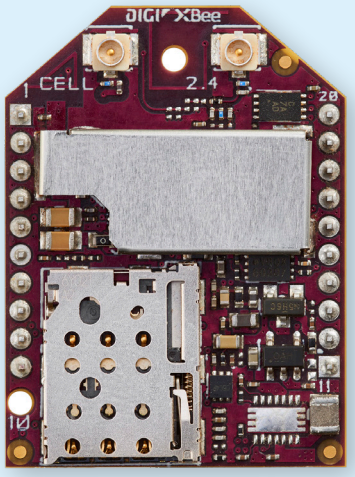
THE ADVANTAGES OF DIGI XBEE3™ CELLULAR

Native MicroPython Programming, Digi TrustFence® Security, Software Flexibility, and USB Option Open Up New Markets and Applications to OEMs



EXPANDING THE DIGI XBEE³ ECOSYSTEM

With the Digi XBee3 Cellular family of embedded modems, developers can bring together the power and flexibility of the Digi XBee3 ecosystem with the latest 4G cellular technology. That means a faster path to embedding 4G cellular technology into their devices and applications without time-consuming, expensive FCC and carrier end-device certifications.

With a full set of standard Digi XBee3 API frames and AT commands, Digi XBee3 customers can seamlessly transition to this new modem with only minor software adjustments. When OEMs add the Digi XBee3 Cellular modem to their design, they create a future-proof design with flexibility to switch between wireless protocols or frequencies as needed, ideal for any business with an agile roadmap.

In the pages that follow, you'll learn about some of the key advantages of the Digi XBee3 Cellular solution:

- Native MicroPython Programming
- Digi TrustFence Security
- Software Flexibility

MICROPYTHON PROGRAMMABILITY

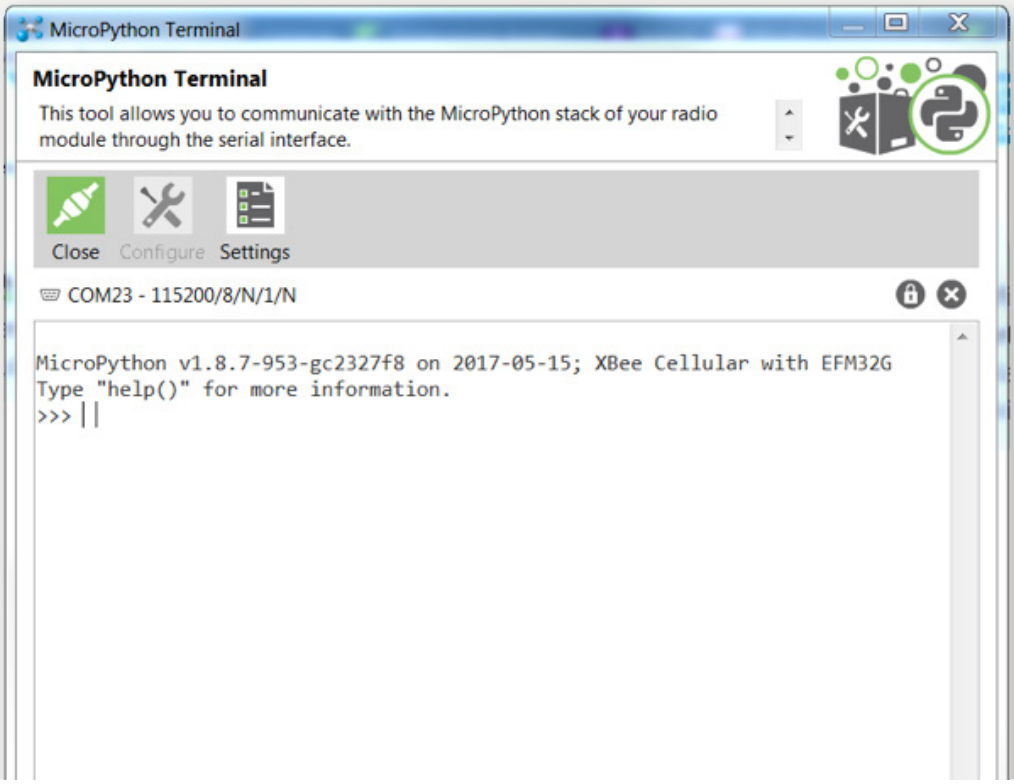
MicroPython is an open-source programming language based on Python 3 that has been optimized to fit on small devices with limited hardware resources (e.g. micro-controllers). It includes an interactive read-evaluate-print loop (REPL) that enables you to connect to an embedded board and execute code without compiling or uploading, making it ideal for quick testing of code blocks and prototyping. It also includes extensive built-in software libraries to accelerate and simplify programming tasks like network socket connections or I/O pin management.

Digi XBee3 Cellular offers native support for MicroPython programmability. With 24 KB of RAM and 8 KB of Flash available in this MicroPython "sandbox," you have the power and flexibility to develop and integrate your own unique features. For basic sensing/actuating applications, it can eliminate the need for an external microcontroller, saving PCB space and simplifying your hardware design.

MicroPython is ideal for reading and/or controlling Digi XBee3 I/O lines (13 digital I/Os, four analog 10-bit inputs). It can also reduce cellular data consumption by adding local intelligence that dictates what data should and should not be sent over the air.

MICROPYTHON TERMINAL IN XCTU

The most recent XCTU release (v7.0) includes a new MicroPython terminal, which allows you to interact with MicroPython on the Digi XBee3 Cellular modem. Through the serial interface in the terminal, you can interact with the REPL to test, load, and run MicroPython code. Of course, many users prefer to use their own terminal program like Tera Term or Putty and can continue to do so. But with the new terminal in XCTU, you have the option to discover, configure, and program your Digi XBee3 Cellular modem through a single interface.



FIND OUT MORE ABOUT MICROPYTHON

Check out the following resources to learn more about MicroPython and Digi XBee3 Cellular:

- Get Started with MicroPython (Section in User Guide 90001525)
- Digi MicroPython Programming Guide (90002219)
- MicroPython Homepage (micropython.org)
- MicroPython Github (https://github.com/micropython)

DIGI TRUSTFENCE: STRONGER SECURITY FOR THE IOT

Network connectivity means IoT applications and devices face significant new risks and threats, which makes embedded security a critical requirement. Digi TrustFence provides a tested and fully integrated security framework for the long product life of embedded devices that use Digi XBee3 Cellular devices.

The Digi TrustFence security framework provides a series of critical features that ensure top-to-bottom security, including secure connections, authenticated boot, secure physical ports, and more. Digi XBee3 Cellular implements key elements of the Digi TrustFence framework, including:

- **Secure Boot** – Digi TrustFence ensures only signed software images run on a device.
- **Encrypted Storage** – Security keys are protected by an onboard security chip.
- **Protected JTAG** – The programming interface is locked to prevent tampering.
- **Secure Connections** – SSL/TLS v1.2 encryption secures your data transmissions.
- **Lifecycle Longevity** – Digi maintains a future-proof platform architecture.

Security threats to embedded devices in IoT solutions are increasingly common, and the sophistication of these attacks is growing. They can include confidentiality breaches, service theft, data integrity, and reduced service availability. IoT systems have unique security requirements and challenges, mostly due to resource limitations. Digi XBee3 Cellular embedded modems use Digi TrustFence for out-of-the-box, integrated security that lets you build secure, connected products.

SOFTWARE FLEXIBILITY

The Digi XBee3 Cellular leapfrogs the typical breakout boards in its features, functionality, and ease of development. A typical breakout board "breaks out" the pins of an underlying cellular module onto a printed circuit board, so you can access and use individual pins, but usually offers little or no additional functionality. Some breakout boards include end-device certification, a SIM slot, a simple power supply, and an antenna connector. That leaves you with the tasks of designing in an external microcontroller to manage the module, integrating security elements into the design, and other complex development tasks.

By contrast, Digi XBee3 Cellular hardware is fully integrated with an onboard cellular module, ARM Cortex M3 microcontroller, power regulator, and security chip, all packed into a compact 24.4 mm x 32.9 mm Digi XBee3 through-hole footprint. This provides numerous useful features unavailable on other cellular modules or breakout boards.

SEE FIGURE 1 (pg. 6)

FIGURE 1: DIGI XBEE3 CELLULAR LTE-M BLOCK DIAGRAM

- **Digi XBee3 software interface** – The Digi XBee3 software interface runs on the onboard microcontroller and provides an abstraction layer for software designers, including a common AT command interface for configuration and control, an API mode for external devices to intelligently communicate with the XBee, and a transparent serial mode for simple and transparent communications through the UART, over the cellular network, to the destination IP address or phone number.
- **A future-proof design** – The Digi XBee3 software interface is consistent across all current and future Digi XBee modules that all share the same footprint. That means you can easily drop new wireless technologies into your design as they roll out – including LTE-Mobile, NarrowBand-IoT, or even LoRa.
- **Deep sleep mode** – In this mode, Digi XBee3 Cellular consumes less than 10 uA. This feature can be configured as cyclic sleep or pin-activated sleep. By contrast, other breakout boards support "low power modes" that, in fact, draw significantly more power.

SERIAL INTERFACE OPTIONS

Digi XBee3 Cellular offers several interface options for connecting to a microcontroller or host device:

- UART, or Universal Asynchronous Receiver-Transmitter, is an asynchronous serial communication in which the data format and transmission speeds are configurable.
- SPI, or Serial Peripheral Interface, provides faster communications as it separates clock and data lines, along with a select line to choose the device you wish to talk to.
- I^2C, or Inter-Integrated Circuit, is a protocol intended to allow multiple "slave" digital integrated circuits ("chips") to communicate with one or more "master" chips. Like the Serial Peripheral Interface (SPI), it is only intended for short distance communications within a single device.
- USB 2.0 provides an easy way for Digi XBee3 Cellular to be configured as a network device in most operating systems.

CONCLUSION

When considering embedded cellular connectivity, be sure to consider all of the additional components and work involved in bringing your design to fruition. If time to market and ease of use are vital to your project, be sure to evaluate the Digi XBee3 Cellular development kit, which includes a Digi XBee3 end-device-certified modem, a development board, a pre-activated SIM, a live data plan with six months of free data service, and the antennas and accessories needed to get your cellular device up and running in minutes.

FOR MORE ON DIGI XBEE3 CELLULAR PLEASE VISIT www.digi.com/xbeecellular

Contact a Digi expert and get started today

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