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NOTICE TO CUSTOMERS

All documentation becomes dated, and this manual is no exception. Microchip tools and documentation are constantly evolving to meet customer needs, so some actual dialogs and/or tool descriptions may differ from those in this document. Please refer to our web site (www.microchip.com) to obtain the latest documentation available.

Documents are identified with a “DS” number. This number is located on the bottom of each page, in front of the page number. The numbering convention for the DS number is “DSxxxxxxxxA”, where “xxxxxxxx” is the document number and “A” is the revision level of the document.

For the most up-to-date information on development tools, see the MPLAB® IDE online help. Select the Help menu, and then Topics to open a list of available online help files.

INTRODUCTION

This chapter contains general information that will be useful to know before using the RN4678 Bluetooth® Dual Mode Module. Items discussed in this chapter include:

• Document Layout
• Conventions Used in this Guide
• Recommended Reading
• The Microchip Web Site
• Development Systems Customer Change Notification Service
• Customer Support
• Document Revision History

DOCUMENT LAYOUT

This document provides information for configuring the RN4678 module, including a command reference, advanced features, and application examples. The document is organized as follows:

• Chapter 1. “Overview” - This chapter describes the operating modes of the RN4678 Bluetooth® Dual-Mode Module.
• Chapter 2. “Command Reference” - This chapter describes the general command categories of the RN4678 Bluetooth® Dual-Mode Module in detail.
• Appendix A. “Command Quick Reference Guide” - This Appendix provides a quick and summarized overview of the commands discussed in the previous chapter.
CONVENTIONS USED IN THIS GUIDE

This manual uses the following documentation conventions:

## DOCUMENTATION CONVENTIONS

<table>
<thead>
<tr>
<th>Description</th>
<th>Represents</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arial font:</td>
<td>Referenced books</td>
<td><em>MPLAB® IDE User’s Guide</em></td>
</tr>
<tr>
<td></td>
<td>Emphasized text</td>
<td>...is the only compiler...</td>
</tr>
<tr>
<td>Italic characters</td>
<td>A window</td>
<td>the Output window</td>
</tr>
<tr>
<td></td>
<td>A dialog</td>
<td>the Settings dialog</td>
</tr>
<tr>
<td></td>
<td>A menu selection</td>
<td>select Enable Programmer</td>
</tr>
<tr>
<td>Initial caps</td>
<td>A field name in a window or dialog</td>
<td>“Save project before build”</td>
</tr>
<tr>
<td>Quotes</td>
<td>A menu path</td>
<td><em>File</em>&gt;<em>Save</em></td>
</tr>
<tr>
<td>Underlined, italic text with right angle bracket</td>
<td>A menu path</td>
<td><em>File</em>&gt;<em>Save</em></td>
</tr>
<tr>
<td>Bold characters</td>
<td>A dialog button</td>
<td>Click <em>OK</em></td>
</tr>
<tr>
<td></td>
<td>A tab</td>
<td>Click the <em>Power</em> tab</td>
</tr>
<tr>
<td>N'Rnnnn</td>
<td>A number in verilog format, where N is the total number of digits, R is the radix and n is a digit.</td>
<td>4'b0010, 2'hF1</td>
</tr>
<tr>
<td>Text in angle brackets &lt; &gt;</td>
<td>A key on the keyboard</td>
<td>Press &lt;Enter&gt;, &lt;F1&gt;</td>
</tr>
<tr>
<td>Courier New font:</td>
<td>Sample source code</td>
<td>#define START</td>
</tr>
<tr>
<td>Plain Courier New</td>
<td>Filenames</td>
<td><code>autoexec.bat</code></td>
</tr>
<tr>
<td></td>
<td>File paths</td>
<td><code>c:\mcc18\h</code></td>
</tr>
<tr>
<td></td>
<td>Keywords</td>
<td><code>_asm, _endasm, static</code></td>
</tr>
<tr>
<td></td>
<td>Command-line options</td>
<td><code>-Opa+, -Opa-</code></td>
</tr>
<tr>
<td></td>
<td>Bit values</td>
<td>0, 1</td>
</tr>
<tr>
<td></td>
<td>Constants</td>
<td><code>0xFF, ‘A’</code></td>
</tr>
<tr>
<td>Italic Courier New</td>
<td>A variable argument</td>
<td><code>file.o, where file can be any valid filename</code></td>
</tr>
<tr>
<td>Square brackets [ ]</td>
<td>Optional arguments</td>
<td><code>mcc18 [options] file [options]</code></td>
</tr>
<tr>
<td>Curly brackets and pipe character: {}</td>
<td>Choice of mutually exclusive arguments; an OR selection</td>
<td>`errorlevel {0</td>
</tr>
<tr>
<td>Ellipses...</td>
<td>Replaces repeated text</td>
<td><code>var_name [ , var_name...]</code></td>
</tr>
<tr>
<td></td>
<td>Represents code supplied by user</td>
<td><code>void main (void) { ... }</code></td>
</tr>
</tbody>
</table>
RECOMMENDED READING

This user’s guide describes how to use the RN4678 Bluetooth® Dual-Mode Module. Other useful document(s) are listed below. The following Microchip document(s) are recommended as supplemental reference resources.

RN4678 Bluetooth® Dual Mode Module Data Sheet (DS50002519)
This document provides the technical specifications for the RN4678 module and is available for download from the Microchip website (www.microchip.com)

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• General Technical Support – Frequently Asked Questions (FAQs), technical support requests, online discussion groups, Microchip consultant program member listing
• Business of Microchip – Product selector and ordering guides, latest Microchip press releases, listing of seminars and events; and listings of Microchip sales offices, distributors and factory representatives

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• Emulators – The latest information on the Microchip MPLAB® REAL ICE™ in-circuit emulator
• In-Circuit Debuggers – The latest information on the Microchip in-circuit debugger, MPLAB ICD 3
• MPLAB X IDE – The latest information on Microchip MPLAB X IDE, the Windows® Integrated Development Environment for development systems tools
• Programmers – The latest information on Microchip programmers including the PICkit™ 3 development programmer
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- Distributor or Representative
- Local Sales Office
- Field Application Engineer (FAE)
- Technical Support

Customers should contact their distributor, representative or field application engineer (FAE) for support. Local sales offices are also available to help customers. A listing of sales offices and locations is included in the back of this document.

Technical support is available through the web site at:
http://www.microchip.com/support.

DOCUMENT REVISION HISTORY

Revision A (June 2016)
This is the initial release of this document.

Revision B (October 2016)
This revision includes the following updates:

- Modified Section 1.3 “Control RN4678 over UART” to update port settings to Hardware flow control enabled.
- Modified Section 2.3.19 to add a sentence to the existing 0x1000 description in Table 2-5, and to change its default text value to 1000.

Revision C (December 2018)
This revision includes the following updates:

- Modified Section 2.3.17, “SO” command to suppress the status strings.
- Modified Section 2.3.19 to describe the “SQ, 0008” command which can enable the SW_BTN.
- Added Section 2.3.23 and Section 2.3.24 for new commands STO and STD which are used to configure the power on standby timeout and disconnect standby timeout respectively.
- Modified Section 2.3.25 to update the baud rate settings, added support for 1Mbps baud rate.
- Modified Section 2.4.1, “D” command to display the feature value which is set by “SQ” command
- Modified Section 2.5.11 to add description of for the F command response format.
- Added Section 2.5.18 for the new command O,0 which puts the module in dormant mode.
Chapter 1. Overview

1.1 INTRODUCTION

Microchip RN4678 Certified Bluetooth Dual Mode RF module supports both Bluetooth Classic and Bluetooth Low Energy (BLE) communication. Under Bluetooth Classic, RN4678 implements the standard Serial Port Profile (SPP) that supports data streaming between two Bluetooth Classic devices. Under BLE, RN4678 introduces a custom private service that mimics the functionality of SPP and supports data streaming between two BLE devices. This BLE data streaming function in RN4678 is labeled as UART Transparent. The data streaming functionality of RN4678 under Bluetooth Classic and BLE behaves virtually the same, creating a universal user experience across two different communication protocols.

The RN4678 module is developed on top of the BM78 module. Its hardware is identical to BM78 and pin-compatible with BM77 and RN4677. A major difference between the RN4678 and BM78 is that RN4678 provides the control interface based on ASCII commands. The command interface on RN4678 is similar to that of previous RN modules, such as RN41/RN42, RN52, and RN4020, providing an easy migration path for customers who are currently using RN Bluetooth modules. The command interface on the RN4678 is also very similar to that of the RN4677, with minimum syntax modifications. Along with BM78, RN4678 additionally provides support for the iAP2 protocol over Bluetooth classic to provide data streaming capability with latest Apple iOS® devices. Apple requires any new product developed under Made for iOS (MFi) product to follow the iAP2 protocols.

1.2 COMMAND MODE VS. DATA MODE

The RN4678 module operates in two modes: Data mode (default) and Command mode. When RN4678 is connected to another device and in Data mode, RN4678 acts as a data pipe: anything received from UART is passed to the connected peer device through SPP if connected to a Bluetooth Classic device, or via a custom private service, UART Transparent, if connected to a BLE device. When data is received from the peer device via SPP for Bluetooth Classic or UART Transparent for BLE, such data outputs directly to UART.

The RN4678 module is configured or controlled, or both, by setting it into Command mode and executing ASCII commands over UART. All configuration changes made by Set commands remain in Non-Volatile Memory (NVM) and survive the power cycle. Any configuration changes made need a reboot of module to take effect. All Action commands take effect immediately, but have no effect in case of power recycle.

1.3 CONTROL RN4678 OVER UART

A terminal emulator, such as TeraTerm (Windows) or CoolTerm (Mac OS-X®), can be used to control the RN4678 PICtail™ board from a computer.

With the RN4678 PICtail board connected to a computer and a serial port enumerated for the UART port, run the terminal emulator to open the COM port with the following port settings:

- Baud rate 115,200 bps
To enter Command mode, type $$\$\$\$ into the terminal emulator. Once RN4678 enters Command mode, it sends the string CMD via the UART to indicate the start of Command mode session. Once in Command mode, valid ASCII commands can be issued to control or configure RN4678. All commands need to be terminated with a carriage return(\n) character. The RN4678 provides a response to every command entered. The next command must not be issued before having received a response for the previous command. For Set or Action commands, the positive response is AOK and negative response is ERR followed by an error code. All error codes are listed in Table 1-1. By default, when the RN4678 is ready to receive the next command, the command prompt CMD> is sent via the UART. Users can turn off this feature by using the command SQ to ensure that the interface is backward compatible with RN41/42/52/4020.

The RN4678 module has two operating modes that can be set by using the command SM.

- **Default mode** (SM, 0) – In this mode, other Bluetooth devices can discover and connect to the module. Outbound connections can also be initiated in this mode.
- **Paring mode** (SM, 6) – In this mode, the module attempts to connect to the remote device whose MAC address matches the value stored in the “Remote Address” field in the module. The command SR sets the “Remote Address” field.

<table>
<thead>
<tr>
<th>Error Code</th>
<th>Error Message</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ERR1</td>
<td>Error in command syntax</td>
</tr>
<tr>
<td>2</td>
<td>ERR2</td>
<td>Error in Parameter format or range</td>
</tr>
<tr>
<td>3</td>
<td>ERR3</td>
<td>Error in accepting command in current operating state</td>
</tr>
<tr>
<td>4</td>
<td>ERR4</td>
<td>Error in current settings</td>
</tr>
</tbody>
</table>

In Command mode, if the <ESC> key (ASCII code 0x1B) is sent to UART, all previous and unexecuted inputs are ignored, and a new command prompt displays when the module is ready to take a new command. To return to Data mode, type ---<cr>.

**1.5 SECURITY MODES**

The RN4678 module supports encryption and authentication with security modes from 1 to 4. The definitions of Security modes are as follows:

- **Security mode 1: Passkey Confirm**
- **Security mode 2: Just Works**
- **Security mode 3: Passkey Entry**
- **Security mode 4: Legacy Pin Code**

For Bluetooth Classic, all of these security modes are supported. For BLE, only security modes from 1 to 3 are supported.

For Security mode 1 and Security mode 3, by default, a random 6-digit security pin is generated and displayed at one end of the connection and the other end must enter the security pin. Optionally, in Security mode 1, it is possible to fix the 6-digit security pin for BLE connection by supplying a 6-digit pin using the command SP instead of a 4-digit pin for Legacy Pin Code mode.
Chapter 2. Command Reference

2.1 INTRODUCTION

The RN4678 module supports a variety of commands for controlling and configuration. This section describes these commands in detail and provides examples.

2.2 COMMAND SYNTAX

The ASCII command syntax is a keyword followed by optional parameters.

- ASCII commands are divided into three groups:
  - Set Commands
  - Get Commands
  - Action Commands
- All commands contain one, two or three case-insensitive characters
- Delimit command and parameter(s) with a comma
- Text data is case sensitive, such as Bluetooth name
- All commands end with carriage return (\r, \x0d)
- Get commands return the value to be retrieved. Most of the other commands return either AOK as a positive response or ERR as a negative response.

2.3 SET COMMANDS

Set commands change the RN4678 configurations and take effect after rebooting via R, 1 command, hard Reset or power cycle.

2.3.1 SA, <1-4>

The Set Authentication command sets the authentication method when a remote device attempts to connect, where <1-4> is one of the values shown in Table 2-1. Once a remote device exchanges pin codes with the RN4678 module, a link key is stored for future use. The device automatically and permanently stores up to eight peer devices in Flash memory, using the First-In, First-Out (FIFO) method.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Secure Simple Pairing (SSP) Pin Code Confirm mode</td>
</tr>
<tr>
<td></td>
<td>If this option is set, a 6-digit pin is sent to UART when authenticating the link. On the remote side, the same 6-digit pin is displayed and confirmation is requested. For BLE, if the command SP sets the 6-digit pin code, the pin code is displayed and confirmed on the remote side; otherwise, a random 6-digit pin code is generated for confirmation.</td>
</tr>
<tr>
<td>2</td>
<td>(Default) SSP “Just Works” mode</td>
</tr>
<tr>
<td></td>
<td>This mode works without any request to display or input any security pin.</td>
</tr>
</tbody>
</table>
2.3.2 SC, \(<H16>\)
This command only applies to Bluetooth Classic.
This command sets the “Service Class” field in the Class of Device (COD). The service class consists of the 11 Most Significant bits in the COD. This command sets the most significant word (msw) to create the 24-bit device class number. The inquiring device interprets the service class to determine the service. A complete listing of available Bluetooth service classes is referenced on the Bluetooth SIG web site at www.bluetooth.org.

Default: 0x1F00
Example: SC,001F
SD,0123

2.3.3 SD, \(<H16>\)
This command only applies to Bluetooth Classic.
This command sets the last significant word (lsw) of the Class of Device (COD). The COD is a 24-bit number. The higher 8-bit value is set by using the command SC and the lower 16-bit value is set by using the command SD.

Default: 0x0000
Example: SC,0002
SD,8040

To set the COD to 0x1F0123, use the following commands:

SC,001F
SD,0123

2.3.4 SDM, \(<TXT>\)
This command only applies to BLE.
This command sets the model string in the BLE Device Information service. It expects the model number string which can be up to 16 characters as the input parameter

Default: RN4678
Example: SDM,MyModel

2.3.5 SDN, \(<TXT>\)
This command only applies to BLE.
This command sets the manufacturer string in BLE Device Information service. It expects the manufacturer string which can be up to 16 characters as the input parameter.

**Default:** Microchip  
**Example:** SDN, MyManufacturer

### 2.3.6 SDR, <TXT>
This command *only* applies to BLE.
This command sets the software revision of the firmware. It expects an ASCII string which can be up to four characters as software revision.

**Default:** Current RN4678 software version  
**Example:** SDR, 1.23

### 2.3.7 SDS, <TXT>
This command *only* applies to BLE.
This command sets the serial number of the device. It expects an ASCII string which can be up to 16 characters as the serial number of the device.

**Default:** MAC address of the device  
**Example:** SDS, 1234567890

### 2.3.8 SE, <H16>
This command *only* applies to Bluetooth Classic.
This command sets the Universally Unique Identifier (UUID) for service discovery process. It *only* supports standard 16-bit UUID.

**Default:** 1101  
**Example:** SE, 1101 // Set UUID for serial port

### 2.3.9 SF, 1
This command restores the device to the factory defaults.

**Default:** N/A  
**Example:** SF, 1 // Restore factory defaults

### 2.3.10 SG, <0–2>
This command changes Bluetooth modes. It accepts any one of the parameter values listed in Table 2-2 to set the Bluetooth mode.

**Default:** 0  
**Example:** SG, 1 // Set RN4678 to be BLE only

<table>
<thead>
<tr>
<th>Parameter Value</th>
<th>Bluetooth Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Dual mode</td>
</tr>
<tr>
<td>1</td>
<td>Bluetooth Low Energy only</td>
</tr>
<tr>
<td>2</td>
<td>Bluetooth Classic only</td>
</tr>
</tbody>
</table>

**TABLE 2-2: BLUETOOTH MODES**
2.3.11 SH, <0,1>
This command enables low-power operation of the RN4678. It expects a single digit input parameter. If the input parameter is 1, the RN4678 uses a 16 MHz clock in Idle mode and UART is always operational. If the input parameter is 0, the RN4678 uses a 32 kHz clock in Idle mode and thus has lower power consumption, but the UART_RX_IND pin must be pulled low to switch to the 16 MHz clock before using UART.

Default: 1
Example: SH, 0 // Enable low-power operation

2.3.12 SI, <H16>
This command only applies to Bluetooth Classic.
The Inquiry Scan Window command sets the length of time the device spends enabling an inquiry scan (discoverability). The minimum value is 0x0012, corresponding to about a 1% duty cycle. The page scan interval is fixed at 0x1000. The default window is 0x0100. If the host is already paired, the inquiry scan is not used.

Default: 0100
Example: SI, 0200 // Set inquiry scan window to 0x0200

2.3.13 SJ, <H16>
This command only applies to Bluetooth Classic.
The Page Scan Window command sets the amount of time the device spends enabling page scanning (connectable). The minimum value is 0x0012, which corresponds to about a 1% duty cycle. The page scan interval is fixed at 0x1000. The default window is 0x0100. The maximum value is 0x800. Set this option to 0x0000 to disable page scanning and render the device unconnectable.

Default: 0100
Example: SJ, 0200 // Set the page scan window to 0x0200

2.3.14 SL, <H8>
This command sets the duration of the Bluetooth Classic and BLE scan operation. It expects one 8-bit input parameter in hex format. The input parameter indicates the maximum scan duration in the unit of 10 seconds. The scan duration must be between 01 and 06. Any scan duration beyond 60 seconds (06 as input parameter) is considered to last forever. The scan operation can be terminated earlier if no memory is available to store scan results. Command X can be used to terminate the scan before the scan duration expires.

Default: 02 // Default scan duration is 20 seconds
Example: SL, 1 // Set scan duration to be 10 seconds

2.3.15 SM, <value>
This command sets the mode, where <value> is a number as shown in Table 2-3.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Default mode</td>
</tr>
<tr>
<td>6</td>
<td>Auto Reconnect mode</td>
</tr>
</tbody>
</table>

TABLE 2-3: MODE VALUES
2.3.16 SN,<string>
This command sets the device name, where <string> is up to 16 alphanumeric characters. By default the device name (Classic/BLE) is set to RN4678-b1b0 where b1b0 are lower order byte values of device BT address.

Default: N/A
Example: SN,MyDevice  // Set the device name to “MyDevice”

2.3.17 SO,<string1>[,<string2>]
This command sets the extended status string, where <string1> and <string2> can be up to four alphanumeric characters each. Setting these delimiter strings for the status strings from the UART can help parse the results. The first parameter, <string1>, is the prefix to the message and the optional second parameter, <string2>, is the postfix to the message. For instance, when a Bluetooth Classic connection is established, the device sends the string <string1>CONNECT<string2>.

If there are no parameters passed as <string1> and <string2> (SO,) then all the status strings in Table 2-4 are suppressed including the “Rebooting” print string response for R,1 command. If the status strings are suppressed, the G0 command will return NULL string to indicate that there are no <string1> and <string2>.

### TABLE 2-4: LIST OF STATUS STRINGS

<table>
<thead>
<tr>
<th>Status String</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUTHENTICATED</td>
<td>BT Classic iAP authentication success</td>
</tr>
<tr>
<td>AUTH_FAIL</td>
<td>BT Classic iAP authentication failure</td>
</tr>
<tr>
<td>BONDED</td>
<td>New bonding information saved</td>
</tr>
<tr>
<td>CONNECT</td>
<td>Device connected with peer</td>
</tr>
<tr>
<td>DISCONN</td>
<td>Device disconnect from peer</td>
</tr>
<tr>
<td>END_INQ</td>
<td>End of BT classic inquiry</td>
</tr>
<tr>
<td>END_SCN</td>
<td>End of BLE scan</td>
</tr>
<tr>
<td>ERR_CONN</td>
<td>Connection attempt fails</td>
</tr>
<tr>
<td>ERR_CONN_PARAM</td>
<td>BLE fails to update connection parameters</td>
</tr>
<tr>
<td>ERR_LSEC</td>
<td>BLE security failure</td>
</tr>
<tr>
<td>ERR_SEC</td>
<td>BT Classic security failure</td>
</tr>
<tr>
<td>FACTORY_RESET</td>
<td>Factory reset is triggered by factory reset pin in the first 5 seconds after powering up</td>
</tr>
<tr>
<td>LBONDED</td>
<td>BLE saved linked key</td>
</tr>
<tr>
<td>LSECURED</td>
<td>BLE secured link</td>
</tr>
<tr>
<td>LSECURE_FAIL</td>
<td>BLE security failure</td>
</tr>
<tr>
<td>LSTREAM_OPEN</td>
<td>BLE UART Transparent stream open</td>
</tr>
<tr>
<td>MLDP_MODE</td>
<td>RN4020 MLDP service detected</td>
</tr>
<tr>
<td>REBOOT</td>
<td>RN4678 reboot</td>
</tr>
<tr>
<td>RFCOMM_CLOSE</td>
<td>SPP stream service deactivated</td>
</tr>
<tr>
<td>RFCOMM_OPEN</td>
<td>SPP stream service activated</td>
</tr>
<tr>
<td>SECURE_FAIL</td>
<td>BT Classic security failure</td>
</tr>
<tr>
<td>SESSION_CLOSE</td>
<td>BT Classic iAP data session close</td>
</tr>
<tr>
<td>SESSION_OPEN</td>
<td>BT Classic iAP data session open</td>
</tr>
</tbody>
</table>
2.3.18 SP, <string>
This command sets the security pin code, where <string> is either a 4-digit or a 6-digit pin. The 4-digit pin is used for Legacy Pin Code pairing, while the 6-digit pin is used for SSP authentication in BLE if fixed pin is desirable. The fixed 6-digit pin code in BLE is not supported by many of the Bluetooth Low Energy implementations. The user must understand the security impact of using the fixed pin code under SSP mode.

Default: %,%
Example: 0123

2.3.19 SQ, <H16>
This command sets the features of the RN4678 module. It expects one input parameter in the format of bitmap. The bitmap must be interpolated according to Table 2-5.

<table>
<thead>
<tr>
<th>Bit Map</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x8000</td>
<td>If set, RN4678 is set into Fast mode. Once set into Fast mode, the command $$\text{CMD}/DATA$$ switch pin defined in command SX controls the device operation mode.</td>
</tr>
<tr>
<td>0x4000</td>
<td>If set, no prompt CMD&gt; is required when RN4678 is ready to accept a new command.</td>
</tr>
<tr>
<td>0x2000</td>
<td>If set, no acknowledgment is required for UART Transparent under BLE connection.</td>
</tr>
<tr>
<td>0x1000</td>
<td>If set, the hardware flow control for UART is enabled. Flow control is enabled by default.</td>
</tr>
<tr>
<td>0x0800</td>
<td>If set, no non-connectable beacon shows up in the BLE scan result.</td>
</tr>
<tr>
<td>0x0400</td>
<td>If set, no connectable advertisement shows up in the BLE scan result.</td>
</tr>
<tr>
<td>0x0200</td>
<td>If set, RN4678 does not filter out duplicate BLE scan results. Set this bit if the RN4678 expects to see dynamically changing advertisements.</td>
</tr>
<tr>
<td>0x0100</td>
<td>If set, RN4678 performs passive scan instead of default active scan.</td>
</tr>
<tr>
<td>0x0080</td>
<td>If set, RN4678 reboots after disconnection.</td>
</tr>
<tr>
<td>0x0008</td>
<td>If set, SW_BTN functionality is enabled. By default the SW_BTN is disabled.</td>
</tr>
</tbody>
</table>

Default: 1000
Example: 8000

// Hardware flow control enabled by default
// Enable Fast mode
// Enter Fast mode, flow control enabled, reboots after disconnection
2.3.20 SR[,<0,1,Z>]<MAC Address>

This command stores the remote address. When the MAC address is for a Bluetooth Classic device, then the only parameter to be entered is the Bluetooth MAC address, a 12 hexadecimal digits (6 bytes) address without space or characters between digits. For a BLE device, the first parameter is either 0 (public) or 1 (random) to indicate address type, followed by the MAC address. Additionally, this command takes special character Z to erase any stored address. For BLE random address, link back feature may not work since the BLE address may have changed when performing the link back feature.

Default: N/A
Example: SR,00A053112233 // Set the remote Bluetooth Classic address to 00A053112233
SR,0,00A053112233 // Set the remote BLE address to 00A053112233
SR,Z // Clear stored address

2.3.21 SS,<string>

This command sets the service name for Bluetooth Classic, where <string> can vary from 1 to 16 alphanumeric characters.

Default: SerialPort
Example: SS,SPP // Service name set to "SPP"

2.3.22 ST,<H16>,<H16>,<H16>,<H16>

This command only applies to BLE.

This command sets the connection parameters for BLE connection. These connection parameters are used for establishing a connection when RN4678 acts as a Master. Connection; parameters can be modified by Action command T after the connection is established.

This command expects four 16-bit hexadecimal parameters: minimum connection interval, maximum connection interval, slave latency and supervision timeout, respectively. The unit for the first two parameters is 1.25 ms. The unit for the last parameter is 10 ms.

Default: 0008,001C,0000,0200
Example: ST,0010,0020,0000,0100 // Set minimum connection interval to 20 ms, maximum connection interval to 40 ms, slave latency to 0 and supervision timeout to 2.56 seconds
2.3.23 STO,<H8>

Command STO sets the power on stand by timeout. The timeout is in the units of 10.24 seconds. The module will go to Deep Sleep mode after the timeout and consumes least possible current. Pulling the WAKE_UP PIN low will bring the module out of this Deep Sleep mode.

Default: FF

Example: STO 2 // Sets the power on standby timeout to 20.48 seconds

**Note:** It is not advised to configure it to 0.

2.3.24 STD, <H8>

Command STD sets the disconnect stand by timeout. The timeout is in the units of 10.24 seconds. The module will go to Deep Sleep mode after the timeout from a disconnect event. In this mode the module consumes the least possible current. Pulling the WAKE_UP PIN low will bring the module out of this Deep Sleep mode.

Default: FF

Example: STO 2 // Sets the power on standby timeout to 20.48 seconds

**Note:** It is not advised to configure it to 0.

2.3.25 SU,<H8>

Command SU sets the UART baud rate. Table 2-6 shows the input parameters and their corresponding baud rates.

**TABLE 2-6: UART BAUD RATES**

<table>
<thead>
<tr>
<th>Baud Rate Index</th>
<th>UART Baud Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>03</td>
<td>115200</td>
</tr>
<tr>
<td>04</td>
<td>57600</td>
</tr>
<tr>
<td>05</td>
<td>38400</td>
</tr>
<tr>
<td>06</td>
<td>28800</td>
</tr>
<tr>
<td>07</td>
<td>19200</td>
</tr>
<tr>
<td>08</td>
<td>14400</td>
</tr>
<tr>
<td>09</td>
<td>9600</td>
</tr>
<tr>
<td>0A</td>
<td>4800</td>
</tr>
<tr>
<td>0B</td>
<td>2400</td>
</tr>
<tr>
<td>10</td>
<td>307200</td>
</tr>
<tr>
<td>11</td>
<td>1000000</td>
</tr>
</tbody>
</table>

Default: 03

Example: SU, 07 // Set the UART baud rate to 19200
2.3.26 SW,<H16>

This command only applies to Bluetooth Classic.

This command enables low-power Sniff mode which provides low-power operation. In this mode, the device goes into a deep sleep and wakes up every 625 µs x <value> to send/receive data. For example, the SW,0050 setting (0x50 = 80, 80 x 625 µs = 50 ms) causes the module to enter low-power sleep and wake once in every 50 ms to check for RF activity.

This setting is useful for applications in which the device is connected and sending data. Data is not lost; however, some delay may occur.

**Default:** 0000 // Disable Sniff mode

**Example:** SW,0050 // Enable Sniff mode with interval time of 50 ms

2.3.27 SX,<H8>,<H8>

Command SX sets the functions of the individual pins available on the module. It expects two 1-byte input parameters. The first parameter indicates the pin and the second parameter indicates the function to be assigned to the pin. Pins and functions are listed in Table 2-7 and in Table 2-8, respectively.

**TABLE 2-7: LIST OF AVAILABLE PINS TO ASSIGN FUNCTION**

<table>
<thead>
<tr>
<th>Pin Number</th>
<th>Associated Pin</th>
<th>Default Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>P00</td>
<td>UART RTS (Avoid to Change)</td>
</tr>
<tr>
<td>01</td>
<td>P05</td>
<td>Null</td>
</tr>
<tr>
<td>02</td>
<td>P17</td>
<td>UART CTS (Avoid to Change)</td>
</tr>
<tr>
<td>03</td>
<td>P31</td>
<td>Factory Reset</td>
</tr>
<tr>
<td>04</td>
<td>P32</td>
<td>Null</td>
</tr>
<tr>
<td>05</td>
<td>P33</td>
<td>UART RX Indication</td>
</tr>
<tr>
<td>06</td>
<td>P34</td>
<td>Pairing</td>
</tr>
<tr>
<td>07</td>
<td>P37</td>
<td>Null</td>
</tr>
</tbody>
</table>

**TABLE 2-8: LIST OF FUNCTIONS AVAILABLE TO ASSIGN TO PINS(1)**

<table>
<thead>
<tr>
<th>Function Number</th>
<th>Associated Function</th>
<th>Input/Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>No function</td>
<td>N/A</td>
</tr>
<tr>
<td>01</td>
<td>UART RTS pin</td>
<td>Output</td>
</tr>
<tr>
<td>02</td>
<td>Battery Low Indicator</td>
<td>Output</td>
</tr>
<tr>
<td>03</td>
<td>RSSI</td>
<td>Output</td>
</tr>
<tr>
<td>04</td>
<td>UART CTS pin</td>
<td>Input</td>
</tr>
<tr>
<td>05</td>
<td>Link Drop</td>
<td>Input (NMI)</td>
</tr>
<tr>
<td>06</td>
<td>UART RX Indication</td>
<td>Input (NMI)</td>
</tr>
<tr>
<td>07</td>
<td>Pairing</td>
<td>Input (NMI)</td>
</tr>
<tr>
<td>08</td>
<td>Inquiry</td>
<td>Input (NMI)</td>
</tr>
<tr>
<td>09</td>
<td>Profile Indicate</td>
<td>Output (NMI)</td>
</tr>
<tr>
<td>0A</td>
<td>Command/Data mode switch (high for Data mode; low for Command mode)</td>
<td>Input (NMI)</td>
</tr>
<tr>
<td>0B</td>
<td>Factory Reset (flip 5 times in the first 5 seconds after powering up)</td>
<td>Input (NMI)</td>
</tr>
</tbody>
</table>
2.3.28 SY, <0-4>
This command sets the transmit power of the module.

Default: 3
Example: SY, 1 // Change max RF power output to be 1

2.3.29 SZ, <0-1>
This command only applies to BLE.
It controls the BeaconThings® feature of the RN4678. A single digit input parameter is expected. If the input parameter is 1, then the BeaconThings feature is enabled; if the input parameter is 0, BeaconThings feature is disabled.

Default: 0
Example: SZ, 1 // Enable BeaconThings feature

2.3.30 S-, <string>
This command sets the serialized friendly name of the device, where <string> can be up to 11 alphanumeric characters. This command automatically appends the last two bytes of the Bluetooth MAC address to the name, which is useful for generating a custom name with unique numbering. The corresponding get command for S− is GN.

Default: N/A
Example: S-, MyDevice // Set name to “MyDevice-ABCD”

2.3.31 S?, <0,1>
This command only applies to Bluetooth Classic.
The Role Switch command enables and disables the role switch, where an input parameter value of 0 disables role switch and 1 enables role switch. If the switch is set when a device in Default mode is receiving an incoming connection, the device tries to force a role switch enabling the slave to become the master. This option is useful in situations where the local device sends high-speed data up to the remote host, and can improve performance. While connected to the local device, the connected host may not be able to make additional outbound (multi-point) connections.

Default: 0
Example: S?, 1 // Enable role switch
2.3.32 $\$,<char>

This command sets the configuration detect character string, where <char> is a single character. This setting configures the escape character to enter Command mode ($$$) to a new character string. Restoring the factory defaults returns the device to use $$$ as the escape character to enter Command mode.

Default: $  
Example: $$,#  // Set ### as string to go into Command mode

2.4 GET COMMANDS

The Get commands retrieve and display the stored information of the device. Get commands do not have a keyword or character, and do not accept any parameters.

2.4.1 D

This command displays basic settings such as the address, name, UART settings, security, pin code, bonding, and the remote address.

Example: D  // Display basic settings
Response: BTA=8CDE52DAB1FC  
BTName=RN4678-B1FC  
Authen=2  
CfgChar=$  
StatStr=,%  
DevClass=001F00  
TxPower=3  
Features=1000  
Rem=NONE SET

2.4.2 GB

This command returns the Bluetooth address of the device.

Example: GB  // Display the device Bluetooth address
Response: 8CDE52DAB1FC  //Where 8CDE52DAB1FC is the BT address

2.4.3 GK

This command returns the current connection status of the device. There are three single-digit values returned that are separated by a comma. The first digit indicates the Bluetooth connection status. Value 0 means no connection and value 1 means connected. The second digit indicates authentication status where the possible values are listed in Table 2-9.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No iAP or BLE authentication</td>
</tr>
<tr>
<td>1</td>
<td>Successful authentication</td>
</tr>
<tr>
<td>2</td>
<td>APP open; Bluetooth connection over iAP ready</td>
</tr>
<tr>
<td>3</td>
<td>APP closed; no data transfer possible</td>
</tr>
<tr>
<td>4</td>
<td>On power-up, the authentication co-processor test failed</td>
</tr>
<tr>
<td>5</td>
<td>Authentication attempted and failed</td>
</tr>
<tr>
<td>6</td>
<td>BLE link authenticated</td>
</tr>
</tbody>
</table>

TABLE 2-9: AUTHENTICATION STATUS
The third digit indicates the type of connection as shown in Table 2-10.

**TABLE 2-10: CONNECTION TYPES**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>SPP</td>
</tr>
<tr>
<td>1</td>
<td>iAP</td>
</tr>
<tr>
<td>2</td>
<td>BLE</td>
</tr>
</tbody>
</table>

Example: `GK`  // Display current connection status  
Response: `0,4,0`  // Where 0 - Non Connected  
4 - On Power-up, the authentication co-processor test failed  
0 - SPP (valid only if the device is connected)

### 2.4.4 G<char>

This command displays the stored settings for a Set command, where `<char>` is a Set command name.

Example: `GA`  // Return Authentication mode set by command `SA`  
Response: `2`  // Where 2 - Authenticate method set in the module

### 2.5 ACTION COMMANDS

Action commands perform actions such as inquiries, connecting and entering/exiting Command mode. Action commands do **not** have any parameters.

#### 2.5.1 $$$

This command causes the device to enter Command mode and display command prompt. The device passes characters as data until it sees this exact sequence.  
The escape character to enter Command mode can be changed with the $S command.

Example: **$$**  // Enter Command mode

#### 2.5.2 ---

This command causes the device to exit Command mode, displaying **END**.

Example: **---**  // Exit Command mode

#### 2.5.3 +

This command toggles the local echo on and off. If command + is sent in Command mode, all typed characters are echoed to the output afterward. Typing + for a second time turns local echo off.

Default: Off  
Example: +  // Turn local echo on
2.5.4 \&, <Addr>

This command only applies to BLE.

Command \& assigns a random address to the local device. It accepts one input parameter which is a 6-byte random address. This random address can be a static or a private address. For format of random address, refer to Bluetooth Core Specification version 4.1, Vol 3, Part C, Section 10.8. If the device is currently advertising, the advertising address immediately changes to the assigned random address.

**Example:** \&, DF1234567890 // Set random address to be DF1234567890

2.5.5 \&C

This command only applies to BLE.

Command \&C clears the random address and uses the local MAC address for advertisement. If the device is currently advertising, the advertising address immediately changes to the local MAC address.

**Example:** \&C // Clear random address and use MAC address

2.5.6 \&R

This command only applies to BLE.

Command \&R generates a resolvable random address and assigns it as the current random address. This resolvable random address becomes the output to UART as a response to this command. If the device is currently advertising, the advertising address immediately changes to the new resolvable random address.

**Example:** \&R // Automatically generate and assign a resolvable random address

2.5.7 B

This command only applies to BLE.

Command B is used to secure the connection and bond two connected devices. Command B is only effective if the two devices are already connected. Bonding can be initiated by either the central or the peripheral device.

Once bonded, security materials are saved in both ends of the connection. Therefore, reconnection between bonded devices does not require pin code exchange, which reduces the reconnection time.

If the bonded connection is lost for any reason, reconnection does not automatically secure the link. To secure the link, another B command must be issued. However, command B is only for securing link other than saving connection information.

**Default:** Not bonded
**Example:** B // Bond with connected peer device

2.5.8 C[, <BTAddr>]

This command only applies to Bluetooth Classic. It initiates a Bluetooth Classic connection with a peer device.

It expects an optional input parameter which is the MAC address of the peer device.

If no input parameter is provided, RN4678 tries to connect to the last connected device. If no prior connection is established, an error message is returned.

**Example:**
C, 112233445566 // Connect to Bluetooth Classic device with MAC address 0x112233445566
2.5.9  C,<0,1>,<address>

This command *only* applies to BLE. It connects the local device to a remote BLE device with `<address>`, where `<address>` is specified in hex format. The first parameter indicates the address type: 0 for public address and 1 for private random address. When this command is used to connect to a device which is already bonded, the link is *not* automatically secured. Use command B to secure the link after the connection is established.

**Example:**

```
C,0,00A053112233  // Connect to the BLE address 00A053112233
```

2.5.10  C<1-8>

This command is used to reconnect to a previously connected device that is stored in the saved paired device list with index from 1 to 8. To display the devices in the saved device list, use the command Y. Reconnection with a BLE device with random address may *not* be successful if the target device has changed its address.

**Example:**

```
C2  // Connect to the second device in the saved // device list
```

2.5.11  F[,<0-5>],<hex>]

This command starts the inquiry process to find Bluetooth devices nearby. By default, the inquiry process lasts 20 seconds, configured by using the command SL. Command F accepts up to two optional input parameters.

The first optional parameter specifies the Inquiry mode. If the first parameter is *not* provided, normal Inquiry mode is used by default. Depending on the Inquiry mode, a second input parameter may be required. **Table 2-11** lists the Inquiry modes and their expected second parameter.

**TABLE 2-11:  INQUIRY MODES**

<table>
<thead>
<tr>
<th>Mode Index</th>
<th>Mode Name</th>
<th>Mode Description</th>
<th>Expected Second Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Normal</td>
<td>Perform normal inquiry; return all available BT classic devices in the neighborhood</td>
<td>None</td>
</tr>
<tr>
<td>1</td>
<td>Address</td>
<td>Inquiry results are filtered with a specified BT address</td>
<td>Expects a 7-byte second parameter. The first byte is the address mask and the remaining 6 bytes are the Bluetooth MAC address. The lower 6 bits of the address mask specify if the corresponding byte in the MAC address is effective in filtering. A bit set means that the corresponding address byte is effective.</td>
</tr>
<tr>
<td>2</td>
<td>COD</td>
<td>Inquiry results filtered with a specified Class of Device (COD)</td>
<td>Expects a 3-byte COD. Only devices with the same COD appear in the scan result.</td>
</tr>
<tr>
<td>3</td>
<td>Device Name</td>
<td>Inquiry results filtered with <em>only</em> one specified device name</td>
<td>Expects the device name as the second parameter.</td>
</tr>
<tr>
<td>4</td>
<td>RSSI</td>
<td>Inquiry results with RSSI value</td>
<td>None</td>
</tr>
<tr>
<td>5</td>
<td>BLE</td>
<td>BLE scan</td>
<td>Optional second 16-bit input parameters for scan window and scan interval</td>
</tr>
</tbody>
</table>

Apart from F, 5 all other commands invoke classic inquiry and only F, 5 triggers the BLE scan.
The classic inquiry response to the command 'F' would be in the following format.
\(<BT\ Address>,<[Device\ Name]>,<COD>,<[RSSI]>\)

The BLE scan response to the command 'F, S' would be in the following format.
\(<BT\ Address>,<[Address\ Type]>,<[Device\ Name]>,<[RSSI]>\)

**Example:**

`F`  // Normal inquiry

`F, 1, 38112233445566`  // Inquiry BT address 112233xxxxxx,
where xx means “don’t care”

`F, 3, ABC`  // Inquiry BT device with name “ABC”

2.5.12 IA, <H8>, <Hex>/IB, <H8>, <Hex>/IS, <H8>, <Hex>
NA, <H8>, <Hex>/NB, <H8>, <Hex>/NS, <H8>, <Hex>

The set of commands IA/IB/IC and NA/NB/NC sets the advertisement, beacon, and scan response payload format.

All advertisement, beacon or scan response data are composed of one or more Advertisement Structure (AD Structure). Each AD structure has one byte of length, one byte of Advertisement Type (AD Type) and various lengths of Advertisement Data (AD Data). The set of commands either appends an AD structure or removes all AD structures, depending on the first parameter.

Commands starting with letter I make the changes effective immediately without reboot. The changes are not saved into NVM and cannot survive the power cycle. This command is suitable to broadcast dynamic data in the AD structure.

Commands starting with letter N make permanent changes and are saved into NVM, therefore, command N requires a reboot to take effect.

The second letter in the command indicates the type of information to be changed. Letter A indicates advertisement to be changed; letter B indicates beacon to be changed and letter S indicates scan response to be changed.

The first parameter is the AD type. Bluetooth SIG defines AD types in the Assigned Number list in Core Specification. If the AD type is set to zero, a number not defined by the Bluetooth SIG, then all AD structures are cleared. Table 2-12 lists the commonly used AD types.

The second parameter is the AD data. AD data has various lengths and follows the format defined in Bluetooth SIG Supplement to the Bluetooth Core Specification.

**TABLE 2-12: LIST OF AD TYPES**

<table>
<thead>
<tr>
<th>AD Type (HEX)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>Clear all AD structure</td>
</tr>
<tr>
<td>01</td>
<td>Flags</td>
</tr>
<tr>
<td>02</td>
<td>Incomplete list of 16-bit UUIDs</td>
</tr>
<tr>
<td>03</td>
<td>Complete list of 16-bit UUIDs</td>
</tr>
<tr>
<td>04</td>
<td>Incomplete list of 32-bit UUIDs</td>
</tr>
<tr>
<td>05</td>
<td>Complete list of 32-bit UUIDs</td>
</tr>
<tr>
<td>06</td>
<td>Incomplete list of 128-bit UUIDs</td>
</tr>
<tr>
<td>07</td>
<td>Complete list of 128-bit UUIDs</td>
</tr>
<tr>
<td>08</td>
<td>Shortened local name</td>
</tr>
<tr>
<td>09</td>
<td>Complete local name</td>
</tr>
<tr>
<td>0A</td>
<td>TX power level</td>
</tr>
<tr>
<td>0D</td>
<td>Class of device</td>
</tr>
</tbody>
</table>
2.5.13 JA, <Address>/JA, <0,1>,<Address>

Command JA adds a MAC address to the white list, and enables white list feature at the same time. Up to 16 BT classic or BLE devices can be added to the white list.

Standard white list only applies to BLE. RN4678 extended the white list feature to Bluetooth Classic. When white list feature is enabled in Master role, only devices in the white list will be shown in the inquiry results. When white list feature is enabled in Slave role, only devices in the white list can be connected with the local device.

This command expects one or two input parameters. If only one input parameter is provided, it indicates the MAC address of a Bluetooth Classic device. If two input parameters are provided, then the first parameter input is a single digit indicating the BLE address type: 0 for public and 1 for private. The second input parameter is the BLE address to be added to the white list. Random addresses that are added to the white list using this method have no resolvable capability. Therefore, once a BLE device with a random address changes its address, it is no longer included in the white list. For resolvable random address, refer to command JB.

**Note:** Do not use this command at the same time with command JB. When this command is issued, it automatically turns off the effect of command JB.

Example: JA,09,414243 // Set local name to be "ABC"

Example: JA,112233445566 // Add BT Classic device to the white list
JA,0,010203040506 // Add BLE device with public address
                     // 0x010203040506 to the white list

2.5.14 JB

This command adds all bonded devices, including both BT Classic and BLE devices, to the white list. If the BLE device listed in the white list has a resolvable random address, then the module has the capability to identify that BLE device even if the resolvable random address has changed to another value.

This command expects no input parameter.

**Note:** Do not use this command at the same time with command JA. When this command is issued, it automatically turns off the effect of command JA.

Example: JB // Add all bonded devices to the white list
2.5.15 JC
This command clears the white list. Once this command is issued, it clears all devices in the white list and disables the white list feature.

Example: JC // Clear white list

2.5.16 JD
This command displays all devices that are currently in the white list. If the device is a BT Classic device, only the MAC address is shown; if the device is a BLE device, both the address and the address type are shown that are separated by a comma. Address type is a single digit value: 0 for public address and 1 for private address.

Example: JD // Display all devices in the white list

2.5.17 K,1
The Kill command disconnects the current link.

Example: K,1 // Disconnect the current link

2.5.18 O,0
Command O, 0 puts the module immediately into Dormant mode, without any UART response. In this mode, the module enters a Deep Sleep state where there is no RF communication, and the current drawn by the module is the lowest. If the host MCU needs the module to communicate with peer device, the host MCU must force the module out of the Dormant mode by pulling the WAKE_UP pin low. On wake up from Dormant mode, the module starts out of Reset.

Example: O, 0 // Enter low-power Dormant mode
Response: // No response is sent as the module Immediately enters the Dormant mode

2.5.19 Q
This command puts the device into Quiet mode which means it is temporarily not discoverable or connectable. This command does not survive a power cycle or Reset.

The Q command settings with different responses are as follows:

- **Q**: The module is undiscoverable for both Bluetooth Classic and BLE
- **Q,0**: The module is discoverable and able to connect for both Bluetooth Classic and BLE. Response is AOK.
- **Q,1**: The module is undiscoverable and unable to connect to either Bluetooth Classic nor BLE
- **Q,2**: The module is able to connect, but is undiscoverable in Bluetooth Classic
- **Q,3**: The module is undiscoverable in BLE
- **Q,?**: Displays the current Quiet mode

Example: Q // Make the module undiscoverable
2.5.20 R,1
This command forces a complete device reboot (similar to power cycle).

**Note:** Any changes to the device configuration using the Set commands do *not* take effect until rebooting the device.

**Example:** R, 1 // Reboot device

2.5.21 T,<H16>,<H16>,<H16>,<H16>
This command *only* applies to BLE.
This command adjusts the connection parameters after establishing the BLE connection.
- The first parameter is a 16-bit hex value for minimum connection interval with unit of 1.25 ms.
- The second parameter is a 16-bit hex value for maximum connection interval with unit of 1.25 ms.
- The third parameter is slave latency.
- The fourth parameter is supervision timeout with unit of 10 ms.

**Example:**
T,0010,0020,0000,0100 // Adjust the connection parameter to be
// min_conn_interval: 20 ms
// max_conn_interval: 40 ms
// slave_latency: 0
// supervision timeout: 2.56 seconds

2.5.22 U,<Z,1-8>
Command U removes one or more devices from the linked device list. It expects one input parameter. The linked device list can be accessed by issuing command Y.
If the input parameter is letter Z, then all devices are removed from the linked device list.
The input parameter can also be a single digit from 1 to 8, corresponding to any of the eight devices in the linked device list to be removed.

**Example:**
U,1 // Remove first device from the linked device list

2.5.23 V
This command displays the firmware version.

**Example:** V // Display the firmware version

2.5.24 W
This command is the same as command Q,0. It is implemented for backward compatibility.
This command enables discovery and connection after it has been disabled with command Q. It reloads the stored value of the Inquiry and Page Window in Inquiry and Page Scan.

**Example:** W // Turn on discovery and enable connectivity
2.5.25 X

Command X is used to terminate a scan operation before scan duration expires for both Bluetooth Classic and BLE. It is one of the few commands that does not have to wait for a command prompt. It expects no input parameter.

Example: X  // Stop scanning

2.5.26 Y

Command Y displays the MAC addresses of the devices in the stored device list. The output uses the following format:

<index>,<priority>,<BT address>[,<address type>]

Where <address type> is optional and applies only to BLE addresses.

Example: Y  // Display devices in the linked device list connection.

2.5.27 Z

Command Z stops current connection attempt before the connection is established. It is one of the few commands that does not have to wait for a command prompt. This command does not expect any input parameter.

Example: Z  // Stop connecting
Appendix A. Command Quick Reference Guide

A.1 DEFAULT CONFIGURATION SETTINGS

Table A-1 summarizes all the commands and the default values described in Chapter 2. "Command Reference".

<table>
<thead>
<tr>
<th>Command</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Set Commands</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SA, &lt;i-4&gt;</td>
<td>2</td>
<td>Sets the authentication method when a remote device attempts to connect</td>
</tr>
<tr>
<td>SC, &lt;H16&gt;(1)</td>
<td>0000</td>
<td>Sets the “Service Class” field in the Class of Device (COD)</td>
</tr>
<tr>
<td>SD, &lt;H16&gt;(1)</td>
<td>1F00</td>
<td>Sets the COD last significant word (lsw)</td>
</tr>
<tr>
<td>SDM, &lt;TXT&gt;(2)</td>
<td>RN4678</td>
<td>Sets the model string in the BLE Device Information service</td>
</tr>
<tr>
<td>SDN, &lt;TXT&gt;(2)</td>
<td>Microchip</td>
<td>Sets the manufacture string</td>
</tr>
<tr>
<td>SDR, &lt;TXT&gt;(2)</td>
<td>Current RN4678 software version</td>
<td>Sets the software revision of the firmware</td>
</tr>
<tr>
<td>SDS, &lt;TXT&gt;(2)</td>
<td>MAC address of the device</td>
<td>Sets the serial number of the device</td>
</tr>
<tr>
<td>SE, &lt;H16&gt;(1)</td>
<td>1101</td>
<td>Sets the UUID</td>
</tr>
<tr>
<td>SF, 1</td>
<td>N/A</td>
<td>Restores the factory defaults</td>
</tr>
<tr>
<td>SG, &lt;0-2&gt;</td>
<td>0</td>
<td>Changes Bluetooth modes</td>
</tr>
<tr>
<td>SH, &lt;0,1&gt;</td>
<td>0</td>
<td>Enables low-power operation</td>
</tr>
<tr>
<td>SI, &lt;H16&gt;(1)</td>
<td>0100</td>
<td>Sets the length of time the device spends enabling an inquiry scan</td>
</tr>
<tr>
<td>SJ, &lt;H16&gt;(1)</td>
<td>0100</td>
<td>Sets the amount of time the device spends enabling page scanning</td>
</tr>
<tr>
<td>SL, &lt;H8&gt;</td>
<td>02</td>
<td>Sets the duration of the Bluetooth Classic and BLE scan operation</td>
</tr>
<tr>
<td>SM, &lt;value&gt;</td>
<td>0</td>
<td>Sets the mode</td>
</tr>
<tr>
<td>SN, &lt;string&gt;</td>
<td>N/A</td>
<td>Sets the device name</td>
</tr>
<tr>
<td>SO, &lt;string1&gt;[,&lt;string2&gt;]</td>
<td>%,%</td>
<td>Sets the extended status string</td>
</tr>
<tr>
<td>SP, &lt;string&gt;</td>
<td>1234</td>
<td>Sets the security pin code</td>
</tr>
<tr>
<td>SQ, &lt;H16&gt;</td>
<td>0</td>
<td>Sets the features of RN4678</td>
</tr>
<tr>
<td>SR[,&lt;0,1,2&gt;&lt;MAC Address&gt;</td>
<td>N/A</td>
<td>Stores the remote address</td>
</tr>
<tr>
<td>SS, &lt;string&gt;</td>
<td>SerialPort</td>
<td>Sets the service name</td>
</tr>
<tr>
<td>ST, &lt;H16&gt;, &lt;H16&gt;, &lt;H16&gt;, &lt;H16&gt;(2)</td>
<td>0008,001C,0000,0200</td>
<td>Sets the connection parameters for BLE connection</td>
</tr>
<tr>
<td>STO</td>
<td></td>
<td>Sets the power on standby timeout</td>
</tr>
<tr>
<td>STD</td>
<td></td>
<td>Sets the disconnect standby timeout</td>
</tr>
<tr>
<td>SU, &lt;H8&gt;</td>
<td>03</td>
<td>Sets the UART baud rate</td>
</tr>
<tr>
<td>SW, &lt;H16&gt;(1)</td>
<td>0000</td>
<td>Enables low-power Sniff mode</td>
</tr>
</tbody>
</table>
### TABLE A-1: COMMAND QUICK REFERENCE GUIDE (CONTINUED)

<table>
<thead>
<tr>
<th>Command</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SX,&lt;H8&gt;,&lt;H8&gt;</td>
<td>listed in Table 2-7</td>
<td>Sets the functions of the individual pins</td>
</tr>
<tr>
<td>SY,&lt;0-4&gt;</td>
<td>3</td>
<td>Sets the transmit power</td>
</tr>
<tr>
<td>SZ,&lt;0-1&gt;[2]</td>
<td>0</td>
<td>Controls the BeaconThings feature</td>
</tr>
<tr>
<td>S-,&lt;string&gt;</td>
<td>N/A</td>
<td>Sets the serialized friendly name of the device</td>
</tr>
<tr>
<td>S?,&lt;0,1&gt;[1]</td>
<td>0</td>
<td>Enables and disables the role switch</td>
</tr>
<tr>
<td>S$,&lt;char&gt;</td>
<td>$</td>
<td>Sets the configuration detect character string</td>
</tr>
</tbody>
</table>

**Get Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>—</td>
<td>Displays basic settings</td>
</tr>
<tr>
<td>GB</td>
<td>—</td>
<td>Displays the device Bluetooth address</td>
</tr>
<tr>
<td>GK</td>
<td>—</td>
<td>Displays current connection status</td>
</tr>
<tr>
<td>G&lt;char&gt;</td>
<td>—</td>
<td>Displays the stored settings for a Set command</td>
</tr>
</tbody>
</table>

**Action Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$$$</td>
<td>—</td>
<td>Enter Command mode</td>
</tr>
<tr>
<td>---</td>
<td>—</td>
<td>Exit Command mode</td>
</tr>
<tr>
<td>+</td>
<td>Off</td>
<td>Local echo on/off</td>
</tr>
<tr>
<td>$,&lt;Addr&gt;[2]</td>
<td>—</td>
<td>Assigns a random address to the local device</td>
</tr>
<tr>
<td>&amp;C[2]</td>
<td>—</td>
<td>Clears the random address</td>
</tr>
<tr>
<td>&amp;R[2]</td>
<td>—</td>
<td>Generates a resolvable random address</td>
</tr>
<tr>
<td>B[2]</td>
<td>Not bonded</td>
<td>Secures the connection and bonds two connected devices</td>
</tr>
<tr>
<td>C[,&lt;BTAddr&gt;][1]</td>
<td>—</td>
<td>Initiates a Bluetooth Classic connection</td>
</tr>
<tr>
<td>C,&lt;0,1&gt;,&lt;address&gt;[2]</td>
<td>—</td>
<td>Connects the local device to a remote BLE device</td>
</tr>
<tr>
<td>C&lt;1-8&gt;</td>
<td>—</td>
<td>reconnects to a previously connected device</td>
</tr>
<tr>
<td>F[,&lt;0-5&gt;,&lt;hex&gt;]</td>
<td>—</td>
<td>Inquires Bluetooth devices in the neighborhood</td>
</tr>
<tr>
<td>IA,&lt;H8&gt;,&lt;Hex&gt;/IB,&lt;H8&gt;,&lt;Hex&gt;/IS,&lt;H8&gt;,&lt;Hex&gt;</td>
<td>—</td>
<td>Sets the advertisement, beacon and scan response payload format</td>
</tr>
<tr>
<td>NA,&lt;H8&gt;,&lt;Hex&gt;/NB,&lt;H8&gt;,&lt;Hex&gt;/NS,&lt;H8&gt;,&lt;Hex&gt;</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>JA,&lt;Address&gt;/JA,&lt;0,1&gt;,&lt;Address&gt;</td>
<td>—</td>
<td>Adds an address to the white list</td>
</tr>
<tr>
<td>JB</td>
<td>—</td>
<td>Adds all bonded devices to the white list</td>
</tr>
<tr>
<td>JC</td>
<td>—</td>
<td>Clears the white list</td>
</tr>
<tr>
<td>JD</td>
<td>—</td>
<td>Displays devices currently in the white list</td>
</tr>
<tr>
<td>K,1</td>
<td>—</td>
<td>Disconnects the current link</td>
</tr>
<tr>
<td>O,0</td>
<td>—</td>
<td>Puts the device into lowest power consumption mode</td>
</tr>
<tr>
<td>Q</td>
<td>—</td>
<td>Puts the device into Quiet mode</td>
</tr>
<tr>
<td>R,1</td>
<td>—</td>
<td>Forces a complete device reboot</td>
</tr>
<tr>
<td>T,&lt;H16&gt;,&lt;H16&gt;,&lt;H16&gt;[2]</td>
<td>—</td>
<td>Adjusts the connection parameters</td>
</tr>
<tr>
<td>U,&lt;Z,1-8&gt;</td>
<td>—</td>
<td>Removes the device from the linked device list</td>
</tr>
<tr>
<td>V</td>
<td>—</td>
<td>Displays the firmware version</td>
</tr>
<tr>
<td>W</td>
<td>—</td>
<td>Turns on discovery and connection</td>
</tr>
<tr>
<td>X</td>
<td>—</td>
<td>Terminates a scan operation</td>
</tr>
<tr>
<td>Y</td>
<td>—</td>
<td>Displays the MAC addresses of the devices in the stored device list</td>
</tr>
<tr>
<td>Z</td>
<td>—</td>
<td>Stops connecting</td>
</tr>
</tbody>
</table>

**Note 1:** Applies only to Bluetooth Classic

**Note 2:** Applies only to BLE
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