AT Command Set for xTendLoRa Flood Routed Mesh Network

11/27/2018 Version 1.0

Introduction

This document covers the AT command set for software version v101 of the xTendLoRa software stack.

Command Structure

Each command will begin with the ASCII characters ‘AT’. The radio will only listen to commands following these character.
Following these letters there should be one of these control switches

1. + This is used to send more information of the command. + should be followed with ASCII characters of the command
2. ? This is used at the end of a command to ask for the current value of a setting
3. = This is used to set current value of a parameter or setting
4. <char> Represents the dynamic portion of the command, like network address, node address, etc

Each command will be terminated by the carriage return and line feed ASCII characters. Commands will not be executed without these terminating characters. After receiving AT, the radio will allow 10 sec for the host to complete the command by sending the \r\n terminators. If these are not received with in this time duration the ongoing reception is flushed and the AT command processor is reset for a new command.

Commands

1. Set Current Address

AT+ADDR=<address in ASCII><cr><lf>	Sets the address of the radio to the value that follows the = sign. This should be ASCII representation of the 16 bit node address. Each node in a network should have a unique address. Default value: Pearson Hash value of the IEEE MAC ID stored in the EEPROM memory
Command AT+ADDR=E25A<cr><lf> Returns OK<cr><lf> NOT OK:<error code><cr><lf>	Sets the current node address to 0xE25A Returns OK\r\n if the address is valid 0x0000 and 0xFFFF are invalid address.

2. Get Current Address

AT+ADDR?<cr><lf>	Returns the current address of the radio. This is an ASCII representation of the 16 bit node address. Default value: Pearson Hash value of the IEEE MAC ID stored in the EEPROM memory
Command AT+ADDR?<cr><lf> Returns ADDR=<Value of address in ASCII><cr><lf>	Returns the current node address.

3. Set Network Address

AT+NADDR=<address in ASCII><cr><lf>	Sets the network address of the radio to the value that follows the = sign. This should be ASCII representation of the 8 bit node address. Default value:0x55
Command AT+NADDR=5F<cr><lf> Returns OK<cr><lf> NOT OK:<error code><cr><lf>	Sets the current node network address to 0x5F Returns OK\r\n once value is set

4. Get Network Address

AT+NADDR?<cr><lf>	Returns the network address of the radio. This is an ASCII representation of the 8 bit network address.
Command AT+NADDR?<cr><lf> Returns ADDR=<Value of network address in ASCII><cr><lf>	Returns the current network address.

5. Send Text Data

AT+SEND:<dest>=<ASCII text data><cr><lf>	Send ASCII encoded data to the destination address.
Command AT+SEND:1FA5=HelloWorld!<cr><lf> Returns OK:<message id><cr><lf>	Returns OK plus the message so that we can wait for a ack or retry after a delay

NOT OK:<error code><cr><lf>	

6. Get Last Text Data

AT+RECV<cr><lf>	Request for the last received message for this node
Command AT+RECV<cr><lf> Returns <source id>:<messages><cr><lf>	Returns The last message along with the node ID that sent the message to this node. This information will also be sent unsolicited to the host with a new message come in.

7. Set AES 128 bit Encryption key

AT+AESKEY=<16 bytes of encryption key><cr><lf>	Set the encryption key for the node to be able to send messages on the air
Command AT+AESKEY=34FA….7541<cr><lf> Returns OK<cr><lf>	Set the encryption key to the ASCII string. The should be 16 bytes long. As this is ASCII encoded total length will be 32 bytes.

8. Get RSSI of the last received packet

AT+RSSI?<cr><lf>	Get the RSSI of the last packet sent to this node
Command AT+RSSI?<cr><lf> Returns RSSI=-<Value>dBm<cr><lf>	Will return the RSSI value computed in dBm for the last packet sent to this node. This will not reflect the RSSI of last packet routed and/or incident on this node. The packet has to be addressed to this node.

9. Soft reset the MCU

AT+RST<cr><lf>	Reset the onboard MCU
Command AT+RST<cr><lf> Returns None	Will reboot the on board MCU and restart code execution.

10. Get MAC ID

AT+MAC?<cr><lf>	Read the factory programmed MAC ID
Command AT+MAC?<cr><lf> Returns MAC=45A22378C61B9F2E<cr><lf>	Will return the MAC ID saved in the EEPROM. This is a 8 byte number programmed at the factory. It is a true EUID.

11. Send Broadcast

AT+BCAST=<ASCII encoded payload><cr><lf>	Broadcast message
Command AT+BCAST=Hey<cr><lf> Returns OK<cr><lf> NOT OK:<error code>\r\n	Will send a message on the broadcast address 0x0000. Broadcast messages are not acknowledged.

12. Set Sink

AT+SETSINK<cr><lf>	Set message sink
Command AT+SETSINK<cr><lf> Returns OK<cr><lf>	Will send broadcast message to set this node as a message sink. Any message set to the data sink will be sent to this node. This can be useful to dynamically make a node act as data concentrator in the field. One one device can be sink as a time in a network. Host should keep repeating this message periodically to set the sink address on new devices. Sink address will be saved to EEPROM

13. Send to Sink

AT+SSINK=<ASCII encoded data to be sent><cr><lf>	Send to sink
Command AT+SSINK=Hey<cr><lf> Returns OK:<message id><cr><lf>	Will send unicast message to the current set network sink. If the current node is the sink, the device will drop this request. If this is a valid request the device will reply back with the message id to wait for ACK

14. Module Information

AT+I<cr><lf>	Module information
Command AT+I<cr><lf> Returns LoRa Mesh AT Command Set <Command set ver> Firmware <version>	Get the versions of the AT command set used and the firmware version

15. Enter Bootloader

AT+BOOTLOAD<cr><lf>	Enter bootloader
Command AT+BOOTLOAD<cr><lf> Returns OK	Enables bootloader entry and then resets the processor to enter bootloader

16. Set Number of Hops

AT+HOPS=<max number of hops><cr><lf>	Set number of hops
Command AT+HOPS=14<cr><lf> Returns OK<cr><lf>	Sets the maximum number of hops for all messages from this node after which the packet will be dropped. The hop count is in hex notation

17. Get Number of Hops

AT+HOPS?<cr><lf>	Get number of hops
Command AT+HOPS?<cr><lf> Returns HOPS=16<cr><lf>	Gets the maximum number of hops for all messages from this node after which the packet will be dropped. The hop count is in hex notation

18. Get Number MAC Activity detected counter

AT+CADCOUNTER?<cr><lf>	Get number of MAC layer back offs
Command AT+CADCOUNTER?<cr><lf> Returns 4<cr><lf>	Gets the CAD counter that caused a message to be delayed. This is an incrementing counter only and will count to decimal 10. It will stay there until it is cleared by host

19. MAC Activity detected counter reset

AT+CADCOUNTERRST<cr><lf>	Reset number of MAC layer back offs
Command AT+CADCOUNTERRST<cr><lf> Returns OK<cr><lf>	Resets the CAD counter that caused a message to be delayed. This is an incrementing counter only and will count to decimal 10. It will stay there until it is cleared by host

20. Mode of operation

AT+MODE?<cr><lf>	Get current mode of operation
Command AT+MODE<cr><lf> Returns MODE=END NODE/ROUTER<cr><lf>	Reads the current mode of operation and reports if its an end node or is enabled as a router. This value can only be set by the switch on the box.

21. Get current RF channel

AT+RFCH?<cr><lf>	Get current channe;
Command AT+RFCH<cr><lf> Returns CHANNEL=<channel number><cr><lf>	Returns the current channel number in a decimal interpreted format. Following are the RF freq associated with channel numbers 1. 906 MHz 2. 908 MHz 3. 910 MHz 4. 912 MHz 5. 914 MHz 6. 916 MHz 7. 918 MHz 8. 920 MHz 9. 922 MHz 10. 924 MHz

22. Set current RF channel

AT+RFCH=<channel number><cr><lf>	Get current channel
Command AT+RFCH=1<cr><lf> Returns OK<cr><lf>	Sets the current channel number in a decimal interpreted format. Following are the RF freq associated with channel numbers 1. 906 MHz 2. 908 MHz 3. 910 MHz 4. 912 MHz 5. 914 MHz 6. 916 MHz 7. 918 MHz 8. 920 MHz 9. 922 MHz 10. 924 MHz

23. Get TX power level

AT+TXPOWER?<cr><lf>	Get current output power setting
Command AT+TXPOWER?<cr><lf> Returns TX POWER=<power level><cr><lf>	Get the current set level of output power in dBm. This can be a value between 1 to 13 dBm

24. Set TX power level

AT+TXPOWER=<power><cr><lf>	Set current output power setting
Command AT+TXPOWER=<Value><cr><lf> Returns OK<cr><lf> Or NOT OK:<code>\r\n	Set the current level of output power in dBm. This can be a value between 1 to 13 dBm

25. Get CAD RSSI level

AT+CADRSSI?<cr><lf>	Get current CAD RSSI
Command AT+CADRSSI?<cr><lf> Returns CAD RSSI=<RSSI level><cr><lf>	Get the current set level of CAD RSSI in dBm. This can be a value between 0 to -120 dBm. This is the value of RSSI used to detect channel activity. If the RSSI is higher than this threshold, channel is deemed busy and the node backs off from transmitting for 1 second

26. Set CAD RSSI level

AT+CADRSSI=<value><cr><lf>	Set current CAD RSSI
Command AT+CADRSSI=-81<cr><lf> Returns OK<cr><lf> Or NOT OK:<error code>	Set the current level of CAD RSSI in dBm. This can be a value between 0 to -120 dBm. This is the value of RSSI used to detect channel activity. If the RSSI is higher than this threshold, channel is deemed busy and the node backs off from transmitting for 1 second

27. Get the current serial parity setting

AT+PARITY?	Get current Parity
Command AT+PARITY? Returns ODD<cr><lf> Or EVEN<cr><lf> Or NONE<cr><lf>	Gets the current parity set for the serial port. If the Parity is NONE, then there are two stop bits else there is only one stop bit of odd and even parity. System will factory default to EVEN parity with one stop bit.

Error Codes

Code	Note
1	Set address has address set to illegal value of 0x0000 or 0xFFFF. Resend command with

	valid address
2	Failed to save the network address to EEPROM memory
3	Payload too long. Pass payload smaller than 64 bytes.
4	AES key length error. Key needs to be exactly 32 ASCII bytes, ie 16 bytes binary
5	Undefined command
6	Illegal channel setting
7	Illegal TX power setting
8	Illegal RSSI setting for CAD process