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.

UBX-16012261 - R04
C1-Public

Document information

Title	**s-center**
Subtitle	Evaluation software for short range modules
Document type	User guide
Document number	UBX-16012261
Revision and date	R04 19-Mar-2021
Disclosure Restriction	C1-Public

This document applies to the following products:

Product name	Type number	Firmware version	PCN reference	Product status
s-center				

u-blox or third parties may hold intellectual property rights in the products, names, logos and designs included in this document. Copying, reproduction, modification or disclosure to third parties of this document or any part thereof is only permitted with the express written permission of u-blox.
The information contained herein is provided “as is” and u-blox assumes no liability for its use. No warranty, either express or implied, is given, including but not limited to, with respect to the accuracy, correctness, reliability and fitness for a particular purpose of the information. This document may be revised by u-blox at any time without notice. For the most recent documents, visit www.u-blox.com.
Copyright © u-blox AG.

Contents

Document information **2**
Contents **3**
1 Overview **5**
1.1 Getting started 5
2 Connecting to another wireless module **7**
2.1 Classic Bluetooth (SPP) 7
2.2 Bluetooth Low Energy (SPS) 7
2.3 Wi-Fi (TCP) 8
3 Sending and receiving data **9**
4 Settings for connecting to other modules **10**
4.1 Bluetooth 10
4.2 Wi-Fi 10
4.2.1 Station 10
4.2.2 Access point 11
4.3 Enable servers 11
5 Updating software **12**
6 Configuring settings **13**
6.1 Saving and downloading all settings 13
6.2 Other settings 13
6.3 Retain or restore settings 14
7 Miscellaneous features **15**
7.1 Serial Settings 15
7.2 Data Mode settings 15
7.3 GATT Server 16
7.4 GATT Client 16
7.5 Console Window 17
7.6 User Defines 17
7.7 GPIO 18
7.8 Wi-Fi Certificate 18
7.9 NFC 19
7.10 Bluetooth PAN 19
7.11 Ethernet 19
7.12 Bridge 20
7.13 Network 20
7.14 Bind Streams 20
7.15 MQTT 20
7.16 EDM 21
7.17 HTTP 21
Appendix **23**
A Glossary **23**

Related documents **24**
Revision history **25**
Contact **26**

1 Overview

s-center is a powerful and easy-to-use tool for evaluating, configuring, and testing u-blox short range modules running the u-connectXpress SW based on AT commands.

This user guide provides a description of the features of s-center and its usage for simple configuration of the u-connectXpress based module.

☞ s-center works with all u-connectXpress-based products.

1.1 Getting started

Having downloaded s-center client from the u-blox website and started the software, the initial display window prompts you to select a COM port, as shown in Figure 1. For new modules, you can keep the default values shown in the window. Ensure that you select the correct COM Port.

Once you select the COM port and click **Open Port**, s-center attempts to connect to the COM port. The main screen is displayed if the connection is successful, as shown in Figure 2.

If the module is in command mode, s-center reads out some information to you. s-center may additionally disable some controls if the module does not support those features.

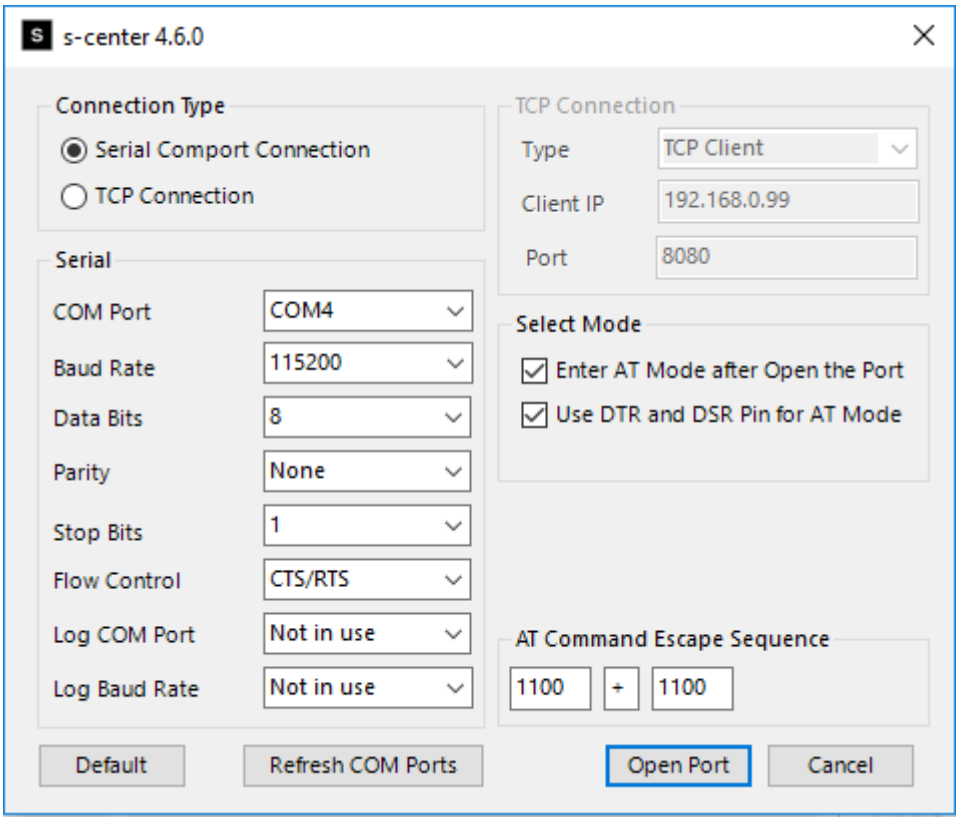

Figure 1: Selecting COM port

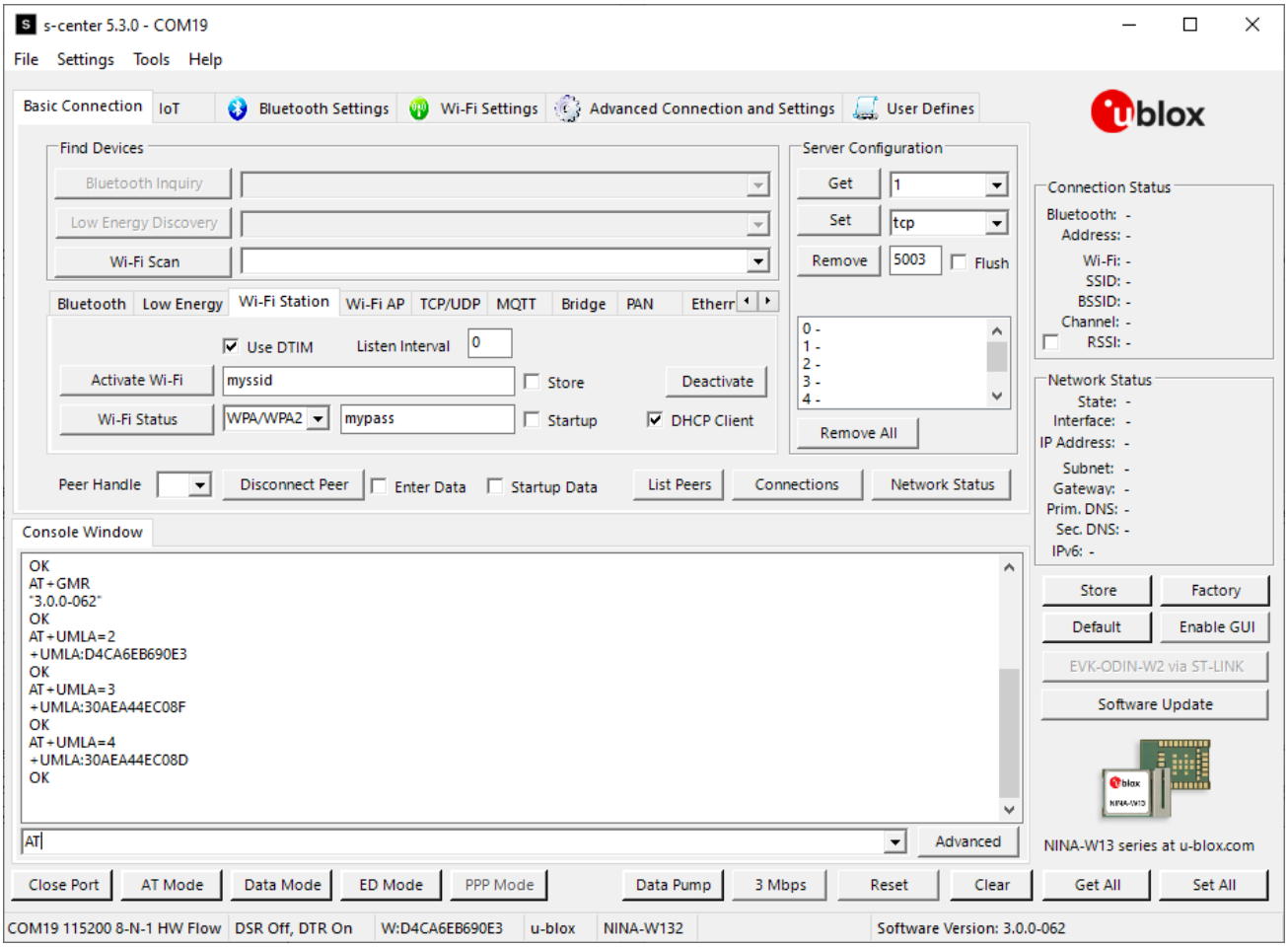

Figure 2: Main s-center screen

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 displays 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 is automatically be entered in the form, as shown in Figure 4. SPP is the default protocol, so you must select **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.

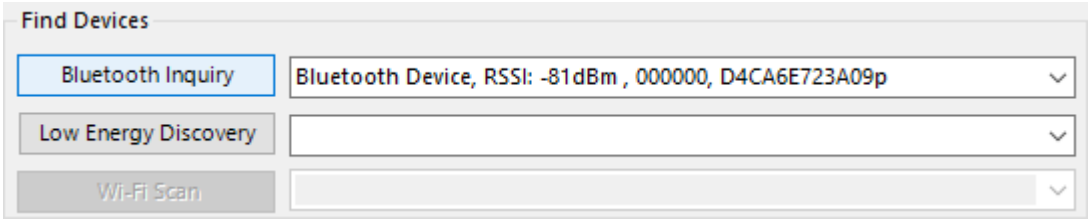

Figure 3: Bluetooth Inquiry

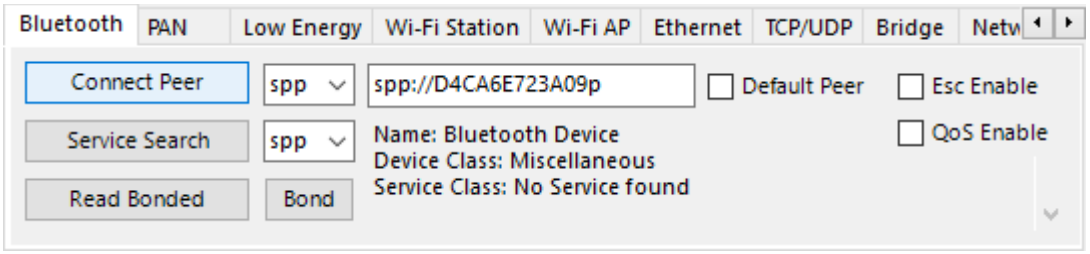

Figure 4: Connecting to peer with SPP

2.2 Bluetooth Low Energy (SPS)

Start searching for other Bluetooth LE devices by running a discovery, as shown in Figure 5. s-center collects 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 Bluetooth Low Energy (LE), so you only need to select **Connect Peer**.

The selected Bluetooth LE device can also be used in the GATT client tab, as described in section 7.4.

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

☞ The device that is connected to must have the SPS server running.

More information about SPS is provided in the u-connectXpress Low Energy Serial Port Service Protocol Specification [1].

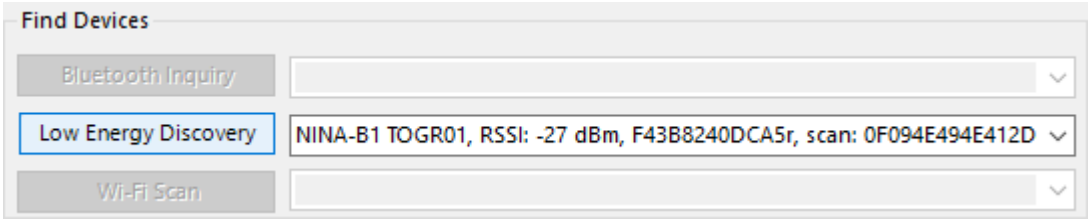

Figure 5: Low Energy discovery

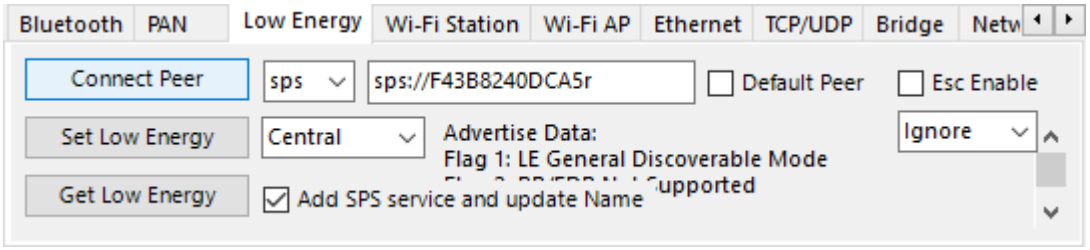

Figure 6: Connecting to peer with SPS

2.3 Wi-Fi (TCP)

Connecting to another module over Wi-Fi involves several more steps, as you first need to connect to an access point and then to the module. The module can 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 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 before selecting **Activate Wi-Fi**. In this example, the security mode is WPA2 and the password is TOGRI-WIFI.

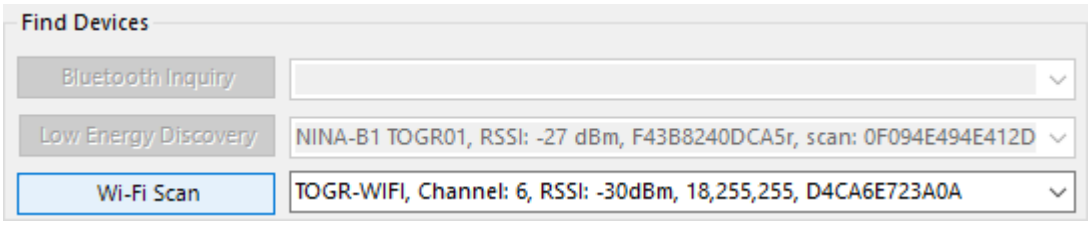

Figure 7: Scanning for Wi-Fi

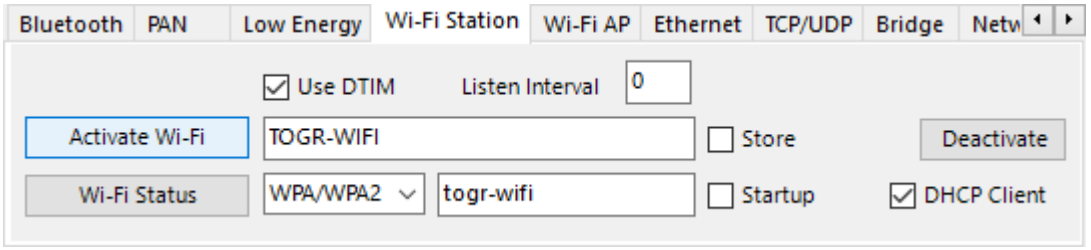

Figure 8: Connecting to a Wi-Fi access point

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 select **Connect Peer**.

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

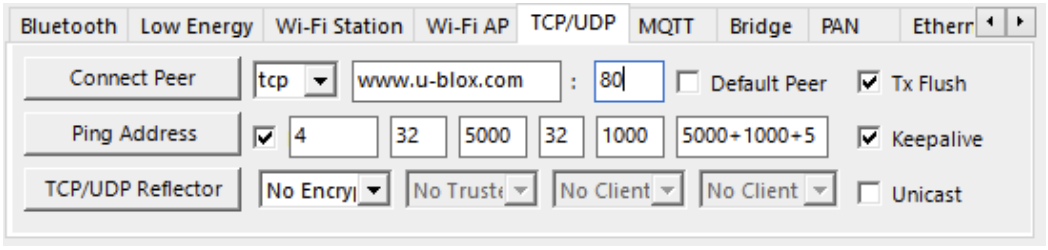

Figure 9: Connecting to peer with TCP

3 Sending and receiving data

Once connected to a peer you can send data to the peer. Select **Data Mode** to send data , as shown in Figure 10.

In Data mode, the module sends raw bytes to the peer and no longer accepts AT commands. Any command is interpreted as raw bytes to send to the peer. Select **AT Mode** to return the module to command mode, as shown in Figure 10.

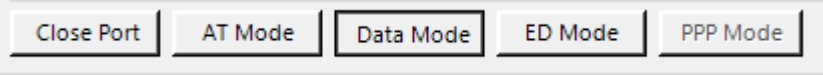

Figure 10: Mode buttons, Data mode highlighted

In Data mode, you select **Data Pump** to test the throughput performance of the module, as shown in Figure 11. The default values are good, so you need only select **Start**, 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 peer device 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

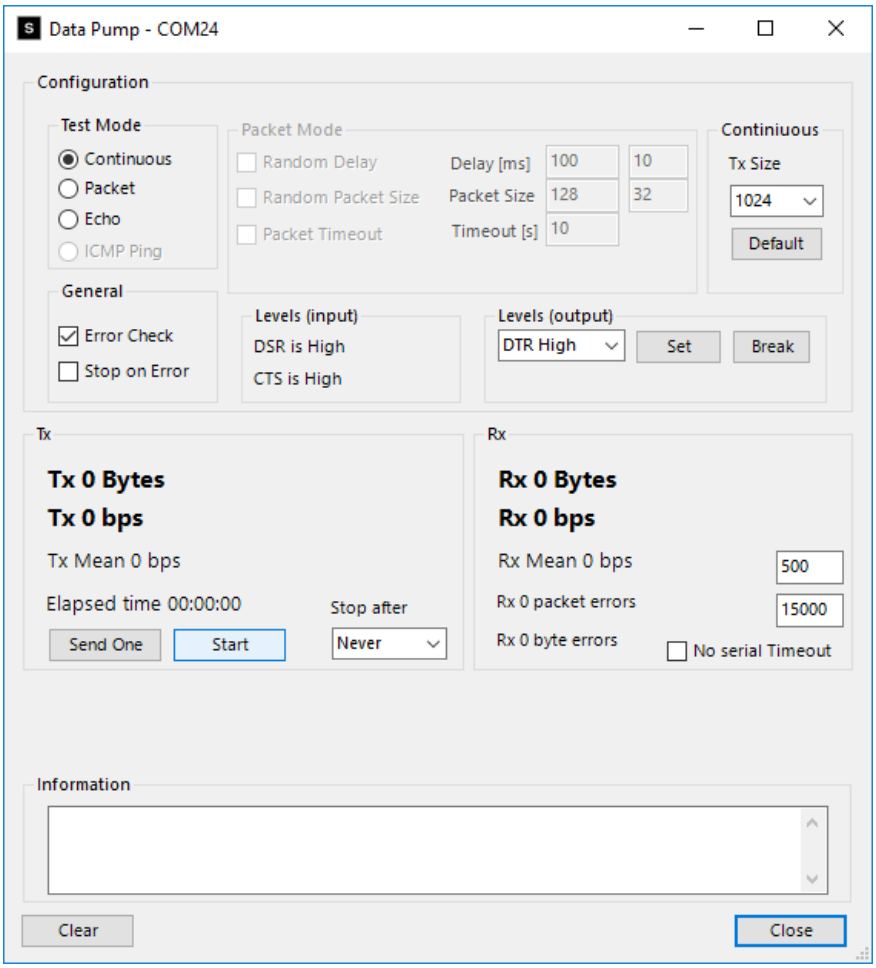

Figure 12: Data Pump

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.

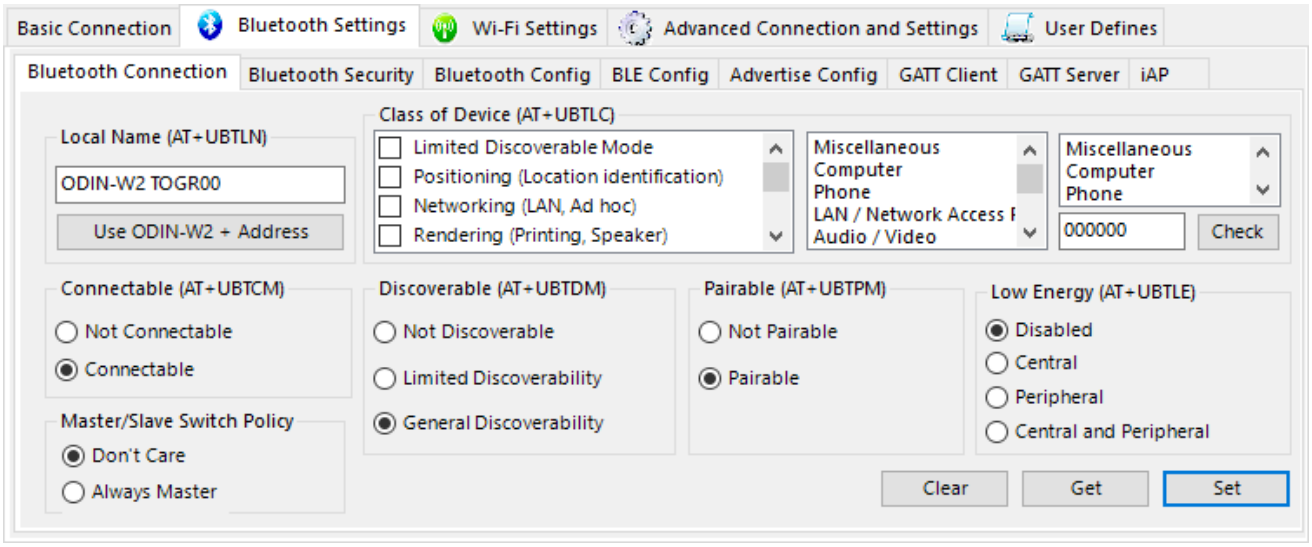

Figure 13: Bluetooth connection settings (scaled to fit)

4.2 Wi-Fi

4.2.1 Station

Figure 14 shows the settings for Wi-Fi station. It contains more settings than those shown in the **Basic Connection** tab. Most notable is the ability to store and load the settings when you need to reset (restart) the module.

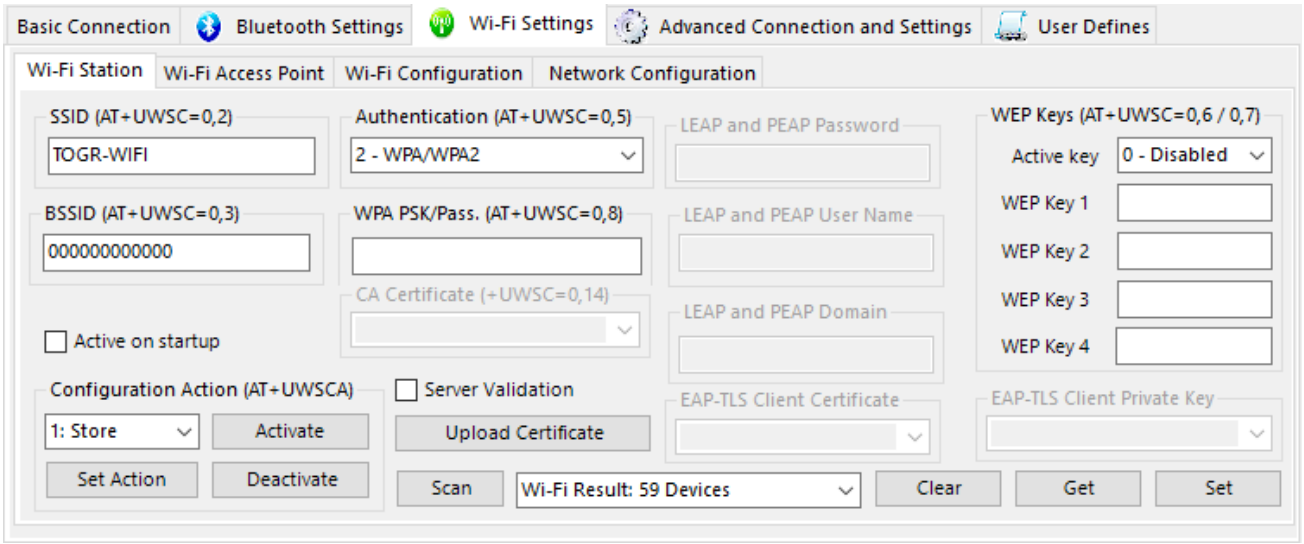

Figure 14: Wi-Fi station settings (scaled to fit)

4.2.2 Access point

Figure 15 shows the Wi-Fi access point settings, including:

- SSID (the name “seen” by other modules)
- Security mode
- DHCP (If this module is to act as a DHCP server so that other connecting modules can be granted an IP address)

You can also store and load the settings in case you need to reset the module.

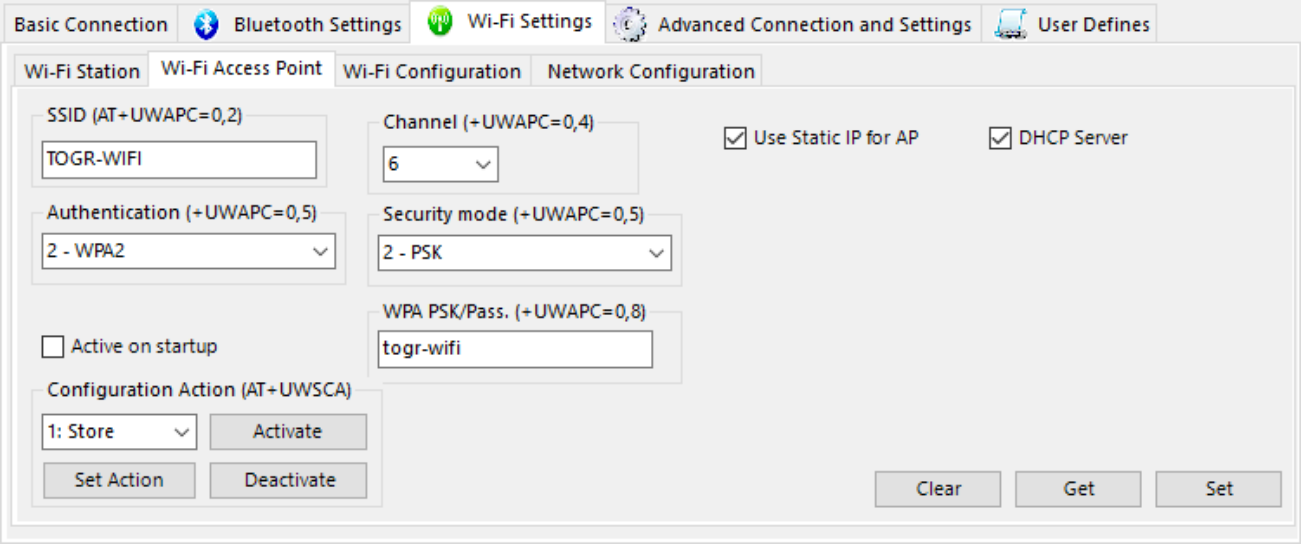

Figure 15: Wi-Fi access point (scaled to fit)

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 shown in Figure 16, the module is running an SPP server and TCP server and is about to set an SPS server.

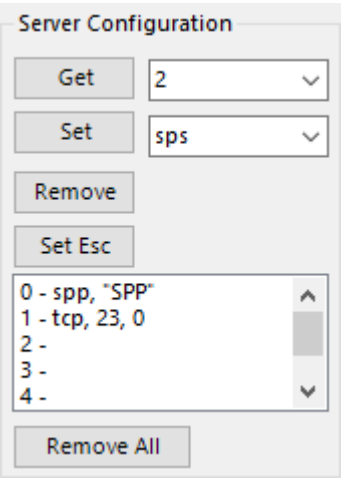

Figure 16: Servers

5 Updating software

Selecting **Software Update** (shown in Figure 17) opens the software update dialog shown in Figure 18. **Select File** allows you to browse for a new software file, and the **Software Update** dialog remembers the last 5 files used. The appropriate method is selected automatically once you select a file. In most cases, you must select **Software Update**.

⚠ A software update undoes all configurations on the device; consider saving them as described in section 6.

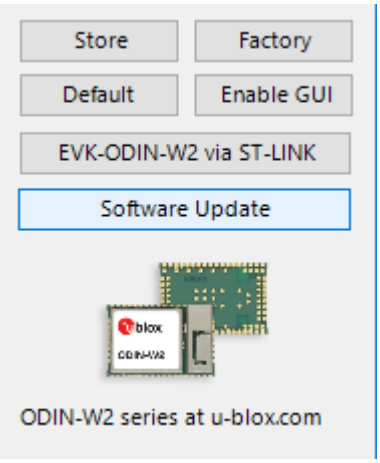

Figure 17: Software Update button

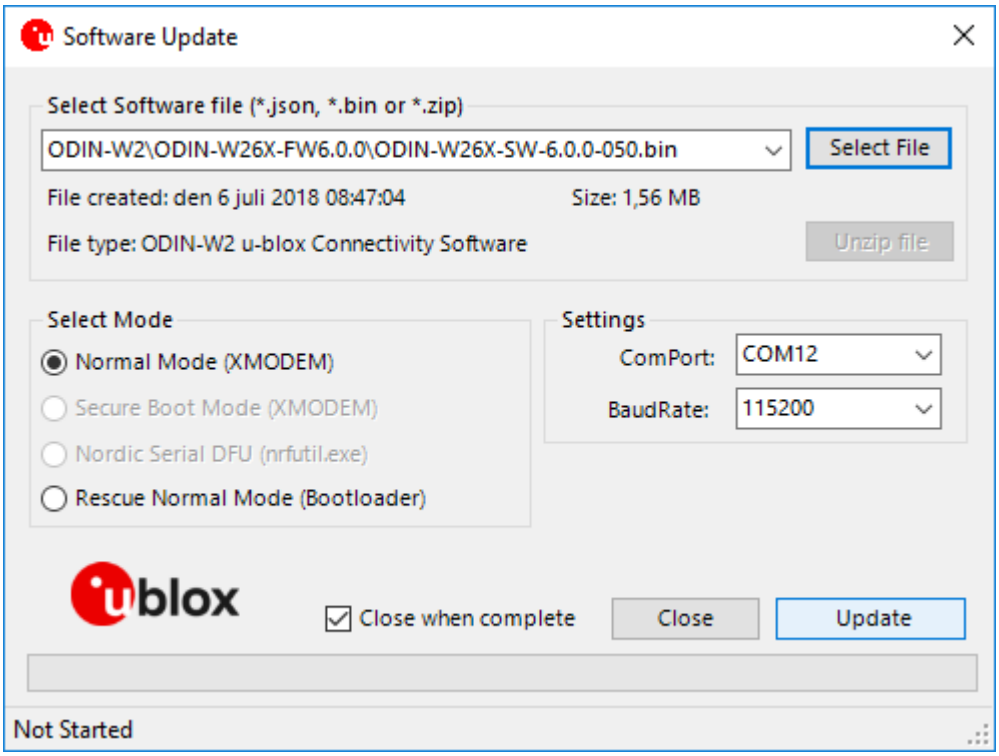

Figure 18: Software Update dialog

6 Configuring settings

6.1 Saving and downloading all settings

To save the device configuration for later use, select **Save Configuration** from the **File** menu, as shown in Figure 19. You specify the location for saving the configuration in the prompt dialog.

The configuration is saved as a list of AT commands that can be used to recreate the current configuration. Selecting **Download Configuration** opens a dialog box from which you can select the specified file. The s-center software then runs all the AT commands to recreate the configuration. As it is run as a script, you can use this function to script procedures.

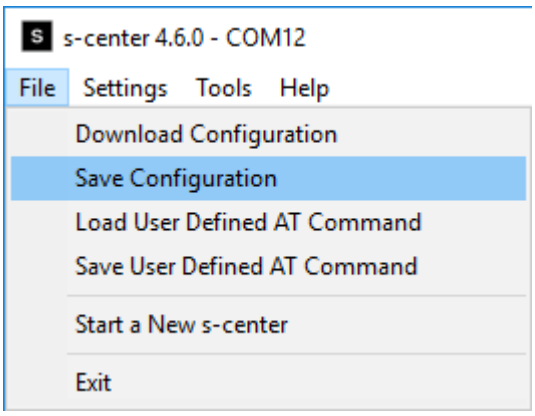

Figure 19: File Menu

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** tabs contain more general purpose settings and some specialized settings. The settings are labeled with their respective AT command and all commands sent to the device are visible in a console window. For more detailed information about these commands, see the u-connectXpress short range AT commands manual [2]. Each tab can get and set their own subset of settings; select **Get All** and **Set All** to get and set all device settings, as shown in Figure 20.

☞ s-center populates some fields with default values until read. Select **Set All** to set the values in the module but note that these are not stored. Reset the module to undo any changes.

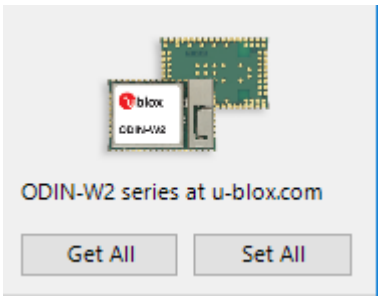

Figure 20: Get and set all settings

6.3 Retain or restore settings

Settings are first stored in volatile memory and are undone during module reset (restart). You must select **Store** to retain the settings in permanent memory, as shown in Figure 21. The module must be reset before the settings take effect.

Selecting **Store** conveniently resets the module after writing. You select **Factory** to undo the stored settings and restore factory defaults.

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

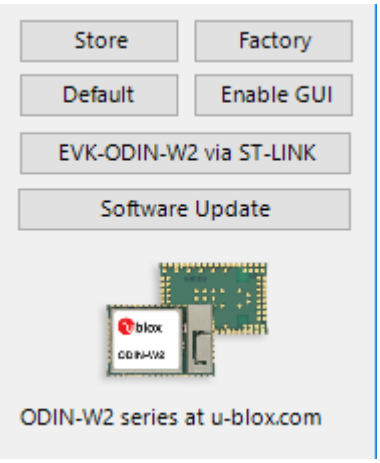

Figure 21: Store and factory settings

7 Miscellaneous features

7.1 Serial Settings

Figure 22 shows the **Serial Settings** tab. From here you can change settings of the serial port (baud rate, flow control, parity) as well as change which characters to use as command characters.

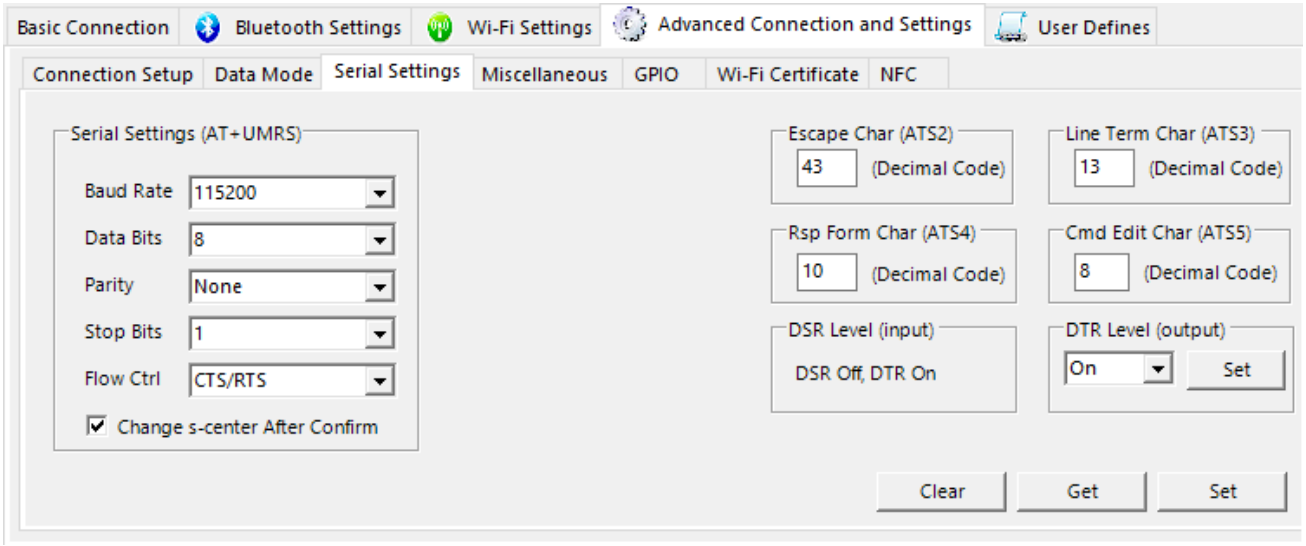

Figure 22: Serial Settings (scaled to fit)

7.2 Data Mode settings

From the **Data Mode** tab shown in Figure 23 you can set the module start up mode and configure how the module handles and interprets the **DSR** and **DTR** pins.

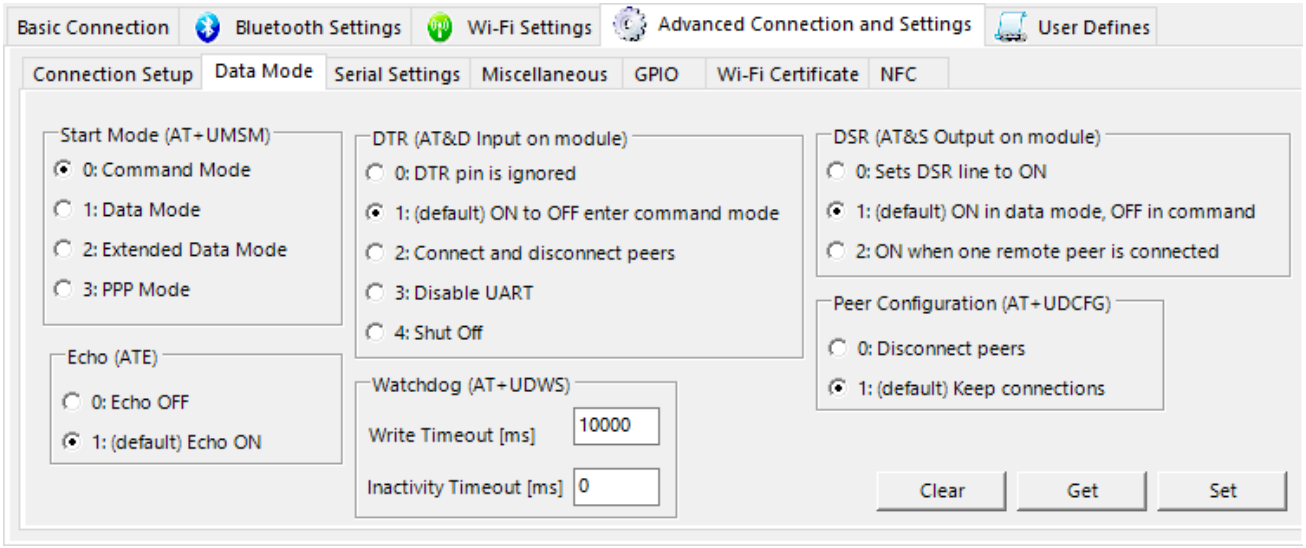

Figure 23: Data Mode settings (scaled to fit)

7.3 GATT Server

Figure 24 shows the **GATT Server** settings. Form here you define the services and characteristics that clients interact with, read values clients have written to characteristics, and notify or indicate new values to the client. Characteristics are added to the latest service defined.

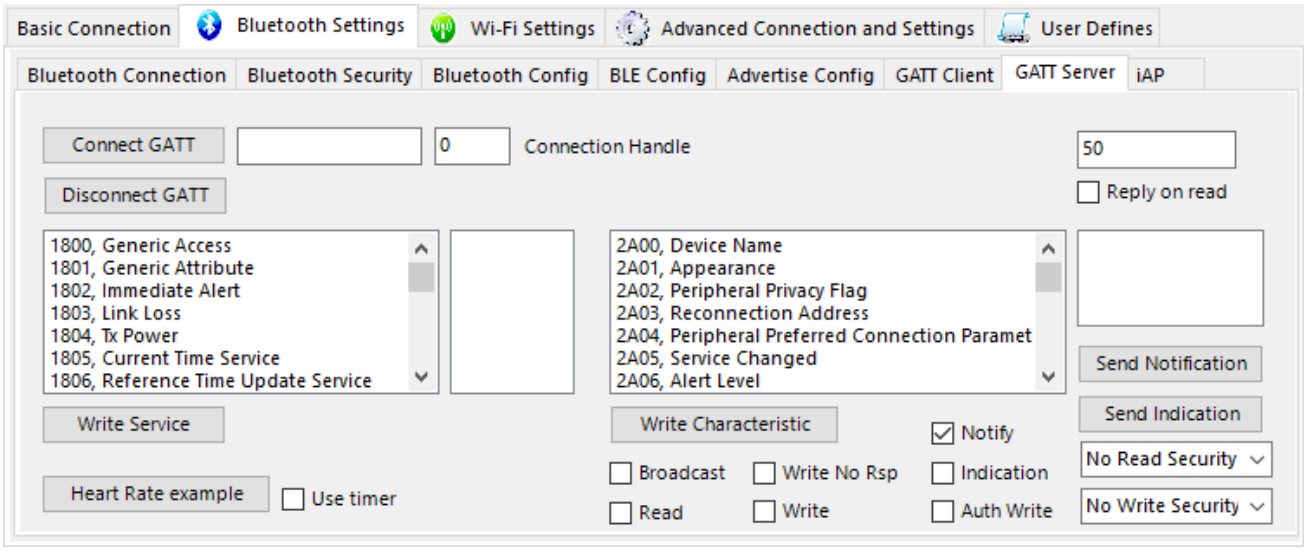

Figure 24: GATT Server (scaled to fit)

7.4 GATT Client

Figure 25 shows the **GATT Client** settings. From here you can establish an ACL link to a server by entering a Bluetooth address and selecting **Connect GATT.** 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.

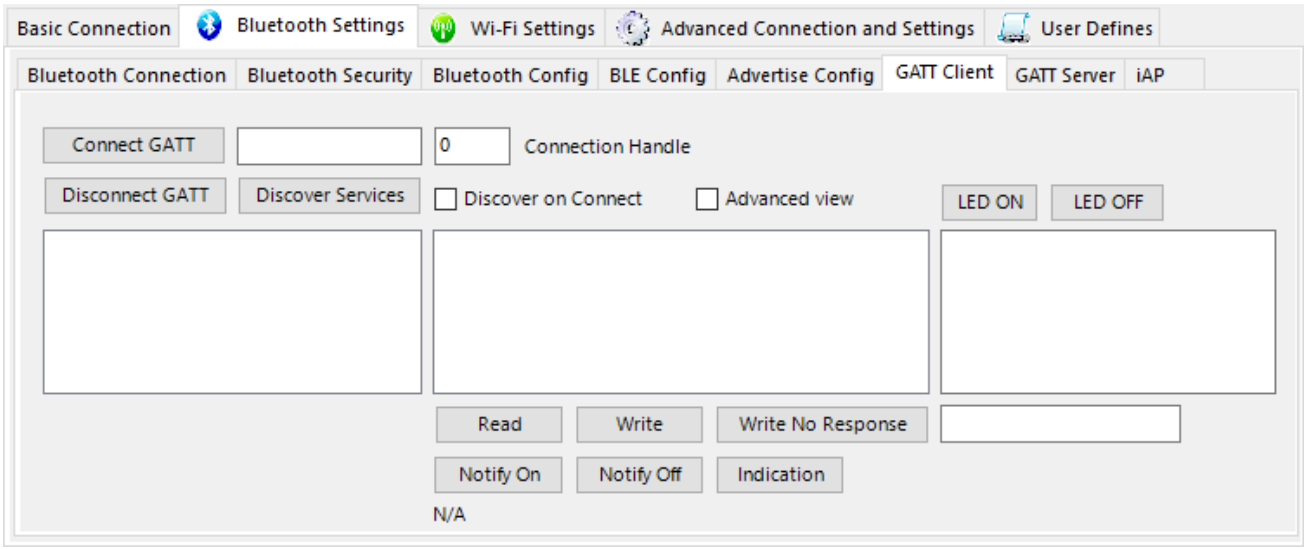

Figure 25: GATT Client (scaled to fit)

7.5 Console Window

The console window shown in Figure 26 allows you to enter raw AT commands to the module and view the response. The console window also echoes the responses 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.

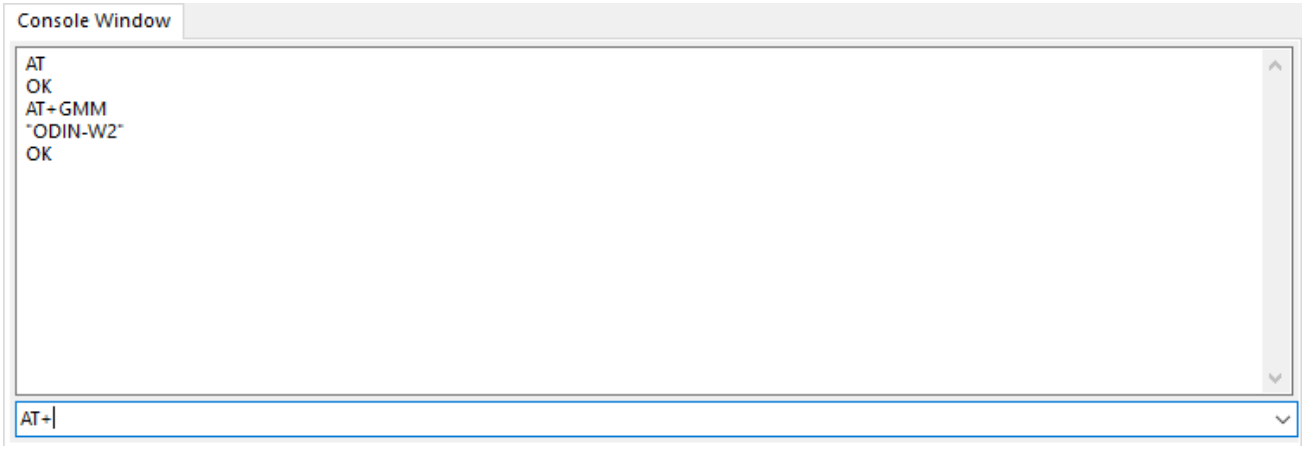

Figure 26: Console Window (scaled to fit)

7.6 User Defines

Figure 27 shows the **User Defines** tab. From here you can 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.

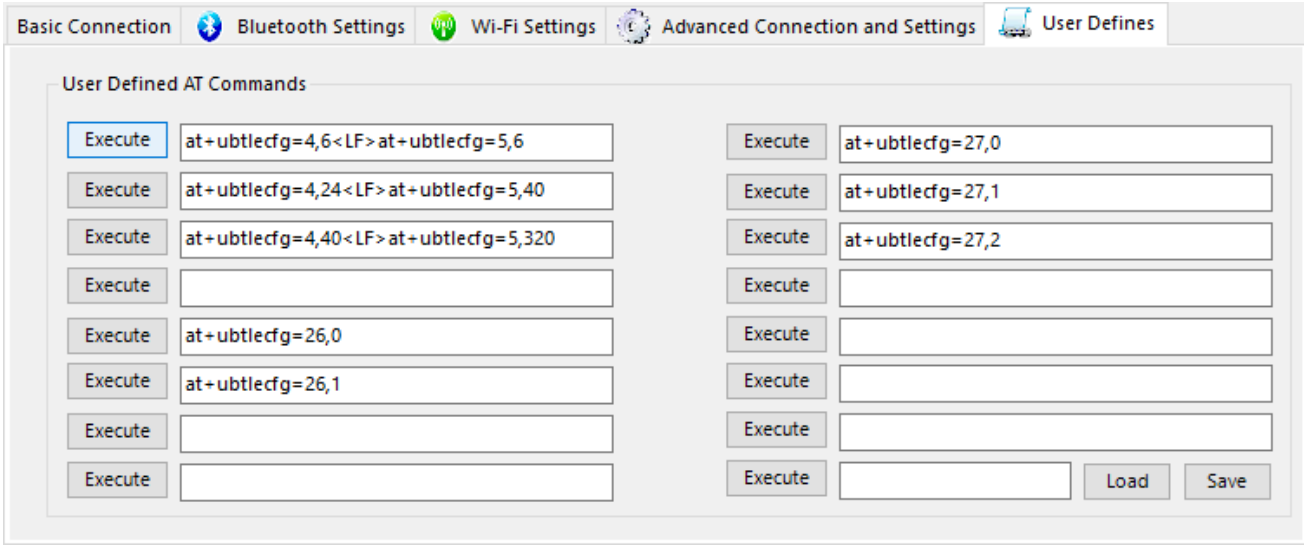

Figure 27: User defines (scaled to fit)

7.7 GPIO

Allows you to configure the GPIO pins of the modules. As shown in Figure 28, 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 regardless of whether pull resistors are used. 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 module, as mentioned in the corresponding module documentation.

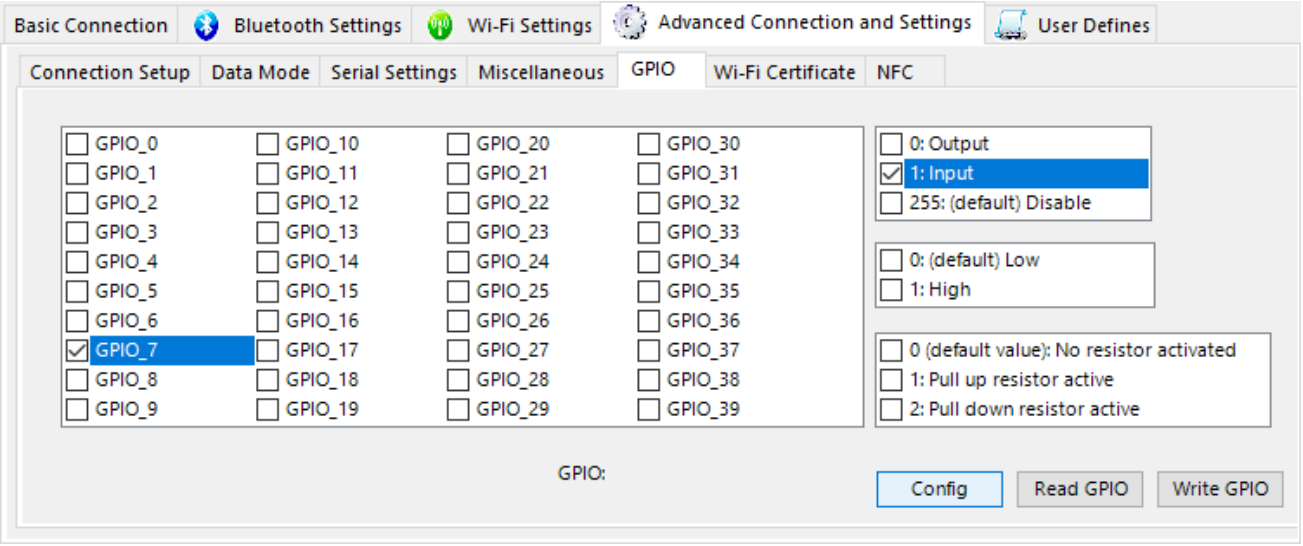

Figure 28: GPIO configuration (scaled to fit)

7.8 Wi-Fi Certificate

The **Wi-Fi certificate** tab allows you to upload and view certificates and keys for use with Wi-Fi station, as shown in Figure 29.

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

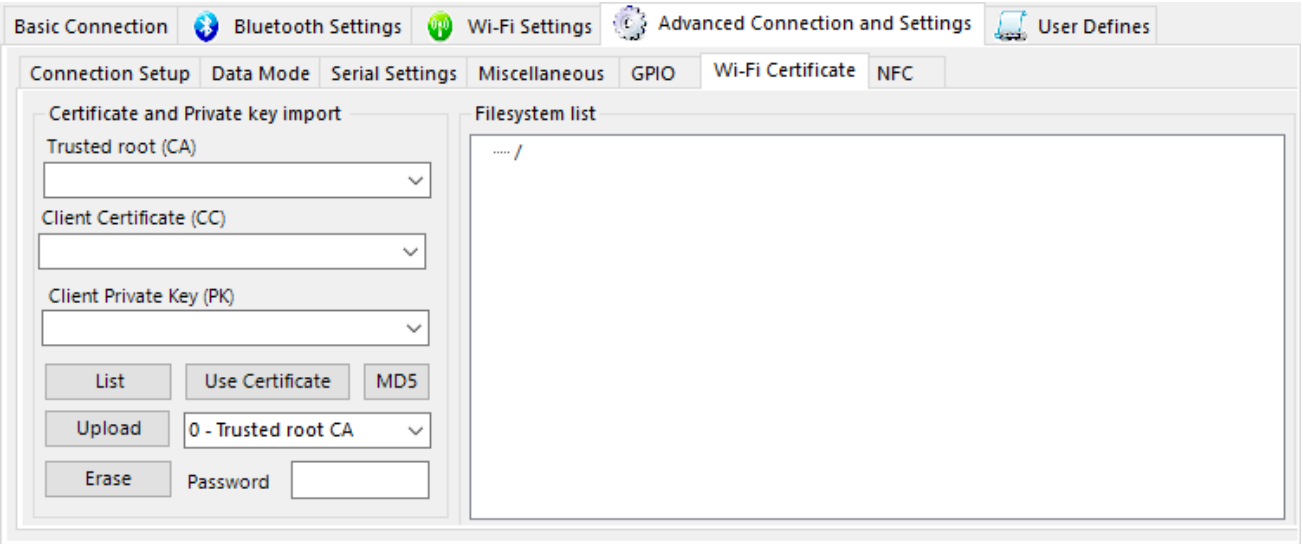

Figure 29: Wi-Fi certificate tab (scaled to fit)

7.9 NFC

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

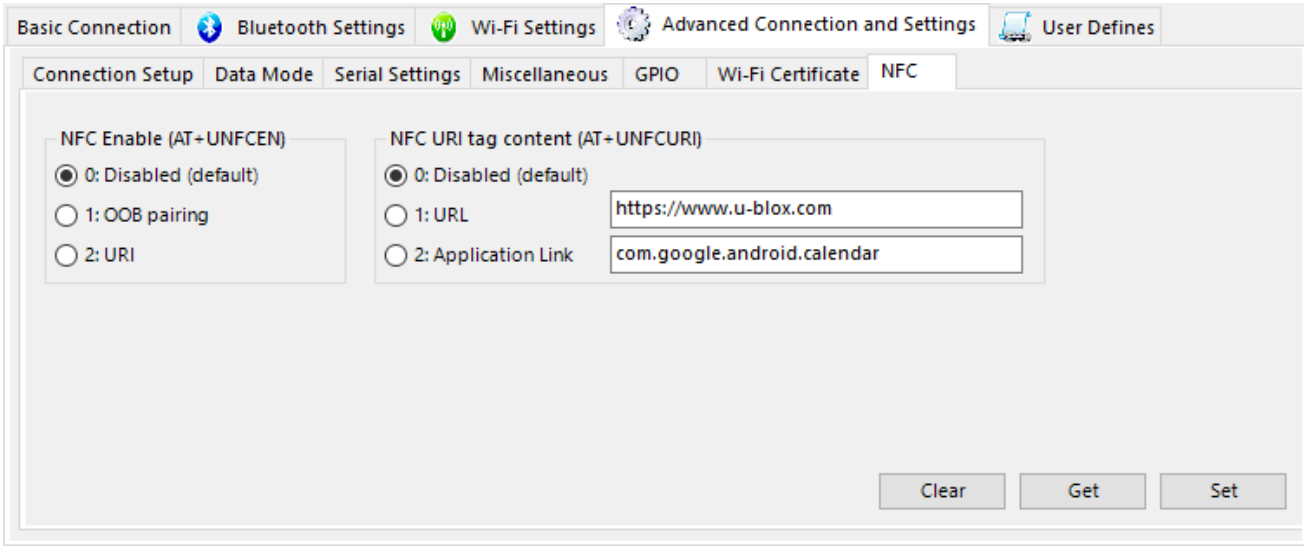

Figure 30: NFC (scaled to fit)

7.10 Bluetooth PAN

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

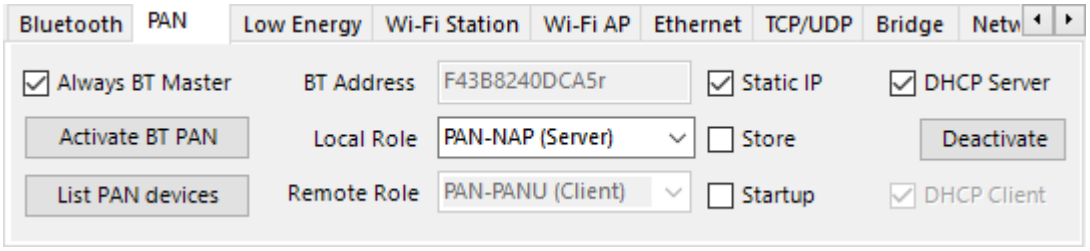

Figure 31: PAN settings

7.11 Ethernet

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

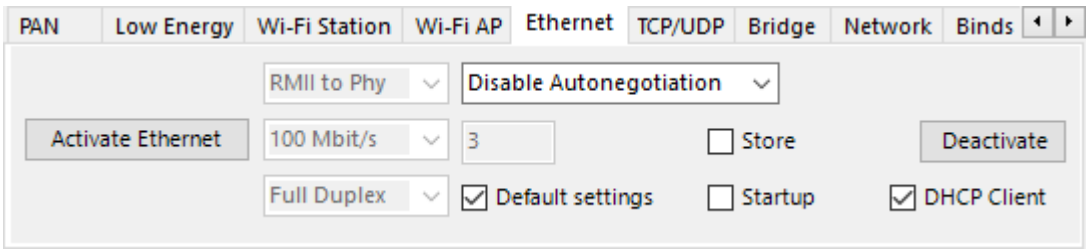

Figure 32: Ethernet settings and connection

7.12 Bridge

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

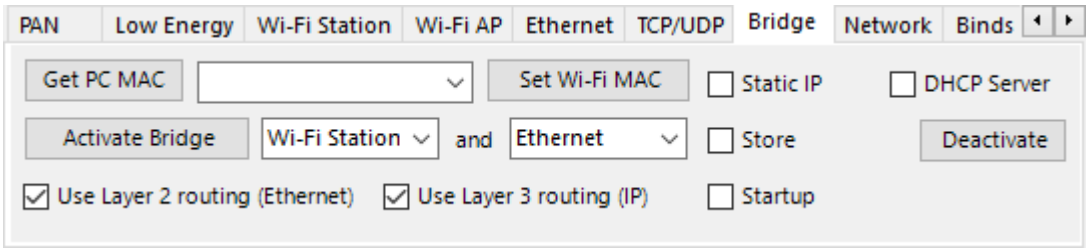

Figure 33: Bridge settings

7.13 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).

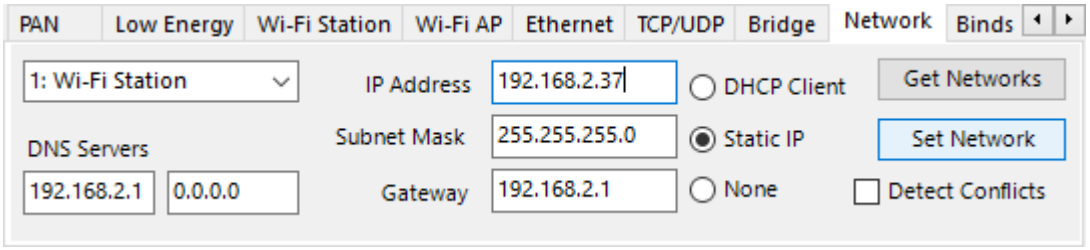

Figure 34: Network settings

7.14 Bind Streams

The **Bind Streams** option (as shown in Figure 35) 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 displayed in the left drop-down list to the channel in the drop-down list prior to the Bind Channels button.

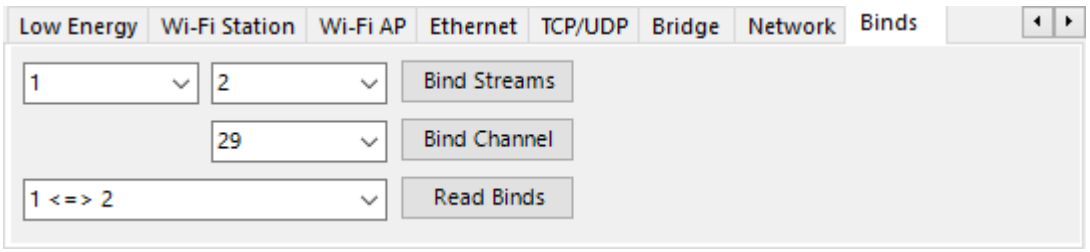

Figure 35: Bindings

For more information about streams and channels refer to the u-connectXpress user guide [4].

7.15 MQTT

Figure 36 shows the MQTT form that allows you to establish contact to an MQTT broker. The placeholder text tells you what each field does. If any field is left blank it is simply not included in the connection request.

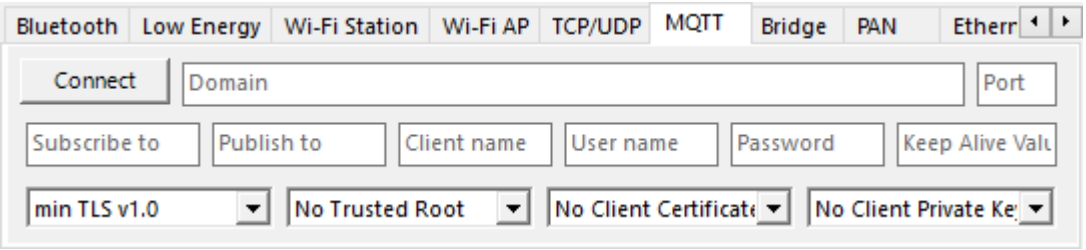

Figure 36: MQTT form

7.16 EDM

In addition to Command (AT) Mode and Data Mode, the modules can also be placed in Extended Data Mode (EDM) which acts as sort of simultaneous AT and Data mode. In EDM mode, the commands and data must be packed in special packets and tagged with type.

Figure 37 shows the button to enter EDM, or if the module is already in EDM sets s-center accordingly. In EDM, s-center attempts to seamlessly handle the packages so the user can use s-center as normal. In EDM, you can send data to specific channels (peers) and s-center allows you to select this when it is applicable.

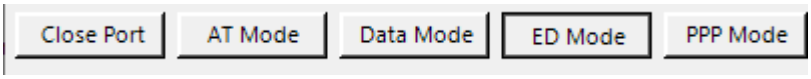

Figure 37: EDM button highlighted

7.17 HTTP

The **HTTP** tab can be seen in Figure 38. In the very basic use case of fetching for example a webpage it is enough to enter the address and select **Go**. A few options are available, such as changing the fetch method to ignore HTTP message 300 (redirects) and attaching content with the request – either as plain text or from a local file.

Figure 39 shows a request in flight. The request is indicated by the message at the bottom of the tab window, as shown in Figure 39 . Any error is also reported here. After receiving a successful response, it is displayed in a new window, as shown in Figure 40. Here you can view the response headers and, if the response body is text based and sufficiently small, a preview. The response body is held entirely in memory, but only if the window remains open and can be saved permanently to file.

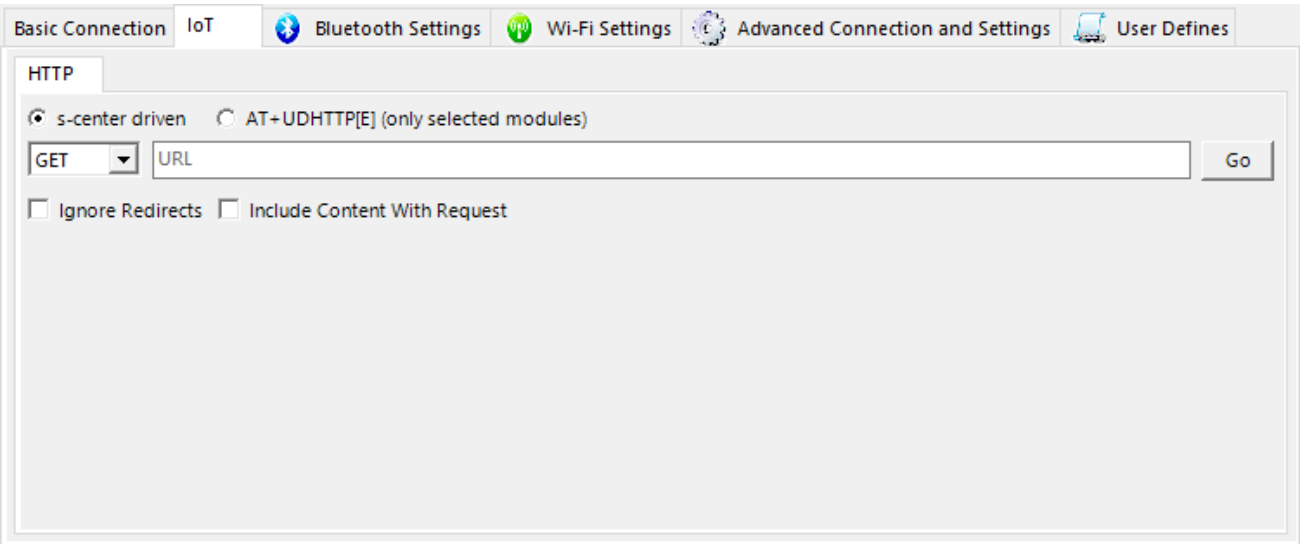

Figure 38: HTTP tab shown

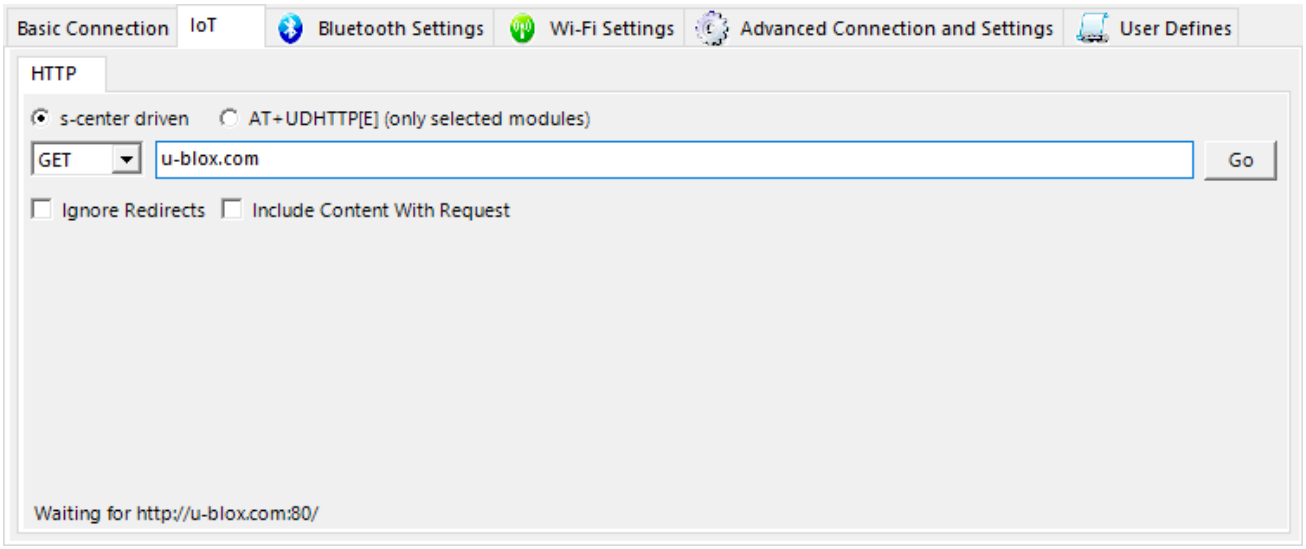

Figure 39: Request sent, waiting for response

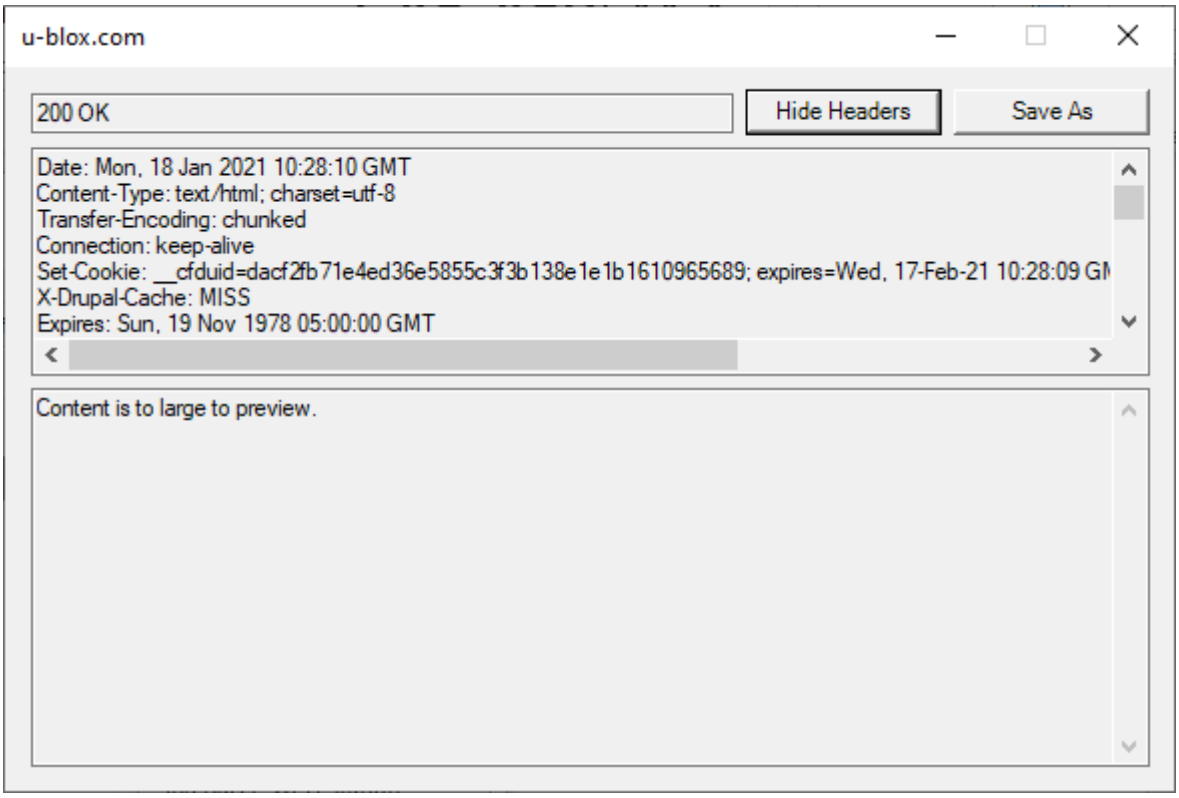

Figure 40: Response received and shown in a new window

Appendix

A Glossary

Abbreviation	Definition
ACL	Asynchronous Connection-Less
DHCP	Dynamic Host Configuration Protocol
EDM	Extended Data Mode
GATT	Generic Attribute
GPIO	General Purpose Input Output
HTTP	Hyper Text Transfer Protocol
IP	Internet Protocol
MD5	A hash function
MQTT	Message Queueing Telemetry Transport
NFC	Near-Field Communication
PAN	Personal Area Network
SSID	Service Set Identifier
SPP	Serial Port Profile
SPS	Serial Port Service
TCP	Transmission Control Protocol
URI	Uniform Resource Identifier
WPA2	Wi-Fi Protected Access II

Related documents

[1] u-connectXpress low energy serial port service, protocol specification, UBX-16011192
[2] u-connectXpress AT commands manual, UBX-14044127
[3] u-blox extended data mode, protocol specification, UBX-14044126
[4] u-connectXpress user guide, UBX-16024251

☞ For product change notifications and regular updates of u-blox documentation, register on our website, 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.
R03	18-Nov-2020	togr	Added MQTT, EDM
R04	19-Mar-2021	togr	Added HTTP

Contact

For complete contact information, visit us at www.u-blox.com.

u-blox Offices

North, Central and South America

u-blox America, Inc.

Phone: +1 703 483 3180
E-mail: info_us@u-blox.com

Regional Office West Coast:

Phone: +1 408 573 3640
E-mail: info_us@u-blox.com

Technical Support:

Phone: +1 703 483 3185
E-mail: support@u-blox.com

Headquarters
Europe, Middle East, Africa

u-blox AG

Phone: +41 44 722 74 44
E-mail: info@u-blox.com
Support: support@u-blox.com

Asia, Australia, Pacific

u-blox Singapore Pte. Ltd.

Phone: +65 6734 3811
E-mail: info_ap@u-blox.com
Support: support_ap@u-blox.com

Regional Office Australia:

Phone: +61 2 8448 2016
E-mail: info_anz@u-blox.com
Support: support_ap@u-blox.com

Regional Office China (Beijing):

Phone: +86 10 68 133 545
E-mail: info_cn@u-blox.com
Support: support_cn@u-blox.com

Regional Office China (Chongqing):

Phone: +86 23 6815 1588
E-mail: info_cn@u-blox.com
Support: support_cn@u-blox.com

Regional Office China (Shanghai):

Phone: +86 21 6090 4832
E-mail: info_cn@u-blox.com
Support: support_cn@u-blox.com

Regional Office China (Shenzhen):

Phone: +86 755 8627 1083
E-mail: info_cn@u-blox.com
Support: support_cn@u-blox.com

Regional Office India:

Phone: +91 80 405 092 00
E-mail: info_in@u-blox.com
Support: support_in@u-blox.com

Regional Office Japan (Osaka):

Phone: +81 6 6941 3660
E-mail: info_jp@u-blox.com
Support: support_jp@u-blox.com

Regional Office Japan (Tokyo):

Phone: +81 3 5775 3850
E-mail: info_jp@u-blox.com
Support: support_jp@u-blox.com

Regional Office Korea:

Phone: +82 2 542 0861
E-mail: info_kr@u-blox.com
Support: support_kr@u-blox.com

Regional Office Taiwan:

Phone: +886 2 2657 1090
E-mail: info_tw@u-blox.com
Support: support_tw@u-blox.com