Q&A for Tech Talk Topic: Battery Optimization with BG22

Q: For my application I need to use AI technology. Is there any issue doing this with Silabs products?
A: It depends on your exact needs, but some AI has been ported to our EFM/EFR products like this one from Cartesiam: https://www.silabs.com/partner-network/design-network-search/partner-search-results.cartesiam

Q: Can we get a copy of the slides?
A: The presentation will be available at www.silabs.com/support/training within 24 hours.

Q: I could not find a link for the recorded session on Connected Home over IP.
A: All of the previous Tech Talk sessions are available to view online at www.silabs.com/support/training.

Q: Is it possible to supply the BG22 with a solar panel?
A: Yes. If your solar panel design (including charge storage and voltage regulation) is capable of sourcing the peak current to supply the BG22 when it's transmitting, then it's possible to have a solar-powered node.

Q: What is the typical wireless range which can achieved with a BG22 board?
A: The BG22 goes up to around +6dBm TX power and has -99dBm sensitivity, giving you around 105dB link budget. Line-of-sight range could be 200 meters or more. Indoors will be less. But of course range always depends on a lot of other factors unique to the location.

Q: Please post the BG22 virtual workshop registration link.
A: https://www.silabs.com/about-us/events/virtual-bluetooth-workshop

Q: What is the minimum set of external components for a BG22 design?
A: Please have a look at this application note: https://www.silabs.com/documents/public/application-notes/an933.2-efr32-series-2-minimal-bom.pdf

Q: Does the BG22 support the Cortex-M33's co-processor interface and is this operation mode discouraged for the BG22?
A: We do not support the Cortex-M33 co-processor extension. All internal peripherals are memory mapped.

Q: Does the BG22 dev board support SiLabs' packet trace interface? …Is it capable of capturing OTA traffic?
A: Yes, PTI is supported on the SLWSTK6021A dev kit.

Q: I saw somewhere that the RTC can run in EM3, or was it even EM4? Does that impact the power consumption stats?
A: We have 2x RTC on the device that operate in different energy modes. The Backup RTC can operate in all energy modes, including EM4. It works with any of the low-frequency oscillators, and can provide system wake-up at user-defined intervals.

Q: Are there plans for a BG22 based module?
A: Yes there are modules coming late Q2.

Q: Is BG22 capable of running Bluetooth apps under control of Micrium RTOS?
A: Yes it is. There are examples of this in Simplicity Studio.

Q: How do you program a bare BG22? Can the Thunderboard be used for this?
A: Yes, the Thunderboard has an onboard debugger which is used to download code onto the BG22.

Q: Is there an Arduino port for BG22?
A: There is not. We offer Simplicity Studio as a free C language development environment / IDE.

Q: Can the software show which frequency band(s) are being used at any given time?
A: Yes, the Network Analyzer function in Simplicity Studio can show you what's happening over the air, and which frequencies are being used.

Q: How does one manually set the energy mode (EM4 vs EM3, for instance)? Are there functions for this?
A: Yes there are API calls for this.

Q: For "gecko_wait()", does the calling process need to read the returned event for the device to enter EM2? Or does the device go into EM2 right after the event is sent to the calling process (i.e. the function return is put on the stack), even if the caller's execution thread has not yet read the function return from the stack?
A: Please take a look on the following link in regards to the usage of the gecko_wait and how to schedule application tasks: https://docs.silabs.com/bluetooth/latest/general/system-and-performance/scheduling-application-tasks-while-running-ble-stack

Q: Can the user utilize RTCC for the app purposes, or it is reserved for the stack needs and cannot be used for anything else?
A: The protocol stack uses a separate RTC, leaving the RTCC block available for exclusive use by the application software.

Q: Should we or can we write program code for the Cortex M0 integrated into the BG22?
A: The M0 core is used to operate the low-level radio functions and is not available to the application.

Q: I am thinking about using BG22 bare microcontroller on the Thunderboard. What programmer/debugger could I use to load my program into the BG22 flash memory?
A: The BG22 Thunderboard has a built-in debug/flash interface accessible via USB. With Simplicity Studio you can download and debug directly to the Thunderboard.

Q: Does the SIP BG22 module have the DC/DC integrated? If not is it possible to integrate external from module?
A: Yes it does.

Q: Any plans for further Virtual Bluetooth workshops since the ones on schedule are full?
A: Yes, we will be posting additional workshops in all three global regions. Please keep checking back.

Q: Are the SLEEP block calls nestable using a push/pop construct or only through the API shown?
A: We recommend sticking to the APIs because the Bluetooth stack manages the device sleep.

Q: When you say "X mA power consumption at EM__", is that an average current or a peak current? Is there a current spike when changing to higher power modes?
A: This document explains the typical power profile for various modes on a BLE device: https://www.silabs.com/documents/public/application-notes/an1246-efr32bg-bluetooth-power-consumption.pdf. It was written using information from a previous generation part, but in general the patterns will be similar.

Q: To clarify, is the LFXO frequency 32kHz or 32.768kHz?
A: It is 32.768kHz

Q: Can I use BG22 for a low power meter pulse counting and send data by BLE? Or do you suggest a standalone MCU and a separate BLE? Since M0 is controlling BLE comm, I think I can get better result. Am I correct?
A: You can probably do this using the BG22 without an external MCU. TIMER peripherals can count external events and trigger actions through the Peripheral Reflex System without waking the main processor. See section 3.5.1 of the BG22 datasheet: https://www.silabs.com/documents/public/data-sheets/efr32bg22-datasheet.pdf

Q: What's the calibration accuracy for the built-in BG22 temperature sensor? My understanding is that previous products are calibrated at +/- 10 degrees C.
A: The temperature sensor is built into the die and has accuracy of +/-1.5 degree C after single-point calibration

Q: Is there a reference design for wearables?
A: The closest reference design would our Thunderboard Sense kit, but it was not designed as a wearable.

Q: There is an increasing number of 1.8V sensors. Is there anything about the BG22 that makes interfacing with them easier, or should I expect to still need level translation?
A: You can supply the BG22 at 1.8V and it supports 1.8V I/Os.

Q: What is the current consumption of the BG22 using the internal 32kHz oscillator in EM2?
A: 1.7uA in EM2 using the PLFRCO. There is a slightly lower EM2 current using an external crystal, but is a trade-off on system cost.

Q: What about using the RF Sense below 0 degrees Celsius?
A: RFSense in the BG22 works across the entire temperature range.

Q: We have registered for the hands-on BG22 training. There was information that we would receive recommendation how to prepare for the training. When do you think we will receive these recommendations? Thank you.
A: The instructions will be emailed to you approximately a week before the event.

Q: Is the low-power PA as fast as the high-power PA?
A: There is no speed difference between the low-power and high-power PA, and you can use either one for any of the BLE PHYs.

Q: Do you have an example of writing firmware to BG22 microcontroller using UART bootloader?
A: Yes we do and you can ask for it with a support ticket. You can also change the bootloader configuration yourself, but of course then you need to program the bootloader onto the device.

Q: Is there EEPROM emulation for non-volatile storage?
A: Yes, the BLE stack uses an implementation called NVM3 which includes wear leveling.

Q: What frequencies are required for the transmitter to use RF Sense?
A: On the BG22, RF Sense is sensitive to signals in 2.4Ghz band.

Q: What is the EM2 current using an external crystal?
A: 1.4uA in EM2 using an external crystal.

Q: Can we use the DC/DC as a booster?
A: The internal DC/DC is a buck only. However we have a standalone PMIC which can work as either a buck or boost. See https://www.silabs.com/power/efp01-power-management-ic

Q: how close do we need to be in order to use RF Sense to wake up the device?
A: The threshold is selectable between -22dBm and -34dBm.

Q: I do not see any BG22 RTOS examples in SS4. Are you sure that they are provided?
A: You should see an example called SOC_thermometer-RTOS under BLE SOC Advanced.

Q: Is there a plan or roadmap to support LE Audio (Full Duplex)?
A: The BG22 does not support LE Audio. Future roadmaps cannot be discussed in this public forum.

Q: What options do we have for Bluetooth antennas? Can it be just a simple PCB antenna instead of external component?
A: Yes, the choice of antenna is entirely up to you. If you use one of our modules, they also support either an internal or external antenna option.

Q: Do I need to complete RF certification if I integrate the module in my design?
A: Your end product will need both Bluetooth and regulatory certifications. However our modules already have a lot of these certifications and should simplify your efforts. The specifics depend on what region of the world you will sell your end product.

Q: What features does the Android app have? Is the source code available in Dart?
A: It has the most common BLE features like scanning, making connections, data transfer and OTA. We provide the app source code in C on GitHub.

Q: What is the best solution for audio application to a headset?
A: Most headsets (and smartphones) today still support only Bluetooth Classic audio using A2DP or HFP.

Q: For the long range PHY, how far can the chip reach?
A: Using the LE Coded PHY with the 125kbps data rate will roughly double the range compared to the traditional 1Mbps PHY.

Q: What is the lowest transmit power for BG22?
A: Transmit power is software selectable between -28dBm and +6dBm.

Q: Is a datasheet/pinout/footprint for the BGM220S module available yet? I'd like to start designing boards for it.
A: Please contact your local Silicon Labs sales representative for access to this.

Q: What are the benefits in comparison to the BGX13P?
A: The BGX13P is a member of our Xpress module line, which offers BLE without the need for writing code for the module. We don't currently offer an Xpress version of the BG22.

Q: Can you obtain I/Q data from the BG22 to be processed by an external processor like x86 or A series ARM CPUs ?
A: Yes this is possible.

Q: Can this chip connect to a PC directly via some SPP virtual Bluetooth serial com port, or is it only working with phone apps as server/client for BLE field reads/writes?
A: The BG22 is a BLE only device and as such does not support the older BT 3.x SPP profile. However, we do have an example that implements an SPP-like profile over GATT.

Q: Is the BLE API document available as a pdf?
A: The pdf isn't available as a download, but it's included in our Bluetooth SDK when you install it. You can also see the full API command set online at https://docs.silabs.com/bluetooth/latest/

Q: When we order the BG22, does it comes with pre-programmed firmware (bootloader), or would it need to be programmed?
A: It will need to be programmed. For volume customers we also offer a factory programming service so that parts you receive will come preloaded with your firmware image.