SYNCHRONIZED BLUETOOTH LOW ENERGY ADVERTISEMENTS TO COMBINE iBEACON PROXIMITY CALLBACKS WITH SCALABLE IDENTIFIERS

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Synchronized Bluetooth Low Energy advertisements to combine iBeacon proximity callbacks with scalable identifiers

A mechanism for passively determining relative proximity of a client device to any other physical device equipped with Bluetooth Low Energy while providing a highly scalable secure identification of the beaconing device.

A common desire in the internet of things is to determine connectivity between one or more devices. This connection needs to be unique and secure. The positive determination of relative proximity between two devices enables multiple secure workflows requiring user presence. The *iBeacon Bluetooth Low Energy format provides reliable callbacks to a handheld device when the device comes within range of any device capable of broadcasting the iBeacon advertisement. Simply leveraging iBeacon alone does not solve the issue of uniquely identifying the advertising device, particularly when the device belongs to a common set of devices capable of large scale.

The iBeacon format provides three identifying constants with its advertisement: a UUID intended to identify the larger group of devices or locations, a major 16-bit integer value intended to identify the region, and a minor 16-bit integer value intended to identify the specific device. Using iBeacon alone you could identify a beaconing device as part of a larger group in specific region as long as that region contains less than 65,536 devices. However, using the current iBeacon callbacks, a single hand-held device can only passively monitor for 20 devices at any given time. By using synchronized Bluetooth advertisements, the number of identifiable devices can be scaled infinitely. Using the same iBeacon format, a single beaconing device can advertise the UUID alone without the major and minor represented as the ‘Group Identifier’ as seen in the below Figure. This ‘Group Identifier’ can then be registered with the hand-held device to receive callbacks on proximity. At the time of a callback the hand-held device can do an additional Bluetooth Low Energy scan to discover a second beacon of a custom format also advertised by the beaconing device. This second beacon will contain a UUID that is specific to the beaconing device represented as the ‘Unique Identifier’ as seen in the below Figure. By combining the two beacons the hand-held device can receive a callback for each and every unique device and securely identify that device from another.
Triggered by the group identifier, an external device can then find individual devices based on the unique identifier.
By leveraging multiple Bluetooth Low Energy advertisements to uniquely identify a device the hand-held device is never required to perform a traditional 1:1 connection with over Bluetooth Low Energy. This provides a performance benefit in that 1:1 connections are inherently slower than a simple advertisement scan and depending on hardware can cause an interruption to the advertisements which would inhibit other handheld clients from discovering and connecting to the beaconing device.

* Is a product of Apple

*Disclosure by Alex J. Cole, David Jerome Sharber and Grey Leman, HP Inc.*