Nordland FYLKESKOMMUNE | MOSJØEN VIDEREGÅENDE SKOLE

sensio

Supervisor for Institution and Housing Infrastructure needs for Welfare Technology

Supervisor for Institution and Housing - Infrastructure needs for Welfare Technology

Innholdsfortegnelse

1 Introduction to supervisor for Institution and Housing-Infrastructure needs for welfare technology

This guide provides an overview of the needs for cabling and infrastructure that may be relevant in a typical delivery of welfare technology in a building, including an overview of the need for power supply, UPS / emergency power supply, as well as the responsible party in a typical construction contract. It must be clarified in connection with certain construction projects, what types of welfare technology functions are relevant. The supplier of welfare technology can assist in such clarifications as needed in connection with design of buildings and infrastructure.

2 Introduction to welfare technology

The Norwegian Directorate of Health (2018) has the following to say about the various forms of Welfare Technology:
«Security-creating technologies are technologies that can create security and lead to the individual being able to live
longer at home and facilitate social participation and counteract loneliness. This includes among other things traditional and digital security alarms, door sensors and other motion sensors, location technology (GPS), fall sensors, stove guard, theft and fire alarm, door camera, electronic door locks and video communications. »

«Coping technologies are technologies that help the individual to have control over their own health and master everyday life better, especially in connection with chronic diseases. It can be technology used in connection with rehabilitation, training and maintenance of mobility. This can be digital calendars and to-do lists, self-measurements of health status, adapted gaming platforms, instructional and motivational videos and training apps. »

«Examination and treatment technologies are technologies that can provide advanced medical assessment and treatment at home. Here will, telemedicine and video solutions play a central part, along with biomedical sensors for medical measurements and apps for self-reporting. »

«Wellness technologies are technologies that increase awareness of one's own health and that assist in practical matters chores daily without impaired function or health being the reason for using the technology. This includes the wide range of training and motivation apps and new electronic aids such as robotic vacuum cleaners and robotic lawnmowers, as well as various smart home solutions and solutions for social contact and interaction with others. »

About the different forms of technology choice: Smart home technology is a combination of several different devices and sensors to be able to create a better everyday for the person who uses it. Technology for smart home solutions is often divided into wired and wireless technology represented by, for example, KNX (wired) and xComfort (wireless). In addition to this there is also security alarms that can cover many of the needs that may be found using their own sensors.

KNX: Possibilities for lights, alarms and shut-off switches. Requires built-in infrastructure with points for KNX and IP. Especially recommended for new establishments or where you have the opportunity for major changes in the infrastructure.

xComfort: Possibilities for light alarms and shut-off switches. Requires very little built-in infrastructure but still has a point requirement for IP. Especially recommended for post-assembly or in buildings where there is no possibility of major changes in the infrastructure.

Security alarm: A digital alarm or Gateway with the option of alerting alarms. Can be combined with security-creating technology such as out of bed alarm, walking alarm and more through affiliates sensors. Requires power and IP point for main unit. The security alarm enables you to cover similar needs as when using KNX and xComfort, without special requirements for infrastructure.

All forms of technology selection can be combined with each other as needed, given that one considers basic prerequisites such as cabling or network coverage.

3 Infrastructure in living quarters

See the section below with accompanying figures and tables for an overview of points and equipment that may be included in the living room, including an overview of the need for power supply, UPS / emergency power supply, and responsible party to the contract.

It must be clarified in connection with certain construction projects, which types of functions are relevant for intended use of the living space. The supplier of welfare technology can assist in such clarifications as needed in in connection with the design of buildings and infrastructure.

3.1 Environment and Wellness

See figure and table below for an overview of points and equipment that can be included in the adjoining living room lighting and blind control functions. Light points should be clarified by the building's architect, lights below should be seen as a minimum of need for bright spots in living quarters.

Figure: Sketch of points in occupant rooms associated with light and blind control

#	Function	Location	Type	Power	Emergency Power	Responsible
1	Wall lamp	On wall between bed and bathroom. Dimmable	Dali/KNX	Mains	To be clarified, minutes are kept	Electric company
2	Ceiling lamp bed	Over bed. Dimmable	Dali/KNX	Mains	To be clarified, minutes are kept	Electric company
3	Ceiling lamp room	In bathroom	Dali/KNX	Mains	To be clarified, minutes are kept	Electric company
4	Bed lamp	In cable duct. Dimmable	Dali/KNX	Mains	To be clarified, minutes are kept	Electric company
5	Ceiling lamp hallway	Front door. Dimmable	Dali/KNX	Mains	To be clarified, minutes are kept	Electric company
6	Ceiling lamp bathroom	In roof. Dimmable	Dali/KNX	Mains	To be clarified, minutes are kept	Electric company
7	Light fixture bathroom	Over sink in bathroom	Dali/KNX	Mains	To be clarified, minutes are kept	Electric company
8	Light switch - Day	On the wall. Follows the standard height of the building switches, for example +1000 mm	Impulse to KNX- actuator	KNX	All KNX lines on UPS and reserve power unit	Electric company
9	Light switch - Evening	On the wall. Follows the standard height of the building switches, for example +1000 mm	Impulse to KNX- actuator	KNX	All KNX lines on UPS and reserve power unit	Electric company
10	Light switch - Night	On the wall. Follows the standard height of the building switches, for example +1000 mm	Impulse to KNX- actuator	KNX	All KNX lines on UPS and reserve power unit	Electric company
11	Light switch – All off / All on	On the wall. Follows the standard height of the building switches, for example +1000 mm	Impulse to KNX- actuator	KNX	All KNX lines on UPS and reserve power unit	Electric company
12	Light switch – On/Off bathroom	On the wall. Follows the standard height of the building switches, for example +1000 mm	Impulse to KNX- actuator	KNX	All KNX lines on UPS and reserve power unit	Electric company
13	Blind control	KNX- relay for blind control	KNX	KNX	All KNX lines on UPS and reserve power unit	Electric company

The supplier of welfare technology will retrofit all IP-based equipment. KNX-based equipment is assembled by supplier of the complete KNX system. Which party this is depends on what the KNX system is to be used for beyond patient notification. See separate chapter for requirements for the KNX system.

See specification below for more detailed requirements for infrastructure and installation.

3.1.1 Point 1-13: Lighting, blinds and light switches

- All light sources and blinds, and any other central power points that can be controlled from the welfare technology system, must be equipped with KNX relay for remote control.
- Light sources that can be controlled individually must be connected to power courses that can also be controlled individually.
- It is recommended that the supplier welfare technology is given control over all logic on light switches in the living room to ensure good and comprehensive solutions that are not perceived as confusing for the employee / user.
- It is recommended to use dimmable light sources in the living room, especially lighting in the bathroom at night. It is recommended to use light sources with a dimmer range of 0-100.
- Control of solar shading further presupposes that the blind motor is installed, and that the blinds are of controllable type.
- Supplier welfare technology indicates the need for number and location of light switches.
- Impulse switches or the like must be used. for light control that sends signal over KNX. In bathrooms, light switches that break the circuit and make it impossible for the supplier of welfare technology to override the light cannot be used. Switch actuators must be correctly dimensioned in relation to the circuit it can break (for example 16A vs. 6A).
- The KNX system must be programmed in accordance with requirements and instructions from the supplier of welfare technology.

3.2 Security and health

See figure and table below for an overview of points and equipment that can be included in the adjoining living room functions for basic patient signal functionality.

Figure: Sketch of points in living rooms associated with standard patient signal functionality.

#	Function	Location	Type	Power	Emergency Power	Responsible
14	Cord pull bathroom	In ceiling	KNX	KNX	All KNX lines on UPS and reserve power unit	Electric company
15	Cord pull bed	In ceiling	KNX	KNX	All KNX lines on UPS and reserve power unit	Electric company
16a	KNX- room panel	Hight +1500 mm. Alternative to room panel in building without integration with lighting/heating	KNX	KNX	All KNX lines on UPS and reserve power unit	Electric company
16b	Room panel	Over ceiling and down to 1410 mm	Welfare-Lan	PoE	Switch router etc. on UPS and reserve power unit	Electric company
17	Info panel	Over ceiling and down to 1410 mm	Welfare-Lan	PoE	Switch router etc. on UPS and reserve power unit	Electric company

The supplier of welfare technology will retrofit IP-based equipment. KNX-based equipment is assembled off the supplier of complete KNX system. Which party this is depends on what the KNX system is to be used for beyond patient notification. See separate chapter for requirements for the KNX system.

See specification below for more detailed requirements for infrastructure and installation.

3.2.1 Point 14 and 15: KNX cord pull

- Simple electric multi-box in the ceiling
- If mounting in a system ceiling, there are requirements for reinforcement with plate, type of plywood or equivalent. The plate should be the same size as the ceiling plate, and approx. 10 mm thick
- KNX cable pulled to electric multi-box. Length: 20 cm from the electric multi-box
- Type of KNX cord pull with binary input is determined and ordered by supplier of welfare technology to ensure that professional requirements are met
- Supplier of welfare technology sends its own instructions for KNX programming

<u>Instructions for mounting the cord pull</u>

- Break protection for the cord is set to 170 cm at and 180 cm in the bathroom / HCWC
- The cord should reach all the way down to 10-30 cm from the floor
- Detailed location must be stated in the floor plan. In general, placement above the bed is set in the ceiling and in center of the bed's positioning possibilities and 10-15 cm from the wall (here a passenger lift can be the reason for some variety). In the bathroom / HCWC is the standard location on the right side, easily accessible with the right hand to the person sitting on the toilet. If the shower is on the left side of the toilet, the cord cover should hang on the left side of the toilet

3.2.2 Point 16a: KNX room panel

- Simple electric multi-box recessed in the wall
- KNX cable pulled to electric multi-box. Length of KNX cable: 20 cm from the electric multi-box
- Type of KNX room panel with binary input is determined and ordered by supplier of welfare technology to ensure that professional requirements are met
- Supplier of welfare technology sends its own instructions for KNX programming and installation

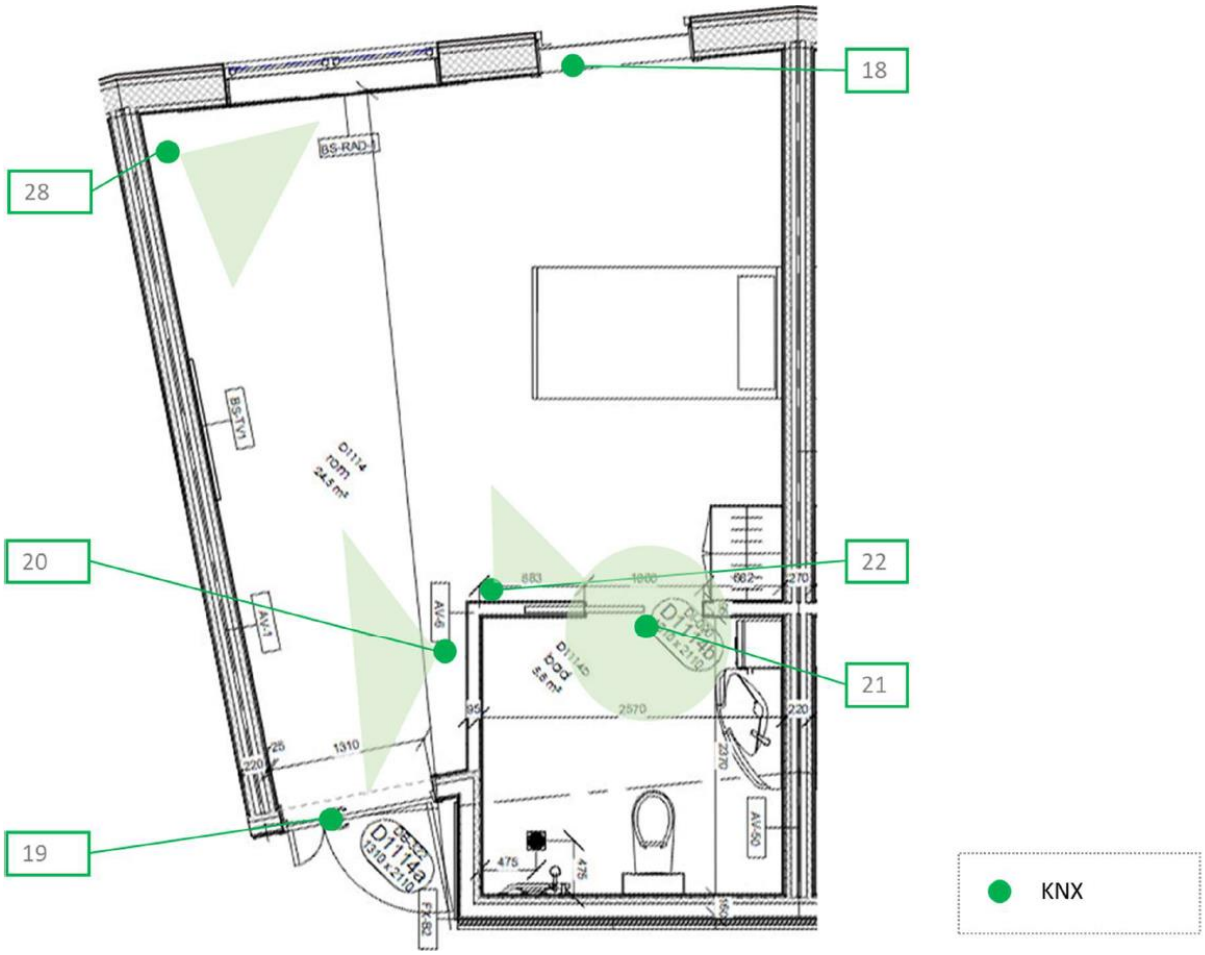
3.2.3 Point 16b and 17 info panel and room panel

- IP network point located above the ceiling at the intended location of the panel

- Double deep electrical box recessed in the wall. Height from floor to center of electrical box: 141 cm (then becomes center of the panel144 cm). Alternatively, 146 cm (then the center of the panel will be 149 cm)
- Traction pipe for network cable RJ / 45-RJ / 45 is laid in the wall down to the electrical box on the wall behind the panel. Traction pipes must be of sufficient dimension, minimum 20 mm.
- Network cable RJ / 45-RJ / 45 is connected to the IP network point above the ceiling and laid in a draw pipe down to the panel. Length: 15 cm from the electrical box on the wall. Factory-terminated patch cables must be used
- Panel uses power supply via PoE switch. Switch must be connected to UPS and emergency power supply
- The panel is retrofitted by supplier of welfare technology

3.3 Points for extended safety and notification

See figure and table below for an overview of points and equipment that can be included in the room, connected features for extended security and notification.



#	Function	Location	Type	Power	Emergency Power	Responsible
18	Door sensor balcony	Over ceiling and down to door frame	Signal to KNX actuator	KNX	All KNX lines on UPS and reserve power unit	Company responsible for locks and fittings
19	Door sensor entrance	Over ceiling and down to door frame	Signal to KNX actuator	KNX	All KNX lines on UPS and reserve power unit	Company responsible for locks and fittings
20	PIR roof	In ceiling	KNX	KNX	All KNX lines on UPS and reserve power unit	Electric company
21	PIR bathroom	Over door	KNX	KNX	All KNX lines on UPS and reserve power unit	Electric company
22	PIR bed	Close to floor. Cover area between the bed and the bathroom	KNX	KNX	All KNX lines on UPS and reserve power unit	Electric company
28	PIR roof	In ceiling	KNX	KNX	All KNX lines on UPS and reserve power unit	Electric company

KNX-based equipment is assembled by the supplier of a complete KNX system. Which party this is depends on what the KNX system is to be used for in addition to patient notification. See separate chapter for requirements for the KNX system.

See specification below for more detailed requirements for infrastructure and installation.

3.3.1 Point 18 and 19: Door sensor

- Signal from magnetic contact connected to a binary input
- All equipment is delivered and installed by the KNX supplier together with the rest of the KNX system
- The supplier of welfare technology sends its own instructions for KNX programming of door sensors

3.3.2 Point 20,21,22 and 28: PIR mounted in ceiling or on the wall

- PIR expected delivered and mounted by the supplier of KNX equipment
- Supplier of welfare technology sends instructions for KNX programming of the PIR sensor
- KNX PIR in bathroom is recommended mounted in such a way that it covers the area approximately ½ meter outside the bathroom entrance (but not the area closest to and directly around the bed)
- Type KNX PIR delivered must be approved by the supplier of welfare technology to ensure that welfare-professional needs are taken care of. The supplier of welfare technology need at least 4 weeks on testing and approval of new types as new programming instructions must be prepared at the same time
- Point 22 must be mounted inn floor height and shielded off at several angles so that it only detects less than 20 cm in the area between the bed and the bathroom. Employees must be able to enter the room and see to user without being detected by this PIR. If the room design does not make this possible, it must instead be used a wireless PIR mounted on the bed. This is delivered and installed by the supplier of welfare technology.

3.4 Positioning

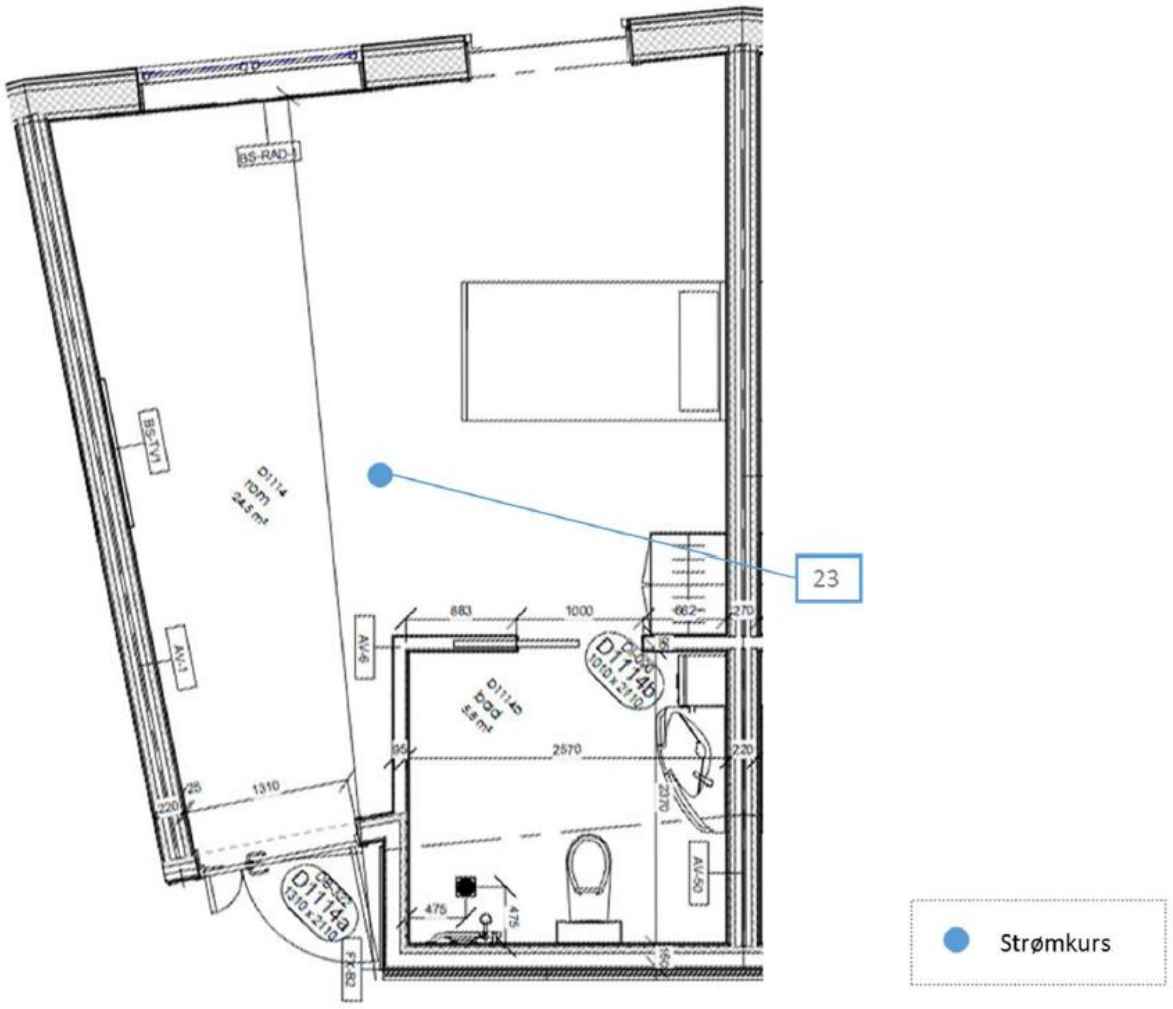


Figure: Sketch of points in room associated with positioning

#	Function	Location	Type	Power	Emergency Power	Responsible
23	Socket for cairn	Over ceiling and by system ceiling, otherwise in ceiling	Mains	Mains	Cairn has built-in battery with UPS lasting for up to 6 hours.	Electric Company

See specifications below for more detailed requirements for infrastructure and installation.

3.4.1 Point 23: Positioning cairn

- Double socket over ceiling near the intended location of the cairn (alternatively under the roof where there it is not a system ceiling). An electrical outlet must be placed so that the client will approve the laying of a power cable up to the intended location of the cairn.

- The cairns (size H: 17.5 cm, W: 11 cm, D: 5 cm) are retrofitted under the ceiling, screwed straight into the roof plate, and communicates wirelessly.

3.5 Other Welfare technology in rooms, options to facilitate future functionality

See figure and table below for an overview of points and equipment that can be included in the living room and associated with other Welfare technology.

Note! If it is not considered appropriate to prepare for all sensors and the functionality from day 1, an empty pipe system can be delivered instead. In that case, it must be done with inlaid pulling wire and electrical boxes must be complete with frame and blind cover.

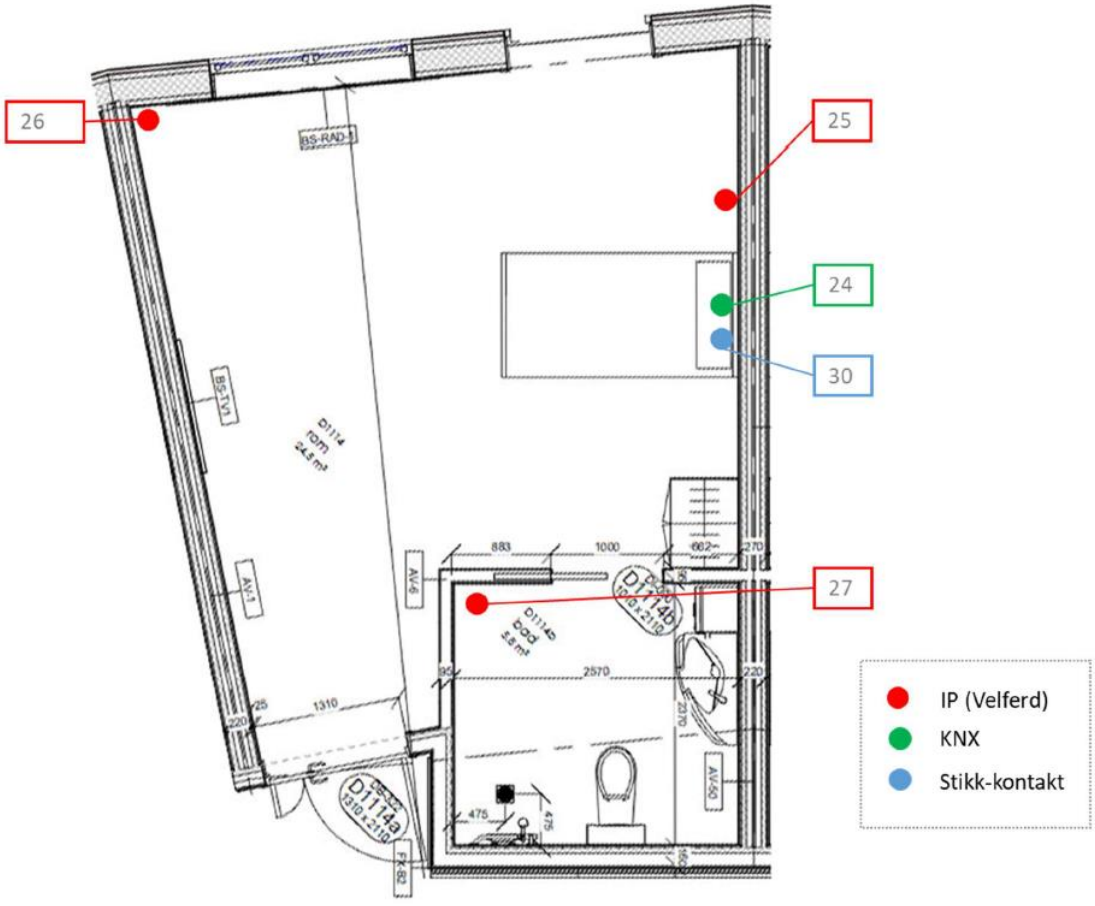


Figure: Sketch of points on living quarters associated with extended security and notification

#	Function	Location	Type	Power	Emergency Power	Responsible
24	I/O Input	In cable duct above bed (data contact with RJ45 plug), for example to epilepsy alarm / bed mat	Signal to KNX actuator	KNX	All KNX lines on UPS and reserve power unit	Electric company
25	Double IP-point sensor/camera	In cable duct over bed	Welfare LAN	Outlet / PoE	To be clarified, minutes are kept. Depends on desired function for camera / sensor	Electric company

#	Function	Location	Type	Power	Emergency Power	Responsible
26	Double IP-point sensor / camera	Over ceiling	Welfare LAN	Outlet / PoE	To be clarified, minutes are kept. Depends on desired function for camera / sensor	Electric company
27	Double IP-point sensor / camera	Over ceiling	Welfare LAN	Outlet / PoE	To be clarified, minutes are kept. Depends on desired function for camera / sensor	Electric company
30	6 sockets	In cable duct	Socket|	Mains	UPS and reserve power unit	Electric company

IP-based equipment, bed mats and any medical sensors are retrofitted by the supplier of welfare technology. KNX-based equipment is assembled by the supplier of the complete KNX system. Which party this is depends on what the KNX system is to be used for in addition to patient notification. See separate chapter for requirements for the KNX system.

See specification below for more detailed requirements for infrastructure and installation.

3.5.1 Point 24: I/O Input in cable duct over bed

- I/O input can be used for epilepsy alarm, humidity sensor, bed mat or other equipment that has the option to be connected to an RJ45 plug (retrofitted by supplier of welfare technology)
- If battery-powered equipment is not to be connected, the required number of sockets must also be established close by
- KNX cable pulled to a simple electrical box at the intended location of the I/O input
- Standard data contact with 1 or more outlets, together with KNX binary input with sufficient number of ducts, mounted in electrical box. Which the 8 conductors to be used to trigger the alarm must be clarified in connection with the individual project depending on the type of equipment to be connected. Default as used unless otherwise specified are pins 1 and 8
- All equipment, including data connector, is expected to be delivered and installed by the KNX supplier together with the rest of the KNX equipment
- Supplier of welfare technology sends its own instructions for KNX programming

3.5.2 Point 25: Double IP-point in cable duct over bed (2-way com) or camera

- Dual IP network point is placed in the middle of the channel with some flexibility to be able to move 30 cm either to the right or left
- Equipment is retrofitted by the supplier for welfare technology
- Assumes use of standard cable duct as available at wholesaler
- Duct lids must be fitted and cut after equipment has been placed and fitted

3.5.3 Point 26 and 27: Double IP-point for sensor over ceiling

- Power supply via either by socket over ceiling or PoE switch depending on type of sensor / camera
- It must be considered whether the current course must as a minimum be connected to an emergency power supply, alternatively both UPS and emergency power supply at high criticality on function connected to sensor

- IP network point is placed above the ceiling at the intended location of the sensor
- Equipment is retrofitted by the supplier for welfare technology

3.6 Other recommended infrastructure in living room

See figure and table below for an overview of points and equipment that can be included in the living room, connected to other recommended infrastructure prepared in the living room.

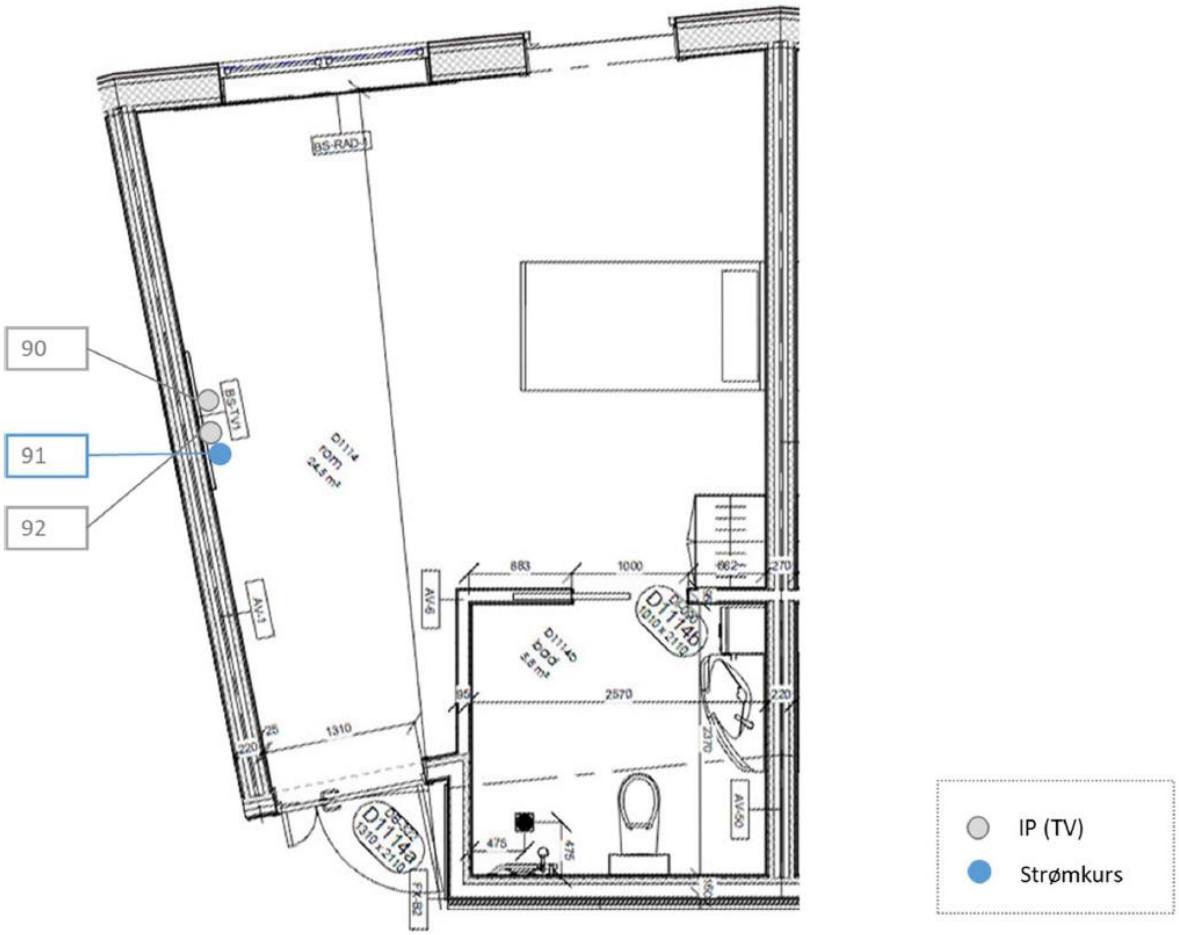


Figure: Sketch of points in living rooms connected to other recommended infrastructure in living rooms

#	Function	Location	Type	Power	Emergency Power	Responsible
90	IP – point for TV	Over ceiling and down 180 cm. Recommended double IP-point	TV - Lan	I.A	To be clarified	Electric company
91	Outlet for TV	Socket for tv connected through KNX actuator. Recommended 4 outlets	Socket	Mains	To be clarified	Electric company
92	IR point for IR emitter	From ceiling and down to 180 cm from floor	TV - Lan	PoE	No	Electric company

3.6.1 Point 90: IP TV

- Any TV provider must define requirements for this point

3.6.2 Point 91: Point for TV control

- Any TV provider must define requirements for this point

3.7 Summary of needs for infrastructure in living rooms

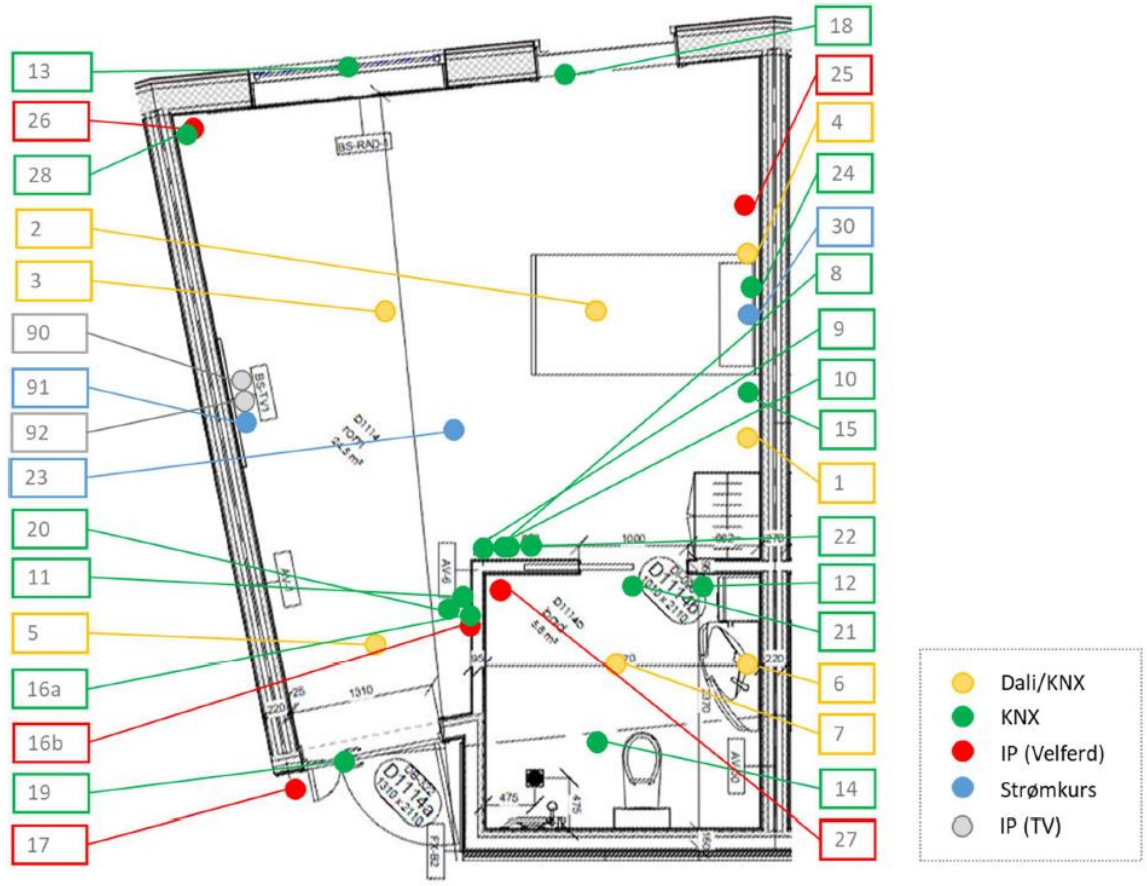


Figure: Summary of all points in living rooms associated with welfare technology

#	Function	Location	Type	Power	Emergency Power	Responsible
1	Wall lamp	On wall between bed and bathroom. Dimmable	Dali/KNX	Mains	To be clarified, minutes are kept	Electric company
2	Ceiling lamp bed	Over bed. Dimmable	Dali/KNX	Mains	To be clarified, minutes are kept	Electric company
3	Ceiling lamp room	In bathroom	Dali/KNX	Mains	To be clarified, minutes are kept	Electric company
4	Bed lamp	In cable duct. Dimmable	Dali/KNX	Mains	To be clarified, minutes are kept	Electric company
5	Ceiling lamp hallway	Front door. Dimmable	Dali/KNX	Mains	To be clarified, minutes are kept	Electric company
6	Ceiling lamp bathroom	In roof. Dimmable	Dali/KNX	Mains	To be clarified, minutes are kept	Electric company
7	Light fixture bathroom	Over sink in bathroom	Dali/KNX	Mains	To be clarified, minutes are kept	Electric company
8	Light switch - Day	On the wall. Follows the standard height of the building switches, for example +1000 mm	Impulse to KNX-actuator	KNX	All KNX lines on UPS and reserve power unit	Electric company

#	Function	Location	Type	Power	Emergency Power	Responsible
9	Light switch - Evening	On the wall. Follows the standard height of the building switches, for example +1000 mm	Impulse to KNX-actuator	KNX	All KNX lines on UPS and reserve power unit	Electric company
10	Light switch - Night	On the wall. Follows the standard height of the building switches, for example +1000 mm	Impulse to KNX-actuator	KNX	All KNX lines on UPS and reserve power unit	Electric company
11	Light switch – All off / All on	On the wall. Follows the standard height of the building switches, for example +1000 mm	Impulse to KNX-actuator	KNX	All KNX lines on UPS and reserve power unit	Electric company
12	Light switch – On/Off bathroom	On the wall. Follows the standard height of the building switches, for example +1000 mm	Impulse to KNX-actuator	KNX	All KNX lines on UPS and reserve power unit	Electric company
13	Blind control	KNX- relay for blind control	KNX	KNX	All KNX lines on UPS and reserve power unit	Electric company
14	Cord pull bathroom	In ceiling	KNX	KNX	All KNX lines on UPS and reserve power unit	Electric company
15	Cord pull bed	In ceiling	KNX	KNX	All KNX lines on UPS and reserve power unit	Electric company
16a	KNX- room panel	Hight +1500 mm. Alternative to room panel in building without integration with lighting/heating	KNX	KNX	All KNX lines on UPS and reserve power unit	Electric company
16b	Room panel	Over ceiling and down to 1410 mm	Welfare-Lan	PoE	Switch router etc. on UPS and reserve power unit	Electric company
17	Info panel	Over ceiling and down to 1410 mm	Welfare-Lan	PoE	Switch router etc. on UPS and reserve power unit	Electric company
18	Door sensor balcony	Over ceiling and down to door frame	Signal to KNX actuator	KNX	All KNX lines on UPS and reserve power unit	Company responsible for locks and fittings
19	Door sensor entrance	Over ceiling and down to door frame	Signal to KNX actuator	KNX	All KNX lines on UPS and reserve power unit	Company responsible for locks and fittings
20	PIR roof	In ceiling	KNX	KNX	All KNX lines on UPS and reserve power unit	Electric company
21	PIR bathroom	Over door	KNX	KNX	All KNX lines on UPS and reserve power unit	Electric company
22	PIR bed	Close to floor. Cover area between the bed and the bathroom	KNX	KNX	All KNX lines on UPS and reserve power unit	Electric company
23	Socket for cairn	Over ceiling and by system ceiling, otherwise in ceiling	Mains	Mains	Cairn has built-in battery with UPS lasting for up to 6 hours.	Electric Company
24	I/O Input	In cable duct above bed (data contact with RJ45 plug), for example to epilepsy alarm / bed mat	Signal to KNX actuator	KNX	All KNX lines on UPS and reserve power unit	Electric company

#	Function	Location	Type	Power	Emergency Power	Responsible
25	Double IP-point sensor/camera	In cable duct over bed	Welfare LAN	Outlet / PoE	To be clarified, minutes are kept. Depends on desired function for camera / sensor	Electric company
26	Double IP-point sensor / camera	Over ceiling	Welfare LAN	Outlet / PoE	To be clarified, minutes are kept. Depends on desired function for camera / sensor	Electric company
27	Double IP-point sensor / camera	Over ceiling	Welfare LAN	Outlet / PoE	To be clarified, minutes are kept. Depends on desired function for camera / sensor	Electric company
28	PIR roof	In ceiling	KNX	KNX	All KNX lines on UPS and reserve power unit	Electric company
30	6 sockets	In cable duct	Socket|	Mains	UPS and reserve power unit	Electric company
90	IP – point for TV	Over ceiling and down 180 cm. Recommended double IP-point	TV - Lan	I.A	To be clarified	Electric company
91	Outlet for TV	Socket for tv connected through KNX actuator. Recommended 4 outlets	Socket	Mains	To be clarified	Electric company
92	IR point for IR emitter	From ceiling and down to 180 cm from floor	TV - Lan	PoE	No	Electric company

4 Infrastructure in common area

The section contains an overview of possible points and equipment that can be included in the common area, including overview of the need for power supply, UPS / emergency power supply, and responsible party in the contract. It must be clarified in connection with the individual construction project, which types of functions are relevant for common area and for use at the institution. Supplier of welfare technology can assist in such clarifications after needs in connection with the design of buildings and infrastructure.

4.1 KNX cord pull and shut-off switch on HC WC and other common areas

Location: On HC WC or other types of common areas where there is a need for access to the cord pull for users. Recommended height to the center of the switch is +1500 mm from the floor. Cord cover is ceiling mounted. On bath / HC WC recommended the cord cover located as standard on the right side, easily accessible to the user's right hand for the person sitting on the toilet. If showering in the room, the cord cover should always be between the toilet and shower, easily accessible to the user who is on the toilet.

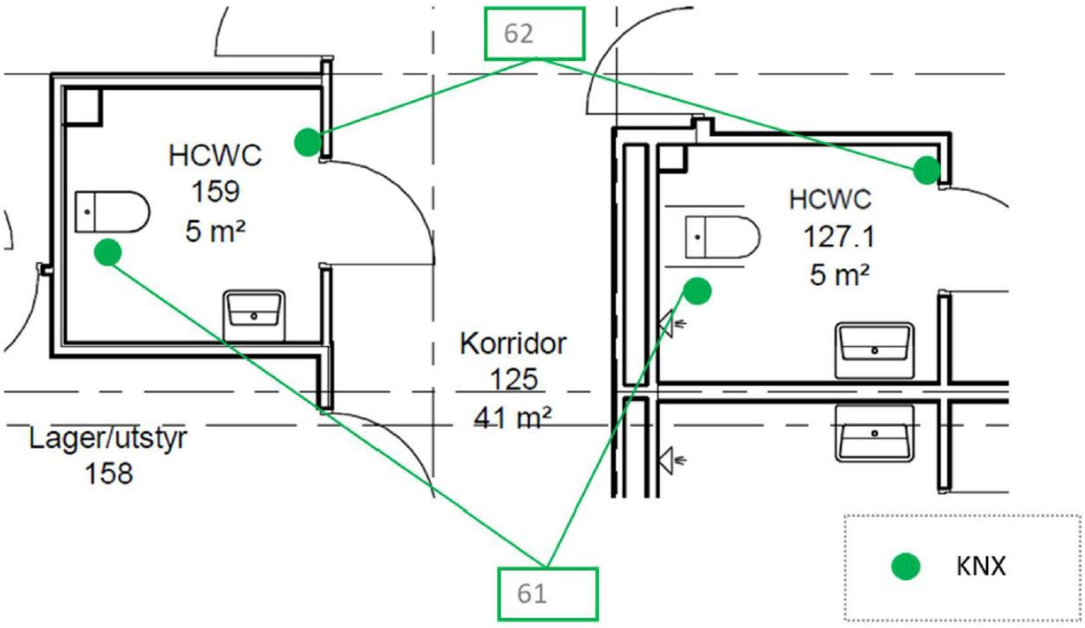


Figure: example sketch illustrating possible placement of cord pull and shut-off switch (KNX room panel) in common area

#	Function	Location	Type	Power	Emergency Power	Responsible
61	Cord pull	In ceiling	KNX	KNX	All KNX lines on UPS and reserve power unit	Electric company
62	KNX room panel	Hight +1500 mm.	Welfare LAN	Outlet / PoE	All KNX lines on UPS and reserve power unit	Electric company

4.1.1 Point 61 KNX cord pull

- Single electric multi-box in the ceiling
- If mounted in system ceiling, there is a requirement for reinforcement with plate, type of plywood or equivalent. The plate should be the same size as the ceiling plate and approx. 10 mm thick
- KNX cable pulled to electric multi-box. Length: 20 cm from the electric multi-box
- Type of KNX cord pull with binary input is determined and ordered by supplier of welfare technology to ensure that professional requirements are met
- Supplier of welfare technology sends instructions for KNX programming

Instructions for mounting the cord pull

- Fracture breakage for the cord is set to 170 ca at and 180 cm in the bathroom / HC WC
- The cord should reach all the way down to 10-30 cm from the floor
- Detailed location must be stated in the floor plan. In general placement is set in the ceiling 10-15 cm from the wall (here, passenger lifts may be due to some variation). In the bathroom / HC WC the cord pull is recommended to be placed as standard on the right side, easily accessible to the user's right hand for the person sitting on the toilet. If there is a shower in the room, the cord pull should always be between the toilet and the shower, easily accessible to the user who is on the toilet

4.1.2 Point 62: KNX room panel

- Single electric multi-box in the ceiling
- KNX cable pulled to electric multi-box. Length: 20 cm from the electric multi-box
- Type of KNX cord pull with binary input is determined and ordered by supplier of welfare technology to ensure that professional requirements are met
- Supplier of welfare technology sends instructions for KNX programming

4.2 Power access to wireless RF repeater (when using xComfort wireless sensors in living rooms)

Location: Placed at regular intervals in the centre of the corridor, preferably above the ceiling by the cable bridge if possible, alternatively it can also be mounted on a wall. Used to amplify wireless signal (from wireless PIR) between the living room and the gateway located in the technical room (approx. 10 meters between). NOTE! Do not use the same wireless networks such as the positioning system (separate system).

See sample sketch for location. ICT subdivision room (where gateway is located) is highlighted in yellow.

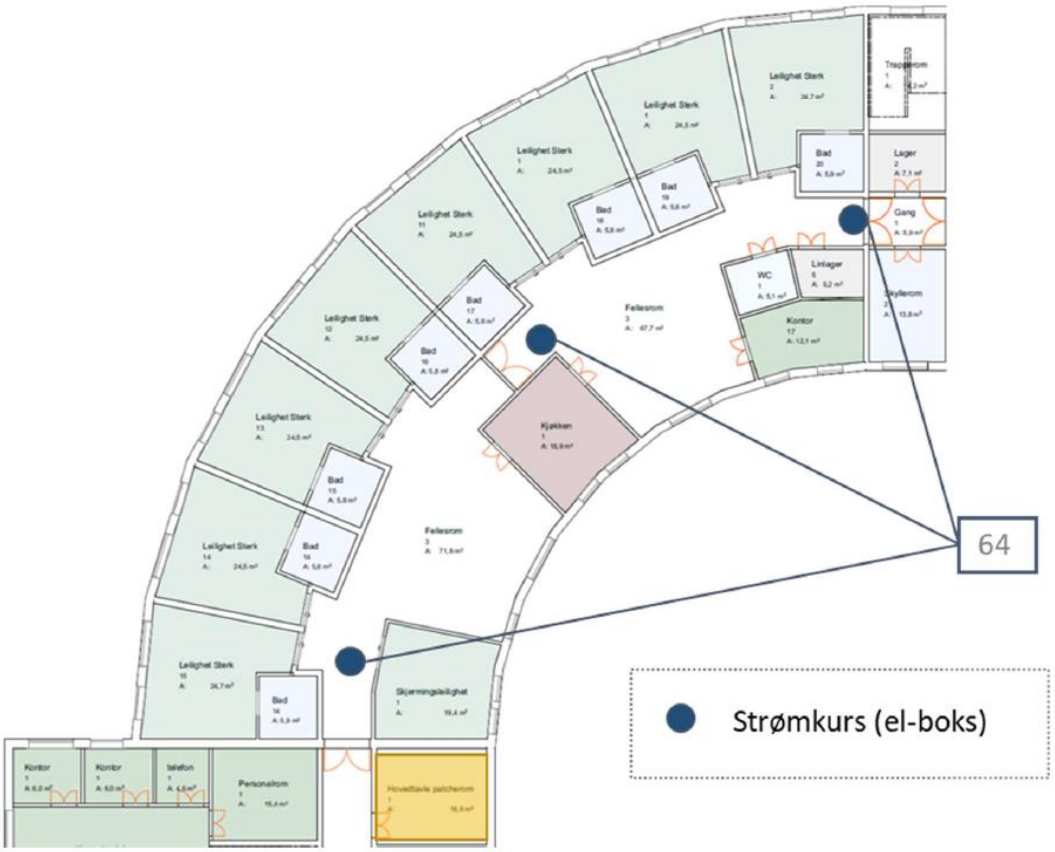


Figure: Example sketch illustrating the location of repeaters for xComfort networks. Room for ICT subdivision where the gateway is located is highlighted in yellow

#	Function	Location	Type	Power	Emergency Power	Responsible
64	Power course	Over ceiling	Power course	Mains	UPS and reserve power unit	Electric Company

4.2.1 Point 64: Power course (electrical box) to RF-repeater

- ABB AP 10 box (or similar)
- Needs mains on UPS and reserve power
- Mounted over ceiling
- Supplier of welfare technology retrofits the RF-repeater

4.3 Infrastructure for alarm board

Location: Typically, 1-2 alarm boards are placed per department in a guard room or other common area easily accessible to staff. In an emergency where the mobile phones do not work, all employees must have easy access to an alarm board without having to move too far. The alarm board can either stand placed on an office desk (like an ordinary PC monitor) or mounted on a wall. Optimal placement in the room will depend on the intended decor and

use of the room. Standard height of wall is +1500 mm from floor to the center of the board. See example sketch below.

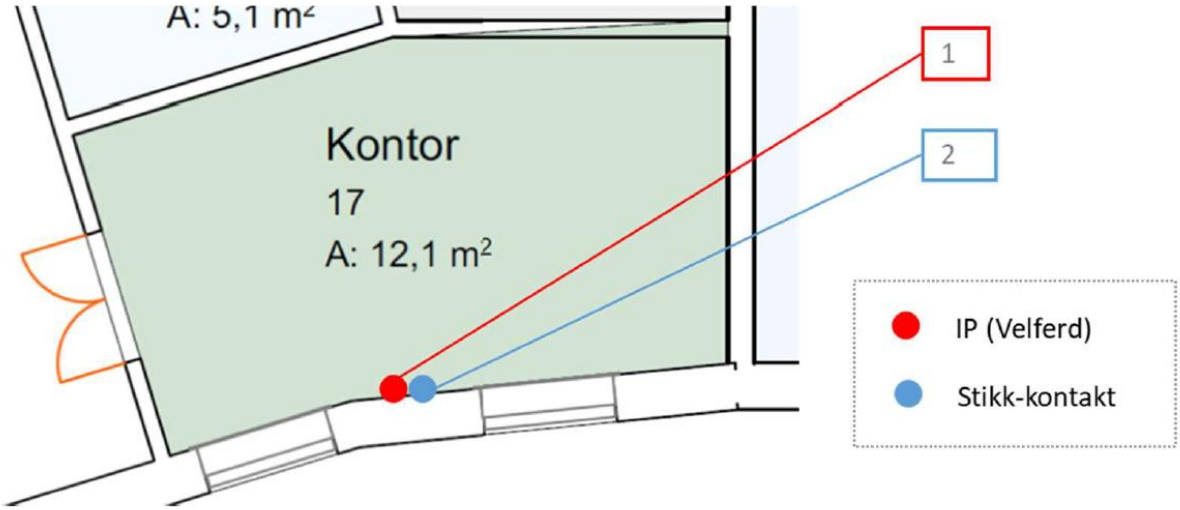


Figure: example sketch placement of alarm board

#	Function	Location	Type	Power	Emergency Power	Responsible
1	Double IP-point	Over ceiling/on wall	Welfare-LAN	PoE	Switch, router etc. on UPS and reserve power unit	Electric company
2	Power outlet	Over ceiling/on wall	Socket	Mains	UPS and reserve power unit	Electric company

4.3.1 Point 1 and 2: Alarm board on wall, room with ceiling

- Dual socket with UPS and emergency power supply near junction box above ceiling
- Dual IP network point located above the ceiling at the intended location of the alarm panel
- A minimum of 50 mm k-pipe from the ceiling is laid in the wall down to the intended location of the alarm board (must be able to pull 1piece device cable and 1 HDMI cable). Point is placed 13 cm below and 18 cm right of center off the alarm board (see sketch). I.e., for alarm board with center 150 cm from the floor, this point is 137 cm from floor + 18 cm to the right of the desired horizontal center position for the board (subject to screen type) - Alternatively, the supplier of welfare technology installs a guide channel down from the ceiling to the alarm board on the outside of the wall if it is clearly specified that the board can be mounted with an open installation in a building
- The supplier of welfare technology retrofits the alarm board on the wall and the Gateway to the board on the wall above ceiling

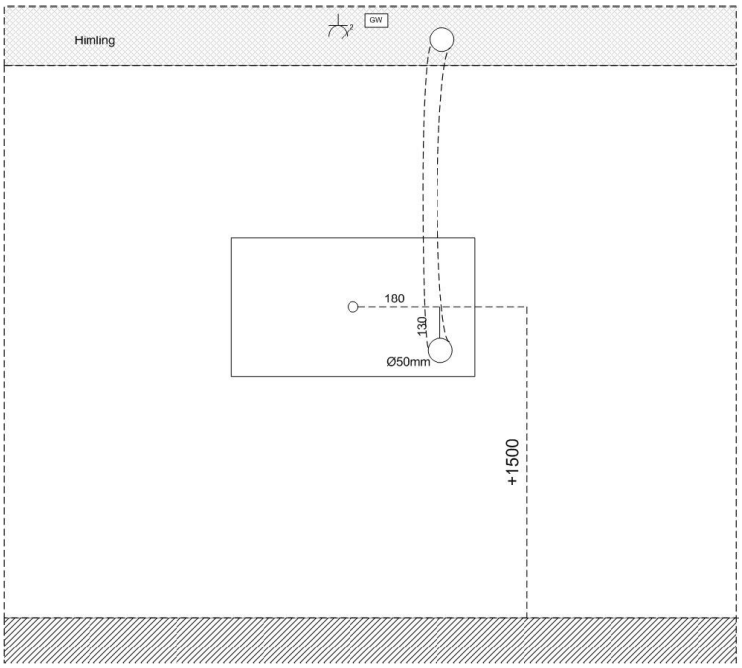


Figure: Installation is carried out by the supplier of welfare technology. Alarm board in rooms with ceiling and hidden installation. NOTE! The exact placement of the pipe down to the board is based on a screen of type: BenQ LED 24 "RL2455HM to ensure space for cables between screen and wall

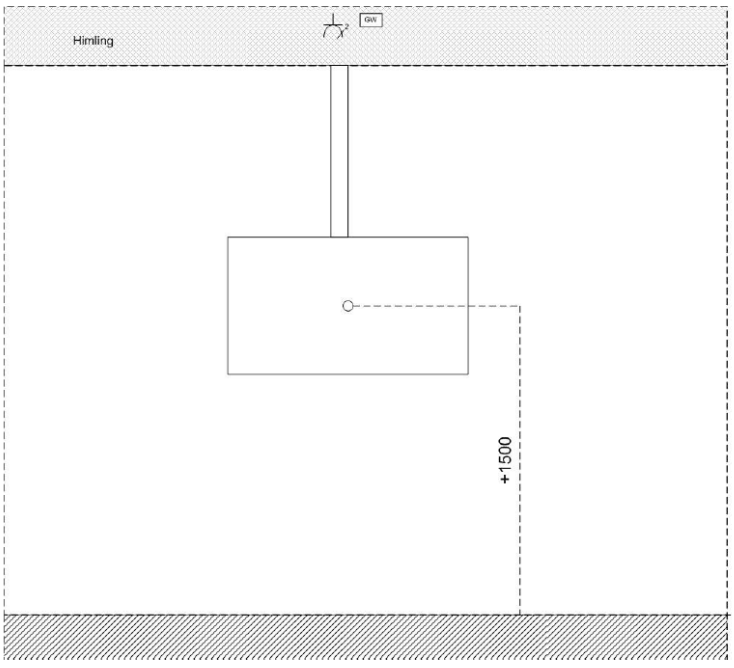


Figure: Installation is carried out by the supplier of welfare technology. Alarm board in rooms with ceiling and open installation.

4.3.2 Point 1 and 2: Alarm board on wall, room without system ceiling

- Dual socket with UPS and emergency power supply
- placed on a wall at standard height for sockets just below the intended location of the alarm board, alternatively in the cable duct under the alarm board if any available
- Dual IP network point next to wall socket
- A minimum of 50 mm pipe from the ceiling is laid in the wall from the IP point and up to the intended location of the alarm board (it must be able to pull 1 device cable and 1 HDMI cable) - Point on the wall is placed 13 cm below and 18 cm to the right of the center of the alarm panel (see sketch). I.e., for alarm board with center 150 cm from the floor this point will be 137 cm from the floor + 18 cm to the right of the desired horizontal center position to the board (subject to screen type for exact location) - Alternatively, the supplier of welfare technology installs one
- cable duct up to the alarm panel on the outside of the wall if it is clearly specified that the panel can be mounted with open placement in buildings
- Supplier of welfare technology retrofits the alarm board on the wall and the gateway to the panel on the wall by the socket under the alarm board

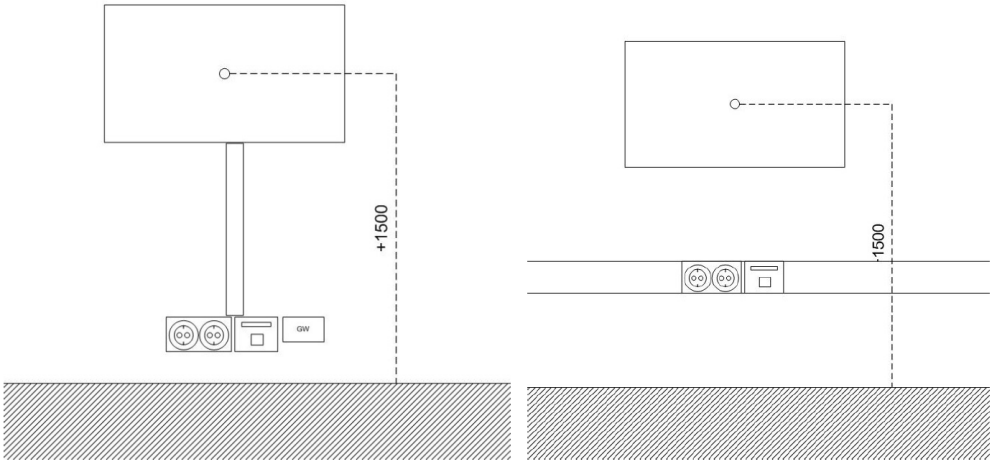


Figure: Installation carried out by supplier of welfare technology, alarm board in room without system ceiling

4.4 Positioning, door control and hiking

See separate piece Infrastructure needs positioning, door control and hiking

4.5 Wireless zone – Wi-Fi

Good Wi-Fi - wireless coverage should be ensured early in the design phase of the construction project. The infrastructure for wireless internet should be coordinated with other infrastructure.

Good internet access must be ensured for both employees, users and relatives / visitors.

Final mapping of coverage conditions and location can only be ensured when the building is up, location of the access points will mainly be in common areas.

Where there is a T-profile ceiling, the network points are placed on cable-stayed bridges, where there is a fixed ceiling the network points are placed just below the ceiling. Standard marking of points shall follow the municipality's standard and be visible under the ceiling.

A dual network point per wireless access point must be installed.

The wireless access points are powered via POE, from switches and network components provided by the IT department.

4.6 Light control in common area

Lights in common areas and corridors, users and employees may need different lighting scenarios during a day depending on activity, environment and light. There should be different light zones in the common area for the dining area and living room.

Light in corridors adjacent to living rooms should be able to be controlled with light scenarios, especially dim lighting at night should be considered both out of consideration for the staff on and to prevent too much light into the living room during possible inspections.

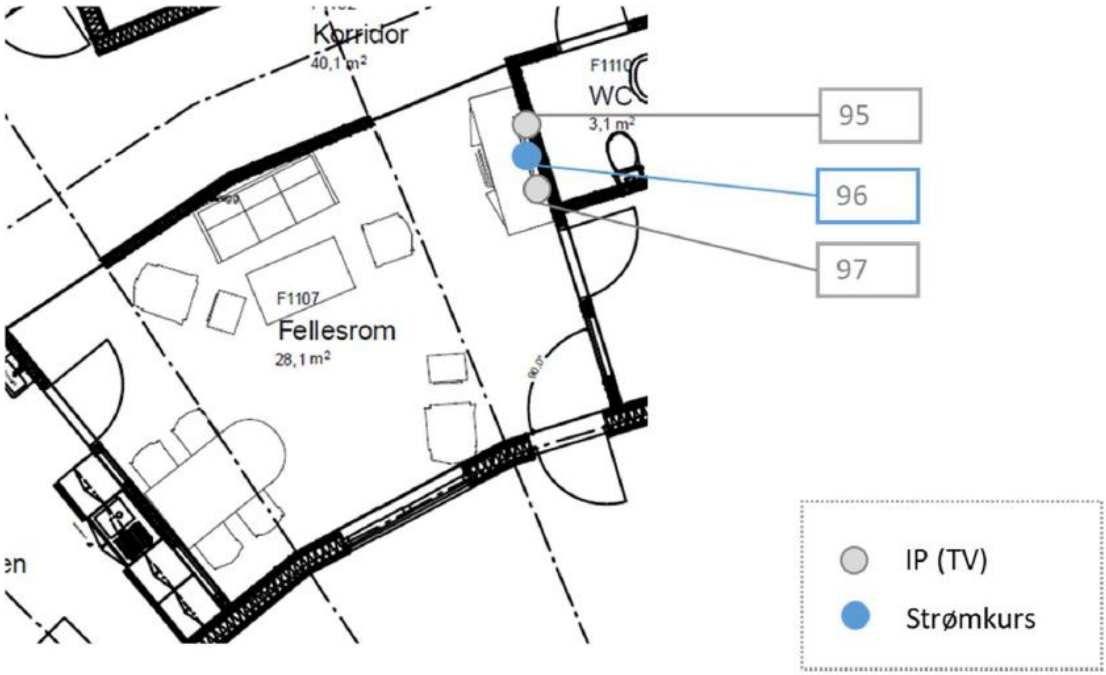
The location of switches and panels should be assessed based on the user group at the institution and the desired availability for both users and employees. Control of lights in corridors should be ensured from guard rooms or other locked zones.

See chapter 3.1 - Light control in living rooms for technical details

4.7 Other recommended infrastructure in common areas

See figure and table below for an overview of points and equipment that can be included in rooms in the common area connected to other recommended infrastructure prepared in common areas.

Figure: Example sketch points in common area connected to other recommended infrastructure



95	IP – point for TV	Over ceiling and down 180 cm.	TV - Lan	I.A	To be clarified	Electric company
96	Outlet for TV	Socket for tv connected through KNX actuator.	Socket	Mains	To be clarified	Electric company
97	IR point for IR emitter	From ceiling and down to 180 cm from floor	TV - Lan	PoE	No	Electric company

See specification below for more detailed requirements for infrastructure and installation.

4.7.1 Point 95: IP TV

- Any TV provider must define requirements for this point

4.7.2 Point 96: Point for TV-Control

- Any TV provider must define requirements for this point

4.8 Summary needs for infrastructure common areas

See figure and table below for an overview of all points and equipment that can be included in the common area of intuition connected welfare technology. This summary includes points related to positioning, door control and hiking in common area.

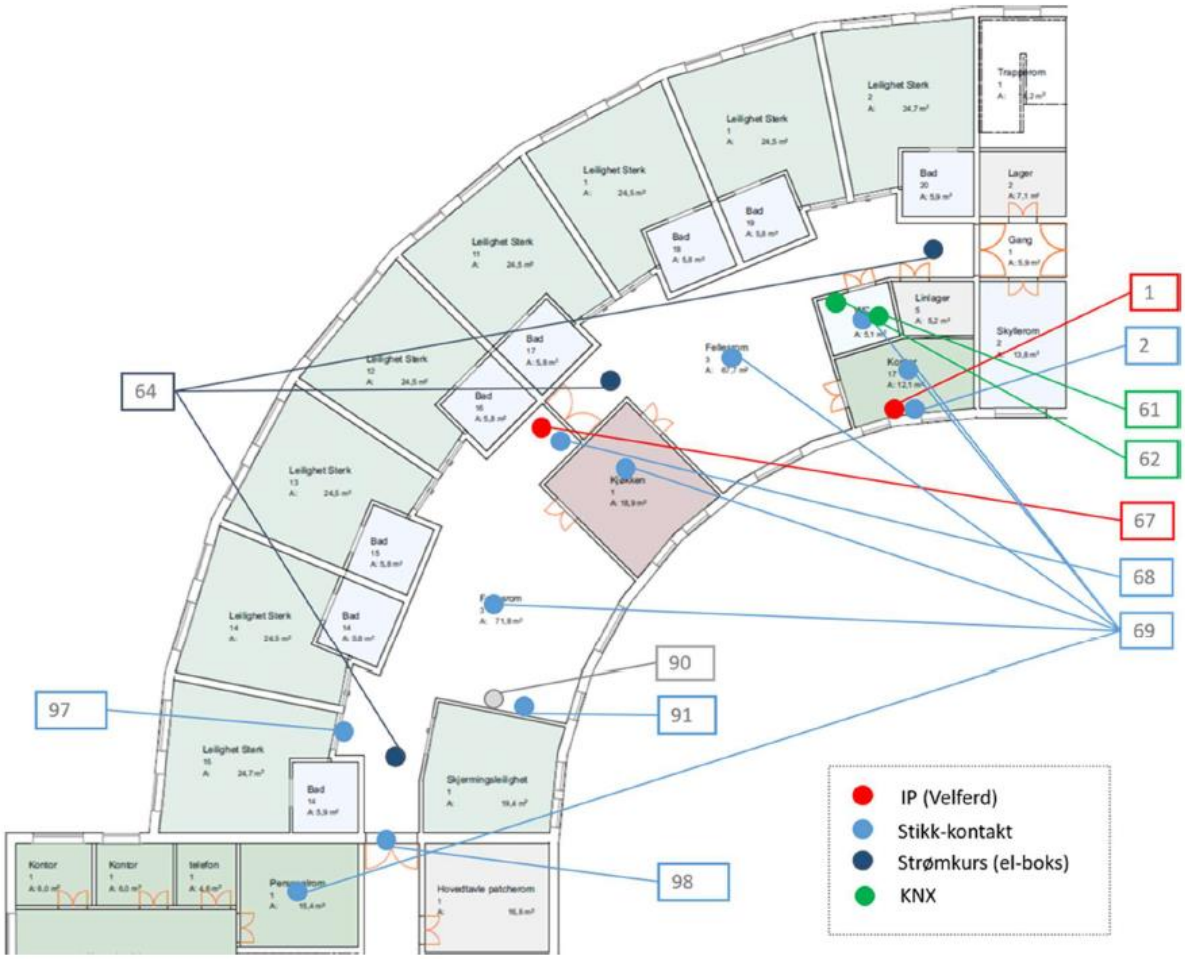


Figure: Summary of all points in common area associated with welfare technology

#	Function	Location	Type	Power	Emergency Power	Responsible
1	Double IP-point	Over ceiling/on wall	Welfare-LAN	PoE	Switch, router etc. on UPS and reserve power unit	Electric company
2	Power outlet	Over ceiling/on wall	Socket	Mains	UPS and reserve power unit	Electric company
61	Cord pull	In ceiling	KNX	KNX	All KNX lines on UPS and reserve power unit	Electric company
62	KNX room panel	Hight +1500 mm.	Welfare LAN	Outlet / PoE	All KNX lines on UPS and reserve power unit	Electric company
64	Power course	Over ceiling	Power course	Mains	UPS and reserve power unit	Electric Company
67	Double IP-point for Gateway	Over ceiling/on wall	Welfare-LAN	PoE	Switch, router etc. on UPS and reserve power unit	Electric company
68	Socket for Gateway	Right beside IP-point for gateway	Mains	Mains	UPS and reserve power unit	Electric Company
69	Socket for cairn	Over ceiling and by system ceiling, otherwise in ceiling	Mains	Mains	Cairn has built-in battery with UPS lasting for up to 6 hours.	Electric Company
90	IP – point for TV	Over ceiling and down 180 cm. Recommended double IP-point	TV - Lan	I.A	To be clarified	Electric company
91	Outlet for TV	Socket for tv connected through KNX actuator. Recommended 4 outlets	Socket	Mains	To be clarified	Electric company
97	Socket for cairn	Above front door on the corridor side	Mains	Mains	Cairn has built-in battery with UPS lasting for up to 6 hours.	Electric Company
98	Socket for cairn	Above front door. Stick to the side with door control (may be both sides)	Mains	Mains	Cairn has built-in battery with UPS lasting for up to 6 hours.	Electric Company

5 Infrastructure needs positioning, door control and hiking

Sensio Localization is a wireless system for mobile security and indoor location with the possibility of zoning, electronic fence, and door control. Area of use as violence alarm or employee alarm, mobile security alarm for users and logistics of tracking equipment.

With Sensio Localization, you can divide premises and rooms into zones where users can move freely, and you can notify if user goes outside the approved zone or electronic fence. Here you can both warn and secure doors with door control. Doors at the sheltered unit can, for example, be unlocked for relatives and employees, but residents with decisions come to locked door. In open housing groups with an open door, employees can be notified when users with a decision go outside the agreed zone. The system consists of Sensio Unity Server, Bluetooth gateway, Bluetooth cairns, and various types of jewelry with an alarm button that van be carried by users and employees.

5.1 Basic infrastructure positioning

For infrastructure in living rooms, see section Positioning under Infrastructure in living rooms. The base of the positioning system consists of gateway and cairns. Cairns can be operated on both mains power and battery. In this section it is based on the use of powered cairns since battery-powered do not need any directly infrastructure in the form of mains voltage. Cairns that are operated on mains power do not need maintenance in the form of battery replacement.

Location of gateway

- At least 1 gateway per floor and at least two gateways per location
- Placed in a technical room but can be placed outside in a living environment, preferably above the ceiling

Location of cairns

- 1 cairn in the center of all rooms that can be uniquely identified in the positioning system
- Maximum 20 meters between each cairn
- In larger or oblong rooms that are over 20 meters long, at least two cairns are needed
- At least 2 cairns must be placed so that it has a wireless connection with the Gateway (which is usually located on technical room) without the signal having to pass through automatically closed fire doors. These normally block out a lot of radio signals
- If indoor positioning is to be used to control the door environment, it must also be possible to place cairns in the middle of the entrance to the door that can be locked / unlocked based on position (see orange dots in the figure to bottom left) - these must be of the power type (not battery). See detailed info under section Infrastructure needs for integration with door control

See example sketch below.

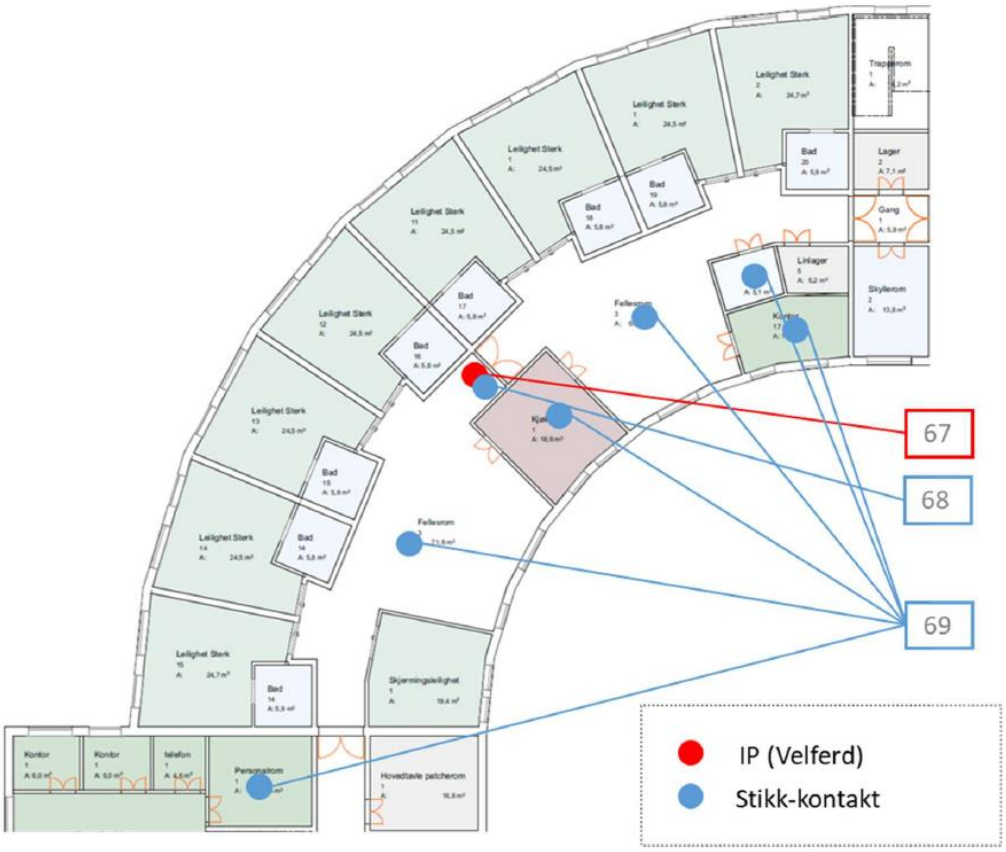


Figure: Sample sketch. The figure illustrates the location of the gateway, wireless cairns and the need for power points

#	Function	Location	Type	Power	Emergency Power	Responsible
67	Double IP-point for Gateway	Over ceiling/on wall	Welfare-LAN	PoE	Switch, router etc. on UPS and reserve power unit	Electric company
68	Socket for Gateway	Right beside IP-point for gateway	Mains	Mains	UPS and reserve power unit	Electric Company
69	Socket for cairn	Over ceiling and by system ceiling, otherwise in ceiling	Mains	Mains	Cairn has built-in battery with UPS lasting for up to 6 hours.	Electric Company

See specification below for more detailed requirements for infrastructure and installation.

5.1.1 Point 67 and 68: Positioning gateway

- Double socket near the intended location of the gateway. Can be placed in a technical room or up in the ceiling out in the corridor. Connected to UPS and reserve power supply.
- Dual IP network point in junction box located above the ceiling at the intended location of the gateway

- Network cable RJ / 45-RJ / 45 connects to IP network point over ceiling. Factory-terminated patch cables must be used.
- Electrical contractor must supply all patch cables. Color / length according to requirements from the IT department.
- The supplier of Welfare technology retrofits gateways and 5V power adapters

5.1.2 Point 69: Positioning cairn

- Double socket over the ceiling near the intended location of the cairn (alternatively under the roof where there is no system ceiling). Socket must be placed so that the builder will approve to pull a power cable to the intended location of cairn, ref. figure to the left above.
- Battery-powered cairns now have no infrastructure needs except that they must have radio contact with the gateway, either direct contact or via the network from other cairns.
- The cairns (size H: 17.5 cm, W: 11 cm, D: 5 cm) are retrofitted under the ceiling, screwed straight into the roof plate, and communicates wirelessly

5.2 Infrastructure needs sensory gardens and outdoor areas

Only battery-powered cairns can be used outdoors due to IP classification. Cairns must have contact with positioning network via either cairns that sit indoors or directly with the gateway. With clear view and without anything which interferes with the signal, there is a need for a smaller number of cairns outdoors compared to indoors.

5.3 Infrastructure needs when hiking

There is no need for additional infrastructure when using the hiking alarm function as it uses the same infrastructure as Sensio localization. If you need a walking alarm in the area without infrastructure for location, this must be installed. Infrastructure needs for cairns are power plugs and mains voltage.

5.4 Infrastructure needs in integration with door control

Sensio Door Control is based on the use of the same wireless Bluetooth-based infrastructure as the positioning solution for users and employees. Door control must therefore be installed together with positioning, or otherwise a network of cairns must be installed for door control cairns to be able to contact the gateway and each other. See section Infrastructure for positioning in common areas for more information. The system locks or unlocks doors for users or employees with positioning jewellery. The door control is administered, in line with Sensio Position-based walking alarm, in the Welfare Portal by the municipality's own super users in accordance with the current decision / consent of the user.

Integration for the door control is based on a direct, wired relay interface to the access control systems. The system is not designed for wireless locking systems or IP integrations,

as this will slow down the response time in the system. The steering takes place via a potential-free relay in the cairn which is located by the door. The rest of the interface consists of a cable with marked conductors out of the cairn as shown in the example to the right, where also an LED is lit with voltage taken from the cairns power supply.

The cairn can be connected to control either normally open, or normally closed circuits, and thus supports both electric door magnets and end pieces, or door nodes that are often located above the door.

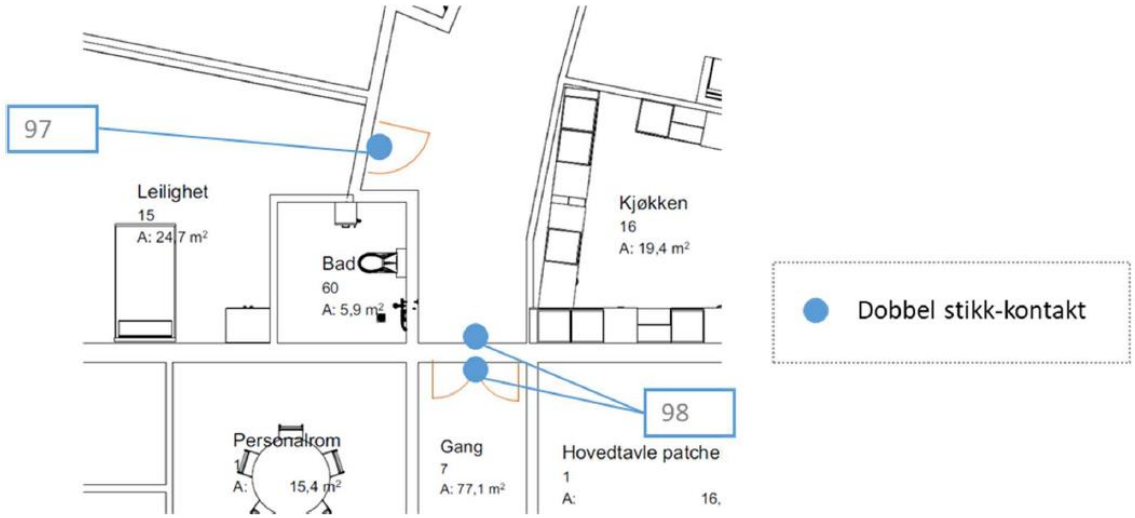


Figure: Sketch of points on doors that are to have door control

#	Function	Location	Type	Power	Emergency Power	Responsible
97	Socket for cairn	Above front door on the corridor side	Mains	Mains	Cairn has built-in battery with UPS lasting for up to 6 hours.	Electric Company
98	Socket for cairn	Above front door. Stick to the side with door control (may be both sides)	Mains	Mains	Cairn has built-in battery with UPS lasting for up to 6 hours.	Electric Company

See specification below for more detailed requirements for infrastructure and installation.

5.4.1 Point 97 and 98: Door positioning cairns

- Double socket near the intended location of the cairn. Socket must be placed so that the builder will approve to run a power cable to the intended location of the cairn.
- Doors that can be locked / unlocked based on access to the user, the socket must be placed above entrance door on the corridor side (ie the side of the door that the user moves towards when the door may need to be locked)
- From the cairn, there is a 2.5 meter cable that will meet the relay in the door's junction box

- The cairns (size H: 17.5 cm, W: 11 cm, D: 5 cm) are retrofitted under the ceiling, screwed straight into the roof plate, and communicates wirelessly.
- On ward doors with door control from both sides, there is a need for a cairn on each side, and thus socket on both sides as well

6 Infrastructure needs shielded apartment

See figure and table below for an overview of all points and equipment that can be included on type of shielding apartment associated with Welfare Technology features.

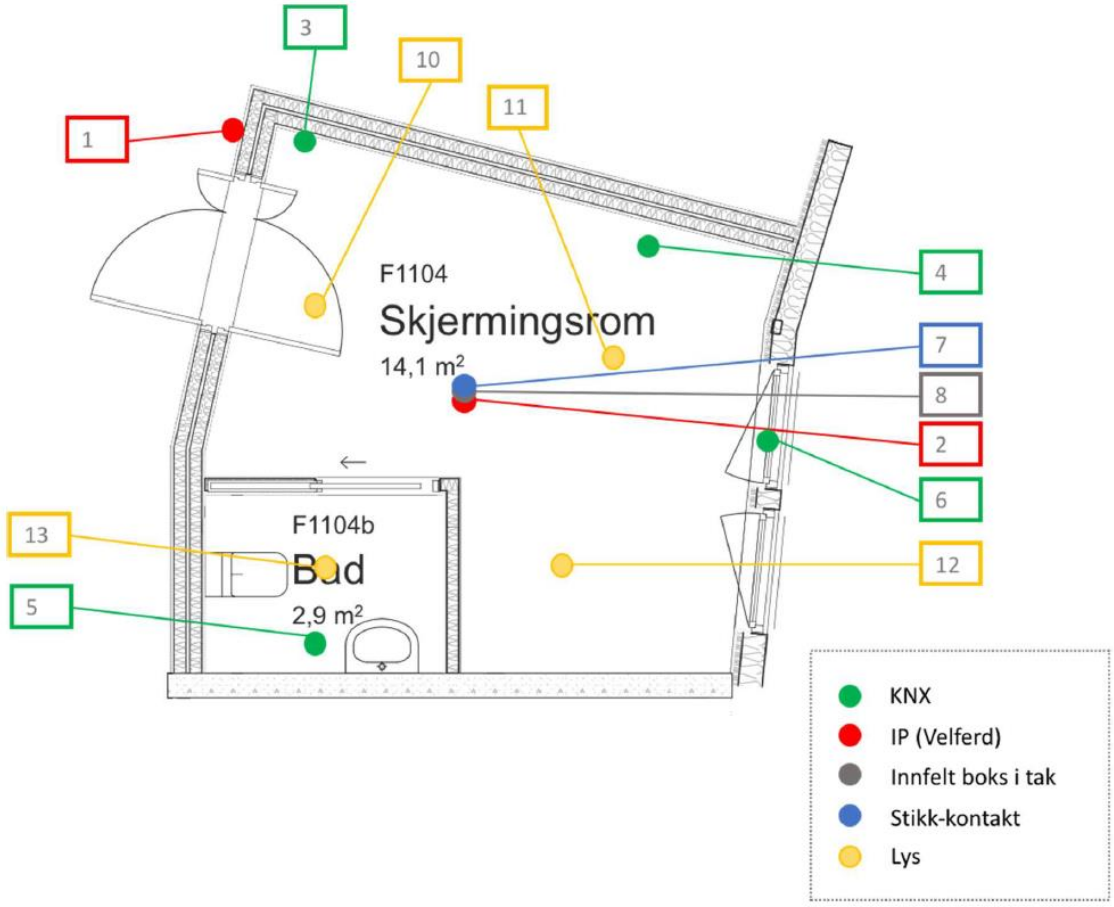


Figure: Sample sketch shielded apartment.

#	Function	Location	Height	Type	Power	Emergency Power
1	Double IP-point for info panel	Over ceiling and down to 141 cm	Height from floor to centre of junction box 141 cm	Welfare-LAN	PoE	Switch, router etc. on UPS and reserve power unit
2	Double IP-point for camera	Over ceiling. Point for IP mounted in recessed junction box		Welfare-LAN	PoE	Switch, router etc. on UPS and reserve power unit
3	Light switch (All off/All on)	On wall beneath panel	+ 100 cm from floor (Norwegian standard height)	Impulse to KNX	KNX	All KNX lines on UPS and reserve power unit
4	Cord Pull	In ceiling		KNX	KNX	All KNX lines on UPS and reserve power unit
5	Cord Pull	In ceiling		KNX	KNX	All KNX lines on UPS and reserve power unit
6	Blind control	KNX relay for blinds		KNX	KNX	All KNX lines on UPS and reserve power unit
7	Socket	Double outlet mounted in recessed box in ceiling		KNX	KNX	UPS and reserve power unit
8	Recessed box	Recessed box in ceiling		N/A	N/A	N/A
10	Ceiling lamp hallway	Between bathroom and entrance. In ceiling, dimmable		Dali/KNX	Mains	Electric company
11	Ceiling lamp room	In ceiling, dimmable		Dali/KNX	Mains	Electric company
12	Socket for cairn	In ceiling, dimmable		Dali/KNX	Mains	Electric company
13	Ceiling lamp bathroom	In bathroom, in ceiling, dimmable		Dali/KNX	Mains	Electric company

The supplier of welfare technology will retrofit IP-based equipment. KNX-based equipment is assembled off supplier of the complete KNX system. See separate chapter for requirements for the KNX system.

See specification below for more detailed requirements for infrastructure and installation.

6.1.1 Point 1: Camera

- IP network point in junction box located in recessed box in ceiling
- Network cable RJ / 45-RJ / 45 is connected to the IP network point and placed loosely in the recessed box. It must be used factory-terminated patch cables. Electrical contractor must supply all patch cables. Color / length according to requirements from the IT department
- The supplier of welfare technology retrofits the camera. This must be done in consultation with the building managers to clarify how the camera can best be "recessed" whether it is fixed or system ceiling projected

The project must clarify whether camera inspection is to take place via a fixed screen in a guard room or hand-held unit. See requirements for fixed screen chapter 4.3 Infrastructure for alarm panel.

6.1.2 Point 2: Info panel

- IP network point located above the ceiling at the intended placement of the panel
- Double deep electrical box recessed in the wall. Height from floor to center of electrical box: 141 cm (then becomes center of the panel 144 cm)
- Traction pipe for network cable RJ / 45-RJ / 45 is laid in the wall down to the electrical box on the wall behind the panel. Traction pipes must be of sufficient dimension, minimum 20 mm.
- Network cable RJ / 45-RJ / 45 is connected to the IP network point above the ceiling and laid in a draw pipe down to the panel. Length: 15 cm from the electrical box on the wall. Factory-terminated patch cables must be used. Electrical contractor must supply all patch cables. Color / length according to requirements from the IT department.
- Panel uses power supply via PoE switch. Switch must be connected to UPS and reserve power unit
- The panel is retrofitted by the supplier of welfare technology

6.1.3 Point 3: Light switch all off / all on

- It must be designed for pulse switches or similar for light control that sends a signal over KNX. In the bathroom it must not be used light switches that break the circuit and make it impossible for supplier welfare technology to override the light. Breaking actuators must be correctly dimensioned in relation to the circuit it can break (e.g. 16A vs. 6A)
- Light switches are mounted in the building's standard height for switches, for example +100 cm from the floor
- The supplier of welfare technology shall be given control over all logic on light switches in the living room to ensure good and comprehensive solutions that are not perceived as confusing for the employee / user. Only exception is light switch at the entrance which is handled especially with built-in logic to turn all light on and off in the living room (also applies to this switch outside the shielding apartment)

6.1.4 Point 4-5: KNX cord pull

- Simple electric multi-box in the ceiling
- If mounting in a system ceiling, there is a requirement for reinforcement with plate, type of plywood or equivalent. The plate must be of the same size as the ceiling plate, and approx. 10 mm thick
- KNX cable pulled to electric multi-box. Length: 20 cm from the electric multi-box
- Type of KNX cord pull with binary input is determined and ordered by the supplier of welfare technology to ensure that professional requirements are met
- The supplier of welfare technology submits its own instructions for KNX programming

Instructions for mounting the cord cover

- Break protection for the cord is set to 170 cm at the bedside and 180 cm at the bathroom / HCWC
- The cord should reach all the way down to 10-30 cm from the floor

6.1.5 Point 6: Blind control

- Blinds in living rooms must be equipped with a relay for remote control via KNX
- The KNX system must be programmed in accordance with the requirements and instructions from the supplier of welfare technology

6.1.6 Point 7: Socket

- Double power outlet mounted in recessed in ceiling
- The power course must be connected to the UPS and reserve power supply

6.1.7 Point 8: Recessed box in ceiling

- Recessed box in the ceiling with a discreet design and hatch in a material that does not block wireless signals
- Recessed box must be dimensioned so that there is at least room for a double socket, a data socket, and a positioning cairn of size H: 17.5 cm, W: 11 cm, D: 5 cm.

7 Infrastructure needs, integration with door telephony

Sensio has additional functionality for door telephony, on the same device that runs Mobile guard room on Android phone, possibility of two-way speech, transfer of image / video from intercom camera and possibility to remotely open the door from the telephone.

Sensio supports integration with 2N's Helios Verso solution provided by Vcom and is one of the world's leading manufacturers of IP-based intercoms. Sensio also has the ability to integrate with other IP-based systems when needed, but then specifications are required to estimate development time. It's on requirements that the facility is integration-friendly and that integration can take place via open standards, and that necessary API, documentation and support are made available to Sensio by the supplier.

When using 2-way voice, there are requirements for setting up a Sensio SIP server in a local operating environment. Alternatively, a cloud-based SIP service can be used, as long as the necessary network access can be secured. Sensio uses a 3. party library provided by Linphone Library Beledonne Communications for communication over SIP. It is assumed that the intercom system is compatible with this or can be adapted accordingly. To be able to remote open exterior door, there is a further requirement that the intercom system is able to open the exterior door via SIP protocols (DTMF codes).

8 KNX system and integration

The welfare technology facility for the institution is mainly built on data collection via the buildings systems. Welfare technology uses a combination of KNX and an IP network. KNX shall be performed as a traditionally certified facility and is used for collecting and controlling light, ventilation, pull cords, door sensors and more. All KNX lines must be supplied with voltage via UPS and be connected to emergency power supply. The structure of GA in KNX must be clarified with supplier welfare technology. Supplier for Welfare technology's components must be addressed, marked, installed, wired and taken care of in design of other contracts.

In the network, there are screens for receiving and processing medical signals and controlling lights and other settings in living room. Network points in patient rooms must be terminated in racks / wall cabinets in rooms for ICT subdivision (ICT / UF). The structured network in the building is always based on the municipality's ICT requirements specification. Switches must be of the PoE type for power supply to panels and equipment. Patch cabinets should be supplied with power via UPS and emergency power supply. It must be documented that the UPS and emergency power supply manages to maintain an uninterrupted power supply to the structured network. Alarm board with PC, as well gateway for patient signal and positioning, shall also have power supply with UPS and emergency power supply.

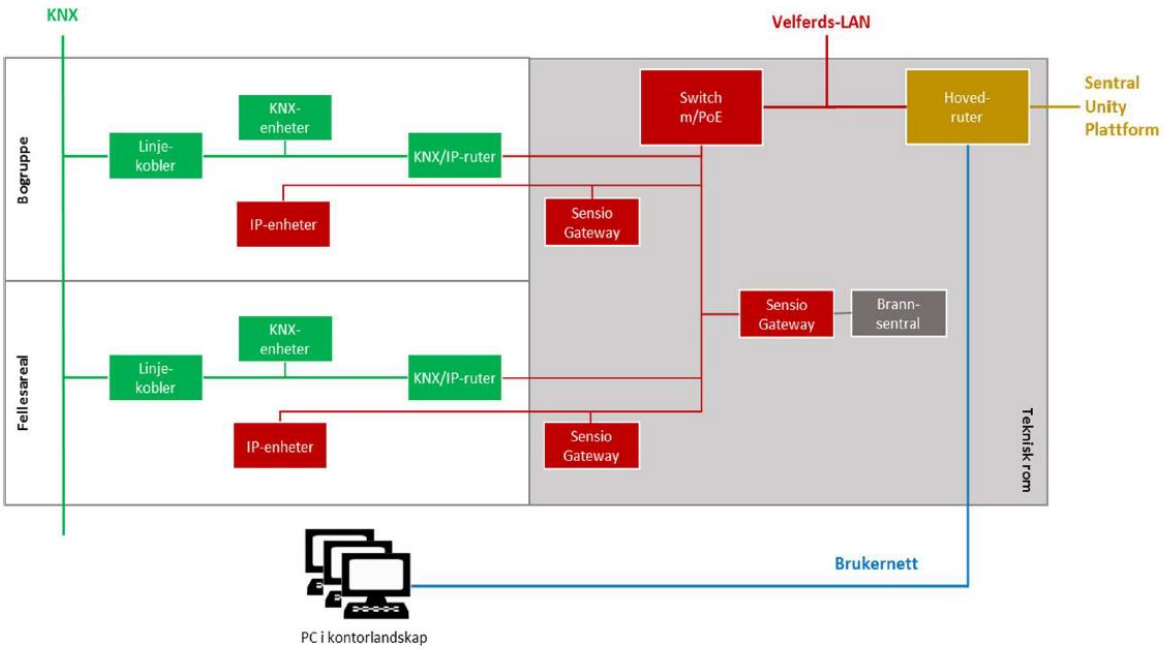


Figure 1: Principal sketch for KNX / IP integration. KNX devices include door sensors, light switches, PIR detectors, Dali lights and dimmers, blinds, relays for TV etc.

Fellesareal = Common area	*Linjekobler = Line coupler*
Bogruppe= Resident group	*Hovedruter = Main router*
Brannsentral = Fire alarm central	*Teknisk rom = Technical room*

How the delivery of the KNX system should take place and what is the optimal interface to the supplier of Welfare technology depends on what the KNX system is to be used for. Two main options are described below.

8.1 If KNX is only for the use of medical signals and Welfare technology

If KNX is only to be used for medical signals and Welfare technology, it is natural that the supplier of Welfare Technology delivers everything from KNX engineering, equipment, and programming. Cabling is handled together with other cabling in the construction contract.

8.2 If KNX is to be used for control of light / heating / ventilation and be part of an SD system

If the KNX system is to be used for control of Dali systems or ventilation or be part of the building's SD system another party must take responsibility for the delivery of a complete KNX system. This includes the following tasks:

- Design of the KNX plant in accordance with specified needs from the Supplier of Welfare Technology, automatics and possibly other subjects in terms of capacity, power, etc.)
    - Number of KNX lines per floor
    - Appropriate distribution of equipment between KNX lines
    - Number of KNX cables between boards (for 0-line)
- All KNX cabling, including power cable between UPS (in rack) and KNX power supply in switchboard (so that KNX power supply is operated by UPS)
- Delivery and installation of KNX equipment in living rooms and common areas. KNX equipment connected to Welfare technology that is not off the shelf is ordered from the supplier Welfare Technology to ensure that professional standards are maintained. The supplier of welfare technology will have a dialogue with the supplier of the KNX facility to coordinate the transmission of these components for addressing and preparation for construction. The project must take these KNX components into account when designing the facilities (capacity, power, etc.)
- Physical marking of all cabling and equipment in accordance with the building's marking standard, and associated MOM (Management, Operation and Maintenance) documentation
- All of central KNX infrastructure (as well as secure space for this in electrical cabinets in technical rooms)
    - 1 KNX / IP router per KNX line or 1 KNX / IP interface per KNX line (2 modules) – number of lines must be clarified
    - 1 KNX power supply per KNX line (8 modules) - number of lines must be clarified
    - KNX line coupler for possible 0-line (2 modules)
    - Optional KNX USB programming device (2 modules)
    - Take care of reserve space requirements according to description
    - Take care of the need for traction cords regarding power, capacity on lines

- Addressing of all KNX equipment and programming of the KNX system in accordance with requirements from the supplier of Welfare technology, automation and possibly other subjects. A separate instruction is sent with guidelines for KNX programming, which must be reviewed in consultation with the supplier of Welfare technology before programming begins
    - KNX group addressing must follow the supplier of welfare technology's requirements and guidelines
    - There are requirements for naming and order of equipment in each room
    - Supplier of welfare technology needs a technical drawing for where to connect (main line or similar)
- Carry out testing of pre-programmed KNX systems, in consultation with the supplier of welfare technology. Sufficient time must be set aside for this which is in accordance with the total complexity of the facility, and the need for several rounds of testing and quality assurance must be taken into account, as well as adjustments of the programming afterwards in line with feedback from supplier of welfare technology

The supplier of welfare technology will be responsible for the following:

- Provide input for the design of the KNX system: State the need for capacity and group addresses in the KNX system
- Provide input for programming the KNX system: Submit and review separate instructions that specify guidelines requirements for KNX programming, and answer questions along the way
- Ordering KNX non-off-the-shelf components that cannot be purchased from traditional wholesalers / KNX suppliers equipment (cord pull and KNX room panel) to ensure that professional standards are met. The supplier of welfare technology will have a dialogue with the supplier of the KNX facility to coordinate transmission of these components for addressing and preparation for construction. The project must take into account these KNX components when designing the system (capacity, power, etc.). All other KNX equipment projected in building is assumed to be delivered together with a complete KNX system

Summary of division of responsibilities per KNX component

Type of KNX equipment	Engineering	Equipment order	KNX cabling and infrastructure	Marking of equipment and ordering	KNX programming
Lights, blinds, light switches, and power outlets	Electric / Automation	Electric / Automation	Electric / Automation	Electric / Automation	Electric / Automation
KNX cord pull	Supplier of welfare tecnology	Supplier of welfare tecnology	Electric / Automation	Electric / Automation	Electric / Automation
KNX door sensor	Electric / Automation	Electric / Automation	Electric / Automation	Electric / Automation	Electric / Automation
KNX PIR	Electric / Automation	Electric / Automation (Type of PIR must be approved of the supplier of welfare technology)	Electric / Automation	Electric / Automation	Electric / Automation
KNX I / O – input	Supplier of welfare technology	Electric / Automation	Electric / Automation	Electric / Automation	Electric / Automation
KNX room panel	Supplier of welfare technology	Supplier of welfare technology	Electric / Automation	Electric / Automation	Electric / Automation

9 Other needs in the building

9.1 Empty pipes facilities

It must be clarified at start-up engineering any need for empty pipe systems in addition to cabling.

9.2 Need for space for ICT subdivision (ICT / UF)

All ICT deliveries in the project must comply with the authorities' ICT requirements specification and cable standard for construction.

Special size of ICT room and good location and with a plan to ensure optimal cable length infrastructure must be secured in consultation with the IT department.

9.2.1 Placement of gateway for medical signals in rack

- Placed on a shelf or attached to a DIN rail (2u in height)
- Supplied with standard 5V adapter
- Available power supply must be connected to UPS and emergency power supply
- Need 1 port in data switch per Gateway

Note! When using xComfort wireless components in buildings, it can sometimes be worthwhile to place an IP point for gateway across the ceiling in the corridor instead of in the technical room. This is to ensure the required signal strength between sensors and gateway and avoid the need for RF repeaters.

9.2.2 Placement of gateway for indoor positioning in rack

- Placed on shelf
- Supplied with standard 5V adapter
- Available power supply must be connected to UPS and emergency power supply
- Need 1 port in data switch per Gateway

In the same rack, the following central equipment must be in place:

- UPS
- PoE switch with sufficient number of ports
- Patch panel with sufficient number of ports
- Red and blue patch cables (according to ICT standard for construction)

All data cabinets, patch cabinets, switches, etc. must be delivered in accordance with the authorities' ICT requirements specification and must be pre-approved by the municipality's IT department before ordering.

9.2.3 Patching from patch panel and down to switch

There is a need for patching of all IP points all the way to the data switch:

- All devices must be connected to ports in switch with DHCP. The exception is cameras, these need a port to switch with fixed IP address (alternatively the switch must be set up to handle hostname)
- Color coding of patch cables:
    - Red patch cables: Standard for welfare equipment
    - Blue patch cables: Camera and equipment for 2-way speakers
    - Orange patch cables: Television and HiFi equipment

9.2.4 Requirements for documentation of cabling in patch cabinets

There are requirements for documentation of cabling in patch cabinets per technical room carried out by the supplier of cabling. This must follow the authorities' current ICT requirements specification and as a minimum specify:

- Marking of data outlets
- Name of product
- Component marking for the equipment that will be installed

9.3 Power requirement for equipment to be connected to UPS and emergency power supply

Equipment	Power requirement per piece	UPS	Emergency power
Room panel / info panel	3 W	Yes	Yes
Gateway for patient signal	10 W	Yes	Yes
Gateway for integration of fire alarm	2 W	Yes	Yes
KNX power supply	36 W	Yes	Yes
KNX / IP router	0.8 W	Yes	Yes
Gateway for positioning	42 W	Yes	Yes
Cairn for positioning	1 W	No	No
Alarm board	300 W	Yes	Yes
Wireless router (WiFi – RF)	1 W	Yes	Yes

9.4 System sketch (connection between technical rooms)

illustrative sketch of IP network topology in a building with two building parts and 4 floors. Recommends the use of a distribution network based on room for ICT subdivision to simplify troubleshooting and network operation, but this is up to the institutions IT department to assess.

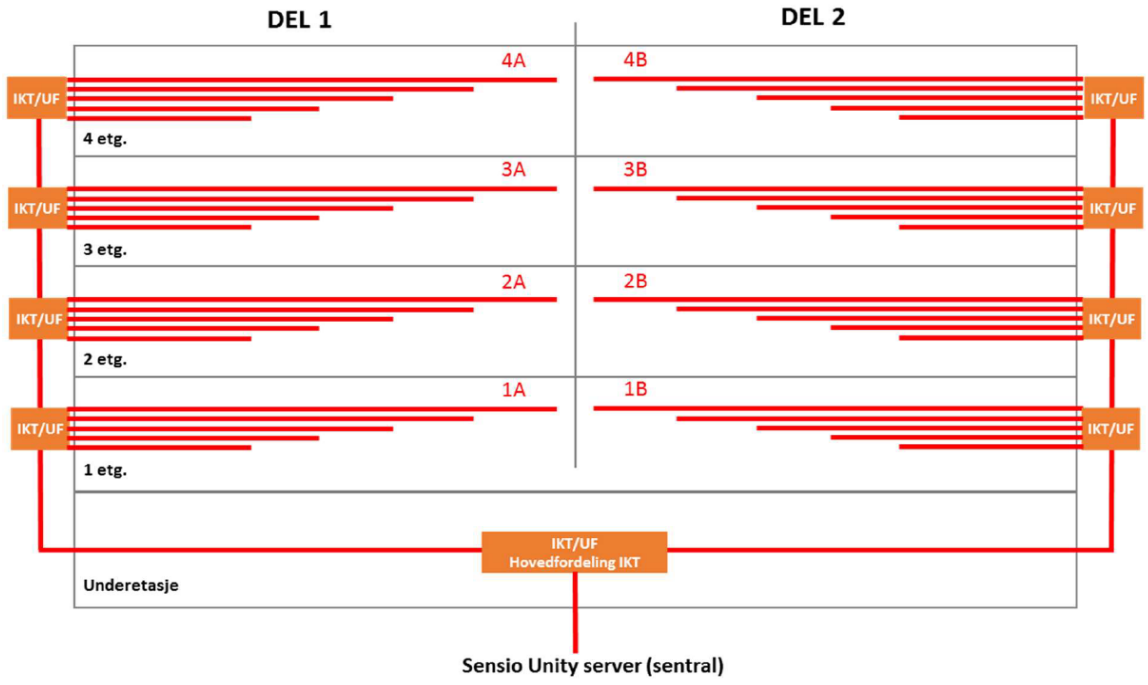


Figure: Illustrative sketch of IP network topology

Illustrative sketch of KNX network topology for patient signal in a building with two building parts and 4 floors. Number of KNX lines per floor are determined by the number of KNX components per room (maximum 64 per line) and the need for reserve capacity.

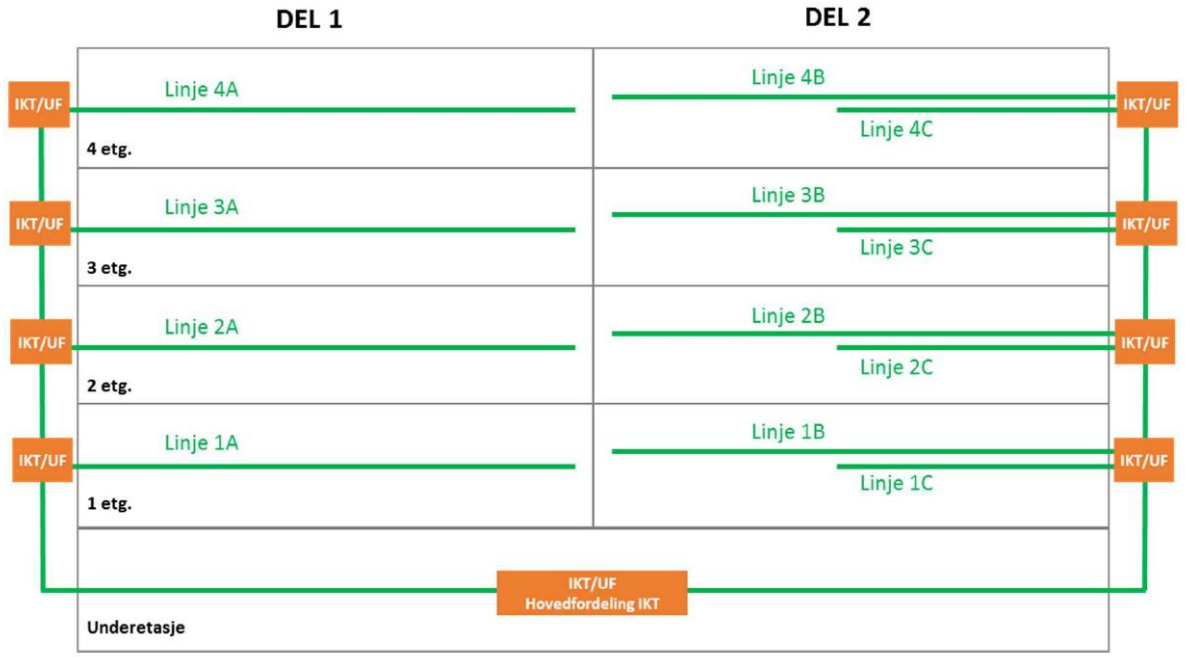


Figure: Illustrative sketch of KNX network topology

9.5 Requirements for Technical LAN and IP addresses

9.5.1 Requirements for Technical LAN

- Setup of a dedicated Technical LAN to differentiate between technical equipment connected the sick signal system and client PCs for employees
- The network (Technical LAN) must support multi-cast
- If there are several switches in the same building, all equipment (Gateway, KNX / IP router, etc.) should be connected to a department should as far as possible be connected to the same switch. This is to minimize the number points of failure for communication
- Technical LAN must have access to the Provider of Welfare Technology Unity Server which is installed centrally in safe zone
- If a wall panel (room panel / info panel) is used which is to be connected to the Technical LAN, the switch must be set up to a maximum of 100 Mb speed (wall panels do not support Gb / s)

9.5.2 IP addresses on Technical LAN

In most cases, it will be sufficient to set aside an IP range of 1024 addresses in the Technical LAN for welfare technology (ie with 255.255.252.0 subnet mask). Then one considers any future expansions of the facility.

- It is recommended to reserve the first 5-10% of the IP range to be used as fixed. Equipment used in welfare technology such as cameras and, various interfaces from different suppliers have been shown in in some cases, to work more optimally when the device is configured with fixed IP. Alternatively, it must be possible to reserve IPs in DHCP.
- The rest of the IP range is used as dynamic IP

9.5 Needs related to possible integration with SD systems via BACnet

Integration with SD systems via BACnet presupposes that the following is made available to the supplier of welfare technology:

- List of BACnet addresses, data formats and relevant function calls from the automation provider according to the needs of the welfare technology provider. Automation provider must count on more rounds on such a list to ensure that all needs are met
- Adequate support from the automation provider for questions related to this overview and other clarifications and coordination related to the integration
- The automation supplier provides a BACnet / IP module and the necessary installation and preparation of infrastructure. Welfare technology provider only deals with IP addresses of various BACnet / IP interfaces
- Communication (network) between Technical Lan and BACnet / IP is arranged and delivered ready tested on location
- The supplier of welfare technology must have access to sufficient test equipment with a similar setup and programming as the central, and the integration to be used in the building. Supplier of welfare technology needs to have this available in its own office no later than 3 months in advance to be able to deliver integration when taking over the building

9.6 Needs related to integration with fire systems

Technical requirements for setup and configuration of fire alarm system

The fire alarm system must support the transmission of messages via ESPA 444 via RS232.

Need for access to test equipment

The provider of welfare technology needs a demonstration system configured with identical message formats which is intended for the actual facility, for setup and testing of the integration. The demonstration system must cover all types of messages that can be sent, including advance notice and cancellation, and there should be at least one example of each message where the maximum length of all text fields is used. This must be made avaiable for the supplier of welfare technology at least 8 weeks before actual fire integration is to be delivered.

Need for list of ESPA-444 messages connected to established room list, in approved Excel format

In order to integrate, the provider of welfare technology must have access to a list of all ESPA-444 messages which the fire system can pass on connected to an approved list of room numbers used in connection with the patient alert, according to an approved Excel format. Construction manager is responsible for ensure the completion and quality assurance of such a list. The supplier of welfare technology will only carry out random samples when testing the fire alarm integration, and thus can not be held responsible for quality assurance or testing that the complete list is correct.

Carrying out a test of the fire alarm system

The supplier of the fire alarm system must involve the supplier of welfare technology in the planning and the implementation of end-testing of the system. So that this can possibly be combined with a testing of integration and setup against the emergency room solution.

Location of Supplier of Welfare Technology's technical equipment related to the fire alarm integration

- Fire integration gateway (SC-1 Controller) must be mounted on DIN rail near fire control panel due to RS232 cabling (max. 10 meters cabling)
- Gateway for fire integration (SC-1 Controller) needs 1 port in data switch with access to Technical LAN

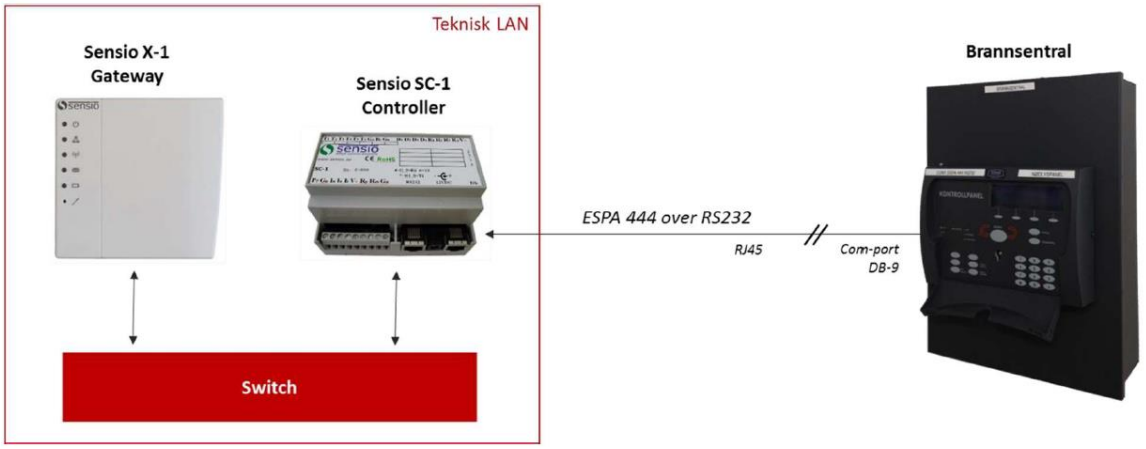
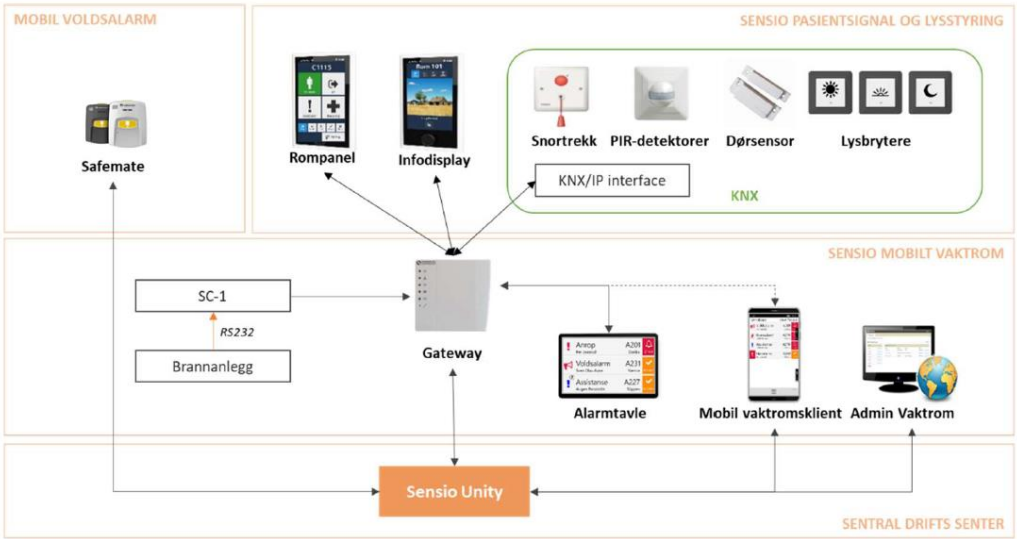


Figure: Illustrative sketch of fire integration

Note! This integration shall constitute an additional notification beyond established basic functionality related for fire alarm in the building. In other words, the building should not be dependent on establishing this integration to satisfy current fire regulations. Nevertheless, support has been developed for such an integration in order to facilitate fast and good information to employees in the event of a fire.

10 Redundancy

When installing and commissioning welfare technology solutions redundancy and preparedness for both power outages and loss of ICT network infrastructure must be considered. Relevant equipment and infrastructure can be secured with the use of UPS / battery pack and emergency unit. In addition, internal notification can be handled via the building's infrastructure and / or mobile broadband and with the use of alarm board for any staff to ensure follow-up of incidents.



11 Input for the implementation of a construction project

11.1 Communication test of equipment delivered by IT

Setup of switches, routers and communication solutions must be ordered and prepared to be able to conduct communication tests. This must be ordered from the project's IT department well in advance the final phase of the building.

11.2 Room numbering

In order to ensure progress in the construction project with a view to planning and setting up patient alerts, it is important to start work early on to produce a complete and structured room numbering on a format that employees can easily relate to.

11.3 Demonstration room

A demo room should be set up as early as possible for display and testing of functionality and interfaces in one living room.

11.4 Handling of technical interfaces

Successful installation of welfare technology in buildings depends on adequate and structured management and planning of complex technical interfaces, and which have clear dependencies towards many disciplines.

The needs for welfare technology as described in this document must be reflected in the requirements specifications for the other subjects in the contract.

The ITB function (Integrated technical building installations) is important to reduce risk in the construction project and ensure that technical interfaces are taken care of.

11.5 Progress plan

The supplier of welfare technology must be involved and proactive in the preparation of an agreement progress plan for the technical subjects' final phases, tests, and adjustments. Deadlines for completion must be clarified early between the parties. Welfare technology is the latest subject to be completed in construction and is depending on the fact that several other subjects have final-tested and completed their deliveries in the building in order to begin their deliveries. Depending on the complexity, at least two weeks must be calculated per department for completion and final testing of the Supplier of Welfare Technology's deliveries before the planned delivery of the supplier of welfare technology's systems. This does not necessarily have to be the same date as handover of buildings. Exact time use must be clarified in connection with a preliminary project.