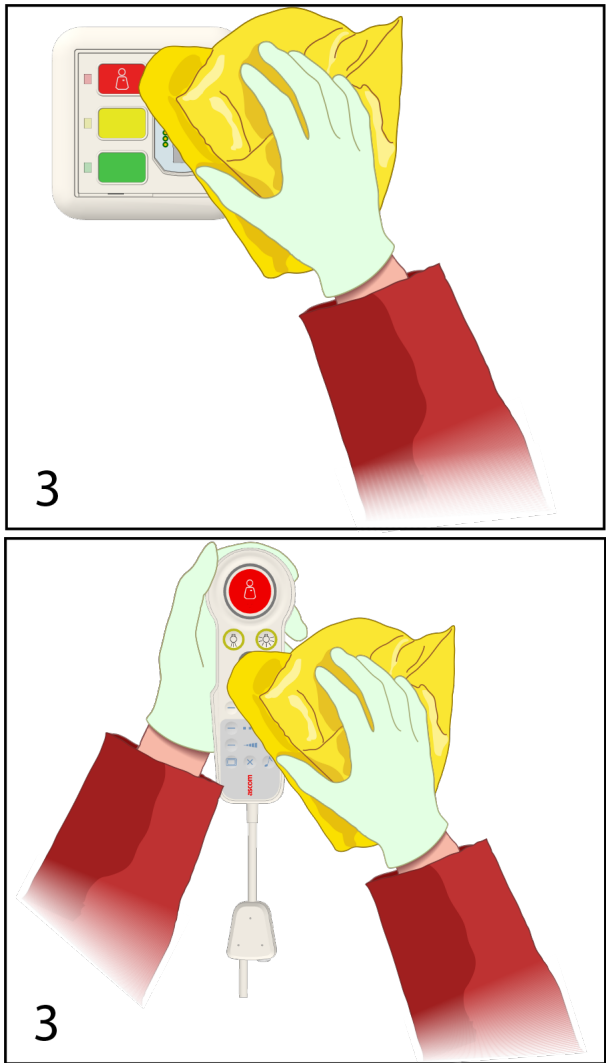
Clean the modules by wiping them with a moistened (not dripping) soft cloth which is soaked in a solution of mild detergent and water.

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

Do not use aggressive or abrasive cleaning agents.

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





Appendix B UTF-8 Support

For the support of multiple languages throughout the system, UTF-8 is supported by modules, messaging capable handsets and unite components. The release notes of each module, messaging 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 messaging handsets have a wider range of support than the NURD, where as the corridor displays NICD and NUCD12IP do not support UTF-8.

Table 2 Supported modules / handsets

Module / handset	Version (if applicable)
vNISM	
NIRC4	
NURD	
Myco handset	
i-series handsets	
d-series handsets	

Table 3 Supported Unicode characters by the NURD

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
	Regional agreed Chinese characters, see NURD data sheet (TD 93386EN) for detailed information.

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.

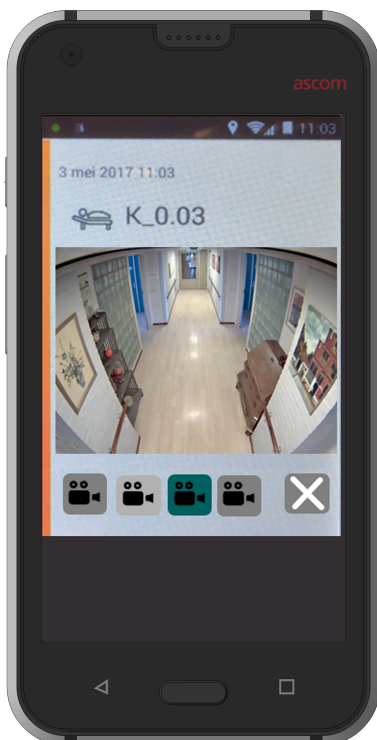
Appendix C Unite SmartSense - Deep Link Functionality

Access to external resources can be established by integrating deep link functionality. When enabled, deep link information will be made available through interactive messaging on mobile devices that support the deep link functionality.

An example of deep link could be to access a camera observation system in a Unite SmartSense environment in order to request the camera footage based on the location of a sensor or nurse call event.

A deep link IM option becomes available through the center soft key of the mobile messaging device, for example on the Myco 3.

Figure 52. Deep link Myco 3 camera observation example



Appendix D Document History

Version	Date	Description
A	10 June 2024	First released version A

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