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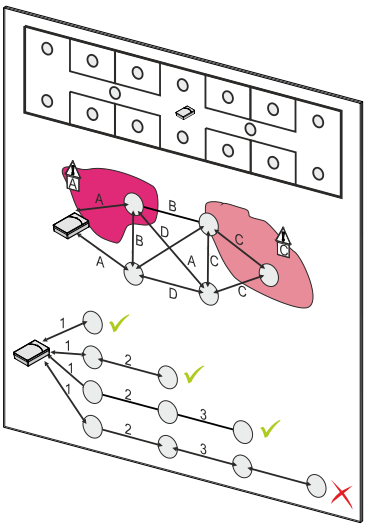

SWING

Radio fire detection system

Planning

A6V10227631_f_en_--
2015-03-03

Building Technologies

Control Products and Systems

Legal notice

Technical specifications and availability subject to change without notice.

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Table of contents

1 About this document

Goal and purpose

This document contains planning guidelines for the SWING radio fire detection system. The SWING radio fire detection system is used for the 'Sinteso' and 'Cerberus PRO' product lines.

In the sections that follow, this document will outline how a radio cell that is based on a mesh network principle works.

Target groups

The information in this document is intended for the following target groups:

Target group	Activity	Qualification
Product Manager	● Is responsible for information passing between the manufacturer and regional company. ● Coordinates the flow of information between the individual groups of people involved in a project.	● Has obtained suitable specialist training for the function and for the products. ● Has attended the training courses for Product Managers.
Project Manager	● Coordinates the deployment of all persons and resources involved in the project according to schedule. ● Provides the information required to run the project.	● Has obtained suitable specialist training for the function and for the products. ● Has attended the training courses for Project Managers.
Project engineer	● Sets parameters for product depending on specific national and/or customer requirements. ● Checks operability and approves the product for commissioning at the place of installation. ● Is responsible for trouble-shooting.	● Has obtained suitable specialist training for the function and for the products. ● Has attended the training courses for Product Engineer.
Installation personnel	● Assembles and installs the product components at the place of installation. ● Carries out a performance check following installation.	● Has received specialist training in the area of building installation technology or electrical installations.

Source language and reference document

- The source/original language of this document is German (de).
- The reference version of this document is the international version in English. The international version is not localized.

Document identification

The document ID is structured as follows:

ID code	Examples
ID_ModificationIndex_Language_COUNTRY -- = multilingual or international	A6V10215123_a_de_DE A6V10215123_a_en_-- A6V10315123_a_--_--

Date format

The date format in the document corresponds to the recommendation of international standard ISO 8601 (format YYYY-MM-DD).

Conventions for text marking

Markups

Special markups are shown in this document as follows:

▷	Requirement for a behavior instruction
1. 2.	Behavior instruction with at least two operation sequences
–	Version, option, or detailed information for a behavior instruction
⇨	Intermediate result of a behavior instruction
⇨	End result of a behavior instruction
●	Numbered lists and behavior instructions with an operation sequence
[→ X]	Reference to a page number
'Text'	Quotation, reproduced identically
<Key>	Identification of keys
>	In addition to relation symbols and for identification between steps in a sequence, e.g., 'Menu bar' > 'Help' > 'Help topics'
↑ Text	Identification of a glossary entry

Supplementary information and tips

The 'i' symbol identifies supplementary information and tips for an easier way of working.

1.1 Applicable documents

Document ID	Title
008331	List of compatibility (for 'Sinteso™' product line)
008836	FS20 Fire Detection System - System Desription
008843	FS20 Fire detection system - Planning
A6V10210355	FS720 Fire detection system - System Description
A6V10210362	FS720 Fire detection system - Planning
A6V10229261	List of compatibility (for 'Cerberus™ PRO' product line)

1.2 Revision history

The reference document's version applies to all languages into which the reference document is translated.

The first edition of a language version or a country variant may, for example, be version 'd' instead of 'a' if the reference document is already this version.

The table below shows this document's revision history:

Modification index	Edition date	Brief description
f	2015-03-03	● Channel number in the frequency range adapted to 868 MHz ● Chapter 'Topology [→ 14]' added ● 'Network size' and 'Network density' adapted
e	2013-09-01	New chapter: Components of the radio fire detection system New chapter: Compatibility FDnet/C-NET
d	2012-11-26	Editing the network size
c	2012-07-01	Editing
b	2012-01-01	Editing Section 'Damping in radio network' removed.
a	2011-11-01	First edition

The language versions and country variants produced by a local company have the same modification index as the corresponding reference document. They are not however included in the table below.

The table below shows the published language versions with the corresponding modification index:

Modification index	en_--	de_--	fr_--	it_--	es_--
f	X	X	X	X	X
e	X	X	X	X	X
d	–	X	–	–	–
c	X	X	X	X	X
b	–	X	–	–	–
a	–	X	–	–	–

X = published

– = no publication with this modification index

2 Planning specifications

The installation must be dimensioned so that the expected fire characteristics can be detected reliably, with ambient effects and false variables taken into account.

The following planning specifications must be taken into account during planning:

- Network size
- Ranges
- Network density

The planning specifications for FD20 / FS20 / FD720 / FS720 remain unchanged. See also document 008843 'FS20 Fire detection system - Planning' or A6V10210362 'FS720 Fire detection system - Planning'.

2.1 Network size

A maximum of 16 radio gateways FDCW241 per line may be connected to a fire detection system. Up to 30 radio devices may be logged on at each radio gateway.

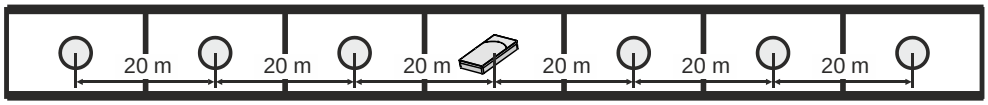
The maximum number of devices permitted per line depends on your fire control panel. More information on the maximum number of devices is given in the applicable documents FS20 Fire Detection System - System Desription and FS720 Fire detection system - System Description.

For larger sites with more than 150 radio devices, please contact the Customer Support Center CSC. on Tel. +49 89 9221-8000 to coordinate the planning with specialists.

2.2 Range

Range criteria:

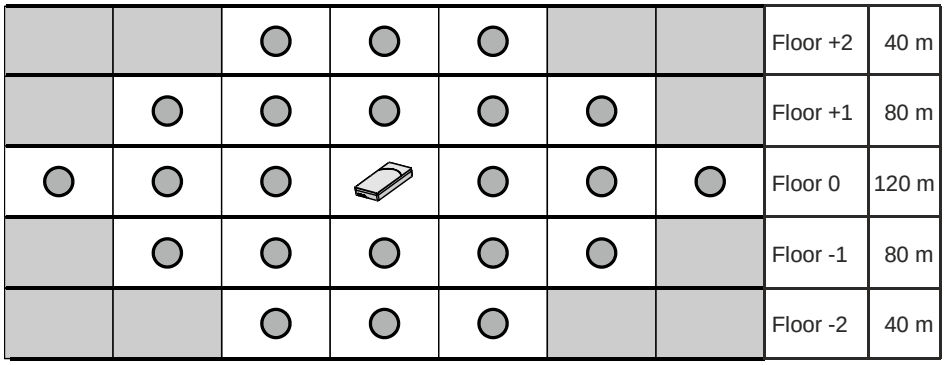
- In buildings with small rooms and several walls, such as hotels and offices, a radio cell may be distributed over a maximum distance of 120 m.



Radio gateways and radio devices in a multi-story building with intermediate walls

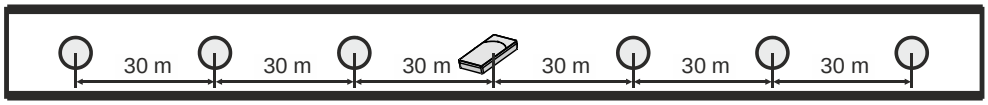
- A radio link may not exceed 20 m in length. The connection to other radio devices in the same radio cell should not penetrate more than one wall [→ 19].
- A radio cell may be operated over a maximum of 5 stories, with the radio gateway positioned at the middle story.

Maximum permissible distribution for cross-story planning:



Radio gateways and radio devices over five stories with intermediate walls

- In buildings without obstructions, such as large halls, a radio cell may be distributed over a maximum distance of 180 m.



Radio gateways and radio devices in a multi-story building without intermediate walls

2.3 Network density

Each radio device must have at least two connections to its surrounding neighbors. The minimum distance to its surrounding neighbors is 1.5 m.

3 Planning a radio cell

A floorplan must be available in order to plan a radio cell.

It is possible to plan multiple radio cells in such a way that they overlap.

3.1 Prerequisite

The locations of the radio devices must be selected in accordance with country-specific regulations governing automatic and non-automatic detectors.

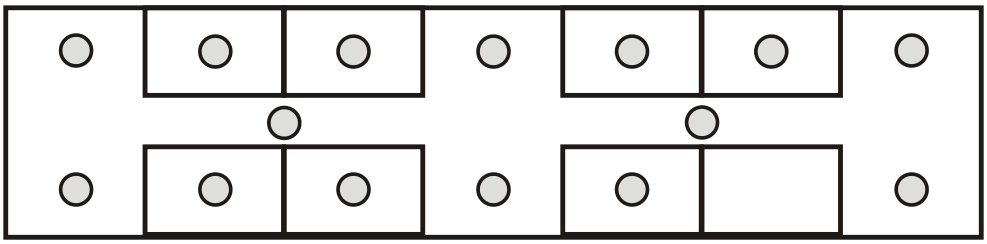
3.2 Positioning radio devices

SWING planning must only take radio devices into consideration. If planning is being carried out for areas with wired fire detectors, these areas must be viewed as exclusion zones.

For planning purposes, the following areas must be marked as exclusion zones on the floorplan:

- Areas without fire detectors, e.g., elevator shafts, wet rooms
- Areas with wired fire detectors
- Walls made out of metal, extremely solid concrete walls, or damp masonry

Planning example:



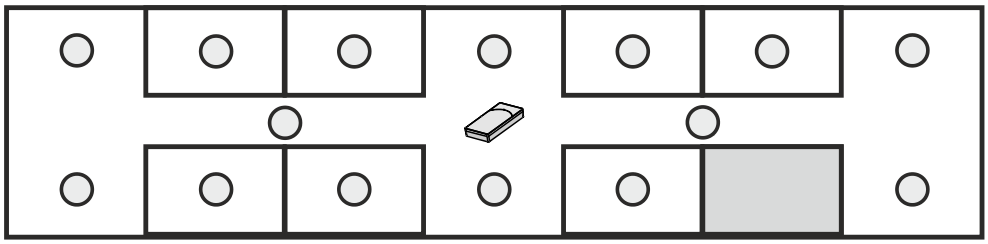
Floorplan

For the radio fire detection system to work as well as possible, radio devices must be placed in central areas such as corridors.

Include 1-2 spare radio devices in the plan for any modification work that may need to be carried out after commissioning.

3.3 Positioning the radio gateway

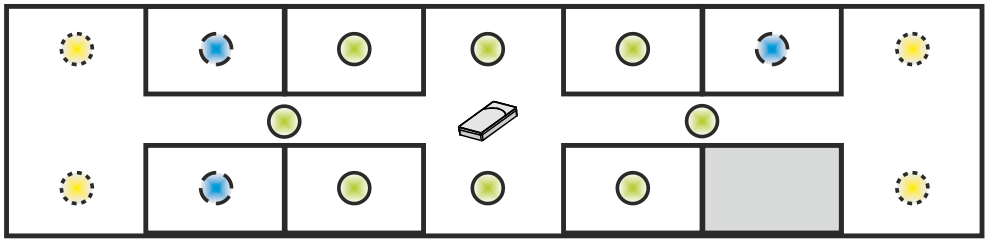
The radio gateway should be installed in a central location within the radio cell. Make sure that there are no large metal objects in the immediate vicinity of the radio gateway. These may have a negative effect on radio links.



3.4 Checking the range

Check the radio device ranges as indicated in the planning specifications. [→ 8]

1. Mark all the radio devices that are directly within the radio gateway range.
2. Using a different color, mark all the radio devices that are within the ranges of those radio devices you have already marked.
3. Using a different color again, mark all the radio devices that are within the ranges of those radio devices you have already marked.



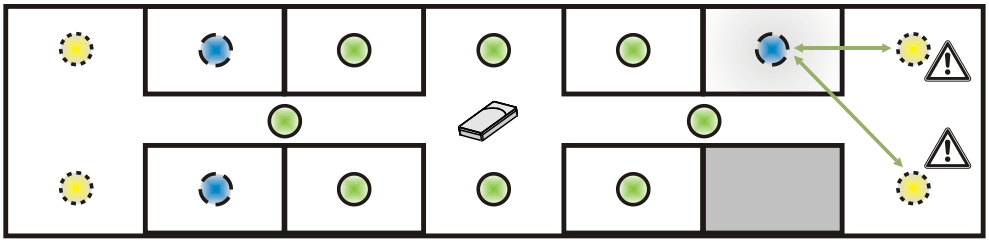
4. If a radio link passes through two walls (exclusion zone), an additional radio device must be included in the range plans.

3.5 Checking the network density

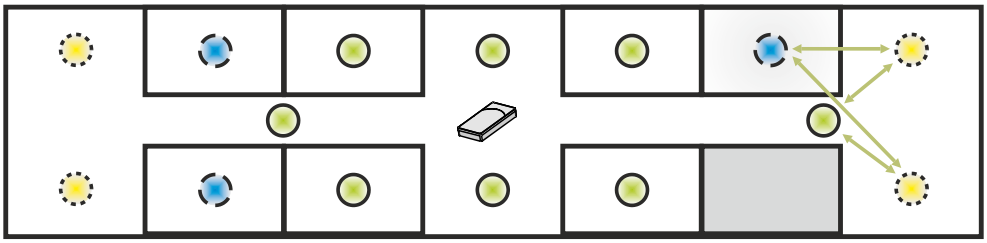
A network is deemed to be dense enough if each radio device is linked to at least two neighboring devices. See the 'Checking the network density [→ 12]' chapter

Steps for improving network density:

- Install additional radio devices.
- Exchange a wired fire detector for a radio fire detector.
- Move existing radio devices (taking country-specific planning guidelines into account).



Compared with the example above, all the radio devices now have at least two neighbors.

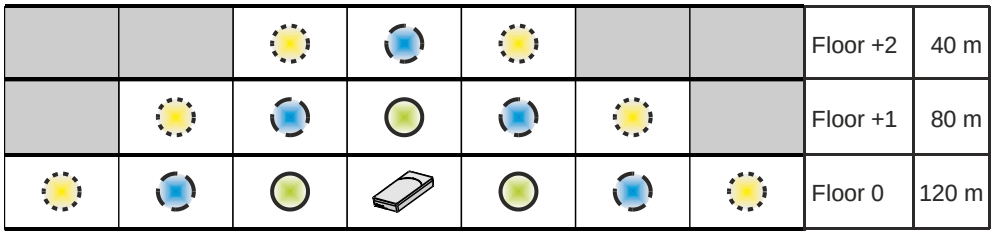


If planning is being carried out for another story, the network density can be improved using radio devices on the adjacent story. See the 'Multiple stories [→ 13]' chapter

3.6 Multiple stories

Proceed as follows if you are carrying out planning across stories:

- Start by planning the story on which the radio gateway is located.
- Then plan the adjacent story.
- Now mark the radio devices in accordance with the permissible ranges, as described in Section 3.4 [→ 11]. You must look at the individual radio links from a cross-story perspective.



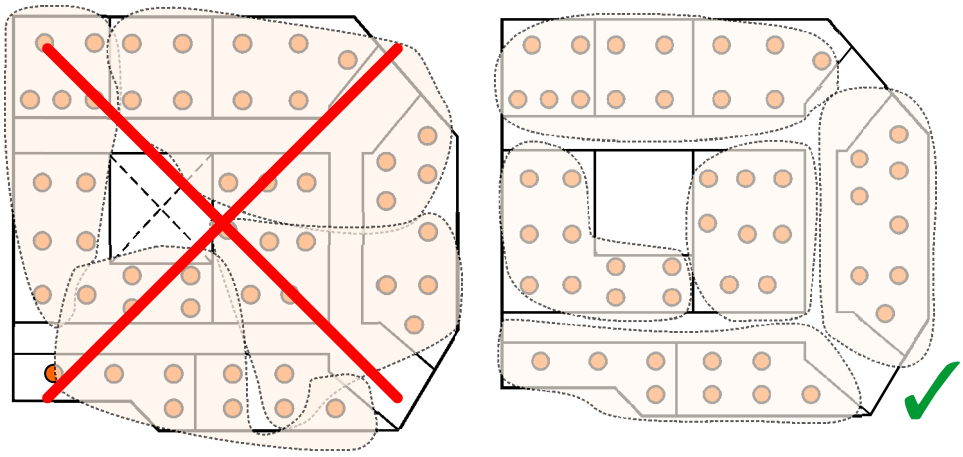
You can use the following measures to make modifications:

- Move existing radio devices (taking country-specific planning guidelines into account).
- Install additional radio devices.
- Exchange a wired fire detector for a radio fire detector.
- Divide the radio cell into two radio cells and repeat the entire planning process from the beginning for both radio cells.

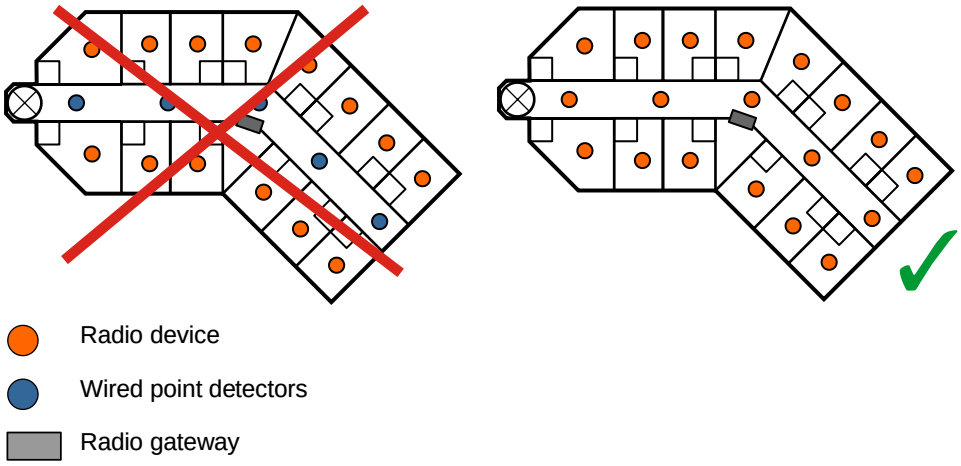
Positioning radio devices across stories improves the network density.

3.7 Topology

- Always plan the position of the radio gateway as close to the middle of the radio cell as possible. Using a central position allows you to establish a connection to the radio gateway with as many radio devices as possible.
- Avoid using elongated and narrow radio cells.
- If a radio cell stretches over multiple rooms that are separated by a corridor, fit radio fire detectors in the corridor as well. This is often required in hotels and nursing homes. Adapt the radio cell in line with the topology of the rooms if radio fire detectors cannot be fitted in the corridor.



- Do not combined existing, wired point detectors in the corridor with radio cells in rooms. This increases the distances between the radio devices and makes communication in the radio cell difficult as a result of the additional walls.



Observe the following points when planning the topology. Where necessary, also fit the radio cell with additional radio devices, relocate existing radio devices, or split the radio cell.

- When planning the radio cell, take fire doors and girder in the ceilings and walls into consideration. Otherwise, fire doors and girders in the ceilings can negatively affect the function of the radio cell.
- Critically check radio cell with wet rooms for compliance with the regulations and requirements described in chapter 'Planning a radio cell [→ 10]'.
- When planning the radio cell, always consider elevators in the position in which they hinder communication inside the radio cell. Elevators can negatively affect the function of the radio cell if they are located right on the same story as the radio cell.

Contact the Customer Support Center if you have questions regarding compliance with regulations and requirements when planning your fire detection installation. Ensure that you have your building plans and planning proposal to hand to receive the best possible support.

You can contact the Customer Support Center by phone on +49 89 9221-8000 or http://siemens.com/bt/download

4 Annex

The following explanatory information applies to SWING.

4.1 SWING technology

The SWING radio fire detection system is based on the following technological principles:

- Mesh network
- Multihop
- Multichannel operation

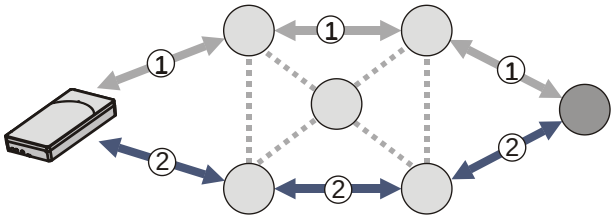
The combination of these three technologies makes the radio system both unique and extremely reliable.

4.1.1 Mesh network

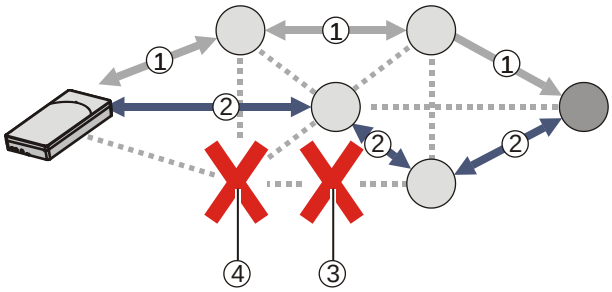
A mesh network is a radio network linking two or more radio devices to an intermeshed network.

Characteristics:

- At least two paths between a radio device and the radio gateway
- Completely different routes; i.e., different radio links and different radio devices
- Radio devices connect to one another and configure themselves of their own accord. The network continuously modifies itself during operation



Different paths



Fault

Radio device

Radio gateway

Radio link

1 First path

2 Second path

3 Interruption in radio link

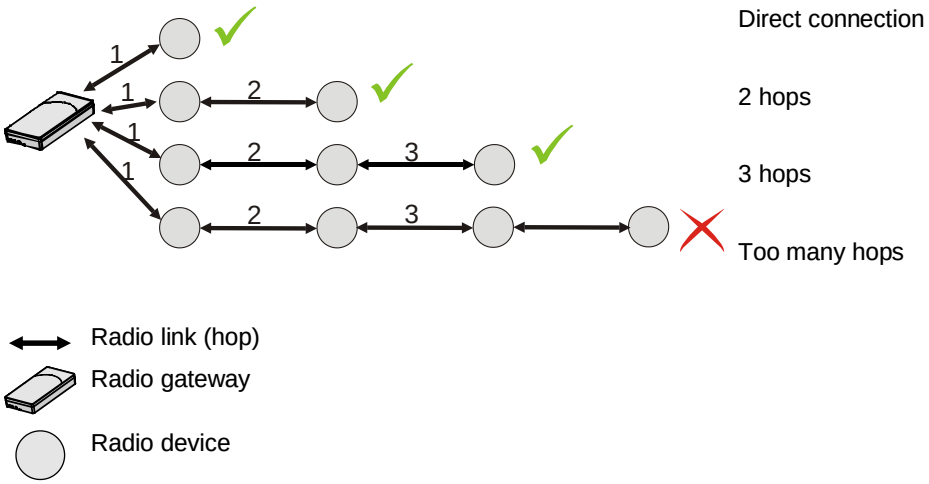
4 Radio device failure

4.1.2 Multihop

Multihop technology makes it possible to extend the range in line with the number of hops. The radio link between one radio device and the next is referred to as a hop.

Characteristics:

- Each radio device has hop characteristics.
- A radio connection between a radio gateway and a radio device must take place over a maximum of three hops.

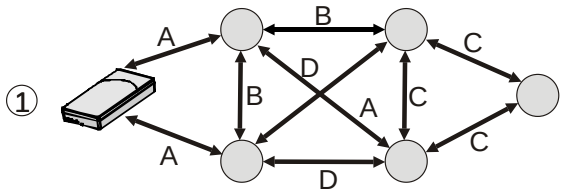


4.1.3 Multichannel operation

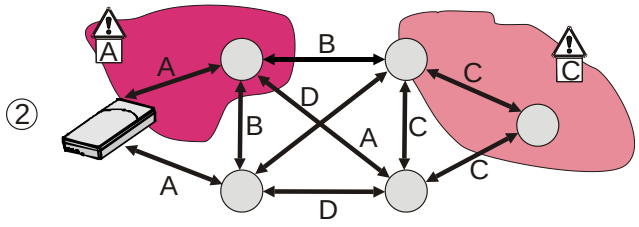
If a radio link repeatedly fails to work or has difficulty working, either the channel for this radio link or the frequency is changed.

Characteristics:

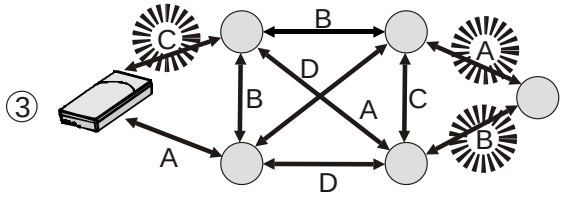
- Dual-band system with two frequency ranges
- 868…870 MHz (SRD band) with 27 channels (A, B, C, etc.)
- 433…435 MHz with 20 channels (A, B, C, etc.)
- Each radio link selects its own, independent receiving frequency.
- The two bands are given equal status.



Radio cell **without** fault



Radio cell **with** faults



The radio cell becomes **fault-free** again when automatic switching to other channels takes place.

Radio gateway

Fault on channel 'A'

Radio device

Radio link

Typical faults are:

- Other radio systems in the MHz range, e.g., garage door openers, wireless headphones, remote controls
- EMC in the case of elevator drive systems, etc.

The frequency ranges of Bluetooth or WLAN connections do not lead to faults.

4.2 Radio network monitoring

Network monitoring involves periodically checking radio devices within a radio cell:

- If a radio device fails, the radio gateway reports this to the control panel after a maximum of 300 seconds.
- If a radio link to a neighboring radio device is blocked, the network automatically looks for another radio device. If there is only one path between the radio device and the radio gateway and this has been configured in the Engineering Tool, the control panel displays this information.

A high network density improves the network's capacity for self-healing.

4.3 Alarm monitoring

If a radio fire detector detects a fire, the alarm is transmitted to the radio gateway over several different paths simultaneously. This ensures a high level of transmission reliability.

4.4 Obstructions

The number of walls through which a direct connection between SWING devices can be established depends on the wall material.

The table below shows the effects of different materials, allowing you to make an assessment for your connection.

Material	Typical damping	Number of walls
Partitions Drywall and chipboard, 16 cm thick Uncoated glass	1 dB	3
Brick, 24 cm thick	3 dB	2
Reinforced concrete, 16 cm thick, dry after 9 months Lightweight concrete, 11 cm thick Brick, 36 cm thick Wooden wall, 16 cm thick	6 dB	2
Plastered drywall	10 dB	2
Reinforced concrete, 16 cm thick, damp after 1 month Brick, 36 cm thick, damp	15 dB	2
Lightweight concrete, 30 cm thick	20 dB	1
Metal Coated insulation glass Wall covering with metallic tissue or foil	40 dB	1

4.4.1 Exclusion zones

Exclusion zones are:

- Areas without fire detectors, e.g., elevator shafts, wet rooms
- Areas with wired fire detectors
- Walls made out of metal, extremely solid concrete walls, or damp masonry

4.5 Components of the radio fire detection system

Device	Art. no.	ES	Standards	Limitations
Radio gateway FDCW241	S54370-F11-A1	≥06	EN 54-17 EN 54-18 EN 54-25	Radio cell with a maximum of 30 radio devices
Radio fire detector FDOOT271	S54313-F1-A1	≥07	EN 54-5 EN 54-7 EN 54-25	None
Radio manual call point FDM273	S54323-B108-A1	≥02	EN 54-11 EN 54-25	None

4.6 Compatibility FDnet/C-NET

Compatible with control panels that support the FDnet/C-NET detector line.

Detector line	Control panel			
	FC20xx	FC72x	SIGMASYS	AlgoRex
FDnet	X MP4 and higher	–	–	–
C-NET	–	X From IP4	–	–

X = compatible

– = not compatible

You will find detailed information in the 'List of compatibility'.

Limitations

- Maximum 16 FDCW241 radio gateways per line
- Reduced if length of line is over 2,200 m as per Sinteso Quantities tool (A6V10094878) or Cerberus PRO Quantities tool (A6V10211118)

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