Q&A for Tech Talk Topic: BLE Evolution

Q: Where are the previous episodes. I would like to show my team the one from last Tuesday, IOT security. Thanks.
A: All of the previous Tech Talk presentations and videos are available at https://www.silabs.com/support/training

Q: What is the purpose of BLE advertisement?
A: Advertising allows the BLE device to broadcast messages over the air without bonding/pairing. It is the simplest type of communication using BLE, but is only one-way. Advertising is also used identify your device to other nearby BLE devices, to begin the bonding/pairing procedure.

Q: What does LE stand for in previous slide?
A: Low Energy is often abbreviated to LE.

Q: What does PHY mean?
A: PHY is referring to the PHYsical layer - this defines the RF signaling used to transfer data over the air.

Q: Can you give us some examples of "fancy beacon" because more advertisement channels are available?
A: This paper has a good overview of advanced beacons using BT5:
https://www.silabs.com/whitepapers/supercharging-beacons-with-bluetooth-5

Q: When are mainstream mobile phones/tablets expected to start supporting Coded PHY?
A: The makers of smartphones are very secretive about their plans to support new technologies like this. So far we have not seen any smartphones which support the LE Coded PHY.

Q: Can the 5.1 direction finding help with distance measurement between 2 nodes (or this needs 3 nodes minimum)?
A: The distance between an AoA transmitter and a single locator would still rely on an estimation based on the received signal strength. For accurate distance you need multiple locators and a location engine that can perform triangulation/trilateration.

Q: What is the impact of Rx sensitivity moving from 1M - 2M roughly in dB ?
A: Approximately 2.5dB

Q: Do you have any Dev Kit with examples for AoA?
A: Yes we do, but at the moment they are not publicly available. You can contact a local Silicon Labs sales office for more information.

Q: Can the LE Coded PHY be used with BLE Mesh?
A: Not at this time. The current standard for Bluetooth mesh uses the 1M PHY.

Q: What is the AoA location accuracy with two antennas?
A: It is not possible to derive position with only two antennas. To derive a true position, multiple locators, each with an antenna array, is necessary.

Q: Why is CTE transmitted only with Periodic Advertisement and not simple extended advertisement?
A: That is how 5.1 specifies it today, but the standard is always evolving.

Q: What is the range (how many meters) could a locator could be from the AoA tag?
A: Typically indoors 30-50 meters (90-150 feet) and outdoors it can be 100-300 meters.

Q: Can the coded PHY options be used with the AoA feature?
A: No, this is not currently supported.

Q: Is there an estimate how much AoA helps to increase accuracy of positioning compared to the classical approach?
A: By classical approach, I assume you mean with traditional beacons. These rely on using the received signal strength (plus some filtering) to calculate distance and are typically not very accurate. A good beacon system might get 5-10 meter accuracy at best compared with AoA/D which can achieve down to 10cm accuracy.

Q: How does AoA deal with reflections and noise when calculating the angle?
A: The antenna design is crucial to overcoming noise and signal degradation. We use antenna arrays with multiple polarizations and the more antennas in the array, the better it can overcome multipath/reflections. Lastly, there are complex algorithms which filter the desired signal from multipath signals.

Q: What does a periodic advertising event consist of?
A: There are two types of packets sent: sync packets that contain the information to sync to a periodic ADV stream which are sent on the three primary ADV channels and then there are the data packets sent on the 37 extended ADV channels.

Q: Can we get I/Q data off the device directly and process externally?
A: Yes, this is possible.

Q: How does the LE Coded PHY improve range through solid surfaces, for example for a sensor buried in earth?
A: The Coded PHY is still using 2.4GHz, which does not penetrate soil very well, especially wet soil. I would expect better range than the 1M PHY but it is something you would need to test for your specific application.

Q: Is BT 5.2 Audio going to replace both BT Classic HFP and A2DP?
A: In the short term (5 years) this is unlikely because many devices (like cars) live for a long time, but in the longer term, perhaps 5-10+ years it is conceivable.

Q: When is audio over BLE scheduled for release? Does it support audio streaming as well as voice calls?
A: The core specifications came out with 5.2 specification in January of 2020. Additional application level specifications will follow throughout 2020.

Q: Does LE Power Control work with AoA?
A: It can work with connection-oriented AoA, since TX power control requires a connection.

Q: Are there smartphones already supporting BLE 5.2 for Audio over BLE?
A: Not yet as far as we know.

Q: How many audio streams can BT 5.2 Audio support? Can we do stereo (streams in parallel)?
A: The protocol supports multiple streams. With 2M PHY you get about 1.4Mbps which might be enough for 2-4 streams at the same time depending on the audio quality (bandwidth) required.

Q: When will modules based on the BG22 be available?
A: The BGM220 modules will be launched in late Q2.

Q: Do you need completely new BT 5.2 hardware to support LE power control, or can this be implemented in firmware?
A: This is implemented in the stack on EFR32 devices.

Q: Is there an equivalent to LE power control in Zigbee or Z-wave, or are these features planned?
A: Neither Zigbee or Z-Wave support power control today.

Q: What is AoD?
A: AoD is “Angle of Departure” - it’s one of the Bluetooth 5.1 direction finding features.

Q: Can AoA technology also determine also z position (on top of x,y)
A: You can basically get a vector - angle and azimuth, from one locator. With multiple locators, 3-D position can be calculated.

Q: Does AoX work with the BG21?
A: At the moment there are no plans for adding AoA/D for BG21 or older devices. The BG22 has performance improvements that make it far better for AoA/D.

Q: Are IoT applications taking advantage of these new BLE improvements? Which categories?
A: Yes they are. OTA updates for example are nowadays almost always using the 2M PHY as it makes OTA 2x faster and much less draining on batteries.

Q: Do you have any dual mode modules that support BT 2.1 and BT 5.0 ?
A: We have a dual mode module called BT121 that does both BR/EDR and LE. It's Bluetooth 4.2 compliant at the moment.

Q: Can you provide the website for the virtual training in May again?
A: You can register at https://www.silabs.com/about-us/events/virtual-bluetooth-workshop

Q: Would you get longer range with the BG13 than with the BG22 since it has higher output power?
A: Yes you would. The BG22 sensitivity is slightly better than BG13, but BG13 can support up to +20dBm TX without an external PA.

Q: Are you planning to support BLE audio with integrated LC3 codec and maybe even audio ADC/DAC and class D amp in any future devices?
A: We cannot disclose our future roadmaps in this public forum. Please reach out to your local Silicon Labs Sales person who can discuss this with you under NDA.

Q: We use the BGM13P32 and BGM13P22 with SDK 2.13.3 in our NFC Reader product that connect to an app running on the iPhone/iOS 13, Android, or Windows 10 device. We believe we support the 2M PHY, but how can we confirm? Our speed tests are not conclusive. Do you have an App, tool, or test procedure?
A: At a low level, you will see the event evt_le_connection_phy_status if the PHY is being switched to 2Mbps from the default 1Mbps.

Q: Can we use the BG22 for LE audio now?
A: The BG22 is not targeted at LE audio applications.

Q: When do you expect to release the new BGM220 module dev kits?
A: We are sampling now and move to broad availability in late Q2.

Q: Can you share the wireless starter kit URL?
A: https://www.silabs.com/products/development-tools/wireless

Q: Is there a product level certification as in Zigbee?
A: Yes - Bluetooth products require qualification with the Bluetooth SIG. See https://www.bluetooth.com/develop-with-bluetooth/qualification-listing/

Q: Can you compare A2DP audio quality to LE Audio quality?
A: The Bluetooth SIG claims that the new LC3 codec improves audio quality over the SBC codec used in Classic Audio and at a lower bitrate.

Q: Since we need to learn a new processor, Bluetooth and Simplicity Studio, it would be helpful to have step-by-step tutorials for all of these.
A: One of the easiest ways to learn is to start with the BG22 Thunderboard and the Getting Started Guide at https://www.silabs.com/support/getting-started/thunderboard. I would also recommend you sign up for the upcoming virtual workshop which will use the BG22 Thunderboard. You can register at https://www.silabs.com/about-us/events/virtual-bluetooth-workshop