



Bluetooth: Global Certification Requirements

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Understanding certification requirements can speed time to market for Bluetooth products.

Bluetooth is a low-power wireless technology deployed with radio equipment operating on the widely used 2.4 GHz spread-spectrum band. Bluetooth was developed to create an open specification for short-range radio for use in the mobile and business market segments. The technology provides transparent connection for mobile computing devices via a wireless modem, and documents can be sent at speeds up to 1 Mb/sec. Bluetooth can provide the same wireless connectivity expected from third-generation wireless (3G), as well as voice capability, at lower costs to the consumer. Unlike 3G, Bluetooth is available now and its first products are already appearing on the market. 3G products may still be two years away. Because users moving between locations are more likely to use data transactions at the starting and end locations rather than in transit, the potential for wireless local networking technology—Bluetooth—within offices and as a competitor to 3G is immense.

As manufacturers address the issues of equipment development and the new wireless connectivity protocol, one important factor to consider is time to market. This issue can best be addressed by understanding the Bluetooth qualification process. This article identifies the common product certification requirements applicable to equipment using Bluetooth, which will have a significant effect on a product's time to market.

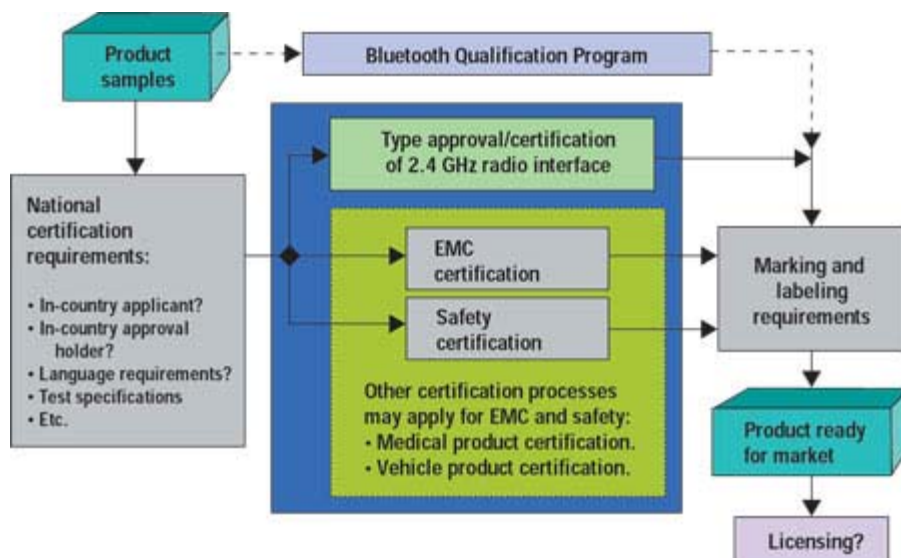


Figure 1. Product certification hurdles.

Certification

Two main sets of approvals requirements must be addressed before products using Bluetooth can legally be placed on the market. These requirements are the Bluetooth Qualification Program and product certification. Figure 1 shows the main certification hurdles for equipment incorporating Bluetooth.

Bluetooth Qualification Program. The aim of the Bluetooth Qualification Program (BQP) is to protect the value of the Bluetooth technology and brand. This is achieved through a combination of manufacturer declarations of conformity, product performance testing, and interoperability testing (see Figure 2). Compliance with the BQP is intended to ensure that a product complies with the Bluetooth specification and will successfully operate with other products claiming support of the same Bluetooth profile. The current Bluetooth specification, V1.0B, includes several profiles: generic access, cordless telephony, intercom, serial port, dial-up networking, headset, fax, and file transfer profiles. National type approval requirements also apply to Bluetooth products and are a primary requirement for market entry.

Product Certification Requirements. In general, three product certification requirements apply to Bluetooth products in most developed markets:

- Radio type approval of the RF transmitter/transceiver unit. In general, receive-only devices are exempt from type approval.
- EMC certification of the RF part, usually when installed within the host unit and relative to normal configuration and conditions of usage. Within the European Union (EU), the Radio and Telecommunications Terminal Equipment (R&TTE) Directive, 1999/5/EC, addresses the EMC requirements for radio products within its scope. The provisions within the EMC Directive, 89/336/EEC, may also be applied to demonstrate conformity with the requirements of the R&TTE Directive.
- Safety certification is usually dependent upon the operating voltages of the product and any associated power supplies. Within the EU, the R&TTE Directive addresses the safety requirements for radio equipment within its scope. However, the provisions within the Low-Voltage Directive, 73/23/EEC, may be applied to demonstrate conformity with the requirements of the R&TTE Directive.

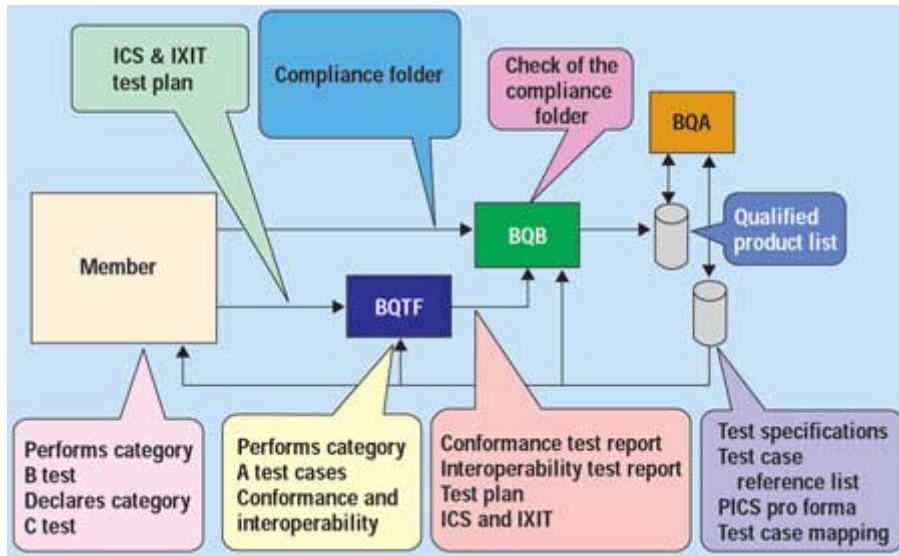


Figure 2. The Bluetooth Product Qualification Program.

Specific-absorption-rate (SAR) requirements may also be applied in some countries for certain applications. However, it is unclear at the moment how this will be applied, because test methodologies have yet to be agreed upon. Additional certification requirements may also apply, depending on the design of the equipment, its intended use, and the type of environment in which the product will be used (e.g., medical, vehicular, etc.).

Radio Type Approval Certification Requirements. Radio type approval is the process whereby the radio transmitter or transceiver unit is certified for use by a national regulatory authority. The main purposes of radio type approval are to ensure that the national radio spectrum is efficiently and effectively used, to prevent undue interference to other radio equipment in neighboring bands, and to make the regulatory authority aware of—and able to control—the type of equipment being placed on the market. The basic steps to radio type approval for Bluetooth products are as follows:

- Identify the permitted frequency bands and other technical parameters and specifications that apply to radio type approval and use of the Bluetooth product relative to the 2.4 GHz band within the intended country of sale. Type approval will not be granted if the product operates outside the frequency bands allocated to a specific product type and usage.
- Identify the type approval certification process applicable to the Bluetooth product within the intended country of sale, along with any other certification requirements.
- Arrange the type approval certification of the product. If radio type approval is needed, testing is generally required at a test laboratory, accredited by the country of interest, prior to submission of the application pack and compliance test report. However, some regulatory processes do differ.

National Frequency Allocations of the 2.4 GHz ISM Band. To obtain type approval, it is essential that the product operate only within a permitted frequency band. Because Bluetooth is inherently designed to operate on the commonly available 2.4 GHz band—one of several industrial, scientific, and medical (ISM) bands—it is important to determine for each target market that the 2.4 GHz band is available, as well as the specific restrictions on the use of the band. Though the 2.4 GHz ISM band is in principle designated within all ITU-R countries, there are exceptions and variations. Table I identifies the bands permitted to Bluetooth products within a number of key countries and markets.

National Radio Type Approval Requirements. Most developed countries require national type approval of low-power radio products. With respect to Bluetooth products operating in the 2.4 GHz ISM band, mutual recognition of type approval is possible within three CEPT (Conférence Européenne des Administrations des postes et des télécommunications) countries since April 8, 2000 (see the section titled Nonharmonized Frequency Band). A number of less-developed countries within the Asia-Pacific region, Africa, and South America have no type approval requirements for low-power (short-range) radio devices. Licensing requirements, however, may exist.

Several countries publish a schedule of technical parameters for short-range devices, against which it is the responsibility of the entity placing the product on the market to ensure product compliance. Where this process exists, certification via a regulatory authority is not usually required. Hong Kong and Australia both publish schedules of exemption by which type approval is not required per se. A discussion of the requirements within select key markets follows.

| Countries | Nationally Designated 2.4 GHz Frequency Band (Note 1) | Maximum Power e.i.r.p. (Note 2) | Notes |
|----------------|---|---------------------------------|--|
| Australia | 2.463–2.4835 GHz | 200 mW | Bluetooth requires full ISM band |
| Austria | Standard ISM band | Std. | |
| Belgium | Standard ISM band | Std. | |
| Bulgaria | Standard ISM band | Std. | |
| Croatia | Standard ISM band | Std. | |
| Czech Republic | Standard ISM band | Std. | |
| Denmark | Standard ISM band | Std. | |
| Estonia | Standard ISM band | Std. | General license has been issued |
| Finland | Standard ISM band | Std. | Individual user license required for HYPERLANs |

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|-----------------|---|-----------------------------------|---|
| France | 2.4465–2.4835 GHz Change to full ISM band agreed: Due Jan. 2001 | -20 dBW/MHz | Some geographical constraints for RLAN usage; number of channels = 35 |
| Germany | Standard ISM band | Std. | Type approval specification = BAPT 222 ZV 126 |
| Hong Kong | Standard ISM band | Max peak output power not greater | Minimum of 75 channels required |
| Hungary | Standard ISM band | Std. | Processing gain: min 10 dB; antenna max gain = 6 dBi |
| Iceland | Standard ISM band | Std. | |
| Ireland | Standard ISM band | Std. | |
| Italy | Standard ISM band | Std. | RLANs not currently included within the SRD category; use of SRD currently still subject to licensing |
| Japan | Standard ISM band now implemented (Previously only 2.471–2.497 GHz) | — | |
| Liechtenstein | Standard ISM band | Std. | |
| Lithuania | Standard ISM band | Std. | User licenses required |
| Luxembourg | Standard ISM band | Std. | |
| Netherlands | Standard ISM band | Std. | |
| Norway | Standard ISM band | Std. | |
| Portugal | Standard ISM band | Std. | |
| Romania | Standard ISM band | Std. | Deployed on a secondary basis |
| Slovak Republic | Standard ISM band | Std. | |
| Slovenia | Standard ISM band | Std. | |
| Spain | 2.445–2.475 GHz Change to full ISM band agreed in principle | Std. | No. of channels = 27 |
| Sweden | Standard ISM band | Std. | |
| Switzerland | Standard ISM band | Std. | |

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|----------------|-------------------|------|------------------------------------|
| Turkey | Standard ISM band | Std. | |
| United Kingdom | Standard ISM band | Std. | |
| United States | Standard ISM band | Std. | 2.5 hops/sec (per FCC Part 15.247) |

1. Standard ISM band = the full 2400–2483.5 MHz (2.4 GHz) band defined within CEPT/ERC/REC 70-03 Annex 3.
2. Std. = The standard CEPT/ERC/REC 70-03 100 mW e.i.r.p. (equivalent isotropically radiated power) maximum output power limit allocated to the 2.4 GHz band.

Table I. National frequency allocations for the 2.4 GHz ISM band.

The European Union

As of April 8, 2001, the essential requirements of the R&TTE Directive became mandatory. These product requirements relate to EMC, safety, and effective use of the radio spectrum.

Equipment now operating within a harmonized frequency band, and for which there is a harmonized standard, may now be placed on the market subject to provision of a declaration of conformity (DoC) stating compliance with the essential requirements of the R&TTE Directive. The procedures defined within the EMC Directive and the Low Voltage Directive may be used to demonstrate compliance with the essential EMC and safety requirements defined within the R&TTE Directive.

For radio local-area network (RLAN) products, the 2.4 GHz ISM band will become an EU harmonized band, once it has been fully implemented in France and Spain and the European Commission has designated products for use within the band as Class 1 equipment. Currently, products designated for use within the 2.4 GHz ISM band are classified as Class 2 equipment and are not harmonized throughout all EU member states.

The EU type approval standard ETS 300 328 is harmonized under the EMC Directive and has recently been issued as a harmonized standard under the R&TTE Directive (Article 3.2). Therefore, the directive's Annex III (declaration of conformity), Annex IV (technical construction file), or Annex V (full quality) routes to conformity may be used to establish compliance of a Bluetooth product or module.

Annex III—Declaration of Conformity. The Annex III route to conformity applies whenever a harmonized standard is used in part or in full. In accordance with Annex II of the directive, a manufacturer or its authorized representative legally based within the EU must affix the CE mark to each product and draw up a written DoC to the directive, in addition to compiling and holding a technical file. It is the responsibility of the manufacturer to take all necessary measures in the manufacturing process to ensure compliance of the product with the technical documentation and directive requirements. If neither the manufacturer nor its representative is established within the EU community, then the obligation to keep the technical documentation and DoC available falls to the person who places the product on the market. The technical file must be made available

upon request to the relevant national authority within any member state for inspection purposes. The file must be available for inspection for not less than 10 years after the last product has been manufactured.

In addition to the requirements defined under Annex II, the following requirements directly apply under Annex III of the directive:

- For each type of product, all essential radio test suites must be carried out by the manufacturer or on its behalf.
- Testing may be conducted by any suitable test facility, including the manufacturer's own, and no obligation exists to use a third-party or accredited test house. Use of a third-party or accredited test house may provide a measure of shared liability, but will not exempt from liability the entity responsible for placing the product on the market.
- If the test suites necessary to ensure compliance with the essential requirements are defined within the harmonized standard, use of a notified body or any other third party is not required.
- If the harmonized standard does not fully define all applicable test suites, the manufacturer must choose a suitable notified body and obtain the full set of test suites under contract with the notified body.
- Subject to completion of the above requirements, a manufacturer or its authorized representative established within the EU community must declare on the official DoC that the required tests have been carried out and that the apparatus complies with the essential requirements. Additionally, if a notified body has been used, the notified body's identity number must be affixed to the product, following the CE mark, during the manufacturing process.

Subject to completing the above process, Class 1 radio equipment, whose frequency of use is fully harmonized throughout all EU member states, may be placed on the community market (see the section titled Nonharmonized Frequency Band, below).

Annex IV—Technical Construction File. Conformity under Annex IV begins with the manufacturer approaching a notified body and identifying the essential radio test suites applicable to the Bluetooth product. These test suites must be carried out by the manufacturer or on its behalf. The notified body must be suitable under the R&TTE Directive and must be within an EU member state.

The manufacturer or its authorized representative within the EU must then compile a technical construction file (TCF) containing the documentation specified within Annex II. The TCF, together with a DoC, must be submitted to the chosen notified body. The notified body must respond within four weeks. On receipt of the opinion of the notified body, or after four weeks from the date of application, the product may be placed on the market subject to affixation of the notified body's identification number on the product. The manufacturer or its representative must maintain the TCF for a minimum of 10 years after the last product has been manufactured.

This process must be completed through a single notified body in order to place a product on the market within all 15 EU member states.

Annex V—Full Quality. As an alternative to the Annex IV route, a Bluetooth product operating on the 2.4 GHz ISM band may be certified under the full-quality route. A manufacturer must present an application to a notified body for assessment of the product's design and manufacturing quality system.

Nonharmonized Frequency Band (2.4 GHz ISM). Under the scope of the R&TTE Directive, equipment whose use is harmonized throughout all EU member states is defined as Class 1 equipment. Equipment whose use is not harmonized throughout all EU member states is defined as Class 2 equipment. Because the 2.4 GHz ISM band is not fully harmonized within all EU member states due to the band variations within France and Spain, Bluetooth equipment is currently designated as Class 2 short-range devices (SRDs). In addition to the requirements defined within the Annex III, IV, and V routes to conformity, the following Class 2 requirements apply to Bluetooth products:

- A manufacturer or its representative within the EU must notify the national authority within the relevant member state of the intent to place the product on the national market.
- The notification must identify the radio characteristics of the product and identification number of the notified body chosen with respect to Annex III, IV, or V. The national authority must respond within 28 days, after which the product may be placed on the national market. Any objections by the chosen radio authority should be resolved before the product is legally placed on the market.

These requirements will remain in effect until the 2.4 GHz band is fully harmonized within all EU member states.

CEPT Countries

Mutual recognition of type approval and adoption of regulatory requirements apply to Bluetooth products for use within CEPT member countries. The CEPT/ERC Recommendation 70-03, Relating to the Use of Short-Range Devices (SRDs), August 19, 1999, defines the permitted technical parameters applicable to the 2.4 GHz ISM band. For radio type approvals, ETS 300 328 is now recognized by CEPT and has since been superseded by CEPT/REC T/R 10-01.

Mutual Recognition of Type Approval—ERC/DEC (97)10. To obtain type approval in one CEPT member country and have the approval accepted within another member state, both member states must have implemented the "ERC decisions of the 30th June 1997 on the mutual recognition of conformity assessment procedures, including marking of radio equipment and radio terminal equipment" (ERC/DEC (97) 10). However, for mutual recognition of type approval to be valid, each member state must not only have signed up to the ERC/DEC (97)10, but also to the ERC decision applicable to the designated frequency band. The ERC decision applicable to the 2.4 GHz ISM band is ERC/DEC

(96)17, defined as follows: "ERC decision of the 1st November 1996, on the adoption of approval regulations for radio equipment to be used for wideband data transmission operating in the frequency range 2.4 GHz to 2.4835 GHz and using spread-spectrum techniques based on the European Telecommunications Standard (ETS) 300 328."

Since the implementation of the R&TTE Directive, the mutual recognition of type approval for Bluetooth products operating within the 2.4 GHz ISM band and certified within a CEPT member state to the ETS 300 328 specification is only applicable within three CEPT countries: Croatia, Slovenia, and Macedonia. To apply mutual recognition of type approval to a certified product for these countries, the type approval must have been issued within one of these countries. Then the product may be placed within the markets of either of the other two countries without further type approval requirements.

For all other CEPT countries, a separate type approval must be applied for via the national regulatory approval authority, based upon a compliant ETS 300 328 test report. Member states that have implemented the R&TTE Directive are exempt from this requirement.

Since the R&TTE Directive came into effect, the ERC decisions detailed above have ceased to be in effect within nine EU member states that had previously implemented mutual recognition of type approval. This is because radio type approval no longer exists for radio equipment falling within the scope of the R&TTE Directive. The current intent is to maintain the CEPT/ERC decisions applicable to Bluetooth, for the benefit of all CEPT member states outside the EU.

License Requirements. In accordance with CEPT/ERC/REC 70-03, the 2.4 GHz ISM band is generally license exempt within CEPT countries, as well as most other countries. This means that the user of type-approved radio equipment does not need a user's license to operate the equipment. However, this rule is subject to equipment operation in accordance with the permitted power limits and applicable parameters. Several exceptions are detailed in Table I.

Australia

The operation of spread-spectrum radio devices in Australia is governed by a class license under subsection 132(1) of the 1992 Radiocommunications Act. Subject to compliance with the requirements specified in the class license, the product may be placed on the market.

To operate under the class license, a spread-spectrum device must either meet the provisions of the European Telecommunications Standards Institute standard ETS 300 328, or the provisions of Section 15.247 of the Rules and Regulations of the U.S. FCC, excepting the provisions specifying frequency bands for operation and the provisions in 15.247(b), which relate to transmitter power and antenna gain.

Spread-spectrum devices operating under the class license must not cause interference to other radiocommunications services and will not be afforded protection from interference caused by other radiocommunications services. Neither will they be afforded protection from interference caused by ISM applications (e.g., microwave ovens) when operating in bands designated for ISM applications. The relevant ISM bands are 918–926 MHz, 2400–2500 MHz, and 5725–5875 MHz. Local residency requirements also exist.

New Zealand

The certification process in New Zealand is even simpler than within Australia. For low-power radio products operating within the permitted frequency bands, a letter of application and a declaration of conformity must be sent to the Ministry of Commerce. A letter of acknowledgement is issued in return. Local residency requirements exist.

United States

The requirements for Bluetooth radio products operating within the ISM band are fully addressed by the FCC Part 15 EMC certification process. Testing at an accredited test house is required, followed by an application for Part 15 certification. The filing process is now electronic, and applications may be submitted to one of a number of independent certification bodies, called conformity assessment bodies, appointed by FCC to manage certification.

Hong Kong

The Hong Kong regulatory authority for radio equipment, the Office of the Telecommunications Authority (OFTA), published "Information Note on Low Power Devices" (OFTA I 414 (99) Issue 2). The 2.4 GHz ISM band falls within the scope of this document. Type approval certification and labeling are therefore not mandatory for Bluetooth equipment operating within the permitted technical specifications. If a manufacturer wishes to apply for certification on a voluntary basis, a formal approval procedure must be followed. Subsequent to certification being issued, the official OFTA low-power-devices approval label must be affixed to the product.

Asia-Pacific, Africa, and South America

Many less-developed countries within regions such as the Pacific Rim, Africa, and South America have no type approval requirements for low-power radio devices. Where this is the case, it is wise to obtain written confirmation from the regulatory or government authority responsible for radiocommunications equipment before placing a product on the market. Usually, the product must be compliant with EMC and safety requirements.

Conclusion

To achieve the fastest time to market, it is essential that the certification hurdles are clearly understood for each country in which the product is intended for use. These hurdles include:

- The certification processes and bodies responsible for their administration.
- The identification of the applicable technical standards and specifications.
- The permitted technical parameters, including frequency bands and power levels.
- The acceptance of foreign test reports and standards.
- The test requirements and suitable laboratories.
- The marking and labeling requirements.
- The import and approval-holder requirements.

Where multiple processes apply, such as with the Bluetooth Qualification Program and type approval, as well as EMC and safety requirements, significant time can be saved if all processes are managed simultaneously.

Additional information on the Bluetooth qualification process can be found both at Bluetooth's old official Web site, <http://www.bluetooth.com>, which is soon to be defunct, or the new site operated by the Open Group, <http://www.opengroup.org/bluetooth>.

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