

**Product Change Notification
Software Release Notes**

**Dot AT Command Firmware
mtxdot-v4.1.2
mtdot-v4.1.2**

**Long Range LoRa Modules
MultiTech xDot[®]
MultiTech mDot[™]**



Date: November 02, 2021

Product Change Notification (PCN) Number
PCN 11022021-00 (Dot)

I. Overview

Dot AT Command Firmware is for use on MultiTech LoRa[®] Modules and is based on mbed-os-6.8:

- MultiTech xDot[®] (MTXDOT Series)
- MultiTech mDot[™] (MTDOT Series)

New versions are currently available for download and evaluation and will be released into standard MultiTech product starting in April 2022.

Device	Evaluation	Shipping Today
MTXDOT Series	mtxdot-v4.1.2	mtxdot-v4.0.5
MTDOT Series	mtdot-v4.1.2	mtdot-v4.0.5

Note: 4.0.5 replaced 4.0.0 in October 2021.

II. Suggested Action Plan

Customers

- Review the information in this PCN and forward to others within your organization who are actively involved with the development of IoT applications using the MultiTech xDot and MultiTech mDot.
- Consider downloading the firmware available on MultiTech or Mbed websites to check compatibility with existing deployments.

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- Review the release schedule for the upcoming firmware release and understand the effect on your manufacturing and deployment schedules.

Distributors

- Forward this announcement to others within your organization who are actively involved in the sale or support of LoRa-enabled sensors.
- Notify existing customers of this change and encourage them to evaluate the new firmware with their custom application.

III. AT Command Firmware – v4.1.2

Overview

Release v4.1.2 is a major software release built upon release v4.0.5. The new features, feature enhancements, bug fixes, and known behaviors available earlier releases are also available in release v4.1.2.

More details on release v4.0.5, are available at:

<https://os.mbed.com/teams/MultiTech/wiki/Dot-firmware-change-log#4-0-5>

New Features (v4.1.2):

1. Updated Mbed version
 - dot-v4.1.2 is based on mbed-os-6.8
 - dot-v4.0.5 is based on mbed-os-5.15.1
 - mtxdot-v4.1.2 (MTXDOT series devices) and mtdot-v4.1.2 (MTDOT series devices)
 - [MBED-474]
2. New AT Commands
 - mtxdot-v4.1.2 (MTXDOT series devices)
 - **AT+DUTY** - Ability to set duty cycle maximum or duty cycle per frequency band.
 - **AT+ERASE=2** – Ability to erase configuration currently stored in the EEPROM
 - mtdot-v4.1.2 (MTDOT series devices)
 - **AT+DUTY** - Ability to set duty cycle maximum or duty cycle per frequency band.
 - **AT+ERASE=2** - Ability to erase both file system and configuration currently stored in the flash
 - **AT+WOTP** – Ability to write protected settings for mDot to the One-Time Programmable (OTP) memory
 - mtxdot-v4.1.2 (MTXDOT series devices) and mtdot-v4.1.2 (MTDOT series devices)
 - [MBED-466]
3. Protected Settings Backup using OTP
 - To safeguard configuration, a backup of protected settings (Device ID, Network ID, Network Key, and Gen App Key) can be stored in the mDot device One-Time-Programmable (OTP) flash using **AT+WOTP** command
 - On startup, the backup of protected settings are restored
 - For example, Device ID 00-00-00-00-00-00-00
 - The device OTP area is divided to allow eight writes of protected settings. The system uses only the latest write to restore settings.
 - mtdot-v4.1.2 (MTDOT series devices) only

- [MBED-452]
- 4. Israel Channel Plan
 - LoRaWAN 1.0.4 support and Regional Parameters RP2 1.0.3 adds AS923-4, extending LoRaWAN support to Israel.
 - mtdot-v4.1.2 (MTXDOT series devices) and mtdot-v4.1.2 (MTDOT series devices)
 - [MBED-356]
- 5. FUOTA Enhancements
 - Available space on mDot flash
 - When starting a FOTA session, the device will check the flash file system for adequate free space to complete download and upgrade processes.
 - If there is not enough free space for download, files will be erased so FUOTA can proceed.
 - Bootloader update
 - mDot bootloader “erase” command will only delete the area of flash containing the file system. Configuration data is left untouched.
 - Specifying “erase all” will erase the entire flash storage.
 - mtdot-v4.1.2 (MTDOT series devices) only
 - [MBED-463]
- 6. Changes to Wake Pin
 - Ability to set trigger for WAKE pin as rising, falling, or either.
 - mtdot-v4.1.2 (MTXDOT series devices) and mtdot-v4.1.2 (MTDOT series devices)
 - [MBED-461]
- 7. Improved Boot Time from Sleep Mode
 - Reduced xDot boot time waking from deep sleep by moving scan for external flash to start of fragmentation session instead of at boot.
 - mtdot-v4.1.2 (MTXDOT series devices) only
 - [MBED-496]

Feature Enhancements (v4.1.2):

1. Updated AT Commands
 - mtdot-v4.1.2 (MTXDOT series devices)
 - **AT+WP** - Added a trigger parameter and mode parameter to set pullup/pulldown.
 - **AT+ERASE=1** – Updated so that only the area of external flash used for FOTA (if present) is erased
 - mtdot-v4.1.2 (MTDOT series devices)
 - **AT+WP** Added a trigger parameter and mode parameter to set pullup/pulldown.
 - **AT+ERASE=1** Updated so that only the file system for mDot is erased (does not affect the configuration).
 - [MBED-461]
2. LoRaWAN 1.0.4 – LoRaWAN Certification Test Tool (LCTT)
 - Pre-tested EU868, US915, KR920, IN865, RU864, AU915, AS923 channel plans in debug firmware
 - mtdot-v4.1.2 (MTXDOT series devices) and mtdot-v4.1.2 (MTDOT series devices)

- [MBED-369]
- 3. Use higher data rates before trying SF11 or SF12 for joining
 - Join data rate progression has been reordered, so higher data rates are used first, prior to SF11 and SF12
 - mtxdot-v4.1.2 (MTXDOT series devices) and mtdot-v4.1.2 (MTDOT series devices)
 - [MBED-439]
- 4. Dot AT Firmware SHALL support DevEUI in OTP
 - DevEUI can be lost if flash or EEPROM memory is erased
 - Default IDs added in OTP section of processor to retain DevEUI
 - mtdot-v4.1.2 (MTDOT series devices) only
 - [MBED 452]

Bug Fixes (v4.1.2):

1. Join Accept in Rx2 when AT+DC=C is set (Class C)
 - Join accept in Rx2 were not being received. Bug fixed.
 - mtxdot-v4.1.2 (MTXDOT series devices) and mtdot-v4.1.2 (MTDOT series devices)
 - [MBED-435]
2. Class A timeout if packet received in Rx1
 - mtxdot-v4.1.2 (MTXDOT series devices) and mtdot-v4.1.2 (MTDOT series devices)
3. Fix AT+PING command to Conduit
 - mtxdot-v4.1.2 (MTXDOT series devices) and mtdot-v4.1.2 (MTDOT series devices)

Schedule (v4.1.2)

1. Downloadable versions of Release 4.1.2 are currently available at:
 - <http://www.multitech.net/developer/downloads/#xdot>
 - xDot AT Command Firmware
 - mtxdot-v4.1.2
 - <http://www.multitech.net/developer/downloads/#mdot>
 - mDot AT Command Firmware
 - mtdot-v4.1.2
2. Manufacturing: xDot and mDot devices manufactured after March 2022 will be shipped with v4.1.2 firmware.
 - MTXDOT Series devices
 - xDot AT Command Firmware
 - mtxdot-v4.1.2
 - MTDOT Series devices
 - mDot AT Command Firmware
 - mtdot-v4.1.2

IV. Flashing mDot Firmware

At any time in the upgrade process, customers can send an email to support@multitech.com or call +1(763) 717-5863.

mDots™ are shipped from the factory with AT Command Firmware. For developing your own custom firmware, refer to the [mDot platform page on mbed](#). Information on using the developer board is in the mDot Developer Guide, available at <http://www.multitech.net/developer/products/multiconnect-dot-series/multiconnect-mdot/#guides>.

Notes:

1. Due to significant changes from beta versions, upgrading from versions prior to 0.1.2 requires resetting the mDot to factory defaults.
2. FUOTA cannot be used to upgrade from release 3.X.X to release 4.1.2.
3. YMODEM upgrade from release 3.X.X to release 4.1.2 requires special firmware and extra steps.
4. When using release 4.1.2 firmware, FUOTA upgrades should use application only versions of the firmware.
5. When downgrading from release 4.1.2 to an earlier version, flash/JTAG must be used.

Instructions are available on the MultiTech Developer Portal:

<http://www.multitech.net/developer/software/mdot-software/mdot-firmware-upgrade/>

V. Ordering Part Numbers Impacted

The following ordering part numbers are impacted by these updates:

Model Name		Ordering Part Numbers	
MultiTech xDot® Long Range LoRa® Modules (MTXDOT Series Devices) AT Command Firmware: mtxdot-v4.1.2			
MTXDOT-AS1-A00-1	MTXDOT-EU1-A00-1		MTXDOT-NA1-A00-1
MTXDOT-AS1-A00-100	MTXDOT-EU1-A00-100		MTXDOT-NA1-A00-100
MTXDOT-AS1-A01-100	MTXDOT-EU1-A01-100		MTXDOT-NA1-A00-1000
MTXDOT-AU1-A00-1	MTXDOT-EU1-IN1-A00-1		MTXDOT-NA1-A01-100
MTXDOT-AU1-A00-100	MTXDOT-JP1-A00-1		
MTXDOT-AU1-A01-100	MTXDOT-KR1-A00-1		
MultiTech mDot™ Long Range LoRa® Modules (MTDOT Series Devices) AT Command Firmware: mtdot-v4.1.2			
MTDOT-923-AS1-M1-UFL-1	MTDOT-868-M1-TRC-1		MTDOT-915-M1-TRC-1
MTDOT-923-AS1-M1-UFL-100	MTDOT-868-M1-TRC-100		MTDOT-915-M1-TRC-100
MTDOT-923-AS1-X1P-SMA-1	MTDOT-868-M1-UFL-1		MTDOT-915-M1-UFL-1
MTDOT-923-AS1-X1-UFL-1	MTDOT-868-M1-UFL-100		MTDOT-915-M1-UFL-100
MTDOT-923-AS1-X1-UFL-50	MTDOT-868-X1P-SMA-1		MTDOT-915-X1P-SMA-1
MTDOT-915-AU-M1-TRC-1	MTDOT-868-X1-SMA-1		MTDOT-915-X1P-SMA-50
MTDOT-915-AU-M1-UFL-1	MTDOT-868-X1-SMA-50		MTDOT-915-X1-SMA-1
MTDOT-915-AU-X1P-SMA-1	MTDOT-868-X1-UFL-1		MTDOT-915-X1-SMA-50
MTDOT-915-AU-X1-SMA-1	MTDOT-923-JP1-X1P-SMA-1		MTDOT-915-X1-UFL-1
MTDOT-915-AU-X1-SMA-50			MTDOT-915-X1-UFL-50
MTDOT-915-AU-X1-UFL-1			
MultiTech xDot® Micro Developer Kit: LoRa USB Dongle Developer Kit (MTMDK Series Devices) AT Command Firmware: mtdot-v4.1.2			
MTMDK-XDOT-AS1-A00	MTMDK-XDOT-EU1-A00		MTMDK-XDOT-NA1-A00
MTMDK-XDOT-AU1-A00	MTMDK-XDOT-JP1-A00		
MTMDK-XDOT-EU1-IN1-A00	MTMDK-XDOT-KR1-A00		

VI. Mbed OS Overview

Arm[®] Mbed[™] OS is an open-source embedded operating system designed specifically for the "things" in the Internet of Things. It includes all the features needed to develop a connected product based on an Arm Cortex-M microcontroller, including security, connectivity, an RTOS, and drivers for sensors and I/O devices.

- **Modular.** Necessary libraries are included automatically on your device, allowing you to concentrate on writing application code.
- **Secure.** Multilayer security helps to protect your IoT solution, from isolated security domains through to Mbed TLS for secure communications.
- **Connected.** We give you a wide range of communications options with drivers for Bluetooth Low Energy, 6LoWPAN, Mobile IoT (LPWA), Ethernet and WiFi.

For additional information on Mbed and the MultiTech/mBed partnership, visit:

- <https://os.mbed.com/mbed-os/>
- <https://os.mbed.com/teams/MultiTech/>

VII. MultiTech xDot[®]

The **MultiTech xDot[®]** is a secure, end-certified, Arm[®] Mbed[™] programmable, low-power RF module, that provides long-range, low bit rate M2M data connectivity to sensors, industrial equipment and remote appliances. The xDot is LoRaWAN[®] compliant, providing bi-directional data communication up to 10 miles / 15 km line-of-sight and 1-3 miles / 2 km into buildings, using subGHz ISM bands in North America, Europe, Australia, Asia Pacific, India and Korea.

xDots bring intelligence, reduced complexity and a lower overall bill of material cost to the very edge of the network while supporting a variety of electronic interfaces to connect just about any "Thing" for years on battery power.

For additional information on the xDot and dot firmware, visit

- <http://www.multitech.net/developer/products/multiconnect-dot-series/multiconnect-xdot/>
- <https://os.mbed.com/platforms/MTS-xDot-L151CC/>

VIII. MultiTech mDot[™]

The **MultiTech mDot[™]** is a secure, CE/FCC/RCM/GITEKI certified, Arm[®] Mbed[™] programmable, low-power RF module, that provides long-range, low bit rate M2M data connectivity to sensors, industrial equipment and remote appliances.

The mDot is LoRaWAN[®] compliant, providing bi-directional data communication up to 10 miles / 15 km line-of-sight and 1-3 miles / 2 km into buildings, using sub-GHz ISM bands in North America, Europe, Australia and Asia Pacific. mDots bring intelligence, reduced complexity and a lower overall bill of material cost to the very edge of the network while supporting a variety of electronic interfaces to connect just about any "Thing" for years on battery power.

For additional information on the mDot and dot firmware, visit

- <http://www.multitech.net/developer/products/multiconnect-dot-series/multiconnect-mdot/>
- <https://os.mbed.com/platforms/MTS-mdot-f411/>

IX. MultiTech xDot[®] Micro Developer Kit

The [xDot[®] Micro Developer Kit](#) is a USB dongle that allows a developer to plug in a MultiTech xDot and start developing their application. Its portable design makes it ideal for connecting to a laptop and doing range testing of the LoRa network. This LoRa USB dev kit includes a development board, xDot, integrated LoRa antenna and Quick Start Guide.

Developer support and resources are available at www.multitech.net.

For additional information on the xDot Micro Developer Kit and dot firmware, visit

- <http://www.multitech.net/developer/products/multiconnect-dot-series/multiconnect-xdot/>
- <https://os.mbed.com/platforms/MTS-xDot-L151CC/>

X. Additional Information

If you have any questions regarding this Product Change Notification/Software Release Notes, please contact your MultiTech sales representative or visit the technical resources listed below:

World Headquarters – USA

+1 (763) 785-3500 | sales@multitech.com

EMEA Headquarters – UK

+(44) 118 959 7774 | sales@multitech.co.uk

MultiTech Developer Resources:

www.multitech.net

An open environment where you can ask development related questions and hear back from MultiTech engineering or a member of this community.

Knowledge Base:

<http://www.multitech.com/kb.go>

Immediate access to support information and resolutions for all MultiTech products.

MultiTech Support Portal:

<https://support.multitech.com/support/login.html>

Create an account and submit a support case directly to our technical support team.

MultiTech Website:

www.multitech.com

MultiTech/Mbed Partnership:

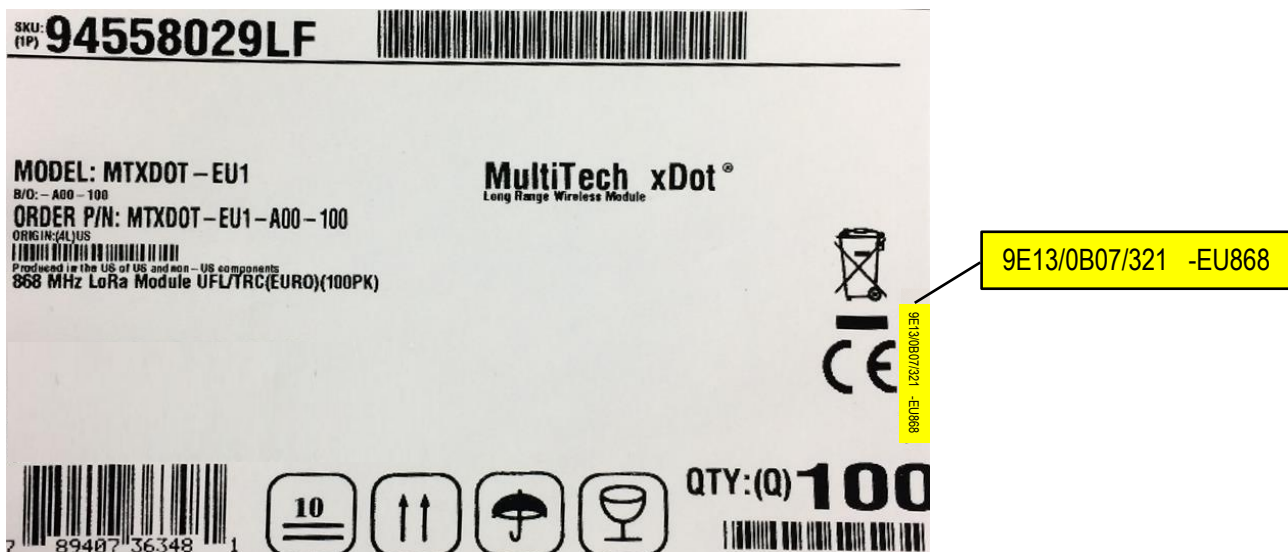
<https://os.mbed.com/mbed-os/>

<https://os.mbed.com/teams/MultiTech/>

ATTACHMENT 1
Identifying Dot Firmware Version

There are two ways to identify the firmware version that has been programmed into the xDot or mDot.

1. Product Packaging
 - The carton label for each xDot and mDot includes an indication of the firmware version included.



9E13/0B07/321	Dot Firmware Version 321 = Dot Version 3.2.1
-EU868	LoRa Channel Plan

2. AT Command
 - The AT Command “ATI Request ID” returns the product and software identification information.
 - Syntax Command: ATI, help ATI, ATI=?
 - Parameters and Values: None
 - Command with Response Examples
 - ATI
 - MultiTech mDot
Firmware: 3.2.0-mbed51101
Library: 3.2.0-mbed51101
MTS-Lora: 3.2.0-mbed51101
 - OK

ATTACHMENT 2
Identifying Date of Manufacture (DOM)

Each individual product that ships from MultiTech is identified with its unique Date of Manufacture (DOM). Below are photos that demonstrate the format and placement of the DOM information.

Product: MultiTech xDot

Model Number: MTXDOT-EU1-A00-100

Example: DOM 2020.02.05 = February 5, 2020



Product: MultiTech mDot

Model Number: MTDOT-868-M1-UFL-100

Example: DOM 2017.10.12 = October 12, 2017



ATTACHMENT 3

Dot AT Command Firmware Versus mPower Software and mLinux Software

MultiTech xDot and mDot LoRa endpoints are most often used with MultiTech Conduit® gateways and mPower™ or mLinux embedded software. Each version of Dot firmware is compatible with different versions of mPower and mLinux embedded software.

Version	mPower Versions						
	5.4.X	5.3.X	5.2.X	5.1.X	5.0.X	1.7.X	1.6.X
V4.1.2	X	X	X	X (**)	X (**)	X (**)	X (**)
v4.0.5	X	X	X	X (**)	X (**)	X (**)	X (**)
v3.3.5	X	X	X	X (**)	X (**)	X (**)	X (**)
v3.2.1	X	X	X	X	X	X (*)	X (*)
v3.1.0	X	X	X	X	X	X (*)	X (*)
v3.0.0	X	X	X	X	X	X (*)	X (*)

(*) FUOTA not available on these mPower versions

(**) Commands required for compatibility mode to be issued on startup

- AT+FOTA=0
- AT+JNV=0
- AT+JOIN

Version	mLinux Versions					
	5.3.X *	5.2.X *	5.1.X *	5.0.X *	1.7.X *	1.6.X *
V4.1.2	X	X	X (**)	X (**)	X (**)	X (**)
v4.0.5	X	X	X (**)	X (**)	X (**)	X (**)
v3.3.5	X	X	X (**)	X (**)	X (**)	X (**)
v3.2.1	X	X	X	X	X	X
v3.1.0	X	X	X	X	X	X
v3.0.0	X	X	X	X	X	X

(*) mLinux does not support FUOTA

(**) Commands required for compatibility mode to be issued on startup

- AT+FOTA=0
- AT+JNV=0
- AT+JOIN

Revision History

Version	Author	Date	Change Description
-00	DT	07/16/2021	Original version with updates
	DT	8/27/2021 9/2/2021	Eric Buhr comments added. Carol Almquist comments added. Jason Reiss comments added.
	RB	10/28/2021	Updated to reflect 4.1.2