



heating control

anywhere, anytime.
easy to fit. easy to use



Radio communication

- What about radio communication?
- How to work with radio communication?
- Which confounders are in radio communication?



WiFi, Bluetooth, Dect ...

Radio communication becomes more and more important in the everyday life: WiFi, Bluetooth, Dect and much more are only available with radio communication.

It is a sensible technology and it consists of different physical effects.

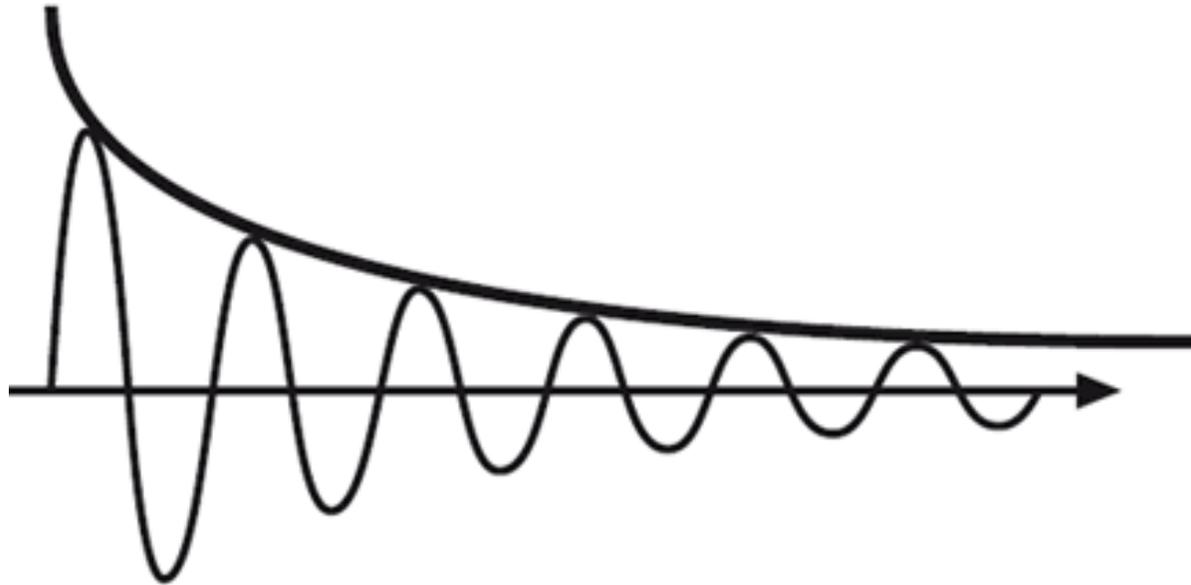
With the speed of light the spherical propagation of the electromagnetic vibrations will take place. The type of wave are different on frequency and wavelength depending.

Z-Wave radio communication uses the frequency range 868 MHz.

Radio waves

Emitted radio waves have a limited energy which are decreasing after a short distance.

Thus, the decrease of energy is inversely proportional to the square of the distance.





Influences

On the way to the receiver Radio waves find out various influences. These can turn, weaken, delete or redirect the signal. We call it:

- Absorption
- Reflection
- Damping

Absorption

Compared to other waves (like light, UV etc.), radio waves are possible to penetrate solid material, like walls or furniture.

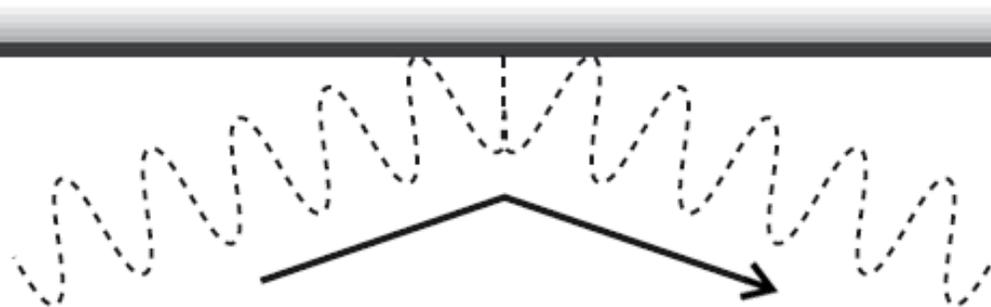
Thereby the radio signals are weakened or absorbed and part of their energy is lost.

How much energy is lost is strongly dependent on the nature and / or the density of the material. Also moisture weakens the energy of the radio waves.

Reflexion

The radio signal will be reflected by metal. The energy of the radio signals is greatly attenuated or completely deflected.

Reflection occurs on almost all metallic surfaces (e.g. mirrors) or materials (e.g. metal door frames, steel or sheet metal cabinets), as well as structural steel. Metal-vaporized heat shields or thermal insulation with metal foils also provide a reflection of the radio waves.





Radio shadow

So-called Radio shadows form behind reflective material. This shadow is without or with only very small radio waves.

Receivers positioned in a metal cabinet (e.g. antenna of the heatapp! floor in the floor distribution box) can't be reached good.

Receivers that lie in the radio shadow are often difficult or impossible to reach.

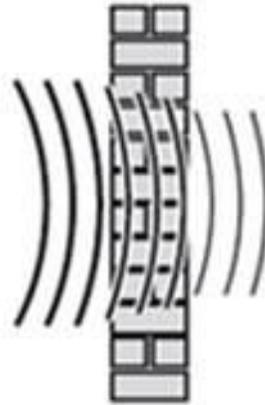
Damping



Plastic



normal
glass



Wood or
brick



Concrete with
steel
reinforcement

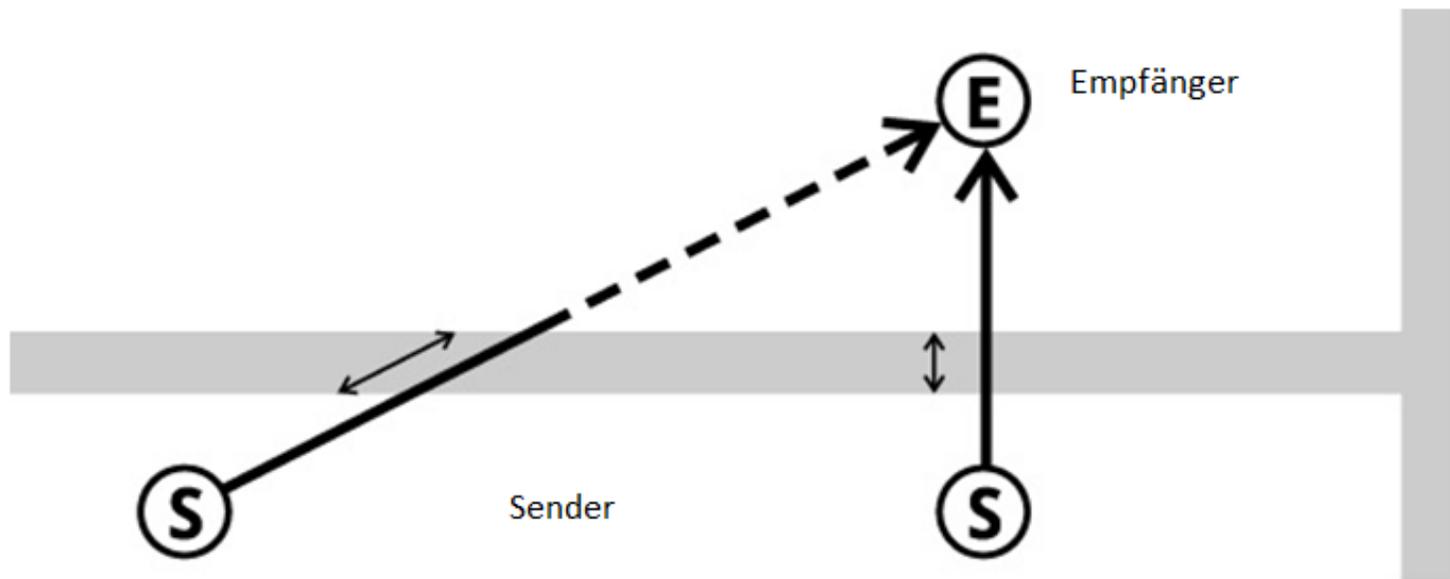


Metal wall

Range of radio waves

The broadcasting reach is strongly influenced across the corner by which the radio waves an obstacle penetrate.

The more angled the corner between transmitter and receiver, the more slightly the reach of the radio waves.





Interferences of radio

Some examples which can affect radio:

- People
- Pieces of furniture
- Plantations
- Metallic surfaces
- Armourings
- Metal grid
- Floor coverings



Distance to disturbance sources

In every building are a lot of disturbance sources and the distance should be as large as possible. Some examples:

- Microwave
- Computer
- Mobile phone
- Electronic transformers
- Audioarrangements and video equipment
- Preswitch devices for fluorescent lamps
- Babyphone
- Broadcasting aerials of other radio systems (e. g. , audiotransference on radio or cordless phones)

Damping by materials

Obstacles on the way between transmitter and receiver provide a damping of the radio signal. This means that the radio signal is weakened. Look to the following points:

- High air humidity or humidity in materials contribute to raised damping.
- Metal-vaporized glasses which serve for the heat insulation let pass the visible light, however, but no radio waves. Normal window glass is only by far lower degree of the damping.

With the help of damping values the obstacles can be analysed in the way of the radio distance and estimated on her sturgeon factor.



Damping values of building materials

Material	Material strength	Porosity in percent
Brick	< 30 cm	50 – 80
Wood	< 30 cm	50 - 70
Gypsum, gypsum cardboard	< 10 cm	90
Concrete with steel armouring		10 – 70
Metal grid (e.g. wire fabric for plaster), metal walls	< 1 mm	0
uncoated glass	< 5 mm	70 – 90
Metal-vaporized glass (e.g. insulating glass)		10 – 60
Plastic		80 – 95
Stone, pressboard records	< 30 cm	65 – 95
pumice stone	< 30 cm	90
Gas concrete stone	< 30 cm	80
Cover	< 30 cm	30
Outside wall	< 30 cm	40
Inside wall	< 30 cm	60

All values are estimates and no absolute values.



Some tips for a good radio reach

1. A good planning with consideration of possible disturbance sources is the basis of a radio network.
2. The less objects and materials stand between transmitter and receiver during assembly, so much better the receipt of the radio signal is. Damping and absorption can disturb the radio distance clearly.
3. Avoid very metallic objects and components on the radio distance, like metal cupboard or a PC case. Antenna (heatapp! floor) and receiver (heatapp! repeater and heatapp! gateway) may never be mounted in a switch cupboard or metal cupboard.



4. Establish the maximum possible distance to electronic consumers, power supply lines, lamps and mobile phones.
5. Try to avoid that radio waves have to go through walls at an angle.
6. Insulating wool which is coated with a tin-foil or metal foil and metal-vaporized heat insulation glass have a high damping qualities.
7. Also fine-meshed under-floor heating or metal-vaporized subsonic noise protection for laminate or parquet damp the radio signal.
8. A change of the furniture or the construction of a new metal board can have influence on the already installed radio system and weaken it.
9. Other radio system and electric devices affect the radio system.



**We wish you a lot of fun and success
by the planning of your radio
network.**

heatapp! Support-Team

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