s-center

Evaluation Software for short range modules
User Guide

Abstract

This document explains how to use s-center, the powerful and easy-to-use tool from u-blox for evaluation and configuration of u-blox short range modules.

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Document Information

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Contents

1   Overview

s-center is a powerful and easy-to-use tool for evaluating, configuring, and testing u-blox short range modules. This user guide provides a description of the features of this software. It allows end users to assess and configure u-blox short range modules.

1.1   Getting started

Once you start s-center, it displays an initial window as shown in Figure 1, which prompts you to select a COM port. For new modules, you can keep the default values. Ensure that you select the right COM Port. Once you select the COM port and click Open Port, s-center will try to connect to the COM port.

If the connection is successful, it will display the main screen, as shown in Figure 2. If the module is in command mode, s-center will read out some information to you. s-center may additionally disable some controls if it knows the module does not support those features.
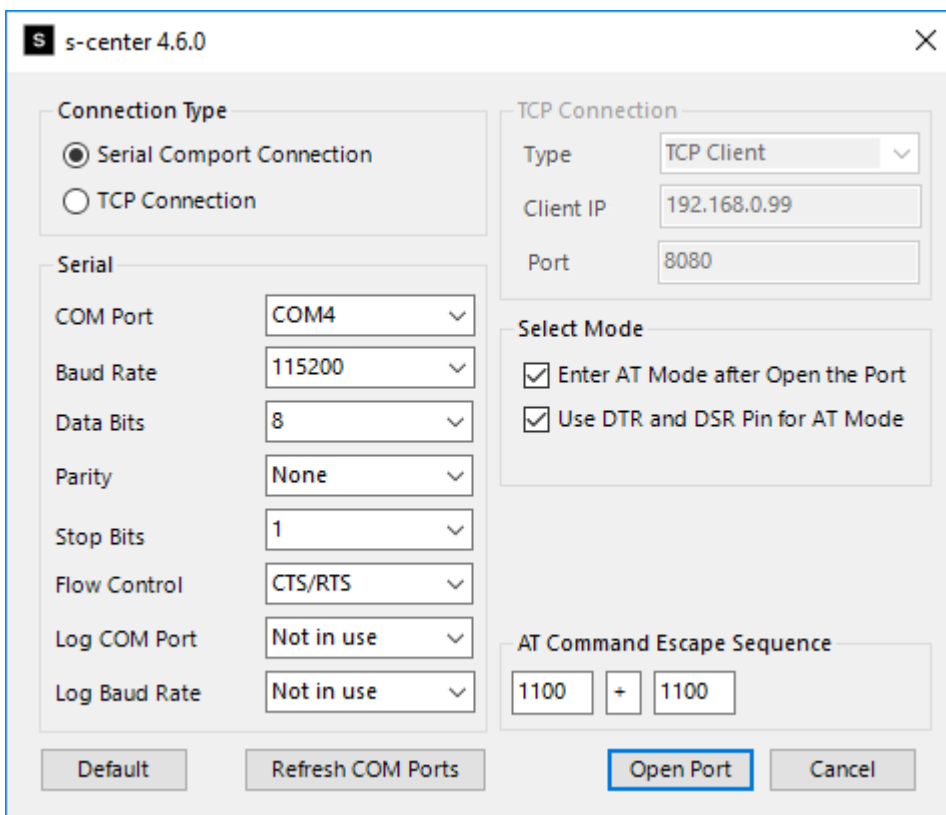

Figure 1: Selecting COM Port
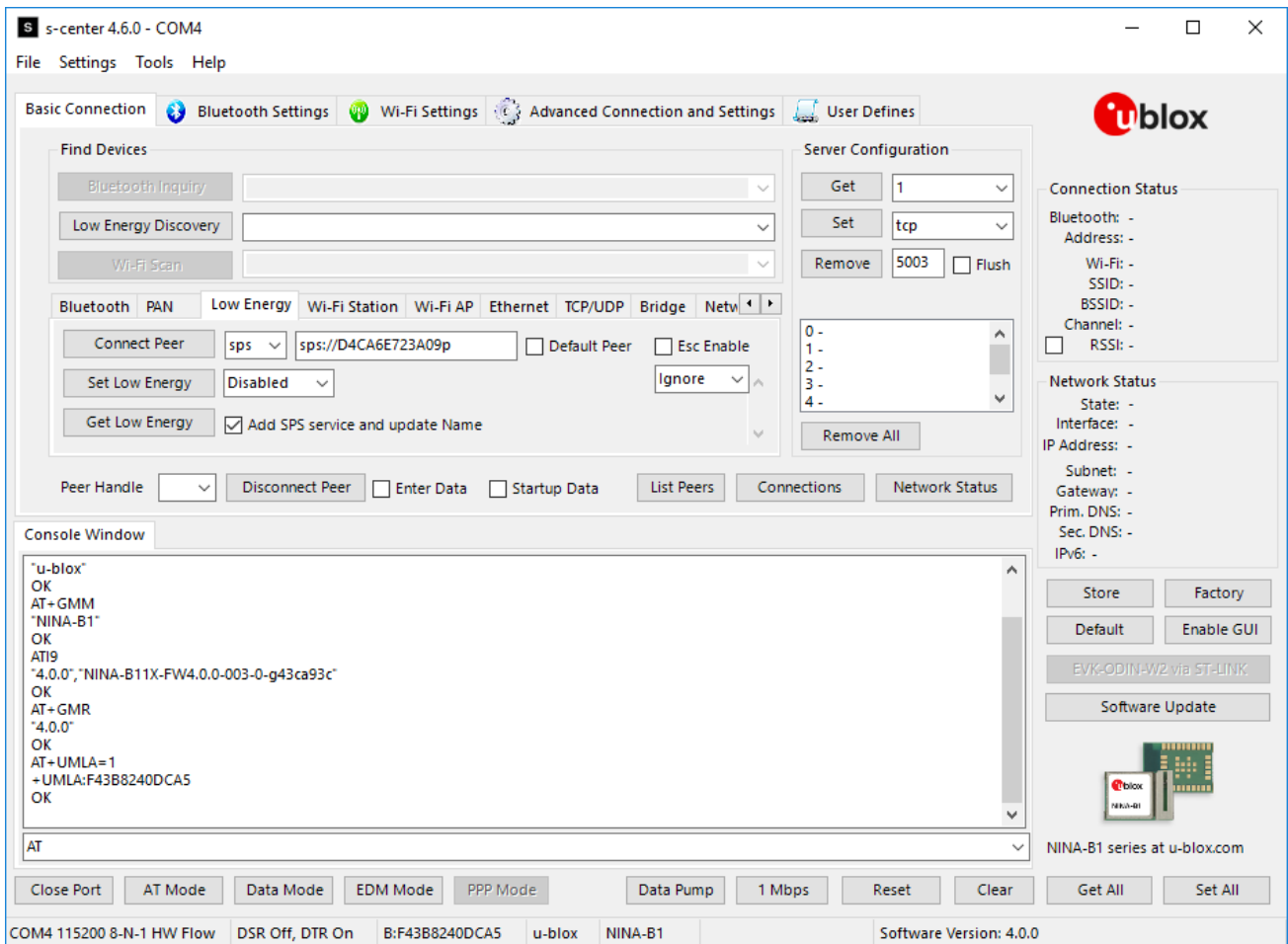
Figure 2: Main s-center screen

2 Connecting to another wireless module

2.1 Classic Bluetooth (SPP)

The act of searching for other Bluetooth devices is called an inquiry and is shown in Figure 3. s-center will display a list of devices that was found in a drop down list. You can select the module you want to connect to from the list and its Bluetooth address will automatically be entered in the form, as shown in Figure 4. SPP is the default protocol, so you have to click Connect Peer only.

☞ The other module must have the SPP server running to connect to SPP.

☞ If the other module has any security enabled, additional steps may be necessary.

Figure 3: Bluetooth Inquiry
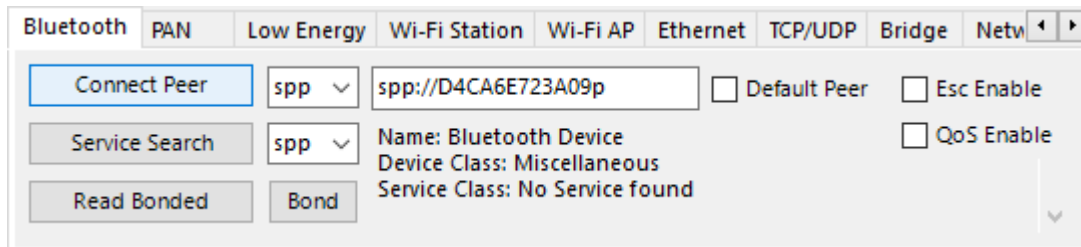
Figure 4: Connecting to peer with SPP

2.2 Bluetooth Low Energy (SPS)

Start searching for other Bluetooth LE devices by running a discovery, as shown in Figure 5. s-center will collect all devices in the drop down list. Selecting an entry from this list fills in the Bluetooth address, as shown in Figure 6. SPS is the default and only protocol available for low energy (LE), so you only have to click Connect Peer.

☞ To establish a low energy connection, this module must be in the Central mode

☞ The other module must have the SPS server running to connect to SPS

☞ More information about SPS is provided in [1]

Figure 5: Low Energy Discovery

Figure 6: Connecting to peer with SPS

2.3 Wi-Fi (TCP)

Connecting to another module over Wi-Fi involves more steps, as you first need to connect to an access point and then the module. The module can of course also be an access point but it is important to separate the roles.

Start by performing a Wi-Fi scan as shown in Figure 7. The results are displayed in the drop down list. Selecting an access point fills in its corresponding SSID as shown in the form in Figure 8. The majority of the values in this form can be left as default, but you may need to set the security mode and enter a passkey or password for that security mode, and then click Activate Wi-Fi. In this example, the security mode is WPA2 and the password is togr-wifi.

Figure 7: Scanning for Wi-Fi

Figure 8: Connecting to a Wi-Fi access point

Once the connection is established with an access point, you can attempt to connect to a peer over TCP, as shown in Figure 9. The default protocol is TCP; enter only the IP address or host name and a port, then click Connect Peer.

☞ The other module must have a TCP server running to connect over TCP.

Figure 9: Connecting to peer with TCP

3   Sending and receiving data

Once connected to a peer you can send data to the peer. To send data, set the module to data mode by clicking on the Data Mode button, as shown in Figure 10. In Data mode, the module sends raw bytes to the peer. In Data mode the module no longer accepts AT commands and any command will be interpreted as raw bytes to send to the peer. To return the module to command mode, click the AT Mode button (also shown in Figure 10).
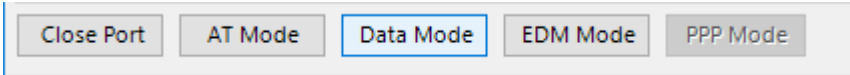
Figure 10: Mode buttons, Data mode highlighted

In Data mode, you can test the module's throughput performance by clicking the Data Pump button, as shown in Figure 11. The default values are good and you only have to click the Start button, as shown in Figure 12. The data pump sends and expects to receive a sequence of bytes [0, 1, 2, …] (0 resets the sequence) and reports any deviations on the received data as byte errors. Only if the other end is pumping data in this manner, can you rely on the byte errors (or lack of) to represent the link quality.

Figure 11: Data Pump highlighted

Figure 12: Data Pump

4   Settings for connecting to other modules

4.1   Bluetooth

To establish Bluetooth connections, the module must be discoverable, connectable, and pairable. Though it is not mandatory, setting a local name can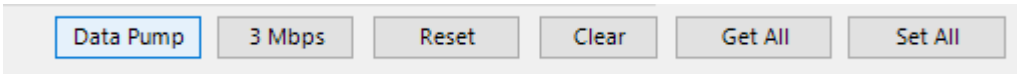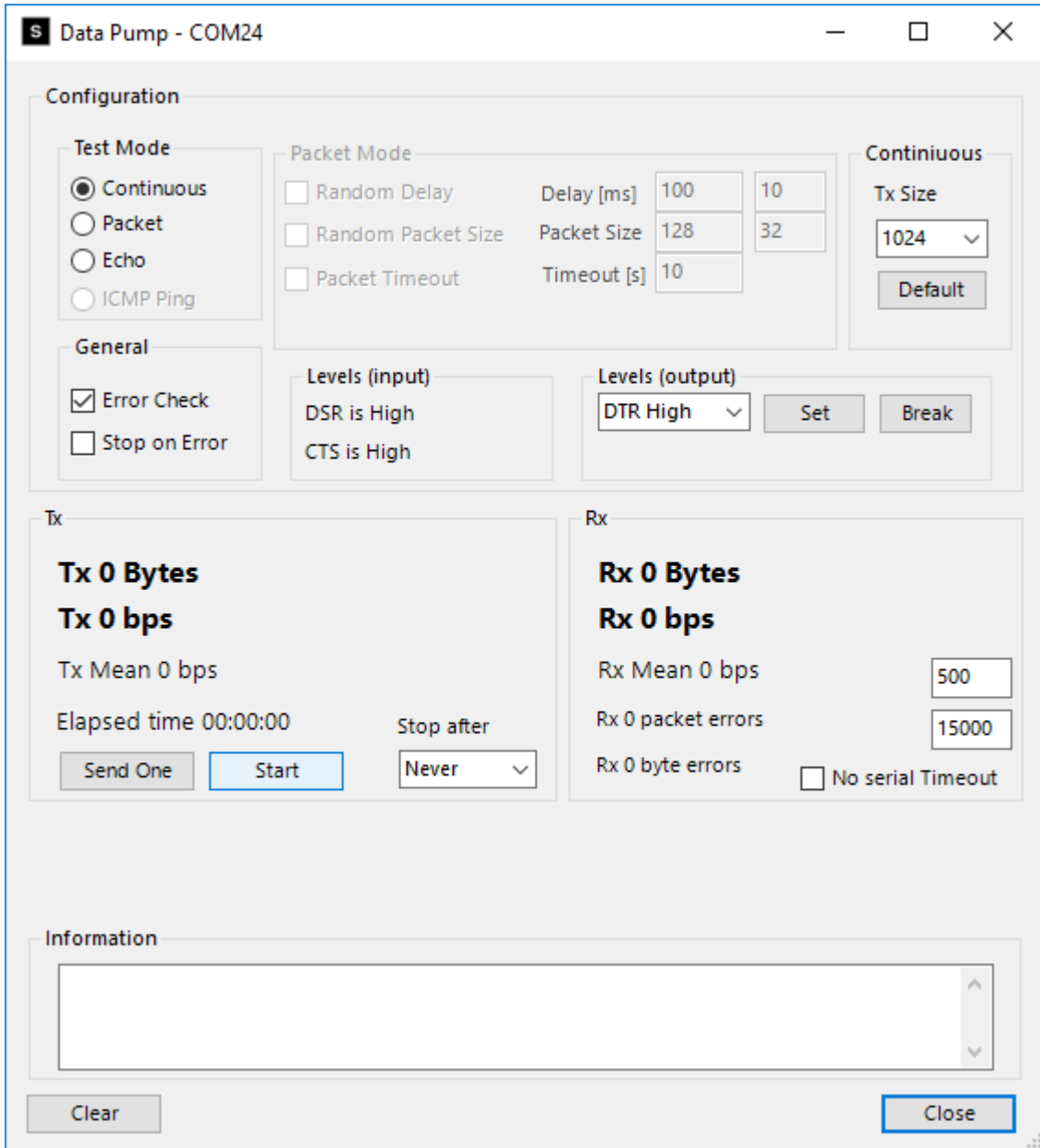 help to easily find your device. To establish a low energy connection, low energy must be active. To initiate a low energy connection, the module must be in the Central mode while to allow incoming connections, the module must be in the Peripheral mode.

Figure 13: Bluetooth connection settings (scaled to fit)

4.2   Wi-Fi

4.2.1   Station

Figure 14 shows the settings for Wi-Fi station. It contains a few more settings than the basic connection tab. Most notable is the ability to store and load the settings, in case you need to reset (restart) the module.

Figure 14: Wi-Fi station settings (scaled to fit)

4.2.2 Access point

Figure 15 shows the Wi-Fi access point settings. Here you can set for example, the following:

- The SSID (the name other modules will see),

- Security mode and

- If this module should act as a DHCP server (allows other modules connecting to this to be granted an IP address).

You can also store and load the settings, in case you need to reset the module.
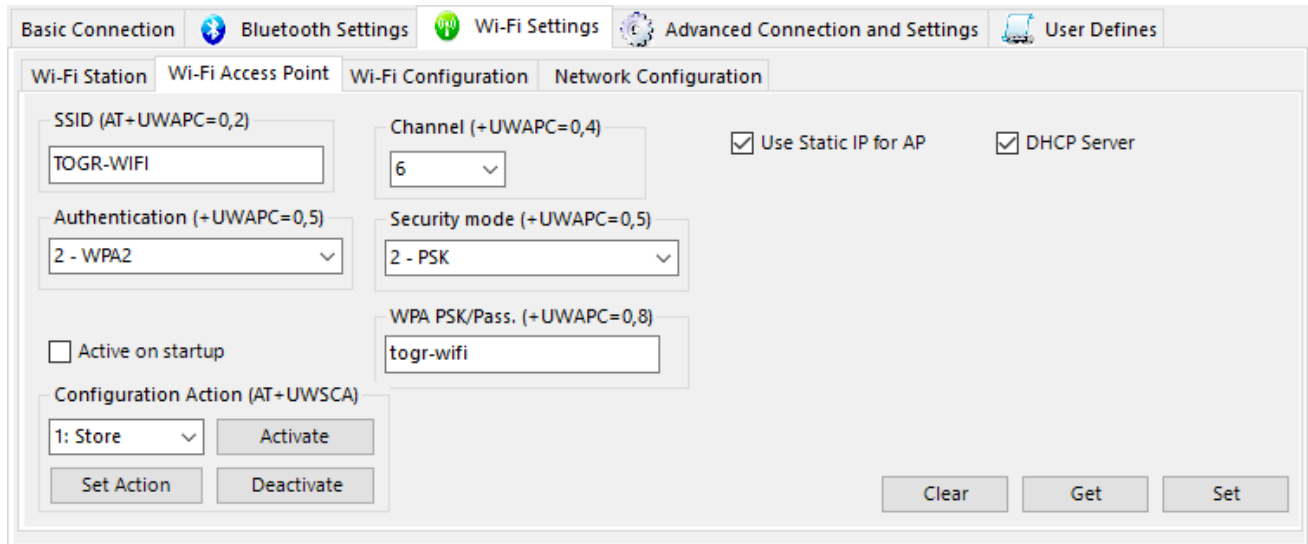
Figure 15: Wi-Fi access point (scaled to fit)

4.3 Enable servers

Figure 16 shows the server configuration. Here you can view the currently running servers and set new ones. You must remove a server to set a new one in its place. In the example provided below (Figure 16), the module is running an SPP server and a TCP server and is about to have an SPS server set.
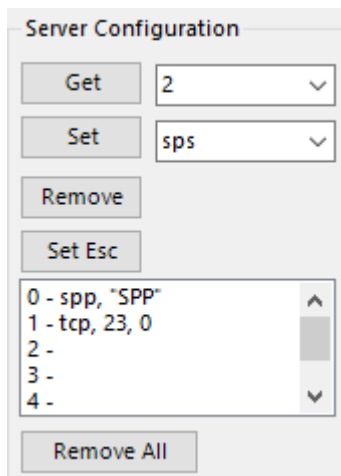
Figure 16: Servers

5 Updating software

Once you click the Software Update button, as shown highlighted in Figure 17, it opens the software update dialog, as shown in Figure 18. After you click the Select File, it allows you to browse for a new software file, and the Software Update dialog remembers the last 5 files used. The appropriate method will be selected automatically once you select a file. In most cases, you have to click the Software Update button only.

⚠️ A software update will undo all configurations on the device; consider saving them as described in section 6.
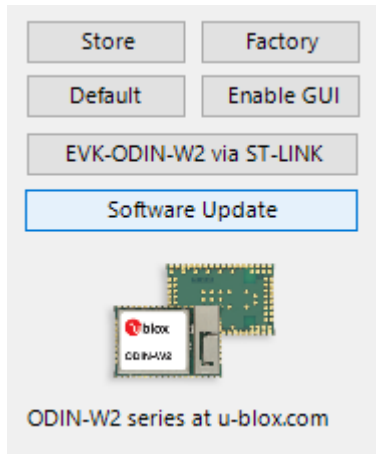
Figure 17: Software Update button
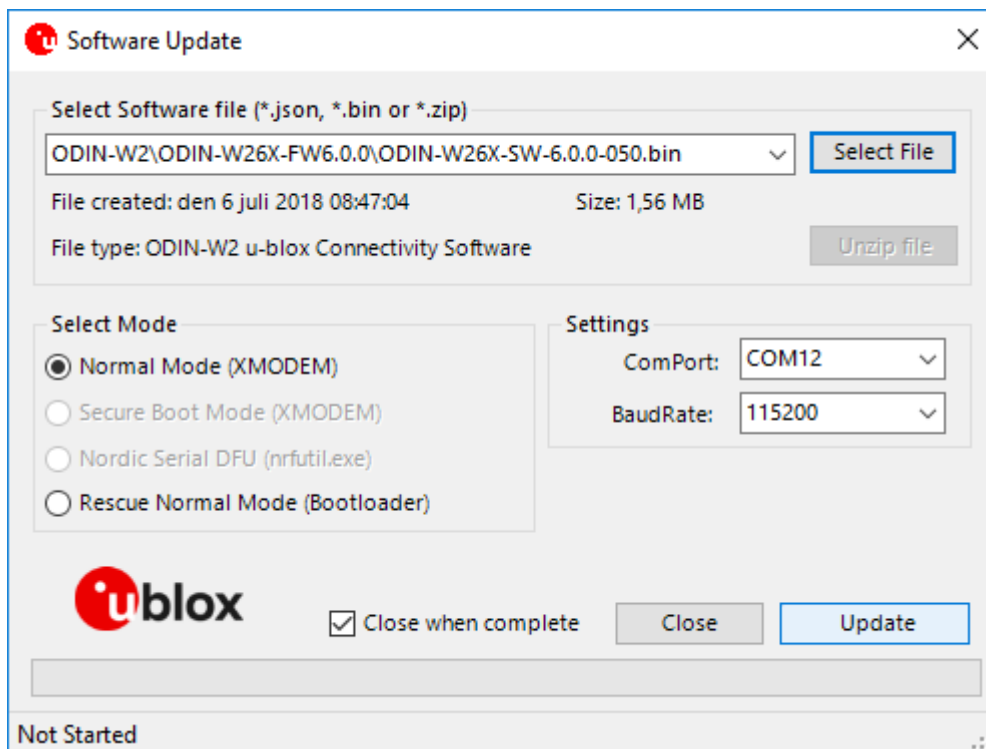
Figure 18: Software Update dialog

6 Configuring settings

6.1 Saving and downloading all settings

To save the configuration of the device for later use, click the Save Configuration option in the File menu, as shown in Figure 19. This will open a dialog box that prompts you to specify the location for saving the configuration. The configuration will essentially be saved as a list of AT commands to recreate the current configuration. If you click Download Configuration, it opens a dialog box from where you can select the specified file. Then, s-center will run all the AT commands to recreate the configuration.
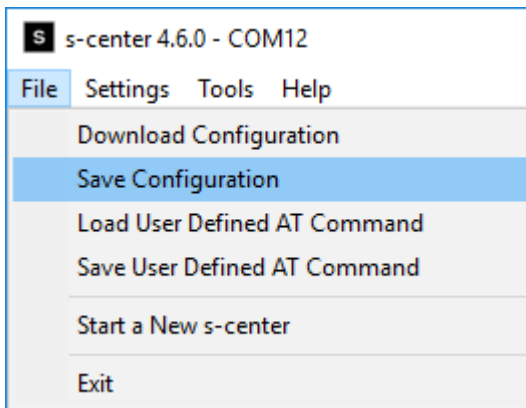
Figure 19: File Menu

6.2 Other settings

The rest of the tabs under Bluetooth and Wi-Fi contain various settings for different functionalities. The Advanced Connections and Settings tab contains more general purpose settings and some specialized settings. The settings are labeled with their respective AT command and additionally, the commands sent to the device are visible in a console window. For detailed information, see the u-blox Short Range AT commands manual [2]. Each tab can get and set their own subset of settings; use Get All and Set All buttons to get and set all device settings, as shown in Figure 20.

☞ s-center populates some fields with default values until read. If you immediately click Set All, it will set these values to the module. They will not be stored however and a simple module reset will undo the changes.
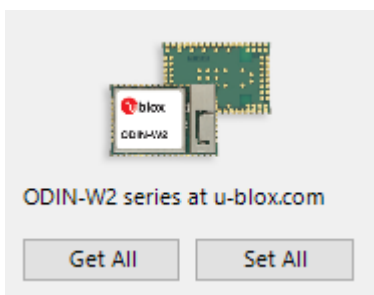
Figure 20: Get and set all settings

6.3   Retain or restore settings

Settings are first stored in volatile memory and will be undone during module reset (restart). To retain the settings in the module, they need to be written to permanent memory. Use the Store button in s-center for this, as shown in Figure 21. Additionally, for some settings to take effect, the module must be reset. The Store button conveniently resets the module after writing. In Figure 21, you can also see the Factory button, which allows you to undo the stored settings and restore factory defaults.

☞ Some settings are permanently stored through a separate command; these tabs will have a separate option to store.

Figure 21: More settings buttons

7 Miscellaneous features

7.1 GATT Server

Figure 22 shows the GATT Server. Here you can define services and characteristics that clients can then interact with. Characteristics are added to the latest service defined. Here you can also read values clients have written to characteristics and notify or indicate new values to the client.
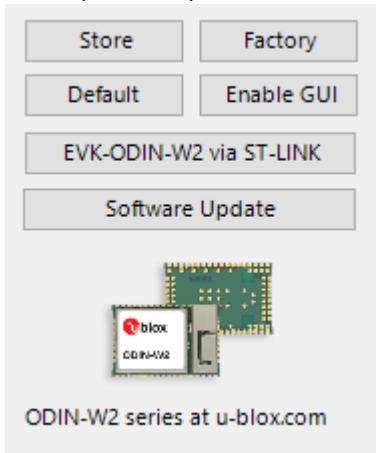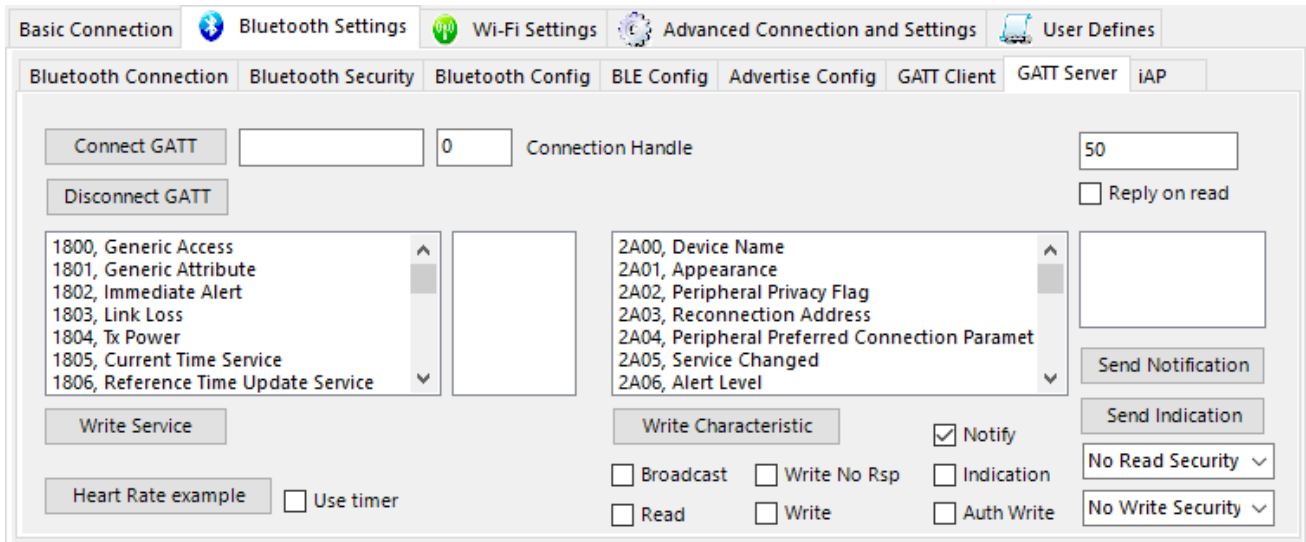

Figure 22: GATT Server (scaled to fit)

7.2 GATT Client

Figure 23 shows the GATT Client. Here you can establish an ACL link to a server by entering a Bluetooth address in the textbox to the right of the button Connect GATT, and then clicking that button. Once connected to a server, you can Discover Services of that server and the services associated characteristics. You can then write the characteristics to the server or register to receive notifications.

Figure 23: GATT Client (scaled to fit)

7.3 Console Window

The console window in Figure 24 allows you to enter raw AT commands to the module and view the response. The console window also echoes the respons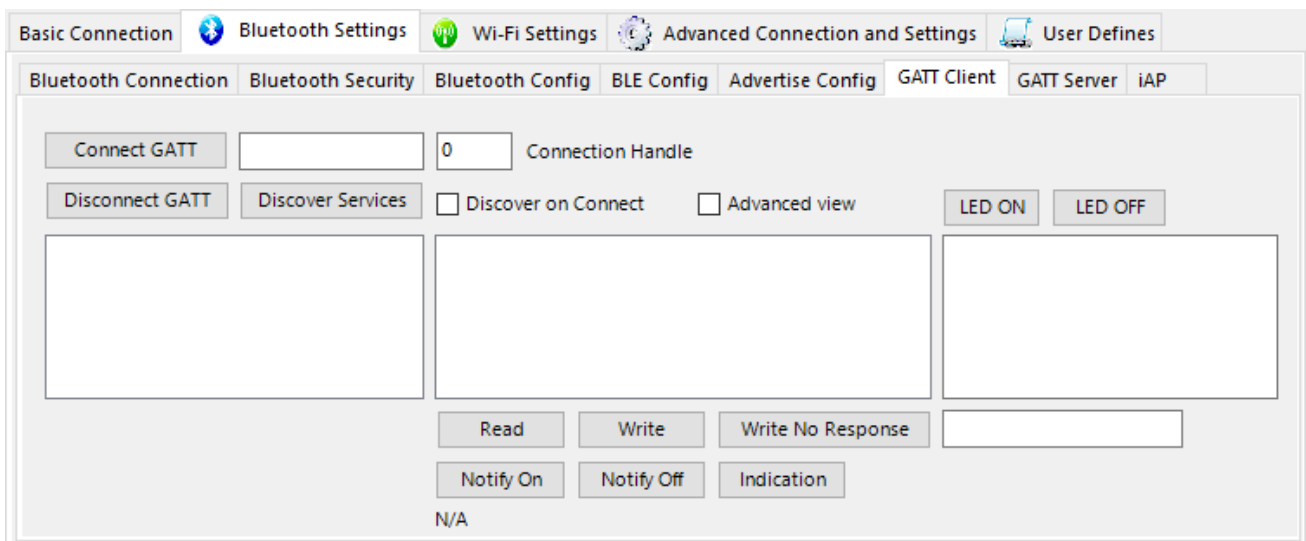es of AT commands sent as a result of interacting with the features of s-center. The console does not echo the sent commands, but the default behavior of the device is to send the command as part of the response.

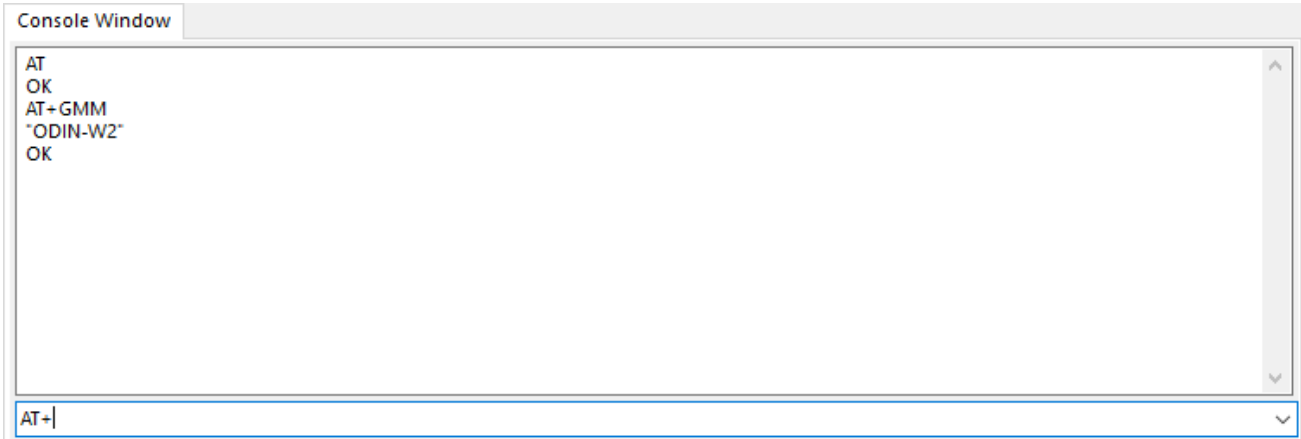**Figure 24: Console Window (scaled to fit)**

7.4 User defines

Figure 25 shows user defines. The User defines allow you to define and execute rudimentary macros. These macros consist of a list of AT commands delimited by <LF> in upper case. When executing a user define, s-center simply executes the AT commands in order with no special handling.
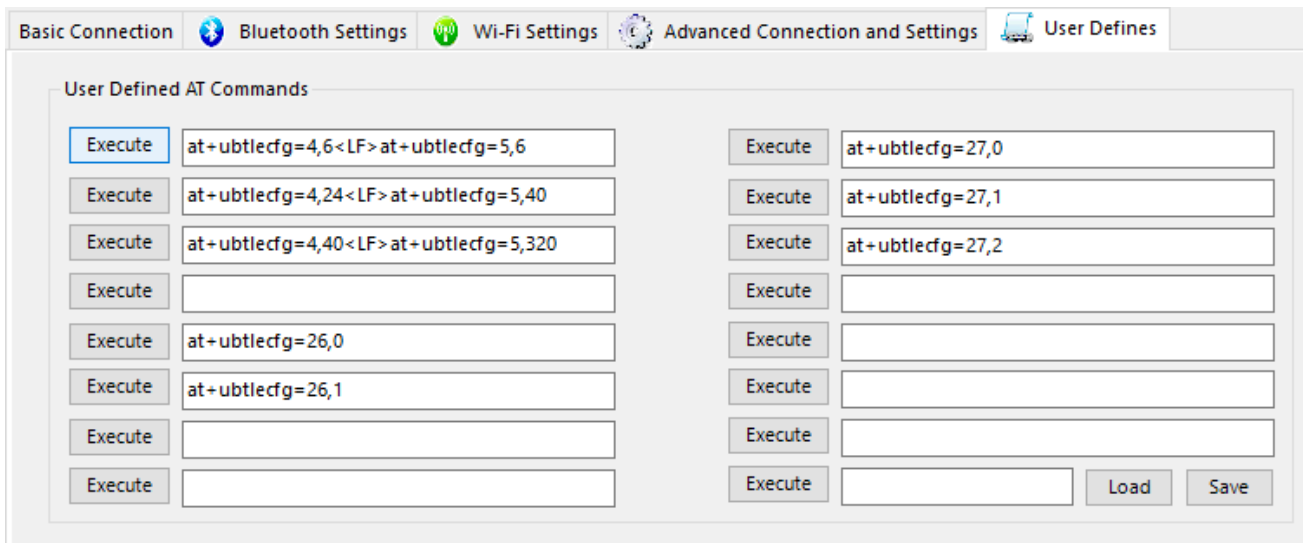

Figure 25: User defines (scaled to fit)

7.5 GPIO

Allows you to configure the GPIO pins of the modules. As shown in Figure 26, select a pin first, then specify whether it is to be configured as Output, Input or Disabled, and finally how to configure it. Output pins can be configured with an initial value, low or high. Input pins can be configured whether or not to use any pull resistors. Output pins can have a new value written to them and both input and output pins can be read.

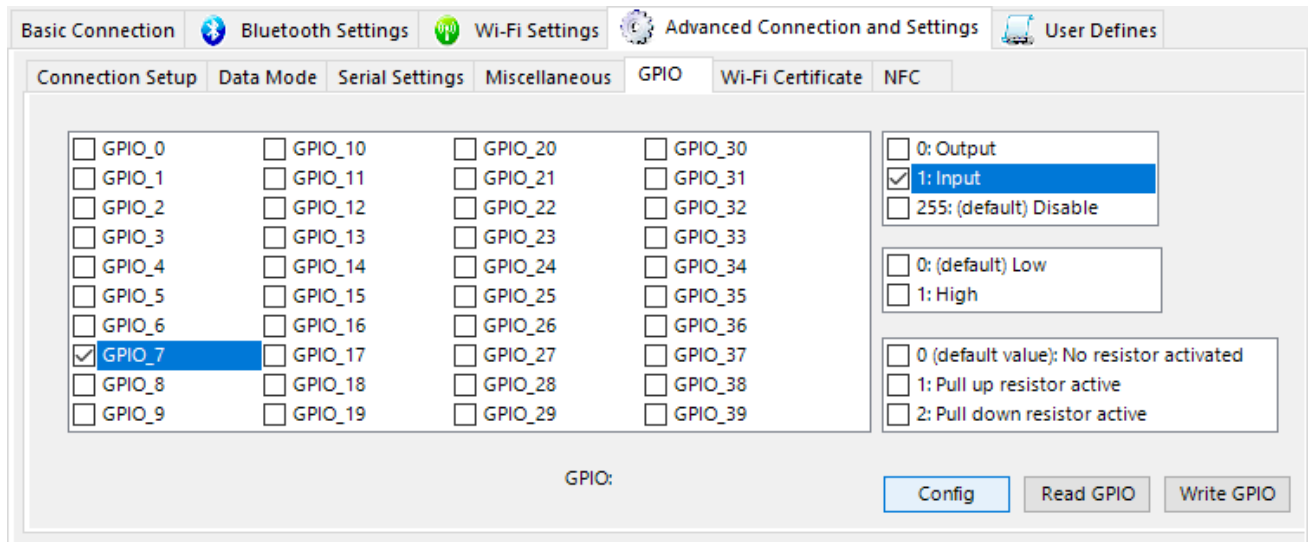☞ Different GPIO pins are available for each modules as mentioned in the corresponding module documentation.

Figure 26: GPIO configuration (scaled to fit)

7.6 Wi-Fi Certificates

The Wi-Fi certificate tab allows you to upload and view certificates and keys for use with Wi-Fi station as shown in Figure 27.

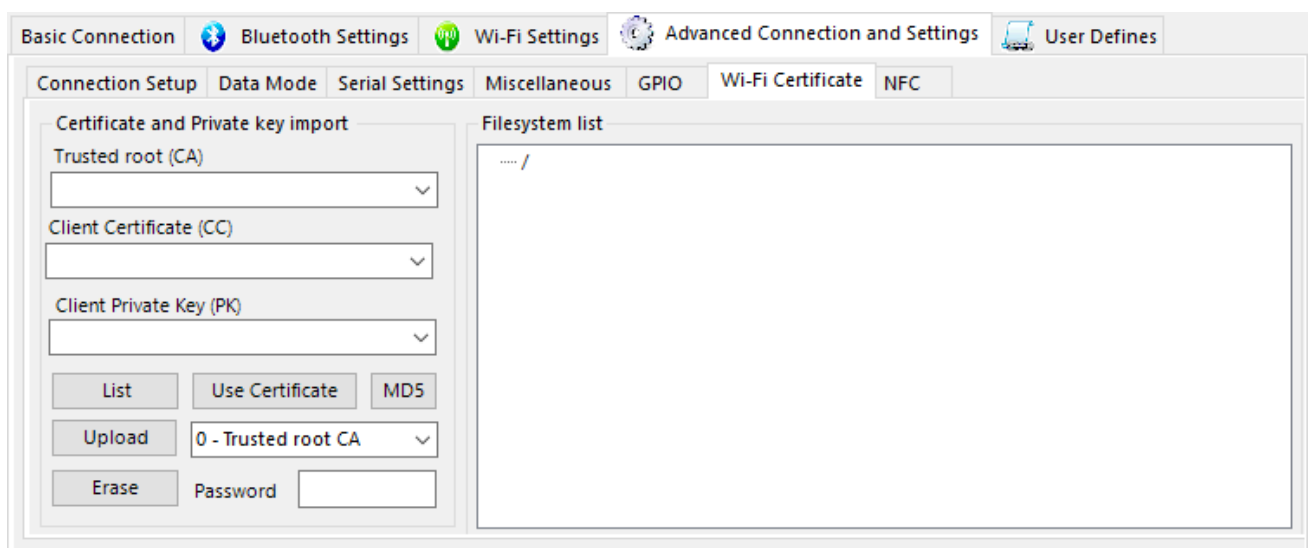☞ Only the name and MD5 of certificates and keys may be read, not the contents.

Figure 27: Wi-Fi certificate tab (scaled to fit)

7.7 NFC

The NFC tab allows you to enable or disable NFC. When NFC is read, the module will send a response.
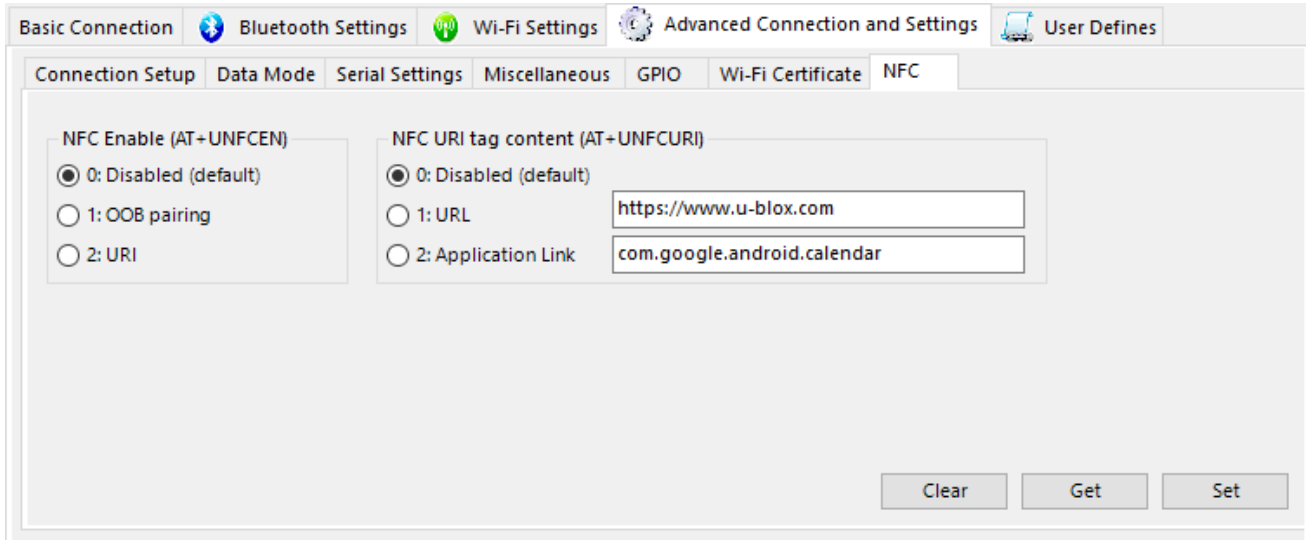

Figure 28: NFC (scaled to fit)

7.8 Bluetooth PAN

The Bluetooth PAN tab allows you to configure and establish or join an existing personal area network over Bluetooth.
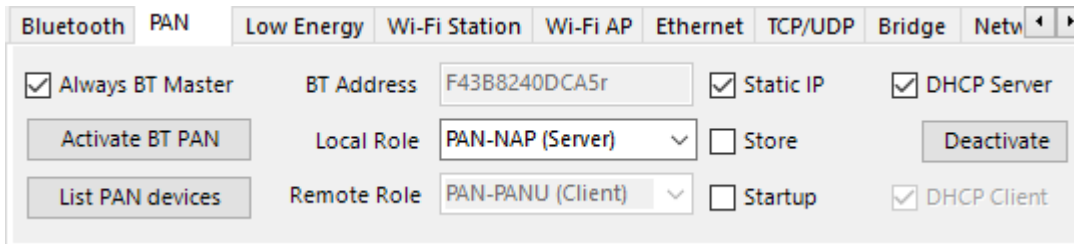

Figure 29: PAN settings

7.9 Ethernet

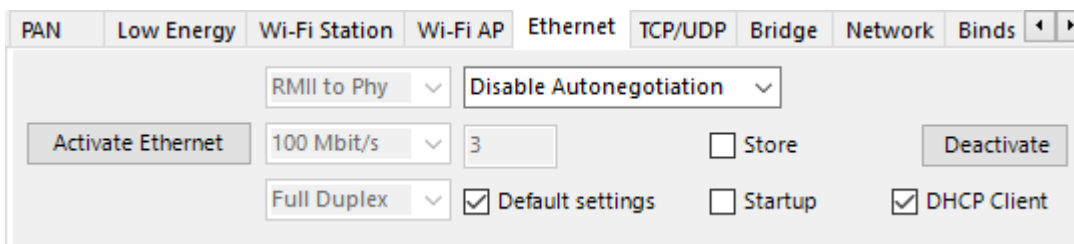The Ethernet tab allows you to configure and establish an Ethernet connection.

Figure 30: Ethernet settings and connection

7.10 Bridge

The Bridge tab allows you to bridge two or more interfaces.

Figure 31: Bridge settings

7.11 Network

The Network tab allows you to set various network interfaces with more control. For example, setting Wi-Fi station to use a specific IP address (static IP).

Figure 32: Network settings

7.12 Bindings

The Bind Streams option (as shown in Figure 33) allows you to bind the streams of two peers to each other, such that the transmissions from peer 1 is received by peer 2 and vice versa. Bind Channel allows a third peer to be hooked up to an existing bind. Bind Channel also binds the peer in the left drop down list to the channel in the drop down list prior to the Bind Channels button.

Figure 33: Bindings

Appendix

A   Glossary

Abbreviation	Definition
ACL	Asynchronous Connection-Less
DHCP	Dynamic Host Configuration Protocol
GATT	Generic Attribute
GPIO	General Purpose Input Output
IP	Internet Protocol
MD5	A hash function
NFC	Near-Field Communication
PAN	Personal Area Network
SSID	Service Set Identifier
SPP	Serial Port Profile
SPS	Serial Port Service
TCP	Transmission Control Protocol
WPA2	Wi-Fi Protected Access II

Related documents

[1] u-blox Low Energy Serial Port Service – Protocol Specification, Doc. No. UBX-16011192

[2] u-blox Short Range Modules – AT Commands Manual, Doc. No. UBX-14044127

☞ For regular updates to u-blox documentation and to receive product change notifications, register on our homepage (www.u-blox.com).

Revision history

Revision	Date	Name	Comments
R01	29-Feb-2018	cmag	Initial release
R02	12-Dec-2018	togr, kgom	Major updates in all sections.

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