

Wireless Technology in Demand Controlled Ventilation (DCV) Systems

What are the pros and cons using wireless technology compared to traditional wired solutions in DCV-systems? How does it work?

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DCV-system, design and function

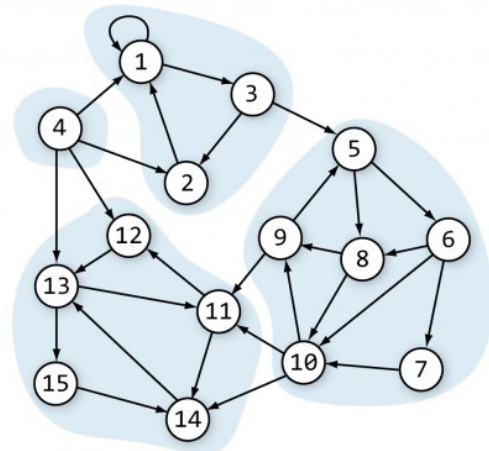
DCV-systems have been around since the beginning of 2000 and we can now see a growing number of companies offering this type of systems. The basic function of such a system is to optimize the room climate by using a minimum of energy to meet the requirements set. To reach a high performance level a DCV-system controls both room functions and the supporting systems like AHU:s and Chillers. Today's DCV-systems are not only handling ventilation but also heating and cooling of the building, so, the correct naming should be Indoor Climate Systems (ICS).

The communication between the components has been based on traditional wired technology and Modbus is the predominant protocol.

Wireless Technology

The only global licence free radio band is the 2,4 GHz and it is, therefore, used by a great number of applications like Mobile Phones, WLAN, Computer Accessories, Microwaves etc. Hence, it can be very crowded in the 2,4 GHz band (2,400–2,4835 GHz). To secure a stabile communication, several techniques can be used and two of the most important ones are Meshing and Frequency Shift.

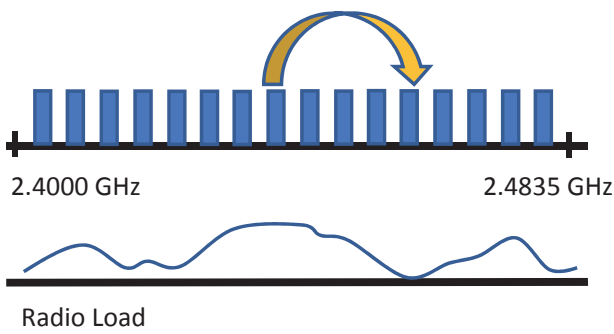
A mesh network is a network topology in which each node relays data for the network. This means that even



Meshed Radio Network.

if one node is out of service the data will be transferred to all other nodes.

The 2,4 GHz band can be divided into several sub bands and the normal frequency shift strategy is to shift to the next band when the currently used band is crowded. This is not the optimal strategy since the next band not necessarily is less crowded. By using an advanced algorithm, you can utilize less crowded frequencies and, by that, achieving a secure and fast communication. The conclusion is that the winning



Frequency Shift.

strategy is to shift to the best band (least crowded) and not to the next one.

When talking about wireless technology, the security topic is brought up. A modern wireless system used for DCV-systems must be equipped with encrypted communication to secure a safe function. Advanced Encryption Standard, AES, is a proven solution and often is a 128-bit key used. To crack this encryption with a super computer you need one billion years. An interesting thing to take into consideration is that a wired system is seldom encrypted at all.

Wired vs Wireless Technology

Applying modern wireless technology will generate several advantages compared to traditional wired solutions. The experience from wired systems is that a big part of the problems is related to the installation and



Torsplan.

commissioning of the network. Finding mistakes in the wiring is, often, quite time consuming.

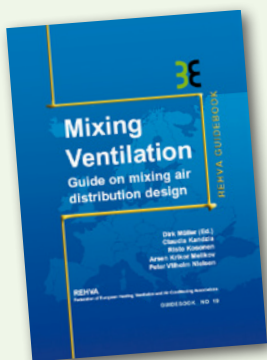
Another drawback with a wired system is that it limits the flexibility once the installation is completed. All changes in the disposition of the building is generating rework of the wiring and related costs. A typical case is creating additional meeting rooms by merging several small office rooms together. The adaption of a wireless system to this new situation is done by digital reconfiguration of the existing installation, no physical change of the installation is needed.

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This is an office building in the centre of Stockholm Sweden, total area 20 000 m². The DCV system is based on 2000 radio nodes linking the VAV dampers and sensors to 20 air handling units. ■



REHVA Mixing Ventilation GUIDEBOOK



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