# 1. Preparation

You will need:

- 1 or more wireless sensors (one gateway can support up to 100 devices)
- 1 IOT Wireless Gateway
- UART Host Hardware (optional USB to Serial UART 3.3V communication cable)
- Serial terminal software
- Antenna

2. Setup Procedure

Basic Interfacing

- Use the header provided to insert the Tarts IOT Wireless Gateway into a breadboard.
- Use a USB to TTL Serial UART converting cable such as the one shown. Make sure the input voltage is 3.3 VDC.

Below is the connection illustrated when using the FTDI USB to Serial UART communication cable: Connect power to P10. Connect ground to either P8 or P4. Connect the Receive line from the cable to the Transmit line on the IOT WIRELESS GATEWAY, which is P3. Connect the Transmit line from the cable to the Receive line on the IOT WIRELESS GATEWAY, which is P5.

Standard Connections

Included breadboard prototyping adapter
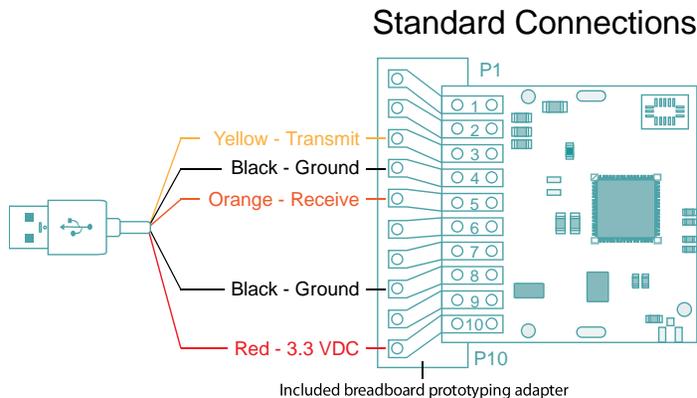
Once connected up, open a terminal program (such as Tera Term, PuTTY, Terminator, Minicom, etc.) and connect to the virtual COM port. The default protocol is 9600 8-N-1.

When everything is connected properly, try the first command: AT$<CR>. If you receive " AT CONSOLE ACTIVE" and "OK", then the gateway is up and running in AT Command mode.

3. General Behaviors

Things To Know

- <LF> – Line Feed character brings the place where characters appear to the beginning of a new line.   Also called the newline character.
- <CR><LF> – Newline sequence that moves the place where character appear to the beginning of the next line. Also denoted as <L>.

Operating Modes

When the IOT Gateway is powered up, it defaults into a binary API mode and is ready to pass binary data frames used in the tarts library. The serial port is set to timeout in 50ms from the start of a frame. The wireless radio is off and no traffic is generated or received automatically. If the device stays in API mode, the binary commands are the only permitted interactions. The gateway will not generate any characters in the terminal and no characters are echoed back to the terminal if keys are pressed. For more information about using the gateway in API mode, please see the latest distribution of the Tarts code library.

By sending "AT$<CR>" at any point of the IOT gateway's operation, the AT command mode is activated. The first time this sequence is run the API mode is active; therefore no characters are echoed back to the terminal. However, on successful completion of "AT$<CR>", the terminal will receive the characters "AT CONSOLE ACTIVE... <L><L>OK<L><L>". Both upper and lower case letters are accepted by the AT command interface.

In AT command mode, the IOT WIRELESS GATEWAY's radio is activated, the serial port timeout is set to 15 seconds per character, and the characters typed into the terminal are echoed back to help with readability and ease of use. To confirm that the console is ready for a new command, a simple <CR> can be sent to clear any old characters from the stream. Additionally, "AT$<CR>" is also a very simple way to verify that the terminal and the IOT WIRELESS GATEWAY are in sync. To correct characters that were erroneously sent, the <BKSP> key will clear one character at a time. To clear the entire character buffer, the <ESC> character can be sent. To exit AT Command mode, use "AT$Q<CR>" to resume binary API mode.

4. AT Command Definitions

In the sections below, the AT Command Definitions are explained. There are four groups: General commands, Gateway commands, Sensor commands, and Unsolicited messages.

General Commands

NAME	DESCRIPTION	COMMAND
Carriage Return	Causes terminal to either process current input buffer of characters , or resets input buffer	<CR>
Backspace	Causes terminal to move to the position of the cursor back on space and causes the IOT WIRELESS GATEWAY to ignore the last character	<BKSP>
Escape	Escape character will cause terminal to reset input buffer immediately without execution of received commands. Clears the buffer.	<ESC>
Blank Command	Blank Command	AT$<CR>
Bad Command	What is received is unknown and the response will contain <L>ERROR<L>	

Please see "Appendix 1 - General Commands" in full user's guide to see the list of all basic interface commands.

Gateway Commands

The gateway has the ability to respond to the following queries:

NAME	DESCRIPTION	COMMAND	EXAMPLE	EXAMPLE RESPONSE
Echo On	Keystrokes are displayed on the terminal screen.	E0	AT$E0<CR>	<L> OK<L>
Echo Off	Keystrokes are not displayed on the terminal screen.	E1	AT$E1<CR>	<L> OK<L>
Quit	Quit AT mode. Exits AT command mode, but gateway continues operating in standard mode.	Q	AT$Q<CR>	<L>GOODBYE<L>
Identify	Returns the unique gateway identifier. Base 36 alpha numerical that always starts with T.	ID	AT$ID<CR>	ID: T02FGG <L>OK<L>
Version	Returns the firmware version of the IOT WIRELESS GATEWAY.	VN	AT$VN<CR>	VN: 2.3.0.0 <L>OK<L>
Force Reset	Sends software reset command. Note that reboot is in API mode, so AT command mode must be initiated before more commands can be sent.	FR	AT$FR<CR>	<L>OK<L>

Gateway Commands (continued)

Operating Channel	Returns the operating channel (out of 25)	OP	AT$OP<CR>	5 <L>OK<L>
Reform Gateway	Clears all known sensors and picks a new operating channel. It is possible to send this command with the channel mask to force the gateway to a known channel.	RG RG:<MASK>	AT$RG<CR> AT$RG:3F8<CR>	<L>REFORMING … <L>OK<L>
Wireless Device Add	Add a wireless device to the list of known devices.	WA:<ID>	AT$WA:T01245<CR>	<L> OK<L>
Wireless Device Remove	Remove a wireless device from the list of known devices.	WR:<ID>	AT$WR:T01245<CR>	<L> OK<L>
Wireless List	Read out the identities of the wireless list.	WL	AT$WL<CR>	<L>WL: T01234<L> WL: T56789<L> WL: T12ABC<L><L> Device Count: 3<L> OK<L>

Please see "Appendix 2 - Gateway Commands" in full user's guide to see the list of all gateway interface commands.

For additional information such as sensor commands and advanced interfacing, please see the full user's guide at www.tartssensors.com/libraries/iot-gateway

5. Community Forum

Tartssensor.com provides access to the Tarts community with set up tips, support issues, and user applications. Please visit the forum at:
www.tartssensors.com/community

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