Bluetooth™ Software Suite

BLUETOOTH INTRODUCTION

An introduction to Bluetooth wireless technology

Contents

About this document

This document will give you a short technical introduction to the Bluetooth™[1] wireless technology. You will find the answers to such questions as:

- What technical principles is the Bluetooth wireless technology based on?
- What is going on behind the features of a Bluetooth device?
- What is meant by the various technical expressions used in connection with the Bluetooth wireless technology?

This document is about the Bluetooth wireless technology in general. For information on how to install and operate your Bluetooth equipment, please refer to the installation and user's manuals.

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[1] The Bluetooth trademarks are owned by their proprietor and used under license.

What is Bluetooth?

Wireless communications

Bluetooth is a new technology that eliminates the need for cables between electronic devices: PCs, mobile phones, headsets, handheld computers, printers, local area networks, etc. The technology is based on short-range radio transmission on a globally available frequency. The Bluetooth wireless technology provides fast, reliable, and secure communications.
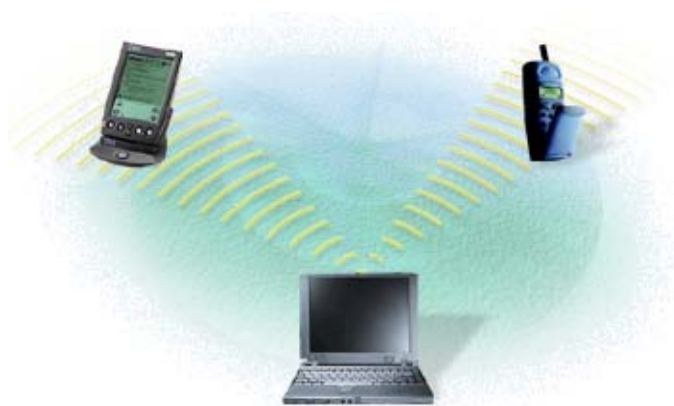
A little history

Originally invented in Scandinavia, the Bluetooth wireless technology was named after the Danish Viking king Harold Bluetooth. However, when the technology was launched in 1998, it was very much an international initiative. A handful of leading companies within the computer and telecommunications industry formed the Bluetooth Special Interest Group (SIG). The goal was for devices from different manufacturers to be able to communicate with each other. Today, a great number of companies have joined the SIG as adopters of the Bluetooth wireless technology, and the number is increasing all the time. The magnitude of industry involvement should ensure that the Bluetooth wireless technology becomes widely adopted.

Technical facts

Small size

The Bluetooth wireless technology does not require much space. In fact, the Bluetooth radio can be built into a small microchip and integrated in any electronic device where wireless operation would be an advantage.

Worldwide operation

You can use the Bluetooth wireless technology anywhere. The radio operates in the 2.45 GHz band, which is license-free and available to any radio system in the world.

Link establishment

You can establish a link between two or more devices almost instantly. The link will be maintained even if the devices are not within line of sight.

Robust link

The Bluetooth wireless technology provides a very robust link. The technology ensures that, under normal circumstances, you will not be bothered by interference from other radio signals operating in the same frequency band.

Data or voice

You can use a Bluetooth radio for data transfer or voice communication; or you can use it for both simultaneously.

Range

As already mentioned, the Bluetooth wireless technology is based on short-range radio transmission. The normal range of the Bluetooth radio is either 10 meters or 100 meters, depending on your Bluetooth equipment.

Bandwidth

A Bluetooth radio link has a maximum data transfer rate of 724 kbit/s, or three voice channels; the data rate for a voice channel is 64 kbit/s.

Security

Two advanced security mechanisms ensure a high level of security:

- Authentication prevents access to critical data and makes it impossible to falsify the origin of a message.

- Encryption prevents eavesdropping and maintains link privacy.

Low power consumption

The Bluetooth radio is very economical, limiting its output power exactly to what is actually needed. For instance, when transmitting to a receiving radio that is only a couple of meters away, the radio immediately modifies its signal strength to suit the small distance. The Bluetooth wireless technology consumes only a tiny bit of the power that eg. a mobile phone needs.

Interoperability

Interoperability refers to the ability of two devices to communicate with each other. Now, any Bluetooth device features one or more applications, known as profiles. For one Bluetooth device to be able to communicate with another, the two devices must have at least one shared profile. If, for instance, your Bluetooth device features the profile object exchange, you can exchange business cards with any other Bluetooth device that has the object exchange profile. Some other examples of profiles are: file transfer, serial port, and network.

Device discovery

When two or more Bluetooth devices are within range, a link can be established. However, first of all a Bluetooth device needs to discover the other Bluetooth devices that are active within its range. This operation is called device discovery. When another Bluetooth device responds, it supplies necessary information, some of which concerns its identity: the device name (eg. Adam) or the unique device address (eg. 00:50:CD:3A:4B:69). A link can now be established to the discovered device.

Wireless networks

Piconet

At the very heart of the Bluetooth wireless technology is the idea of forming small wireless networks known as piconets. When a Bluetooth device has established a link to one or more other devices, a piconet has been formed. The device that initiates a connection acts as the master. The other devices are slaves. The master controls all traffic in the piconet. Communication between slaves can only take place via the master. In the below example of a piconet, the laptop (master) transmits to the handheld computer (slave 1) and the mobile phone (slave 2):

Slave 1   Slave 2
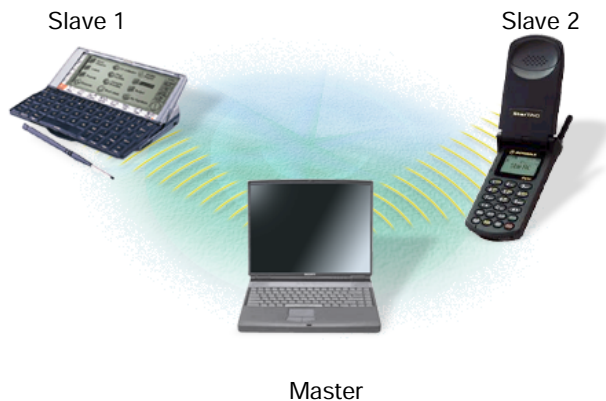
Master

One master, up to 255 slaves

As already mentioned, in a piconet there can only be one master. Furthermore, up to seven slaves can be active. However, there can be additional slaves which are not active but remain synchronized to the piconet. Such slaves are referred to as parked. A parked device can very quickly become active and begin communicating in the piconet. By swapping active and parked slaves, you can increase the number of slaves virtually connected to the piconet from seven to 255 devices.

Bluetooth in action

Unlimited possibilites

A technology that, like Bluetooth, eliminates the need for cables offers a great number of potential applications. The possibilities are virtually unlimited. Nevertheless, in some areas it is particularly obvious that the Bluetooth wireless technology is an ideal solution. This section gives you a few examples.

Three-in-one phone

Use the three-in-one phone for different purposes-–at the office, as an intercom; on the road, as a mobile phone; at home, as a portable phone.

Wireless headset

Use the wireless headset for hands-free operation of a phone-–in the car, in the office, or at home.

Synchronization

Automatic synchronization of eg. your PC, mobile phone, and handheld computer. An example: As soon as you enter the office, the calendar in your handheld computer is automatically updated to agree with the calendar in your office PC.

Internet bridge

Connect to the Internet no matter where you are, using a laptop and a mobile phone.

Bluetooth glossary

Authentication

Security mechanism that prevents access to critical data and makes it impossible to falsify the origin of a message.

Device address

The unique address of a Bluetooth device.

Device discovery

Before a link can be established, a Bluetooth device needs to discover the other Bluetooth devices that are active within its range.

Device name

The name that a Bluetooth device presents itself with when supplying identity information to another device.

Encryption

Security mechanism that prevents eavesdropping and maintains link privacy.

Master

The device that initiates a connection and, during this connection, controls all traffic in a piconet.

Park mode

Economical, low-power ''sub-mode'' of standby. In park mode, a slave does not participate in the piconet but remains synchronized to it. Park mode is used to increase the number of slaves connected to a master.

Piconet

A wireless network formed by two or more Bluetooth devices.

Profile

Application that a Bluetooth device facilitates. For one device to communicate with another, the two devices must have a shared profile. For instance, to transfer files from one computer to another, both computers must feature the file transfer profile.

Slave

A device in a piconet controlled by another device (the master).