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Digi XBee 3 Cellular LTE-M/NB-IoT Global Release Notes

Digi XBee 3 Cellular LTE-M/NB-IoT Global

Version 11416 (September 18, 2020)

INTRODUCTION

These are the release notes for Digi XBee 3 Cellular LTE-M/NB-IoT Global.

SUPPORTED PRODUCTS

- [Digi XBee 3 Cellular LTE-M/NB-IoT Global](#)

KNOWN ISSUES

1. CRITICAL!!: For complete support for new features added in the 11410 firmware such as Bluetooth Low Energy and the Gecko Bootloader, you must update to the latest version of XCTU (6.4.2 or later). If you are upgrading from a version prior to 11410, you must use the 1140F firmware. It will not be possible to downgrade to a version prior to 11410 after upgrading.
2. By-pass mode is now deprecated and is not recommended for new designs. XBee 3 Cellular products support direct USB to access the cellular modem directly. See the user manual for details on how to configure your XBee to use direct USB.
3. Intermittent failure to go to sleep or wake up when using pin sleep with the SPI_nSSEL line while in SPI mode. [XBCELL-3100]
4. u-blox cellular modem firmware versions before L0.0.00.00.05.08,A.02.04 do not support hardware flow control; as a result, RTS (DIO6) and CTS (DIO7) cannot be relied upon for flow control in bypass operating mode. Flow control in bypass operating mode is only reliable when using XBee firmware version 11414 or later and u-blox cellular modem firmware version L0.0.00.00.05.08,A.02.04 or newer. [XBCELL-3359, XBCELL-4946]
5. Loss of signal after multiple attempts to rejoin the network will result in entering an Out-of-Service mode where no network registration or data transfer will be attempted for four minutes. [XBCELL-3494]
6. A race condition exists that will reduce the number of available sockets when a socket is closed while data is in flight. The workaround is to reboot the XBee if a persistent error is received on attempts to open new sockets. [XBCELL-3499]
7. When in API mode, multiple incoming connections to a listening socket over the maximum allowed

will result in attempts to connect being rejected. Incoming connections made once established connections are closed will not be properly reported through API frames. Avoid making multiple simultaneous incoming connections to the XBee. [XBCELL-3500]

8. Sending an SMS message will not wake the cellular component from PSM sleep. [XBCELL-3750]
9. Internal logic can interfere both with USB operation and network connectivity in direct USB mode when configured for anything other than bypass (AP=5). Workaround: Enabling bypass mode can eliminate some edge case conflicts that can cause USB direct network connection issues and USB interface operation conflicts. Note that this is not enabling bypass mode but is ensuring better control of network functionality in USB direct mode. [XBCELL-3753]
10. Modules registering to the AT&T network have been observed infrequently to get stuck in the PSM dormant state (AI=0x2c). This state persists until the XBee is reset. [XBCELL-4812]
11. Versions of XCTU earlier than 6.4.2 will error out at the end of a firmware update, due to the 35 second delay on first boot. Fix: Update to the latest version of XCTU.
12. u-blox cellular modem firmware versions L0.0.00.00.05.06,A.02.00 and L0.0.00.00.05.06,A.02.01 have a maximum baud rate of 115,200 baud. If using bypass operating mode with XBee firmware version 11414 or newer AND one of these u-blox cellular modem firmware versions, ensure ATIB is set to 7 (115,200 baud). If using u-blox firmware version L0.0.00.05.08,A.02.04 with XBee firmware 11414 or later (recommended), ATIB should be left at its default value of 0xA (921,600 baud). [XBCELL-4946]
13. It is not possible to interrupt the MicroPython autostart if the application performs a soft reset very quickly. Workaround: delay the soft reset by a second using `time.sleep(1)`. [XBPY-796]
14. Connections to the BLE API Service within five seconds of waking from sleep can sometimes fail to perform the unlock sequence.
15. Instances where the desired BLE connection type is “Display YesNo” with legacy pairing being used the XBee will request LE Secure Connections instead of using “Just Works”. This will cause the XBee to fail to pair as LESC will be disabled on the other device. [XBPY-862]

UPDATE CONSIDERATIONS

The 11412 release is required to perform over the air or over the wire (UART) updates to the underlying cellular module. There are scripts available on our support site to update over the wire or over the air. See the LTE-M/NB-IoT User Guide for complete prerequisites and instructions.

UPDATE BEST PRACTICES

Digi recommends the following best practices:

1. Test the new release in a controlled environment with your application before you update production devices.
2. Unless otherwise noted, apply updates in the following order:
 1. Device firmware
 2. Modem/Module firmware
 3. Configuration
 4. Application

Digi recommends Digi Remote Manager for automated device updates. For more information, go to <https://www.digi.com/products/iot-platform/digi-remote-manager>.

If you prefer manually updating one device at a time, follow these steps:

1. [Update to latest firmware from XCTU](#)

TECHNICAL SUPPORT

Get the help you need via our Technical Support team and online resources. Digi offers multiple support

levels and professional services to meet your needs. All Digi customers have access to product documentation, firmware, drivers, knowledge base and peer-to-peer support forums.

Visit us at <https://www.digi.com/support> to find out more.

CHANGE LOG

11416 (September 18, 2020)

This is a recommended release.

NEW FEATURES

1. Added support in MicroPython for doing nonblocking socket connect() calls.
2. The **BP** command has been added to allow adjustment of the BLE advertisement power level.
3. Added xbee_connect method to the digi.ble module. This method wraps a gap_connection object and will authenticate and allow API frame access to another XBee3 over BLE.
4. Added support for 4 digit short code SMS targets (P#, 0x1F frames and sms_send() in MicroPython)
5. Added BLE pairing and bonding support for MicroPython GATT client connections. See the MicroPython Programmers Guide for API documentation and the xbee-micropython repository for samples.
6. Updated MicroPython to version 1.12. This does change the bytecode format requiring recompilation of program code.
7. The ER (for TCP) and ES (for UDP) AT commands have been added to allow override of the IP ports used for Remote Manager.
8. A command to specify Remote Manager idle timeout (ATMT) has been added. Remote Manager connections will be closed when there is no activity for this time. MT does not apply when persistent connections have been configured (ATMO bit zero is set).
9. Added new Digi Remote Manager health metrics, which can be enabled with the ATHM command, see documentation for details:
 - o Cellular Reference Signal Received Power (RSRP)
 - o Cellular Reference Signal Received Quality (RSRQ)
 - o Module temperature
 - o TCP and UDP application data counters
 - o Internet link deactivations
 - o Sleep count
10. Digi's version of MicroPython now allows for step sizes other than one in slicing bytes and string objects.
11. API frames have been added to provide filesystem access. See the documentation for further details.

BUG FIXES

1. Fixed an issue in MicroPython where a select() call against a listen socket would always return return as 'writable'. Listen sockets are never writable. [XBCELL-5793, XBCELL-5796]
2. Socket Status 0xCF API frames are now correctly generated if SPI mode was forced by holding DOUT low during boot. [XBCELL-6084]
3. PWM output will now properly resume after coming out of sleep. [XBCELL-6140]
4. Improved reliability of shutdown command and airplane mode. [XBCELL-5648, XBCELL-5676]
5. SMS send in MicroPython properly returns an error if an update is in progress. [XBPY-542]
6. Fixed an issue where AI would be stuck at 0x23 on certain networks. [XBCELL-6532]
7. ATAS response frames in API mode did not always contain the user-specified Frame ID. [XBCELL-6549]

11415 (February 19, 2020)

This is a recommended release.

NEW FEATURES

1. The ATIB command was added, which controls the baud rate used by the XBee CPU to communicate with the u-blox cellular chipset when using bypass mode (ATAP = 5). This command has no effect on other operating modes.
 - Note that this XBee AT command only changes the physical speed of the “host side” of this UART link; before changing a working ATIB value you must use the AT+IPR command in bypass mode to set the baud rate of the cellular chipset.
 - Depending on NVM profile configuration, use of firmware update, etc., the ATIB value may not match the actual configuration of the cellular chipset, in which case you will need to try different ATIB values until communication is restored.
2. The Low Power Shutdown Feature was added, which allows specifying voltages where the XBee will shutdown the modem and file system to prevent memory corruption. This is useful for XBees running off of a battery.
3. Added support for closing all open sockets when using the API Close Socket frame.
4. Add support for various line ending conventions in TLS/SSL certificates and keys.
5. The ability to enable and configure eDRX for additional power saving options has been added. A new enable flag has been added to DO (bit 5) and the DX and D? commands allow configuration and query respectively.
6. Retrieving the RSRP and RSRQ LTE signal quality indicators is now possible in MicroPython and with the SQ and SW AT commands.
7. The Reboot command in Digi Remote Manager will now cleanly shut down the cellular radio before rebooting device.
8. Added Cellular.shutdown command in MicroPython.
9. To improve the over the air update experience:
 - The FI AT command has been added which will report the status of the last update attempt.
 - The AI command will now report the value 0x30 when an update is in progress.
 - During an update, socket or SMS creation/transmits will return an error indicating an update is in progress.
10. Bluetooth Low Energy (BLE) MicroPython APIs:
 - The `digi.ble` module is now available in MicroPython.
 - GAP scan (advertisement discovery).
 - GAP advertise (custom advertisements including beaconing).
 - GAP connect.
 - GATT client operations.
 - See the documentation for additional details.
11. Added Clean Shutdown button (ATSD command) to XCTU firmware definition file.
12. Added username (ATCU) and password (ATCW) settings that are needed by some cellular carriers to authenticate and connect to the network.
13. Added PIN (ATPN) and PUK (ATPK) settings that are needed when using a locked SIM.
14. The ATSD (Shutdown) command now takes an optional parameter to reboot the XBee after shutting down.
15. The ATP1 command has now added PWM functionality.
16. The ATDB command now can take an optional parameter to get an uncached RSSI signal value.
17. In MicroPython, slice-assignment to arrays and bytearray is now supported.
18. The **BI** command has been added, which determines the name that appears in the XBee device's BLE advertisement data. If **BI** is set to the default value (0x20; ASCII space character), the default name of “XBee3 Cellular LTE-M/NB1” will be used.
19. MicroPython has had the ‘uselect’ module added. This will allow cleaner asynchronous socket

operations.

20. The **FO** command has been added, which is used to initiate a cellular component FTP OTA. See the documentation for usage details.
21. Increased RAM available to the MicroPython interpreter to allow for more complex applications.
22. The `ucryptolib` MicroPython module has been added allowing for hardware accelerated AES encryption/decryption in user applications.
23. Updated the XCTU firmware definition file to support cellular component firmware update over USB Direct using XCTU 6.5.0+ on Windows.
24. MicroPython now supports registering callbacks for various functions, including the following: * Cellular SMS * User Data Relay Frames * `micropython.schedule()`
25. The `WDT` class has been added to the `machine` MicroPython module. This allows for the system to detect a hung or poorly behaved application in certain scenarios and recover. The Digi implementation differs from upstream in that it has modified defaults and allows a selection of recovery strategies.

BUG FIXES

1. Enable RTS/CTS flow control on the UART link between the XBee CPU and the u-blox cellular modem. If the u-blox cellular modem is not updated to firmware version L0.0.00.00.05.08,A.02.04, this has no effect, because older u-blox firmware does not support RTS/CTS flow control. See KNOWN ISSUES above and the “Hardware flow control in bypass mode” troubleshooting topic in the user guide. [XBCELL-3359, XBCELL-4946]
2. Fixed issue with ATDT reporting a time value that was far into the future/incorrect.
3. `ATPY^` now correctly interrupts a MicroPython script which has disabled keyboard interrupts using `micropython.kbd_intr(-1)`. [XBPY-446]
4. The MicroPython REPL no longer continuously prints “soft reboot” if autostart is disabled after the script starts and the script performs a soft reset. [XBPY-795]

11413 (August 7, 2019)

This is a recommended release.

NEW FEATURES

1. A new family of socket operation API frames (Create, Connect, Close, Socket Status) have been added to increase the level of control and visibility into network connection creation and management.
2. Over-The-Air (OTA) update notifications will be sent out as modem statuses. This applies to both OTA XBee firmware and OTA cellular component updates.
3. The `ATII` command was added, which reads the IMSI (International Mobile Subscriber Identity) from the SIM.
4. This release includes support for a new maintenance release for the cellular module (u-blox SARA-R410M-02B-01 version L0.0.00.00.05.08) and includes a number of fixes listed in this [PCN](#) from u-blox. See the Digi Product Support page for XBee 3 directions on how to obtain this update and apply it using EasyFlash, over-the-air update, or API mode. XBee firmware 11413 supports both the current u-blox firmware and the new maintenance release.

BUG FIXES

1. Reduce the time it takes to reach `AI = 0x00` on NB-IoT networks. [XBCELL-5191]
2. Increase space available for phone numbers to accommodate full length international numbers including country code. [XBCELL-5110]
3. Extended blocking module entering sleep when performing Over-the-Air update to include the

image download phase. [XBCELL-5322]

4. Shutdown command (ATSD) now errors out if an over-the-air update is in progress. Over-the-air updates are now rejected if a shutdown is in progress. [XBCELL-5351]
 5. Sending an SMS on a network that doesn't support SMS will no longer cause a modem reset. Check with your carrier for network capabilities. [XBCELL-5345]
 6. Sending a TX Request API frame for the TLS protocol with the close flag and with a payload containing one or more bytes will no longer result in data loss. The workaround is dependent upon updating the u-blox cellular modem to firmware version L0.0.00.00.05.08,A.02.04. [XBCELL-3400]
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11412 (June 28, 2019)

This is a recommended release.

NEW FEATURES

1. The firmware now supports updating the firmware on the cellular component. Two methods are available:
 - Packaged Firmware Update: Update performed through the serial interface
 - Firmware Update Over the Air: Update performed through Digi Remote Manager
2. The ATMV command, which reports the cellular component firmware version, now includes the revision and patch level. For instance prior to 11412 the ATMV was displayed like "L0.0.00.00.05.06 [Feb 03 2018 13:00:41]" and now it is displayed like "L0.0.00.00.05.06,A.02.00".
3. The ATSD (Shutdown) command was added. You should use the ATSD command to safely shut down a device before removing power.

BUG FIXES

1. Reduced the chance of encountering a critical bug that causes the cellular component to stop working. This bug only happens with a specific cellular component firmware version which can be determined by the output of the ATMV command. On firmware versions prior to 11412 the problematic cellular component firmware version will be displayed as "L0.0.00.00.05.06 [Feb 03 2018 13:00:41]" and on version 11412 it will be displayed as "L0.0.00.00.05.06,A.02.00".

To reduce the chance of encountering this critical bug it was necessary to add additional delay in situations where the cellular component is being powered down. These delays are only done when running with the problematic cellular component firmware. It is highly recommended that you update the cellular component firmware to avoid this bug and the added delays. [XBCELL-4934]

11411 (April 12, 2019)

This is a recommended release.

NEW FEATURES

1. Cellular Network Time command (ATDT)
 - Reports the local time of the XBee device, if time has been synchronized with the network.
 - Read the number of seconds since Jan 1 2000 00:00:00 UTC, or an ISO 8601-formatted timestamp.
2. Enhanced support for Digi Remote Manager
 - Filesystem support
 - Upload, download, list and delete files remotely using the SCI File System service or File Management UI in Digi Remote Manager.

- SM/UDP connection management
 - In order to minimize data charges for an inactive connection, the XBee will no longer maintain an active TCP connection to DRM. DRM will periodically be polled through Digi's SM/UDP protocol on an interval determined by the DF AT value (default of once per day). Requests to bring up and terminate a full-featured TCP connection can be made from DRM over SM/UDP.
 - The previous constantly connected behavior may be regained by setting bit-0 of the MO AT command.
 - See the documentation for additional details.
 - SMS-based connection management
 - SMS messaging from Digi Remote Manager is now supported. Requests to bring up and terminate a full-featured TCP connection can be made from DRM over SMS.
 - See the documentation for additional details.
 - Configuration and status reporting
 - Read current settings, configure the XBee device, and read the XBee device's current status remotely.
 - Data point creation and upload using MicroPython
 - Create data points with integer or string values and upload them to Digi Remote Manager using MicroPython code.
 - See the documentation for additional details.
 - Device health metrics reporting
 - Configure the XBee to upload device health metrics to DRM, including cellular signal strength.
 - See the documentation for additional details.
 - Data service device request handling with MicroPython
 - Receive Data Service Device Requests from DRM using MicroPython, allowing data to be passed to and from the XBee.
 - See the documentation for additional details.
- 3. Active Scan command (ATAS)
 - Scans for mobile cells in the vicinity and returns information about the cells in the service area of the XBee.

BUG FIXES

1. Fixed security issue to make it more difficult to create a phony firmware update image. [XBCELL-4609]
2. ATAI stuck at 0x22 after fixing an incorrect ATAN value. [XBCELL-4508]
3. When SPI operation has been forced by holding DOUT/DIO13 pin 2 low while resetting the XBee, data arriving at the configured listening socket would be dropped. [XBCELL-4691]
4. Keyboard interrupt at the MicroPython REPL only works when the interrupt byte appears first in a block of input. [XBCELL-4853]
5. The RO parameter (packetization timeout) no longer applies when at the MicroPython REPL (AP = 4). [XBCELL-4853]

11410 (November 13, 2018)

This is a recommended release.

NEW FEATURES

1. Gecko Bootloader
 - Upgrade images are now .gbl files instead of .ebin files, they are compressed to reduce OTA update data usage.

- The first boot cycle when applying an upgrade to firmware version 11410 or later will exhibit a delay of approximately 35 seconds before the XBee modem becomes responsive.
- 2. User Data Relay Frame
 - Relay custom user data to and from MicroPython, BLE, and the local interface.
- 3. MicroPython Features:
 - Flash upload mode now compiles and stores the code in the file system at /flash/main.mpy.
 - Cross compilation support using mpy-cross on a PC and uploading them to the file system.
 - The XBee adds an os.compile() method to compile .py files into .mpy files on the device itself.
 - The XBee adds an os.bundle() method to freeze multiple .mpy files into the device flash for execution in place to reduce heap usage.
- 4. Bluetooth Low Energy (BLE)
 - Send a subset of API frames to the XBee through the encrypted BLE API Service
 - Configure the XBee 3 Cellular using the Digi XBee Mobile app for Android and iOS.

BUG FIXES

1. Unable to delete mpy files from the file system after failing to import them. [XBCELL-219]
 2. Server certificates programmed previously on the system may still be used to authenticate servers despite configuration change or being removed from the file system. [XBCELL-3736]
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1140F (November 13, 2018)

This is a recommended release.

IMPORTANT NOTES

1. This is a gating firmware and is required to update devices on versions earlier than 11410. This gating firmware will automatically update the device to 11410 after about a minute of operation. Versions of XCTU earlier than 6.4.2 will error out at the end of the firmware update, due to the time it takes for the update to apply. Update to the latest version of XCTU to avoid this error.
 2. This firmware will reduce the size of the file system to 420KB after formatting. The upgrade will maintain as much of the file system as possible, prioritizing files in the /flash/cert directory before files in other directories.
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1140C (September 25, 2018)

This is a recommended release.

NEW FEATURES

1. NB-IoT Support
 - Support for European and U.S. Carriers.
 - Important: Conditionally approved for use on T-Mobile NB-IoT network for evaluation and development purposes. Full certification will be completed with an upcoming cellular component firmware update (SARA-R410M-03B). Contact Digi sales for more information.
2. Added new option 1 to CP command for network configuration.
3. Added new commands BM, BN to select band mask.
4. Added new command N# to select network preference.

BUG FIXES

1. Fixed issues with a memory leak when using TLS mutual authentication and additional sockets

- cannot be opened. [XBCELL-3861]
 - 2. Sequence to initially connect to cellular network improved. [XBCELL-4091]
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1140B (June 14, 2018)

This is a recommended release.

NEW FEATURES

1. File system support
 - ATFS command to access through Command Mode
 - MicroPython file interfaces for programmatic access
 - Provides MicroPython module import support
 - Allows storage of TLS certificates for authentication
 - Secure encrypted file storage to protect MicroPython code and TLS private keys
 2. TLS Authentication
 - Accessed in MicroPython with the `ussl.wrap_socket` method
 - Configurable with the `$0/$1/$2` commands
 - Uses certificates stored on the file system
 - New API frame 0x23 to access multiple authentication profiles
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1140A (May 4, 2019)

This is a recommended release.

NEW FEATURES

1. Initial release
2. Digital I/O support
3. Analog Input support
4. API & Transparent mode
5. AT command mode
6. By-pass to raw cellular module
7. SMS
8. TCP/UDP (up to six sockets)
9. TLS (up to six sockets)
10. Incoming connections
11. MicroPython!
 - On-device programmability to add local intelligence
 - Many examples in the Digi MicroPython Programmer Guide
 - AT commands for managing run-time behavior
12. Low power modes
 - LTE power save mode (PSM)
 - Deep sleep mode
 - Pin sleep support
 - Cyclic sleep support
 - Airplane mode support
13. Digi TrustFence secure boot
14. SMS UTF-16/UCS-2 encoding support
15. Multi-network capability (Verizon, AT&T, ...)

BUG FIXES

1. When a transmission wakes the cellular component from the PSM sleep state, it is possible for the transmission to fail while network registration is being confirmed and retry may be necessary.
[XBCELL-3506]

*Release Notes Part Number: 93001302