



With so much information, discussion, speculation - and even controversy - surrounding the Bluetooth technology, we have decided to create an official Bluetooth SIG publication. The Bluetooth SIGnal is slated to be the official voice of the Bluetooth SIG and will be issued primarily in electronic form.

The Bluetooth SIGnal will be issued regularly and is aimed at keeping you informed on key issues surrounding

Welcome to the source

Rarely has the introduction of a new technology generated such extensive and sustained interest as that presented in the Bluetooth™ specification. This revolutionary wireless technology has succeeded in uniting the communications and computer industries, and has gained overwhelming support from many other industries. Since the formation of the Bluetooth Special Interest Group (SIG) in early 1998, over 800 companies have joined the founding members (Ericsson, IBM, Intel, Nokia and Toshiba) to build one of the largest industrial organizations ever to promote a new technology.

the development, introduction and application of the Bluetooth technology. Typical subjects covered can be seen in this first issue, and suggestions and feedback are welcomed at: bluetooth@pyramid.se.

With your help, we expect that this publication will become a valuable information channel on all aspects of the Bluetooth technology.

The Bluetooth SIG

The Bluetooth Qualification Program

The aim of the Bluetooth Qualification Program is to protect the value of the Bluetooth technology and brand. This will be achieved through a combination of manufacturer declarations, product performance testing, and interoperability testing.

But before a manufacturer can release Bluetooth-enabled devices on the global

market, two parallel compliance procedures will have to be carried out:

1) The **Bluetooth Qualification Program** to ensure that the product complies with the Bluetooth specification. When this has been approved, an adopter company can take advantage of a Bluetooth license covering patent rights and will be allowed to use the Bluetooth brand on products and in marketing activities.

2) **Regulatory type approval** to verify that a device conforms to a set of rules defined in diverse national or international regulations. The type approval is a mandatory requirement and the manufacturer's sole responsibility in order to gain a license to sell the device on a national or regional market.

>> STORY CONTINUES >>

As the Bluetooth SIG organizes and runs the Qualification Program, it is the same worldwide. However, there is no harmonized approval procedure available for regulatory type approval (unlike e.g. GSM and EU). Therefore this will entail many different requirements and procedures for approval of Bluetooth-enabled devices in different countries.

What has to be qualified

Complete compliance requirements in the Bluetooth specification cover the radio link, protocols (lower layers), profiles and information to end-users. A profile defines how to use the protocol stack for a certain usage model and is the primary means of achieving interoperability. The generic profile is mandatory. Bluetooth accessories, such as a PC Card or USB dongle, have to be submitted for complete qualification installed in a host device.

Bluetooth components, like a Bluetooth module to be permanently mounted in a computer, may be pre-qualified as a reference design. The discretion as to what tests can be omitted when qualifying the final product lies with the testing house. No qualification is needed for development or demonstration tools. However, the manufacturer should check and guarantee compliance of the tools to the Bluetooth specification and inform the public that the product has not passed the official qualification program. When this has been done, the manufacturer will be put on the approved list by the BQTF and allowed to use the Bluetooth brand according to the Bluetooth Brand Book.

The organizational structure

The structure of the Qualification Program is now being worked out. It is expected that the initial qualification process will be launched around October 1999, with the full Qualification Program targeted for mid-2000. The strategies being followed are:

- to create a stable framework and process for product qualification

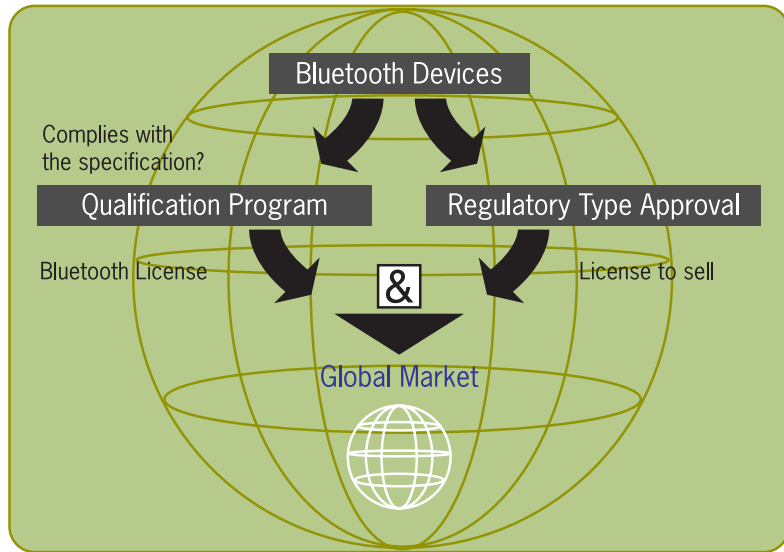


Fig.1 The two parallel compliance procedures.

- to establish institutions needed to execute the program
- to publicize the qualification requirements
- to initialize the qualification test facilities.

As part of the qualification process a manufacturer must provide an Implementation Conformance Statement (ICS) which specifies the Bluetooth capabilities that are built into a product.

The ICS will determine the scope of testing by the test facility. When a Bluetooth-enabled product has been approved, the manufacturer must issue a Declaration of Compliance with the Bluetooth specification as well as documentation containing the precise product description.

The chain of authorization of the different units in the Qualification Program and the initial Bluetooth qualification

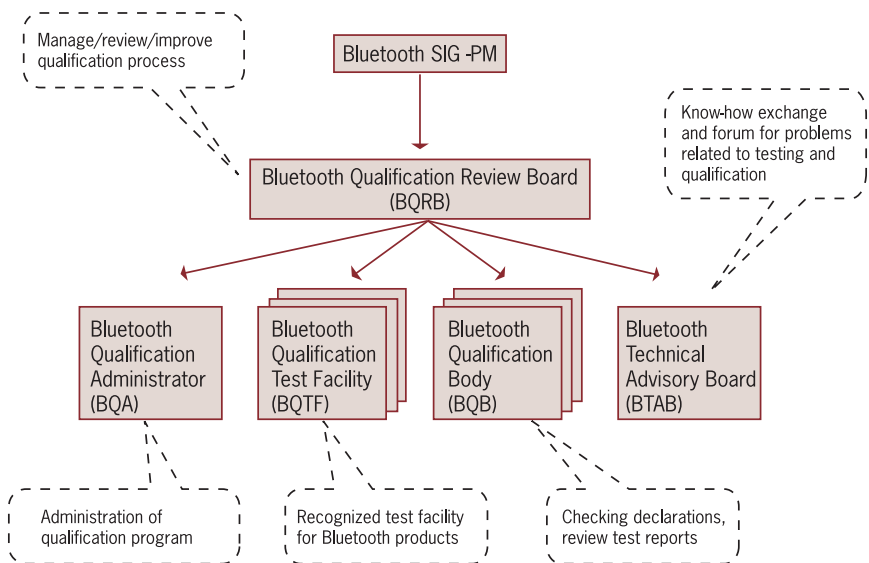
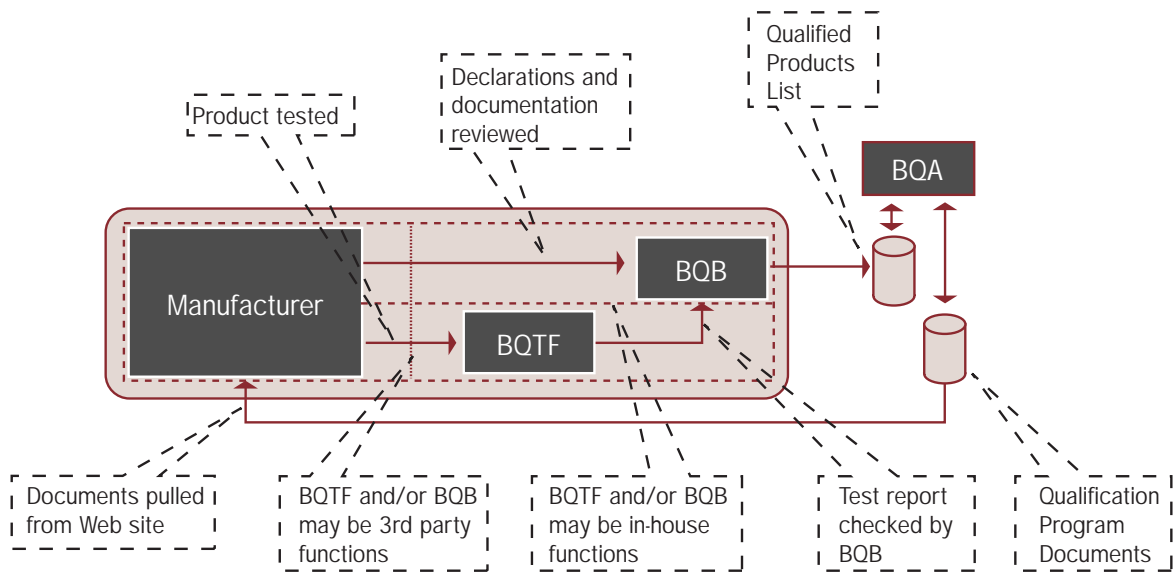


Fig.2 Authorization in Qualification Program



process can be seen in the Figures 2 and 3. Testing may be carried out by approved test facilities run by adopter companies or by an independent external organization

But what happens now?

Although the full Qualification Program is targeted for mid-2000, provision is made to manage the introduction of

"early products" to promote the development and spread of Bluetooth-enabled devices. For example, small deviations from the specification will be allowed if the product is not expected to cause any significant interoperability problems in the market. A manufacturer will also be permitted to perform and report parts of the testing procedure.

The conditions for early product

qualification will be published soon on the official Bluetooth website.

A summary of the qualification procedures can be seen in Table 1.

Table 1 A summary of the qualification procedures.

Subject	Early Qualification Proposals	Final Qualification
Regulatory type-approval	Yes	Yes
RF-link	Basic RF test by BQTF	Full RF test by BQTF
Protocol testing	By manufacturer	Baseband, LM and L2CAP by BQTF
Profiles	By manufacturer who publishes deviations	By BQTF
Ad hoc interoperability test event	Mandatory attendance of at least one event no later than 6 months after shipping	Mandatory attendance of at least one event no later than 6 months after shipping, if required
Information to end-users	Claim compliance against other products	Claim compliance against other products

Accelerating time to market

To many, the most important benefit of the recently introduced Bluetooth Development Kit is that it turns the intangible technology specification and flood of media information into concrete reality.

As seeing is believing, use of the kit for demonstration purposes will not only convert the skeptics, but it will also facilitate the understanding of the Bluetooth technology. In addition, the kit acts as an evolutionary springboard by enabling early adopters of the Bluetooth technology to accelerate the time to market of their products and applications, and to cut development time and cost.

A flexible toolkit

The ultimate goals of the kit are to ensure that the Bluetooth technology spreads rapidly within electronic companies of all sizes and to promote its application. The kit comprises a set of tools providing a flexible design environment for engineers to integrate the Bluetooth technology into a range of electronic devices.

Two development circuit boards are needed to allow device-to-device testing by transmitting receiving of data and voice signals. This means that engineers can now construct appropriate hardware interfaces between their products and the Bluetooth development boards for creating the Bluetooth-enabled software needed for integration into a product range.

Ericsson designed the Bluetooth Development Kit in cooperation with Symbionics. Other development tools available range from Bluetooth radio and link controller to a complete Bluetooth module including a high-speed USB interface.

What's inside?

Basically, the hardware of the Bluetooth Development Kit consists of:

- Radio module
 - 0 dBm or 20 dBm RF module
 - Integrated antenna or SMA antenna connector

- ASIC link controller
 - 96-pin BGA baseband chip with embedded ARM. Option: 176-pin link controller with TRACE32 connector
 - Flash memory
 - JTAG connector for debug
- Motherboard
 - Audio interface; Codec, PCM i/o, handset connector
 - Data interfaces; USB, RS-232
 - Memory, glue logic, LEDs, monitoring pins
 - User board interface

Also included are the power supply, handset, serial cables and a Developer's Cookbook. The latter's recipes cover a variety of dishes, such as the Bluetooth technology tutorial, voice and data transfer application examples, information on the certification of products and a tutorial on antenna usage and propagation.

Information on the Bluetooth Development Kit can be found on: http://bluetooth.ericsson.se/ebc/c_devkit.asp

The Brand Book - protecting a valuable trademark

The aim of the Bluetooth brand is to provide licensees with competitive advantages by communicating the consumer benefits made possible by the Bluetooth technology in general, and how these benefits add value to the specific product applications of the OEM. Therefore as the Bluetooth brand will be a valuable asset to all licensees, it is important to ensure that the Bluetooth name and mark are used consistently and referred to throughout the product communications carried out by all licensees.

A marketing guide

In order to ensure uniform application, the Bluetooth Brand Book is now available to all licensees and those involved in marketing the Bluetooth technology. The purpose of this book is to support licensees in the use of the Bluetooth name and mark, and to guide all those involved

in communicating the consumer benefits of the Bluetooth technology.

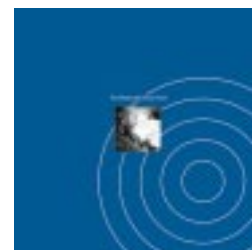
The Bluetooth brand itself consists of a number of different elements that both individually and together make up the brand. Different communication activities will demand different customer applications of the brand elements. The brand elements covered in the Bluetooth Brand Book are:

- The Bluetooth name
- The Bluetooth marks and tagline
- The animated Bluetooth mark
- Complementary Bluetooth jingles/sounds

The heart of the Bluetooth brand identity is the Bluetooth name, which refers to the Danish king Harald Bluetooth who brought Christianity to Scandinavia and unified Denmark and Norway.

Connective freedom

The Bluetooth brand conveys the promise of greater speed, freedom, security, simplicity, versatility and reliability in connecting technical devices. The most obvious advantage of the Bluetooth technology is that it gives people the freedom to create simple yet secure and reliable communication solutions through wireless connectivity. A digital copy of the Bluetooth Brand Book in PDF format will be available soon on the website: www.bluetooth.com



Putting it simply

How Bluetooth transceivers sidestep interference and fading

The Bluetooth system operates in the 2.4 Ghz ISM (Industrial, Scientific and Medical) radio frequency band, which is license-free in nearly all countries. Although globally available, each country has a specified set of frequencies that can be used for transmission. For example, in the USA and Europe (except Spain and France) the bandwidth is 2.400-2.4835 GHz.

This band carries a lot of traffic, among which can be found LAN networks, microwave ovens and remote control devices for garage doors. So how do the Bluetooth transceivers resist signal interference and fading in such a narrow transmission band? The answer is frequency hopping spread spectrum. Now let's simplify this mouthful.

A matter of synchrony

Frequency hopping chops the data signal up into small data packages that hop from frequency to frequency within the ISM band as a function of time. Bluetooth-enabled devices have a hop rate of 1,600 hops per second over 79 channels. This technique minimizes interference because other signals in the same band can only affect the spread spectrum resulting from frequency hopping if both signals are being transmitted simultaneously at the same frequency. Therefore the interference over

time is low, with consequent insignificant or zero bit errors. As frequency hopping over 100 channels is considered military secure in the USA, this technique also contributes to Bluetooth data security.

Although the hopping frequency may seem to be random, an algorithm has to be applied so that a receiver, hopping between frequencies in synchronization with the transmitter, can receive the message correctly.

In turn, different algorithms can be used to fine-tune the avoidance of interference by virtually ensuring that no two transmitters will hop to the same frequency at the same time.

A cost-effective solution

There is another type of signal interference technique called direct sequence spread spectrum, which spreads data packages across several frequencies at the same time, not in a sequence of time like frequency hopping. However, although both techniques have their own advantages, frequency hopping was chosen for the Bluetooth technology primarily because it is more cost-effective, consumes much less power, and several access points can coexist in the same area to transmit and receive signals. A number of direct sequence access points would block each other from transmitting.

Events

COMING UP

Sept 22-24

PCS, New Orleans

Oct 10-17

Telecom 99, Geneva

Nov 1-5

Embedded Systems, San Jose

Nov 4-5

3G Mobile, Sydney

Nov 15-19

Comdex, Las Vegas

Nov 30-5

Mobile Internet, London

Feb 28-1

CTIA's WIRELESS 2000

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It is sponsored by:

Ericsson
IBM
Intel
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Toshiba

The newsletter is produced by Pyramid Communication AB for the Bluetooth SIG 1999 °.

Suggestions and feedback on articles are welcomed at bluetooth@pyramid.se

Telefonaktiebolaget LM Ericsson is the sole owner of the Bluetooth brand, and has assumed the responsibility of protecting its name and mark through trademark registration.

Ask your question

In future editions of Bluetooth SIGnal, we will be answering a selection of the most frequently asked questions surrounding the development, introduction and application of the Bluetooth technology.

E-mail your question(s) to: bluetooth@pyramid.se under the heading: **Ask your question.**