



Guide to U.S. Radio-Frequency (RF) Equipment Regulation:
*Your Comprehensive Guide for Ensuring Connected Devices Comply in
the Age of the Internet of Things (IoT)*

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Federal, State, and International laws and regulations governing communications are subject to change through legislation, court decisions, and regulatory decisions, policy shifts and rulemakings. Many such changes are often subject to adequate advance public notice before taking effect allowing time to adjust to any new requirements. However, recently, some changes are being effected with little or no advance notice. Before any major initiatives are undertaken the most prudent practice is to check on the current status of any applicable laws and regulations that may apply. Some of the content on this document may be considered Attorney Advertising under the applicable rules of certain states. Prior results do not guarantee a similar outcome.

INTRODUCTION



Businesses of all kinds are rapidly realizing that new value is to be had by connecting traditional products to the Internet. The Internet of Things (“IoT”) (*i.e.*, physical devices that can connect to the Internet wirelessly) is everywhere — in cars, in household appliances, even our bodies. We are in the midst of new developments that offer tremendous market potential. The Federal Trade Commission (“FTC”) estimates that by 2020 more than 50 billion connected devices will be part of the IoT.

The exponential growth of IoT is the result of manufacturers adding wireless modules into all manner of products, which subjects those products to radiofrequency (“RF”) equipment regulation by the U.S. Government. The Federal Communications Commission (“FCC”) can, and often does, impose significant penalties on manufacturers, importers, and other responsible parties that supply non-compliant RF products to the market. Ignorance of the regulations is no excuse.

Accordingly, we have prepared this Guide, which provides a high-level regulatory overview of RF equipment regulations and compliance requirements in the United States.

Virtually all devices that radiate RF energy and are manufactured, imported, and/or marketed in the U.S. are subject to stringent rules. This Guide provides valuable information concerning the pertinent RF equipment regulations. But, the rules themselves are varied and complex. Accordingly, this Guide is for informational purposes only and does not constitute legal advice.¹

The crux of all RF equipment rules is to ensure that proper safeguards are in place to prevent RF devices from causing harmful interference to other devices and communications operations in general. As such, the FCC enforces rules to ensure that RF devices are properly tested for

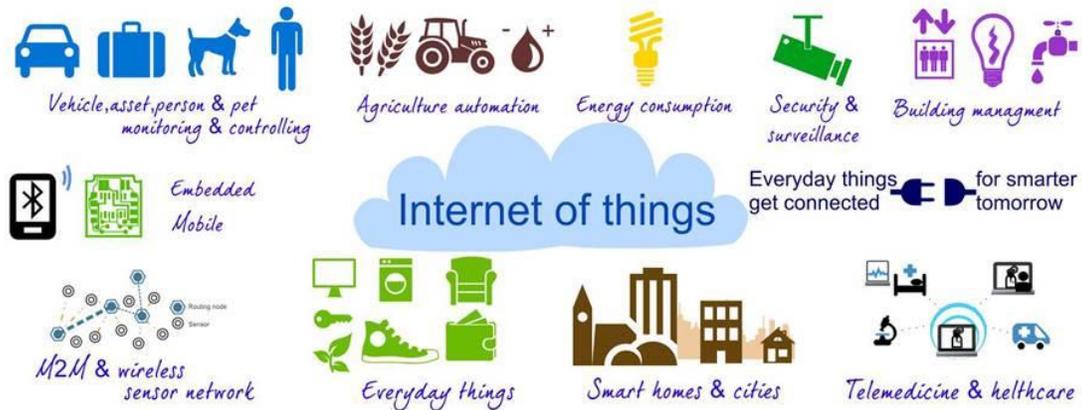
¹ This is not intended to create an attorney-client relationship between and you and Marshlian & Donahue, PLLC. Do not rely on the information provided in this Guide to determine your legal rights and obligations. You should seek the advice of a qualified attorney before attempting to market RF devices internationally or if you have any questions or concerns about your rights and compliance obligations.

conformity with the applicable technical standards, authorized, and labeled before they are imported or marketed in the U.S.

Failure to comply with the applicable regulations typically results in FCC enforcement proceedings, substantial fines, the banning of non-compliant products from the market, and other severe sanctions. Therefore, all potentially responsible parties should ensure that their equipment is in compliance with the applicable regulations at all times.

The information in this Guide will help the responsible parties understand and comply with applicable regulations. But, the compliance process itself is quite complex and time-consuming. Accordingly, enlisting the services of an experienced and efficient legal counsel or consultant for support through the necessary regulatory procedures is highly recommended.

This Guide is current as of the date of publication. As noted below, the FCC is currently reviewing comments in a rulemaking proceeding that will result in a number of changes to its equipment authorization rules. The new rules will likely take effect in Q2 or Q3, 2016. Subsequent editions of this Guide will include regulatory updates concerning the FCC's new rules.



About The CommLaw Group

The *CommLaw* Group is unique among its peers, offering clients a scope of capabilities rarely found in boutique law firms. With a headcount rivaling the Telecom Practice Groups of most major law firms, we boast a team of attorneys, paraprofessionals and consultants possessing the skills, focus, and resources necessary to serve the communications law needs of Fortune 100 companies, all without sacrificing the range of services and affordability which makes us the “go-to” firm for new entrants and service providers of all sizes.

In association with [The Compliance Group](#), which specializes in fixed-fee licensing and compliance services tailored to the communications industry, The *CommLaw* Group offers businesses the “Full Spectrum” of legal, regulatory, administrative, and consultative services.

The *CommLaw* Group was recently profiled in The Wall Street Journal as one of the [Capital Region's Premier Law Firms](#).

Contact Us for Assistance

If you would like additional information concerning RF equipment regulatory issues or are interested in a legal consultation with Marashlian & Donahue, please feel free to call us at (703) 714-1305. Or, email Ronald E. Quirk, Jr. at reg@commlawgroup.com. Consultation with knowledgeable counsel and/or consultants would be helpful to any company looking to avail itself of the opportunities in this marketplace. Successful ventures depend not only on solid business planning, but also proactive regulatory compliance to avoid being caught in the crosshairs of a regulatory enforcement body.



17 'Internet Of Things' Facts Everyone Should Read

Published October 27, 2015

By: [Bernard Marr](#)

[The Internet of Things](#) is here and it's growing rapidly. Internet of Things (IoT) or Internet of Everything (IoE) refers to devices or objects that are connected to the Internet, like your smartwatch, Fitbit, or even your refrigerator. These devices are able to collect and transmit data via the Internet, contributing to our [big data world](#).

[Smart, connected devices](#) are already transforming our world and the competitive forces in business. To demonstrate how fast this sector is growing and what an impact it will have on our lives and business, I've rounded up 17 of the most mind-boggling IoT numbers and stats that prove that the phenomenon is here and here to stay.

1. The majority of people ([87%](#)) have not heard of the term 'Internet of Things'.
2. ATMs are considered some of the first IoT objects, and went online as far back as [1974](#).
3. Back in [2008](#), there were already more objects connected to the Internet than people.
4. This year, we will have [4.9 billion connected things](#).
5. And some predict that by 2020, the number of Internet-connected things will reach or even exceed [50 billion](#).
6. In 2015, over [1.4 billion](#) smart phones will be shipped and by 2020 we will have a staggering [6.1 billion](#) smartphone users.
7. The IoT will connect many of the devices we have in our homes, from smart thermostats to smart fridges. Companies like [Google GOOGL -0.95%](#) and Samsung understand this. Google bought smart thermostat maker, Nest Labs, for [\\$3.2 billion](#), and Samsung purchased connected home company SmartThings for \$200 million.
8. By 2020, a [quarter of a billion vehicles](#) will be connected to the Internet, giving us completely new possibilities for in-vehicle services and automated driving.
9. In fact, we already have cars that can drive on their own – Google's self-driving cars currently average about [10,000 autonomous miles per week](#).
10. The global market for wearable devices has grown [223%](#) in 2015, with Fitbit shipping 4.4 million devices and [Apple AAPL -0.84%](#) selling 3.6 million Apple [Watches](#).
11. And yes, Internet-connected clothing is coming. [Estimates](#) predict that 10.2 million units of smart clothing will ship by 2020, compared to a meager 140K units in 2013.
12. Today, the market for Radio Frequency Identification (RFID) tags, used for transmitting data to identify and track objects, is worth \$11.1 billion. This is predicted to rise to [\\$21.9 billion in 2020](#).
13. Machine-to-machine (M2M) connections will grow from 5 billion at the beginning of this year to [27 billion by 2024](#), with China taking a 21% share and the U.S. 20%.
14. GE believes that the "Industrial Internet" (their term for IoT) will add [\\$10 to \\$15 trillion](#) to global GDP in the next 20 years.
15. According to estimations by the McKinsey Global Institute, the IoT will have a total economic impact of up to [\\$11 trillion](#) by 2025.

16. Having a connected kitchen could save the food and beverage industry as much as [15%](#) annually.
17. CISCO believes the IoT could generate [\\$4.6 trillion](#) over the next ten years for the public sector, and \$14.4 trillion for the private sector.

The IoT is only going to grow. I believe that currently less than 0.1% of all the devices that could be connected to the Internet, are connected to the Internet. Just think of the tremendous potential and limitless opportunities this brings for business and society.

Bernard Marr is a best-selling author, keynote speaker and business consultant in big data, analytics and enterprise performance.

The *CommLaw* Group Wants You to Read a Few More Facts About the 'Internet Of Things' ...

18. Virtually every single IoT device that connects to the Internet ("Connected Device") is a device that emits "Radio-Frequency" (RF) energy.
19. All RF-emitting Connected Devices are subject to diverse and stringent Regulatory Requirements, not just here in the United States, but around the globe.
20. The Rules, Regulations and Governmental policies governing the licensing, authorization, import/export, and marketing of RF-emitting Connected Devices are complex and the consequences of non-compliance are severe.

The *CommLaw* Group's Guide to U.S. Radio-Frequency (RF) Equipment Regulation should be every IoT company's first stop to ensure the Connected Devices they manufacture, market and sell are in compliance with the rules, regulations and policies associated with their products and services.

ABOUT THE AUTHORS

Ronald E. Quirk, Jr., Senior Managing Attorney at Marashlian & Donahue, PLLC, The CommLaw Group, focuses his practice primarily on federal, state, and international telecommunications regulation and policy, with a particular expertise in assisting clients navigate the complex labyrinths of radiofrequency ("RF") equipment authorization and enforcement processes around the world. Mr. Quirk brings extensive legal experience to his current client representation. His career spans more than 20 years, including several years at AMLAW 100 firms and the Federal Communications Commission ("FCC"). He has successfully represented clients ranging from solo proprietorships to Fortune 500 corporations, in matters before the FCC, Department of Justice ("DoJ"), Department of Transportation ("DoT"), Food and Drug Administration ("FDA"), state public utility commissions ("PUCs"), international regulatory entities, and state and federal courts.

Marashlian & Donahue, PLLC, [The CommLaw Group](#), is not your ordinary law firm. Together with [The Compliance Group](#), its affiliated consultancy, The CommLaw Group is a professional services "organization" that was specially designed and staffed to service the full-range of legal, consulting and compliance needs of the telecommunications, broadcast, information technology and Internet services and manufacturing industries. Boasting a vibrant and diverse communications law practice, The CommLaw Group currently serves hundreds of clients throughout the U.S. and internationally. The firm's loyal base includes clients of all shapes and sizes, from start-ups to Fortune 100 enterprises, and from practically every sector of the communications and info tech industries. The firm also serves the intellectual property, privacy, cyber-security, litigation and general business law needs of its clientele.

In 2005, anticipating the seismic shift in the market for effective, yet affordable legal services, The CommLaw Group set out to engineer its one-of-a-kind, "[Full Spectrum](#)" professional services business model. The ground-breaking processes developed by the firm enable it to provide value-driven, high-quality professional services that deliver business-savvy solutions for reasonable, predictable, task appropriate costs; all provided with the customer-friendly approach that has become the firms' hallmark characteristic.

The CommLaw Group is led by its founder and managing partner, Jonathan S. Marashlian, an AV Preeminent Rated, nationally-recognized expert in the areas of communications taxes, regulatory fees, regulatory litigation, audits, advocacy and defense. Winner of a SmartCEO Executive Management Award for his [innovation and leadership](#) in the legal profession, Mr. Marashlian also earned multiple [Client Choice Awards](#) by Lexology/International Law Office; named overall winner in the Telecommunications Law – USA category.

The CommLaw Group is the recipient of several ACQ Law and ACQ Global Awards and was named "Customer Service Law Firm of the Year" and "Best Communications Law Firm of the Year" in the U.S., and was profiled in the Wall Street Journal as one of Washington D.C.'s [Premier Law Firms](#).

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RF EQUIPMENT REGULATORY REQUIREMENTS

UNITED STATES

This Guide delineates the Federal Communications Commission's ("FCC" or "Commission") rules for the authorization and marketing of radiofrequency ("RF") equipment. The FCC has very strict and specific rules to ensure that RF devices are properly tested for conformity with the Commission's technical requirements, then authorized and labeled before they are marketed in the U.S.²

FCC WARNS: COMPLY BEFORE YOU MARKET!

The FCC has a very broad and comprehensive definition of "marketing" RF devices, including: "Sale or lease, or offering for sale or lease, including advertising for sale or lease,³ or importation, shipment, or distribution for the purpose of selling or leasing or offering for sale or lease."⁴ Strict compliance with the FCC's regulations is essential before marketing of RF devices may commence.

The FCC has, and will continue to, impose substantial fines and other sanctions on entities that market or operate RF devices in violation of the federal Communications Act and/or Commission rules. There is a base sanction of \$10,000 for willful violation of the Communications Act,⁵ as well as a \$500 per day fine for willful violation of FCC rules.⁶ Each non-compliant RF device that is marketed constitutes a separate violation.⁷

In recent years, the FCC has not been reticent about levying large financial sanctions on companies that market non-compliant RF devices; some of which have totaled in the hundreds of thousands of dollars.⁸ The Commission is currently levying record fines against suppliers of non-compliant RF equipment and other rule violators.⁹ The FCC has also been actively using its authority to order unauthorized or illegal RF devices off the market.¹⁰ Accordingly, it is critical that all responsible parties (as defined below) have a solid understanding of the FCC's rules and ensure compliance with them before introducing their RF devices to the U.S. market.

² See 47 U.S.C. §302(b). The FCC is currently conducting a rulemaking by which some of the rules delineated here will likely be revised. See *In the Matter of Amendment of Parts 0, 1, 2, 15 and 18 of the Commission's Rules regarding Authorization of Radiofrequency Equipment, Notice of Proposed Rulemaking*, 80 FR 46,900 (July 21, 2015). An update of this Guide will be provided once the new rules have been effectuated. That will likely occur in the second or third quarter of 2016.

³ "Advertising" includes traditional media advertising and other types of communications; even extending to a mere mention of the availability of a device on a company's website.

⁴ 47 C.F.R §2.803(a).

⁵ 47 U.S.C. §302(b).

⁶ 47 U.S.C. §501.

⁷ See 47 U.S.C. §502.

⁸ See e.g., *ASUSTEK Computer, Inc.*, 29 FCC Rcd. 9974 (2014); *Pilot Travel Centers, LLC*, 19 FCC Rcd. 23113 (2004).

⁹ The FCC is facing criticism from Republican lawmakers and getting pushback from industry over its eye-popping fines and other enforcement actions, but it's unlikely the agency will alter its aggressive tactics in response. The FCC's Enforcement Bureau levied a record-setting \$100 million proposed fine against AT&T this summer and has followed that up with several other multimillion-dollar fines. See "GOP Criticism Unlikely To Deter Aggressive FCC Enforcement," *Law360, Washington* (November 25, 2015).

¹⁰ See e.g., *Phong Le Company*, 28 FCC Rcd. 08188 (2013).

FCC Requirements and Equipment Classification

The testing and authorization requirements respecting RF devices vary considerably, depending on the FCC's regulatory classification of a given device. The more interference potential a device has, the more stringent the authorization requirements.

The FCC's rules include four general categories of regulated RF equipment, each with specific and unique interference prevention and regulatory approval requirements: (1) incidental radiators; (2) unintentional radiators; (3) intentional radiators; and (4) telephone terminal equipment ("TTE").¹¹

Incidental Radiators and Interference Safeguards

An incidental radiator is a device that generates some RF energy during its operation, but does not transmit or utilize RF energy for any purpose.¹² Incidental radiators include equipment such as mechanical light switches and DC current motors. These devices are very lightly regulated. The FCC requires only that manufacturers of incidental radiators employ "good engineering practices" to diminish the risk of harmful interference before marketing.¹³

Unintentional Radiators and Authorization Requirements

An unintentional radiator is a device that generates RF energy for use within the device or that sends RF signals by conduction to associated equipment via wiring, but does not transmit RF energy for any purpose.¹⁴ In general, any RF device (except an incidental radiator) that does not transmit RF energy is classified as an unintentional radiator.¹⁵ Examples of unintentional radiators include TV and radio receivers, personal computers and peripherals, central processing unit ("CPU") boards and power supplies, radio interface devices, battery chargers, radar detectors, as well as virtually any RF device containing a secure digital ("SD") card that does not contain a transmitter.¹⁶

Unintentional radiators that use digital techniques are subdivided into two categories:

- *Class A Digital Devices* - RF devices marketed for use in business and industrial environments.¹⁷
- *Class B Digital Devices* – RF devices marketed for use in residential environments.¹⁸

The FCC does not permit Class A Digital Devices to be marketed to the general public in any fashion.¹⁹ Because Class B Digital Devices are intended to be sold to the public, they are subject to more stringent RF interference protection standards than are Class A Digital Devices.²⁰ Accordingly, if a digital device is going to be marketed to the public, the responsible party should ensure that it is clearly categorized as Class B Digital Device when submitting the device to a laboratory for compliance testing and authorization.

¹¹ See 47 C.F.R. §§15.3(n),(o),(z);68.102.

¹² 47 C.F.R. §15.3(n).

¹³ 47 C.F.R. §15.13.

¹⁴ 47 C.F.R. §15.3(z).

¹⁵ *Id.*

¹⁶ See 47 C.F.R. §15.101.

¹⁷ 47 C.F.R. §15.3(h).

¹⁸ 47 C.F.R. §15.3(i).

¹⁹ See 47 C.F.R. §15.3(h).

²⁰ See *e.g.*, 47 C.F.R. §15.109.

Most unintentional radiators are subject to one of two types of pre-marketing authorization: (1) Verification; or (2) Declaration of Conformity ("DoC").²¹ The majority of unintentional radiator types are subject to Verification, but it is essential to be certain that the correct authorization procedure for a given device is utilized, as improper authorization can result in substantial financial penalties or other FCC sanctions. The FCC's rules list the specific types of unintentional radiators that are subject to Verification or DoC.²²

Verification

Verification is a procedure wherein the responsible party tests a device to ensure that it complies with the FCC's technical requirements and obtains documentation to prove compliance with the FCC's rules.²³ This is typically done by submitting a prototype and other required information to a testing lab, obtaining a Verification certificate from the lab (assuming the device passes the required tests) and retaining the certificate and testing records in case the FCC conducts an audit. Testing labs typically charge \$2,500 - \$5,000 for product testing, and the turnaround time is usually two weeks or less. There is no need to submit any information to the FCC unless requested.²⁴

Verification, and indeed all other forms of authorization,²⁵ "attach" to subsequently marketed devices. That is, all devices that are "identical"²⁶ to the tested and authorized prototype must comply with the FCC's rules when they are marketed or operated.²⁷ Hence, it is critical that responsible parties have strict quality control procedures in place to ensure that all identical RF devices marketed after testing and authorization comply with the pertinent FCC rules.

All devices subject to Verification must be labeled before marketing.²⁸ A label must be placed in a conspicuous location on the device and contain a statement that the device complies with Part 15 of the FCC's Rules and that operation is subject to two conditions: (1) it may not cause harmful interference; and (2) it must accept any interference received.²⁹ Additionally, the device's users manual or instructions must contain a warning to the user that unauthorized modifications could void the user's authority to operate the device.³⁰

The labeling requirements extend to advertising. All advertisements for RF devices (no matter how authorized) must include proper labeling information. Labeling is critically important, because a violation of this requirement is often the first thing that is noticed by competitors, which, when brought to the FCC's attention, will almost certainly trigger an enforcement action.

Declaration of Conformity

Declaration of Conformity is a procedure very similar to that of Verification: The subject device is tested for compliance with FCC technical requirements and (assuming the device passes the tests)

²¹ 47 C.F.R. §15.101(a).

²² *Id.* Examples of devices subject to DoC include PCs and peripherals, microwave ovens, radio receivers, and TV interface devices. A very few types of unintentional radiators are subject to Certification prior to marketing. The Certification procedure is described below.

²³ 47 C.F.R. §2.902(a).

²⁴ *Id.*

²⁵ As explained herein, the other forms of authorization are Declaration of Conformity and Certification.

²⁶ The FCC defines the term "identical" to mean, "identical within the variation that can be expected to arise as a result of quantity production techniques." 47 C.F.R. §2.908.

²⁷ 47 C.F.R. §2.902(b).

²⁸ 47 C.F.R. §15.19(a)(3).

²⁹ *Id.*

³⁰ 47 C.F.R. §15.21.

the responsible party obtains a DoC which must be retained in the event of an FCC audit.³¹ Unlike Verification (wherein any credible testing lab may be used), devices requiring a DoC must be tested by a laboratory accredited by the National Voluntary Laboratory Accreditation Program ("NVLAP"), the American Association of Laboratory Accreditation ("A2LA"), or an accredited laboratory designated by the Commission under the terms of a negotiated Mutual Recognition Agreement ("MRA") with other countries.³²

The labeling/user manual requirements for DoC-authorized devices require a "unique identifier" on the label, as well as the trade name of the product, the model number, and information as to whether the device was tested after assembling, or assembled from tested components.³³ All advertisements for DoC devices must contain the required labeling information.

Intentional Radiators and Authorization Requirements

The FCC defines an intentional radiator as a "device that intentionally generates and emits radiofrequency energy by radiation or induction."³⁴ Basically, any device that transmits RF energy is an intentional radiator.³⁵ Examples include cell phones, walkie-talkies, wireless connections, Bluetooth connections, short range broadcast equipment, wireless key-access systems, CB radios, and high-power transmitters such as commercial mobile two-way radio transmitters.³⁶

Intentional radiators are authorized by the Certification process.³⁷ A Certification is issued by an FCC-authorized Telecommunications Certification Body ("TCB") based on representations and test data submitted by the applicant.³⁸ Any entity seeking to obtain Certification of an RF device must comply with the following procedures.

First, the responsible party must obtain an FCC Registration Number ("FRN"). An FRN, which is required of all entities that do business with the FCC, is available for free by registering via the FCC's website.³⁹

Second, an FCC Grantee Code must be procured. A Grantee Code is a three or five digit code used to designate the manufacturer or other responsible party (referred to as the "Grantee") for Certified

³¹ 47 C.F.R. §2.906(a).

³² See www.fcc.gov/oet/ea/procedures.html.

³³ See 49 C.F.R. §§2.1074, 15.19(b).

³⁴ 47 C.F.R. §15.3(o).

³⁵ *Id.*

³⁶ Many types of low power, unlicensed RF devices are subject to the FCC's Part 15 rule technical requirements. Low power industrial, scientific and medical equipment are subject to Part 18 technical requirements. Higher-powered, licensed devices are subject to the technical requirements in various other rule sections: (a) Part 22 (cellular and other commercial mobile radio services ("CMRS")); (b) Part 24 (personal communication service ("PCS")); (c) Part 25 (satellite); Part 27 (miscellaneous wireless services); (d) Part 73 (broadcast); (d) Part 74 (broadcast translators and boosters); (e) Part 80 (VHF transceivers and maritime radio); (f) Part 84 (respiratory protective devices); (g) Part 87 (aviation devices); (h) Part 90 (private land mobile devices); (i) Part 95 (personal radio devices); (j) Part 97 (amateur radio services); and Part 101 (fixed microwave devices).

³⁷ 47 C.F.R. §2.907(a).

³⁸ 47 C.F.R. §2.907(a).

³⁹ See www.fcc.gov/help/getting-fcc-registration-number-frn-universal-licensing-system-uls.

RF devices.⁴⁰ A Grantee Code, which currently costs \$65.00, may be obtained by an online application through the FCC's website.⁴¹

Third, a permissible operating frequency for the device must be chosen. Because many frequencies have restrictions on their use, it is advisable to review the FCC's Table of Frequencies to determine which would be the most desirable frequency or frequencies on which an intentional radiator can operate.⁴²

After choosing the appropriate frequency, a production-ready device should be sent to an FCC-accredited laboratory for testing to ensure compliance with the applicable FCC rules.⁴³ The lab tests for compliance with FCC requirements concerning output power, harmonics, and RF emissions.⁴⁴

After testing is complete, the test results and a Certification application are submitted to a TCB for review and determination as to whether Certification will be granted.⁴⁵ The current Certification fee for a receiver device is \$535.00; for all other applicable RF devices, the fee is \$1,365 per device.⁴⁶ For many RF devices, the following information must be provided with the application in the form of a Technical Report: manufacturer name & address, installation and operating instructions, block diagram, test results, FCC ID, and photos of the device and its components.⁴⁷

Some types of intentional radiators, such as Software Defined Radios ("SDRs"), have additional Certification requirements.⁴⁸ For example, Certification applications for SDRs must contain a description of the device's software and security information describing how the software will not be modified by anyone but the Grantee.⁴⁹

Once the review process has been completed and, assuming that the application is complete and testing results are accurate, the TCB will issue a Grant of Certification within a short period of time. Like unintentional radiators, intentional radiators must be properly labelled and user instructions included prior to being marketed or offered for sale. The label and user instruction content for a Certified device is the same as that of a Verified device.⁵⁰ All product advertisements must contain proper labeling information. Certification attaches to all subsequent marketed devices that are identical to the sample tested and found in compliance with the FCC's rules.⁵¹

⁴⁰ 47 C.F.R. §2.926(c).

⁴¹ See 47 C.F.R. §1.1103. All FCC fees are subject to change periodically.

⁴² See generally 47 C.F.R. §2.106.

⁴³ See 47 C.F.R. §§2.907(a), 2.911(d).

⁴⁴ The testing and measurement requirements for low power, unlicensed devices are contained in Part 15 or Part 18, depending on the type of device. See 47 C.F.R. §2.1041. For licensed devices, the testing and measurement requirements are specified in §§ 2.1046-2.1057 of the FCC's Rules.

⁴⁵ See 47 C.F.R. §2.911; see also *In the Matter of Amendment of Parts 0, 1, 2, and 15 of the Commission's Rules regarding Authorization of Radiofrequency Equipment, Report and Order*, 29 FCC Rcd 16335 (2014) ("*RF Equipment Order*") at ¶ 9.

⁴⁶ See 47 C.F.R. §1.1103.

⁴⁷ See 47 C.F.R. §2.1033.

⁴⁸ SDRs have transmitters that can change frequency range parameters, power, and modulation type by a change in the device's software. 47 C.F.R. §2.1

⁴⁹ See 47 C.F.R. §2.944.

⁵⁰ See 47 C.F.R. §15.19(a).

⁵¹ 47 C.F.R. §2.907(b).

Telephone Terminal Equipment and Authorization Requirements

TTE is RF equipment that is (a) connected to the Public Switched Telephone Network ("PSTN") or (b) connected to wireline facilities used to provide private line services.⁵² Examples of TTE include telephones, computer modems, fax machines, automatic dialers, ADSL modems, automated teller machines, private branch exchanges ("PBXs"), and local area network ("LAN") gateways. Although TE does not directly pertain to IoT, manufacturers and importers of wireless devices may also manufacturer or import TE. Accordingly, information regarding the regulation of TE is included in this Guide.

TTE is authorized by one of two methods: (1) Certification or (2) a supplier's declaration of conformity ("SDoC").⁵³ The Certification process is complex; requiring not only testing for compliance with the applicable testing criteria, but is also subject to the FCC's rules concerning the TCB program.⁵⁴ Most responsible parties, therefore opt for the SDoC, which is similar to the DoC procedure described above (*e.g.*, testing for technical compliance, "self-declaring" compliance with applicable rules), with some additional requirements.⁵⁵

Administrative Counsel for Terminal Attachments

The FCC has outsourced much of its TTE compliance protocol to the Administrative Council for Terminal Attachments ("ACTA"). Authorization procedures require TTE to meet ACTA-adopted technical criteria to prevent four types of harms: (1) electrical hazards to operating company personnel; (2) damage to network equipment; (3) malfunction of billing equipment; and (4) degradation of service to customers other than the TTE user and that person's calling and called parties.⁵⁶

Once a responsible party has demonstrated compliance with the ACTA criteria regarding a specific device (*e.g.*, SDoC), it is required to apply to ACTA to have its TTE listed in the ACTA database of approved TTE. The ACTA database is accessed by the FCC, U.S. Customs & Border Protection, as well as the public to verify that TTE conforms to the applicable FCC rules and ACTA standards.

Composite Systems and Authorization Requirements

A composite system incorporates different RF devices contained either in a single enclosure or in separate enclosures connected by wire or cable.⁵⁷ FCC rules state that a composite system with different RF devices subject to different technical standards and authorization procedures requires each individual RF device within the System to comply with its respective standard.⁵⁸ For example, if a composite system contains an intentional radiator subject to Certification and an unintentional radiator subject to Verification, when the intentional radiator is submitted to a TCB for Certification, the applicant must include information about the entire system and indicate that the pertinent components are, or will be Verified before the system is marketed. The applicant will need to demonstrate that none of the measured emissions of the composite system will exceed the highest

⁵² See 47 C.F.R. §68.100.

⁵³ See 47 C.F.R. §§68.102, 68.201.

⁵⁴ See 47 C.F.R. §§68.160, 68.162.

⁵⁵ See 47 C.F.R. §68.324.

⁵⁶ See 47 C.F.R. §68.3

⁵⁷ 47 C.F.R. §15.31(k).

⁵⁸ *Id.*

level permitted for any individual component.⁵⁹ All the pertinent components may be submitted to a certified lab at the same time to test for Verification and Certification, as applicable.

Specific Absorption Rate Restrictions

The FCC also has rules limiting the amount of RF radiation that may be emitted from portable transmitting devices ("PTDs") operating in certain frequency bands.⁶⁰ The RF radiation limits are based on the localized specific absorption rate ("SAR") criteria set by the American National Standards Institute ("ANSI").⁶¹

The FCC defines a PTD as a device that is designed to be used so that the radiating structure of the device is within 20 centimeters of the body of the user.⁶² The FCC requires that PTDs operating in the "higher frequency bands" such as the 3650 MHz and 4.9 GHz bands undergo routine environmental evaluations prior to equipment authorization, in order to confirm their compliance with the SAR limits.⁶³ Such devices must contain a SAR-compliance certification when submitted for Certification.⁶⁴ The SAR limits and evaluation requirements for PTDs are listed in the Commission's rules.⁶⁵

The FCC's rules are somewhat ambiguous as to what specifically constitutes "higher frequency bands" (*e.g.*, whether operation in bands lower than 3650 MHz would require a routine environmental evaluation). But, a reliable FCC source has indicated that it is recommended that all PTDs undergo the routine environmental evaluations.

Hearing Aid Compatibility Requirements

The FCC has additional rules regarding hearing aid compatibility ("HAC") intended to ensure that consumers with hearing loss are able to access wireless communications services through a wide selection of handsets without experiencing disabling RF interference.⁶⁶ Specifically, manufacturers and telecommunications service providers are required to offer minimum numbers or percentages of handset models that meet technical standards for compatibility with hearing aids operating in both acoustic coupling and inductive coupling modes.⁶⁷

The HAC rules apply to all wireless handsets that contain a built-in speaker and are typically designed to be held to the ear.⁶⁸ The FCC provides an exemption for handsets that are not designed to typically be held to the ear in any ordinary use, but provide voice communications

⁵⁹ *Id.*

⁶⁰ See 47 C.F.R. §2.1093(c)(1).

⁶¹ See 47 C.F.R. §2.1093(d).

⁶² See 47 C.F.R. §2.1093(b)(1).

⁶³ See 47 C.F.R. §2.1093(c)(1); see also *Facilitating Opportunities for Flexible, Efficient, and Reliable Spectrum Use Employing Cognitive Radio Technologies, Notice of Proposed Rulemaking and Order*, 18 FCC Rcd 26859, ¶ 45 (2003).

⁶⁴ See 47 C.F.R. §2.1093(c)(3).

⁶⁵ See 47 C.F.R. §2.1093(d).

⁶⁶ See 47 C.F.R. §20.19(a).

⁶⁷ See 47 C.F.R. §20.19(b)-(d).

⁶⁸ See *Amendment of the Commission's Rules Governing Hearing Aid-Compatible Mobile Handsets, Policy Statement and Second Report and Order and Further Notice of Proposed Rulemaking*, 25 FCC Rcd 11167 ¶¶ 74-93 (2010).

through a speakerphone, headphone, or other instrument that carries voice communications from the handset to the ear.⁶⁹

The FCC has stipulated that the word “typically,” in the context of HAC, means *any* intended or anticipated ordinary use, and does not mean “usually” or “most often.” If a handset is configured so as to enable a user to hold it to the ear to receive voice communications in any ordinary anticipated application, it is a “handset” covered by the HAC rules, even if the manufacturer or service provider expects that most users will operate it with a headphone, speakerphone, or other mode.⁷⁰

Exceptions for Pre-Authorized RF Devices

RF devices subject to Verification, DoC or Certification may be marketed prior to authorization under certain limited circumstances, including:

- product development or market trials, provided that an experimental license is obtained from the FCC;⁷¹
- pursuant to rule waiver;⁷²
- sales contracts with vendors on condition that delivery is contingent upon FCC authorization;⁷³
- advertisements at trade shows or exhibitions, as long as a conspicuous notice is displayed that the device has not been authorized by the FCC and may not be offered for sale until such authorization is obtained;⁷⁴ or
- evaluation kits offered for sale to product developers, software developers, and/or systems integrators – for evaluation purposes only (subject to other restrictions).⁷⁵

Similar rules exist that permit limited operation of pre-authorized RF devices, including pursuant to experimental license, rule waiver, special temporary authority, and for purposes of compliance testing, and exhibitions at commercial, scientific, and medical locations, as long as applicable notices that the devices are not yet authorized by the FCC are displayed.⁷⁶

Confidentiality

TCBs are required to submit all test results and related documentation in applications for Certification to the FCC’s Equipment Authorization System (“EAS”); a database that is accessible by

⁶⁹ Id. at ¶ 20.

⁷⁰ *Id.*

⁷¹ 47 C.F.R. §§2.803(c)(1), 5.601, 5.602. Experimental licensees may sell equipment to another licensee (manufacturer to licensed service provider) and lease equipment to trial participants for purposes of an experimental trial. The rule strictly limits the number of devices that may be marketed and also requires that all equipment must be retrieved or rendered inoperable after the trial. See 47 C.F.R. §5.602(d)(e).

⁷² 47 C.F.R. §2.803(c)(2).

⁷³ 47 C.F.R. §2.803(c)(2)(i)(ii).

⁷⁴ 47 C.F.R. §2.803(c)(2)(iii).

⁷⁵ 47 C.F.R. §2.803(c)(2)(iv).

⁷⁶ See 47 C.F.R. §2.805(c),(d),(e).

the public.⁷⁷ Most information submitted to the TCB as part of the Certification application (e.g., block diagrams, schematic designs, etc.) is not considered confidential.

If confidentiality for any information is desired, a request for same must be provided to the FCC at the time the application is submitted to the TCB. Explanations as to why release of the information would cause harm to the applicant (e.g., trade secrets) must be included in the confidentiality request.⁷⁸ The subject items must be labeled as "CONFIDENTIAL" in the filing and a \$195.00 payment included.⁷⁹

Note that items such as photos and test results are typically not eligible for confidential treatment. But, confidential treatment for these items can be requested, and may be granted if sufficient showing of competitive harm in the event of public disclosure is presented.⁸⁰

Responsible Parties

The FCC has very specific rules as to who is responsible for regulatory compliance regarding various types of RF devices. As discussed below, different responsible party rules apply for RF devices subject to different types of authorization.

The responsible party is the exclusive party that is required to ensure that RF devices under its custody comply with FCC rules. This includes all identical devices marketed after authorization. Because the responsible party is liable for non-compliant RF devices and related matters, that party will be subject to FCC enforcement actions in the event potential rule violations are discovered.⁸¹

In the case of RF equipment subject to Certification, the responsible party is the party to whom the Certification Grant is issued (typically, but not always, the manufacturer or importer of the subject device).⁸² But, if an unauthorized party not affiliated with the Grantee modifies the equipment, that party becomes the responsible party for the particular device.⁸³

For RF equipment subject to Verification, the responsible party is the manufacturer or, in the case of equipment imported into the U.S., the importer.⁸⁴ Any unauthorized party that modifies the equipment becomes the responsible party.⁸⁵

For domestic RF equipment subject to DoC, the responsible party is the manufacturer.⁸⁶ If, however, a system is assembled from individual component parts and the resulting system is subject to a DoC, the assembler is the responsible party.⁸⁷ For imported equipment subject to a DoC, the importer is the responsible party.⁸⁸ Any unauthorized party that modifies the equipment becomes the responsible party.⁸⁹ And, unlike responsible parties for Certified or Verified equipment, a

⁷⁷ See apps.fcc.gov/oetcf/eas/reports/GenericSearch.cfm.

⁷⁸ 47 C.F.R. §§0.457, 0.459.

⁷⁹ *Id.*; 47 C.F.R. §1.1103.

⁸⁰ See 47 C.F.R. §§0.457, 0.459.

⁸¹ See 47 C.F.R. §2.909.

⁸² 47 C.F.R. §2.909(a).

⁸³ *Id.*

⁸⁴ 47 C.F.R. §2.909(b).

⁸⁵ *Id.*

⁸⁶ 47 C.F.R. §2.909(c)(1).

⁸⁷ *Id.*

⁸⁸ 47 C.F.R. §2.909(c)(2).

⁸⁹ 47 C.F.R. §2.909(c)(4).

responsible party for DoC equipment may contract with retailers or the original manufacturer to transfer responsible party status.⁹⁰

Regarding TTE, if a device is Certified, the responsible party is the holder of the Certification.⁹¹ For TTE that is subject to a SDoC, the responsible party is the device usually the manufacturer or importer.⁹² But, the responsible party could be another entity in the supply chain under certain circumstances. For example, the responsible party is the manufacturer who develops the protected circuitry that is marketed with the device if it is not connected to the network. If the TTE is assembled from component parts, the responsible party is the assembler.⁹³ Retailers of TTE may contract with the original responsible party to assume those duties.⁹⁴

Additionally, any responsible party for TTE must obtain an ACTA Responsible Party Code ("RPC") via ACTA's website⁹⁵ The data associated with an RPC application (mainly responsible party contact information) must be updated on a yearly basis. The fee for an RPC is \$825, and an RPC must be obtained before TTE authorization is registered on the ACTA website. The annual fee is \$125; the fee is discounted to \$95 if the application is filed early.⁹⁶

Equipment Modification

The FCC has specific rules concerning various types of equipment modifications, including which kinds of modifications warrant re-authorization of a given RF device.

Modifications to devices subject to Verification or DoC that adversely affect the emanation characteristics require reauthorization.⁹⁷ Other types of modifications do not. The party responsible for the reauthorization is the original responsible party, or party making the modification if not associated with that party.⁹⁸

Modifications to equipment subject to Certification that change the basic frequency determining and stabilizing circuitry, frequency multiplication stages, basic modulator circuit or maximum power or field strength ratings require a new certification.⁹⁹

There are two pertinent classes of "permissive" modifications to Certified equipment that do not require re-certification.¹⁰⁰ These modifications may typically only be made by the Grantee.¹⁰¹

- A *Class I permissive change* is a modification that does not degrade the characteristics of the device as certified. No FCC filing is required for this type of modification.¹⁰²
- A *Class II permissive change* is a modification that degrades the certified characteristics of the device but the degraded performance of the device still meets the minimum

⁹⁰ 47 C.F.R. §2.909(c)(3).

⁹¹ See 47 C.F.R. §68.4.

⁹² *Id.*

⁹³ *Id.*

⁹⁴ *Id.*

⁹⁵ See www.part68.org/FAQ_datavalidation.aspx.

⁹⁶ *Id.*

⁹⁷ 47 C.F.R. §§2.953(d), 2.1073(d).

⁹⁸ 47 C.F.R. §§2.953(d), 2.1073(e).

⁹⁹ 47 C.F.R. §2.1043(a).

¹⁰⁰ 47 C.F.R. §2.1043(b). There is a third category of permissive change that applies to SDRs only.

¹⁰¹ 47 C.F.R. §2.1043(b)(4).

¹⁰² 47 C.F.R. §2.1043(b)(1).

requirements of the applicable technical rules. The responsible party (Grantee) must file test results and other information with the FCC showing complicity with the pertinent rules. The modified equipment cannot be marketed until the FCC grants approval of the modification.¹⁰³

Regarding TTE, the FCC prohibits changes to the equipment or protective circuitry if it results in a material change to the information in the SDoC.¹⁰⁴ Minor modifications to TTE may be done only by the original responsible party.¹⁰⁵

Post-Market Surveillance

FCC rules require TCBs to conduct post-market surveillance of RF equipment they have Certified.¹⁰⁶ The FCC can, and will, conduct post-market surveillance regarding equipment subject to Verification, DoC, or SDoC.¹⁰⁷ This surveillance is intended to ensure that marketed RF equipment conforms to the technical parameters of the equipment that was tested and authorized.¹⁰⁸ TCBs and the FCC conduct surveillance by obtaining sample RF devices on the market, measuring the characteristics, and comparing them to the characteristics of the prototypes that were authorized.¹⁰⁹

A TCB is required to conduct surveillance at a rate of at least five percent of all its certified RF devices.¹¹⁰ Responsible parties whose RF devices are under surveillance must, upon request, provide the investigating TCB with a sample RF device or vouchers to purchase any sample device it wishes in order to conduct the surveillance.¹¹¹ And, if special software or specialized mechanisms are required to test marketed devices, the responsible party must provide them to the TCB at no charge.¹¹²

If a TCB or the FCC determines that a sample RF device is non-compliant (which typically occurs when manufacturers or marketers use replacement parts or otherwise modify the RF equipment from what was certified), the TCB will (as applicable) immediately inform the FCC and the responsible party; the FCC will likewise notify the responsible party as applicable.¹¹³ The responsible party will have 30 days to inform the TCB in detail as to how it will resolve the non-compliance issue.¹¹⁴ If the TCB is not satisfied with the information provided, the FCC will conduct arbitration between the TCB and the responsible party to resolve the matter.¹¹⁵

FCC Enforcement Proceedings

The FCC will commence an enforcement proceeding if it suspects that a non-compliant RF device is being marketed or operated in violation of its rules. The FCC typically discovers potential rule violations when a competitor or customer files a complaint involving an RF device or through post-

¹⁰³ 47 C.F.R. §2.1043(b)(2).

¹⁰⁴ See 47 C.F.R. §68.348(a).

¹⁰⁵ See 47 C.F.R. §68.348(b).

¹⁰⁶ 47 C.F.R. §§2.945(b), 2.962(g).

¹⁰⁷ 47 C.F.R. §2.945(b).

¹⁰⁸ See *RF Equipment Order* at ¶ 24.

¹⁰⁹ 47 C.F.R. §2.945(b).

¹¹⁰ See *RF Equipment Order* at ¶ 25.

¹¹¹ *Id.*

¹¹² See *RF Equipment Order* at ¶ 27.

¹¹³ *Id.* at ¶¶ 24-25.

¹¹⁴ 47 C.F.R. §2.962(g)(5).

¹¹⁵ See *RF Equipment Order* at ¶ 24.

market surveillance. As previously discussed, violations of the Communications Act or Commission rules could result in the responsible party being subject to steep monetary fines and removal of equipment from the marketplace.¹¹⁶

Enforcement proceedings are prosecuted by the FCC's Enforcement Bureau ("Bureau"). When a complaint is filed or a potential violation is otherwise discovered, the Bureau will conduct a field investigation (often involving reviewing the target company's website and other advertising) to gather more evidence. At the completion of the field investigation, the Bureau will serve a Letter of Inquiry ("LOI") on the responsible party.

A LOI typically contains a summary of the complaint/investigation, including the rules alleged to have been violated. The LOI requires the recipient to answer questions and produce documents relevant to evaluating whether a violation has occurred, and if so, the nature and scope. A response is required, typically within 30 days of the date the LOI was served. The responsible party must provide the information requested by the Bureau, but it also has the option to request a meeting with the Bureau to explain factual and legal matters, and/or provide such information in its response.

Depending on the information contained in the response to the LOI, the Bureau may request additional information, cease prosecution, or issue a Notice of Apparent Liability for Forfeiture ("NAL"), describing the case against the responsible party and listing any preliminary monetary forfeitures and/or other sanctions levied against the responsible party. The responsible party may file a response to the NAL, disputing the charges and seeking reduction of the proposed sanctions.

The Bureau will consider the response to the NAL and then will issue a Liability Notice, listing the "final" amount of the fine and any other sanctions imposed on the party, and ordering compliance with same.

A targeted party could also choose to resolve the matter by negotiating a consent decree with the Bureau. Consent decrees typically result in the responsible party admitting liability, agreeing to pay a (somewhat reduced) fine, implementing compliance procedures to ensure the violation does not occur in the future, and submitting periodic progress reports to the Bureau. The Bureau does not always agree to negotiate consent decrees, and even if it does, negotiating favorable terms can be difficult. Nonetheless, if the initial sanctions contain a requirement to pull RF devices from commerce, a consent decree, if properly negotiated, will nearly always result in exempting a party from having to take its devices off the market.

The initial LOI phase of an enforcement proceeding is private, but NALs, Liability Notices, and consent decrees are released to the public.

¹¹⁶ See *supra* nn. 4-10 and accompanying text.