

DECT Wireless Technology and DECT Density

WHITE PAPER



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Introduction to DECT

DECT technology has become a popular standard for wireless voice communication. DECT devices are not likely to be affected by other electronic devices and signals because they operate in a separate frequency-band.

In an office environment, DECT devices can be used alongside Bluetooth® devices and WiFi due to the different frequency. Furthermore, DECT technology provides the user with good voice quality and superior mobility.

DECT phones and headsets can be used with traditional PBX telephone systems and VoIP-systems to achieve a clear voice quality and ease of use for employees.

Various factors influence the range and density of the devices, including the number of simultaneous users, the layout and design of the building, the type of technology in use and the number of devices using the same technology.

Facts about the DECT technology¹

Digital Enhanced Cordless Telecommunications (DECT™) is the ETSI (European Telecommunications Standards Institute) standard for short-range cordless communications, which can be adapted for many applications, including voice, data and networking applications and can be used over unlicensed frequency allocations world-wide.

The most common spectrum allocation is 1880 MHz to 1900 MHz, which is used in Europe. This spectrum is unlicensed and exclusively for technology, which ensures an interference-free operation.

In the United States, the FCC (Federal Communications Commission) changed channelization and licensing costs in 1920 MHz–1930 MHz, or 1.9 GHz, known as Unlicensed Personal Communications Services (UPCS), allowing DECT devices to be sold in the U.S. with only minimal changes².

1) Please refer to www.etsi.org and www.dect.org for more information.

2) The US DECT standard is also known as DECT 6.0 (created by DECT Forum).



Advantages of DECT solutions

Mobility, comfort and communication are major advantages of DECT solutions that lead to improved staff efficiency and productivity. The ability to answer calls when away from a desk as well as being able to use both hands for other tasks can boost job satisfaction and help to create a pleasant working environment.

Additionally, a DECT solution does not interfere with 2.4 GHz WiFi, whereas a Bluetooth® solution does. This means that it is possible to have more users in the same area when a DECT solution is used.

Density – communication without interference

Density is a keyword when you are planning the deployment and use of wireless communication technology. Density refers to the number of DECT devices in use in a specific area.

DECT devices share the number of channels available on the radio spectrum when they are within close range of each other, which therefore puts a limit on the number of DECT devices that can be in use at once. When this limit is exceeded, it can result in break-ups in the audio quality or delays when creating a link to the DECT headset.

Many factors influence the transmission power, or the number of channels on the radio spectrum, that a product is using. One factor, for example, is roaming range. The farther away from their respective base a headset is being used, the more transmission power it takes, leaving less radio spectrum remaining for other devices. Therefore, as roaming range increases, density decreases.

Considerations – quantity of DECT units

There is a fixed number of channels available for DECT devices. The number of channels is not equivalent to the number of units you can deploy in your business. Various factors influence whether you can deploy more or fewer DECT devices. The most important factors are:

- DECT standard (frequency band)
- Office routines
- Simultaneous users
- Office layout and location
- Products deployed

DW Series



D 10 Series



Sennheiser DECT wireless headsets – DW Series and D 10 Series

Experience the quality of freedom

Sennheiser professional wireless headsets are the ultimate DECT communication tools. With the focus on ergonomic perfection in wearing style and the well-being of users, DW Series and D 10 Series headsets have been specially designed to meet the needs of all-day users and experienced professionals working in noisy environments, where the benefits of switching from wired to wireless are biggest.

The wireless range for Sennheiser DECT headsets is up to 55 meters/180 feet in typical office buildings and up to 180 meters/590 feet in line of sight. Users can choose from a wide range of variants based on their preference for wearing style and phone connectivity.

The figures below illustrate that office layout and location can have a major impact on DECT density and therefore can influence how many headset users can be on the calls simultaneously.

Figure 1. Horizontal office layout

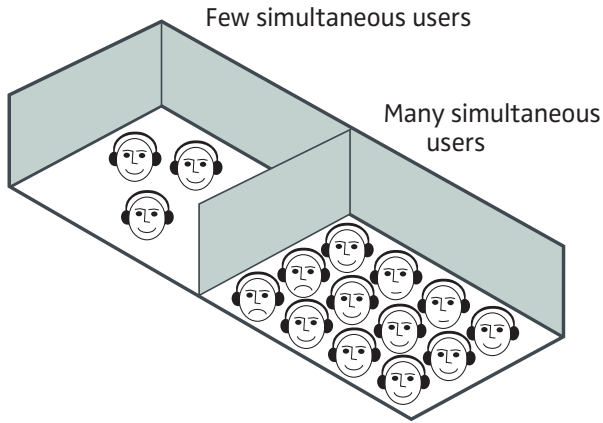
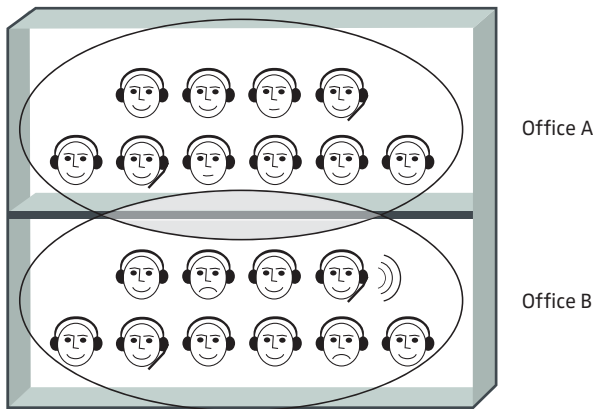


Figure 2. The DECT density can also be affected from Office A to Office B and vice versa.



Office routines

Sennheiser DECT headsets are “intelligent” because they adapt to the usage by deploying different channels and increasing the transmission power the further away they are from their base units. In other words: Office work routines have an effect on the density of DECT devices. The more desk workers who mainly stay at their desks, the more devices can be used simultaneously.

Simultaneous users

There is a huge difference from company to company when it comes to call utilization. In some companies only a few employees use the phone at the same time whereas the staff of busy contact centers are constantly on the phone. The number of concurrent users plays a large role in determining the number of possible DECT units at one location.

Office layout and location

The office layout and location can have a major impact on DECT density and range, and therefore have an impact on how many headset users can be on calls simultaneously and the range those users have.

The horizontal layout, walls, hallways, conference rooms, angles and other obstacles are just some of the examples of factors that might limit the range of the DECT units. The same applies for the building materials that have been used. A solid concrete wall limits the radio signal more than a window.

Just as these different factors reduce the range within your office, they also lower the interferences from neighboring offices (in the horizontal layout).

DECT density can also be influenced by other companies above or below. If we look at the vertical location of the office, the number of units and the range for each unit will decrease if companies on the other floors also use DECT technology. How much, is determined by the size of the DECT solution and factors like building materials.

Products deployed

DECT is an industry standard and all DECT-products must comply with the relevant regulations and standards. However, there are major differences in the quality of different headset models and manufacturers, which also have an impact on the maximum number of units deployed and their user range.

A guideline

At Sennheiser we have made a rough guideline for the maximum number of DECT units that can be deployed at one location. However, as mentioned above, certain considerations need to be taken into account when planning the deployment of DECT technology.

ESTIMATED MAX. NUMBER OF UNITS PER LOCATION*	
Large office environment	Europe/APAC** DW & D 10 Series
Contact Centers When 90 % of the users spend most of the time on calls	200 units
Offices When up to 40 % of the users call at the same time	360 units
<small>* Location is defined as an open office environment which is not interfering with another area using a DECT system. The estimated max. number of units per location is based on the maximum optimization of DECT units (combination of narrowband and short-range mode), which is described on page 7 of this white paper. ** With exception of Japan which has another DECT standard.</small>	



How to increase the number of Sennheiser DECT headsets in use

Typically, the number of employees increases when a company expands. This will often lead to the use of more headsets in the office and thereby increase the density. In many cases, this is not a problem but if the number of simultaneous users increases dramatically it may be necessary to address the issue.

Today, it is possible to deploy a larger number of DECT units in one area by making a few choices regarding the DECT devices.

Choose short-range mode

This means that you choose a shorter range (approximately 5–10 meters / 16–32 feet in high density) for each device. The employee will not be able to use the full range, but in reality this is often not a problem.

Choose narrowband mode

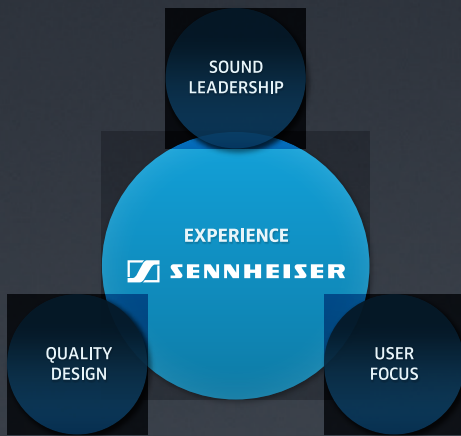
Wideband mode (150–6.800 Hz) delivers a better voice quality but it also occupies two of the available DECT channels on the radio spectrum. The number of channels cannot be increased which makes narrowband mode (300–3.500 Hz) a good option for majority of landline calls. The voice quality is still good and each device only occupies one DECT channel. A unique feature of Sennheiser DECT headsets is that they can operate in narrowband even in PC mode.

Close the audio connection when you are not in a call

The auto link function of the Sennheiser DECT headset automatically links the headset with the base station when the headset is taken out of the charger. To secure maximum DECT capacity, headsets need to be put back into the cradle when not in a call. This closes the link to the base station and thereby frees up DECT channels, making it possible to deploy more units in the same office environment.

Enjoy music via headphones

It is very convenient to use a DECT headset when listening to music but it makes a lot of sense to switch to wired headphones instead. This is because the music takes up two DECT channels on its own and limits the total number of devices. Encourage the users to only use headsets for communications and enjoy music with headphones.



Experience Sennheiser

Perfection is always relative: Users have different expectations from their headsets and speakerphones depending on their needs. For professional users, that need is to communicate as effectively as possible.

With Sennheiser's range of headsets and speakerphones, the combination of exceptional HD sound, quality design and build – and a focus on real life usability – give the best performance possible in busy offices, contact centers and Unified Communications environments.

See more at www.sennheiser.com/cco



Sennheiser is one of the world's leading manufacturers of headphones, microphones, wireless transmission systems and high-quality headsets for both business and entertainment.

Drawing on the electro acoustics expertise of Sennheiser and the leading hearing healthcare specialist William Demant, Sennheiser Communications' wireless and wired headsets and speakerphones for contact centers, offices and Unified Communications, professionals are the result of Sennheiser's and William Demant's joint leadership in sound quality, design, wearing comfort and hearing protection.

Sennheiser Communications A/S
Industriparken 27 · DK-2750 Ballerup · Denmark