A9 - Legal and Regulatory Analysis

Year: 2025 Semester: Spring Team: 8 Project: Buddy Beacon
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Assignment Evaluation: See the Rubric in the Brightspace Assignment

1.0 Regulatory Analysis

The FCC regulates all electronic devices that emit radio waves to prevent harmful interference. The Buddy Beacon, which uses a LoRa radio module as well as a GPS module, is subject to these regulations. It must meet FCC standards as an intentional radiator. To license the Buddy Beacon with the FCC, there is a multi- step process. Firstly, you must register online through CORES, the FCC's Commision Registration System [1]. You receive an FRN (FCC registration number), and then file an electronic application via the ULS (Universal Licensing System). Since the LoRa module on the device is already certified with the FCC and CE, it may be the case that we do not need to be recertified.

If we intend to sell this product in Europe, we must meet the CE standards along with RoHS. To be certified with CE, we have to "ensure conformity with all relevant EU-wide requirements" [2]. Certain devices require involvement of a "notified body" [2], or another organization that can perform the assessment for you if there are higher risks. Since there aren't really safety risks presented by the Buddy Beacon, I believe this is something we'd be able to perform on our own. Afterwards, we would have to write a "technical dossier documenting conformity" [2]. This would need to be approved, at which point we draft and sign a conformity declaration. RoHS is a specific directive of the CE framework designed to prevent harmful materials from being used in our product, specifically lead, cadmium, or mercury. We would have to ensure that all non-high-temperature lead solder is less than 1000 ppm[3], and all parts (except for specific capacitors) don't contain notable traces of any other metals [3]. Again, this is a part of the CE certification process.

A third entity worth considering is the IEC, or International Electrotechnical Commission. The IEC isglobal entity that creates standards for virtually every type of technological product intended for use. Many of these standards are used by countries when developing their own guidelines, and currently 89 countries are members with "national committees" present to represent the interests of their country [4]. The IEC has its own conformity assessment, which provides "the only globally standardized approach to testing and certification" [5]. Getting the Buddy Beacon certified by the IEC would be important, as it would enable us to market our product with top safety specs. One other important system the IEC provides is the IP rating system. Because the Buddy Beacon is intended for outdoor use, an IP rating is a marketable and testable way to "prove" that our product is trustworthy in a wide variety of environments. The IP code consists of two numbers. The first is from 0 to 6 and represents the level of dust resistance, where 6 means the device is extremely dust-resistant. The second digit uses a scale from 0 to 9 and represents the level of waterproofing, where a 9 is the absolute best, meaning the product can take high- pressure hot water from different angles [6]. However, it's worth noting that this is not a certification, but a standard. We would have to test this ourselves as products are manufactured to ensure quality.

2.0 Legal Liability Analysis

2.1 Analysis of Patent 1 [7]

US Patent Number US 11,095,539 B2:
Filing Date: September 13, 2017
Abstract: This patent describes a system where IoT devices (like sensors or smart gadgets) connect to "cradles" (base stations) that talk to each other and a central hub over a mesh network (like Wi-Fi or LoRa). The cradles collect data from the devices and share it with other cradles or the hub, allowing different brands of devices to work together.
Potential Infringements: The Buddy Beacon GPS Communicator may potentially infringe upon the following claims from the patent:

- The patent covers devices forming a self-organizing mesh network (like Buddy Beacons do with LoRa). The risk is that if the patent's claims are broad, using LoRa mesh networking could be seen as similar.
- The patent describes cradles sending location data, messages, and sensor readings to other devices (just like Buddy Beacons do). Here, the risk is if the patent's claims include any device sharing GPS/data over a mesh network, there might be overlap.

However, despite the possible overlap, there are plenty of differences. The patent focuses on IoT ecosystems (smart homes, factories), while Buddy Beacon is for outdoor group communication (no smart devices or cloud integration). Also, no Fog Computing was used. Since the patent relies on cloud/fog computing (remote servers), the Buddy Beacon differs because it's designed to work offline.

2.2 Analysis of Patent 2 [8]

US Patent Number US 7,099,770 B2:
Filing Date: August 29, 2006
Abstract: This patent describes a battery-powered GPS tracker that sends location updates via satellite. It saves power by only turning on the GPS and transmitter when needed, and can adjust how often it sends updates based on whether the device is moving. It's designed for tracking trucks, trailers, or cargo containers in remote areas without cell service, using simple one-way satellite communication to report locations. The device is built tough to withstand outdoor conditions.
Potential Infringements: The Buddy Beacon shares several similarities with the patented technology.

- Both devices use GPS for location tracking relay data to one another.
- Both employ power management to extend battery life by cycling the GPS and transmitter.

However, the Buddy Beacon does have some key differences. Firstly, the patented device is designed for asset tracking (e.g., trailers, rail-cars, barges), while the Buddy Beacon is intended for personal safety and outdoor recreation (e.g., hikers, adventurers, emergency use). Also, the patent includes external alarm inputs for industrial monitoring (e.g., cargo theft detection). On the contrary, the Buddy Beacon focuses on manual activation without industrial alarm integration. The patented system allows for alternate interval schedules triggered by alarms or motion, while the Buddy Beacon doesn't implement any alarms, as stated previously.

2.3 Analysis of Patent 3 [8]
US Patent Number US 7,099,770 B2:
Filing Date: August 29, 2006
Abstract: This patent covers a tracking system with two parts: a small remote control (fob) with emergency buttons, and a GPS tracker that attaches to vehicles or equipment. The fob can send signals to the tracker within about 60 feet. If the vehicle moves without the fob nearby, the tracker automatically sends its location via satellite to alert owners of possible theft. When the fob is nearby, users can press buttons to send messages (like "Help" or "OK") through the tracker's satellite connection to emergency contacts or family. The system is mainly for protecting vehicles and sending emergency alerts.
Potential Infringements: The Buddy Beacon shares several similarities with the patented technology.

- Both devices use GPS receivers to determine their precise geographic coordinates.
- Both are designed for battery efficiency, cycling power to the GPS and transmitter to extend operational life.
- Both rely on one-way satellite communication (simplex transmission) to send location and status data.

However, the differences are clear. The Buddy Beacon lacks the two-device fob/tracker system. Also, it’s designed as a communication device, not for recovering stolen goods. The Buddy Beacon doesn’t use unauthorized movement alerts but makes use of multi-button messaging, while the tracker only can send certain pre programmed messages. In general, the Buddy beacon is just a simpler communication-centered product that allows for higher message customizability, and while both devices make use of GPS technology, the Buddy Beacon uses these coordinates primarily for communicating with others.

3.0 Sources Cited:

[1]"Licensing," *Federal Communications Commission*, Jan. 13, 2014. https://www.fcc.gov/licensing-databases/licensing

[2]EU, "CE Marking," *Your Europe - Business*, 2020. https://europa.eu/youreurope/business/product-requirements/labels-markings/ce-marking/index_en.htm

[3]"RoHS Guide," *Rohsguide.com*, 2019. https://www.rohsguide.com/

[4]"International Electrotechnical Commission," *Wikipedia*, Jun. 26, 2020. https://en.wikipedia.org/wiki/International_Electrotechnical_Commission

[5]"What is conformity assessment | IEC," *www.iec.ch*. https://www.iec.ch/conformity-assessment/what-conformity-assessment

[6]IEC, "IP ratings | IEC," *www.iec.ch*, 2024. https://www.iec.ch/ip-ratings

[7]"US11095539B2 - Common interface system for mesh networking and fog computing systems - Google Patents," *Google.com*, Sep. 13, 2017. https://patents.google.com/patent/US11095539B2/en?q=(mesh+networking+with+lora)&country=US&oq=(mesh+networking+with+lora)+country:US (accessed Mar. 29, 2025).

[8]"US7099770B2 - Location monitoring and transmitting device, method, and computer program product using a simplex satellite transmitter - Google Patents," *Google.com*, Sep. 08, 2003. https://patents.google.com/patent/US7099770B2/en?oq=7%2c099%2c770 (accessed Mar. 29, 2025).

[9]"US8130096B2 - Simplex personal and asset tracker - Google Patents," *Google.com*, Jan. 20, 2010. https://patents.google.com/patent/US8130096B2/en?oq=8%2c130%2c096 (accessed Mar. 29, 2025).