ADRASTEA COMMANDER

REFERENCE MANUAL

VERSION 1.0.0

APRIL 19, 2022

Revision history

Manual version	SW version	Notes	Date
1.0.0	1.0.0	• Initial release	April 2021

Abbreviations and abstract

Abbreviation	Name	Description
COM	Communication port	serial port interface
GNSS	Global navigation satellite system	The general term for systems like GPS
GPIO	General general-purpose input/output	
GPS	Global Positioning System	GNSS developed by United States
GUI	Graphical User Interface	
IDE	Integrated Development Environment	Tools to write and compile software
IoT	Internet of things	
LTE	Long Term Evolution	Communication standard for mobile phones and devices
NMEA	National Marine Electronics Association	NMEA specification is used in GNSS
SIM	Subscriber identification module	
SNR	Signal-to-noise ration	An indicator used in GNSS
UART	universal asynchronous receiver-transmitter	Serial communication

Contents

1 Overview

The Adrastea Commander is a simple PC tool to interact with the EV-Boards of the Würth Elektronik eiSos cellular module using the UART interface. It allows:

- Taking into operation of the EV-board

- Evaluation of module capabilities and features

- Getting familiar with module AT protocol

- Configuration of the module without knowledge of the protocols

1.1 Supported cellular modules

The following cellular products are supported:

- Adrastea-I (2615011136000)

- Adrastea-I Evaluation Board (2615129230001)

1.2 System requirements

1.2.1 Supported operating systems

The following operating systems are supported:

- Windows 10, 32/64 bit

- Windows 8, 32/64 bit

- Windows 7, 32/64 bit

1.2.2 .NET Framework

Version 4.8 or later of the Microsoft .NET framework is required to use Adrastea Commander. Install this package if you receive a corresponding error message when starting the program.

1.2.3 Internet connection

Adrastea Commander works mostly offline. An internet connection is only required to follow links present in the software, e.g. links to manuals or related websites. Normal operation can be done without internet connection of any sort.

2 Installation

Adrastea Commander is provided in the form of a compressed zip file. To use Adrastea Commander extract the zip files to a directory of your choice. The new folder will contain the following files:

- AdrasteaCommander.exe
- CommandList.xml
- QuickSelection.xml

No further actions are required for installation. However, the serial-to-USB FTDI converter chip (for example, FT232R) on the evaluation platform or USB dongles requires special drivers to be installed for proper operation. To use USB dongles or evaluation boards of Würth Elektronik eiSos wireless connectivity modules, the Virtual COM Port (VCP) drivers have to be installed by following the "Installation Guides" of FTDI found under:
https://www.ftdichip.com/Drivers/VCP.htm

> ! It is recommended to restart the PC after installation of the drivers.

> ! Adrastea Commander creates folders and writes log files during operation. Please make sure that the directory has the necessary permission.

2.1 Connect the EV-Board

After the FTDI VCP drivers installation the EV-Board can be connected to the PC via USB cable. This will make 4 COM ports available from which 3 are used by the module. Adrastea Commander is meant to be used with UART0.

UART	Description	Default baud rate
UART0	Application UART	115200
UART1	FW LOG	921600
UART2	bootloader	115200

Table 1: Adrastea COM ports

Please refer to the EV-Board user manual for detailed information.

3 Deinstallation

Adrastea Commander can be uninstalled by simply deleting the directories and files that have been created during operation and installation. Adrastea Commander operates only in the folder it was extracted to. No changes are made to the registry.

4 Operation

4.1 Starting the program

The program can be started by double-clicking the "AdrasteaCommander.exe" extracted earlier during the installation. Right after start up the application view will be shown.
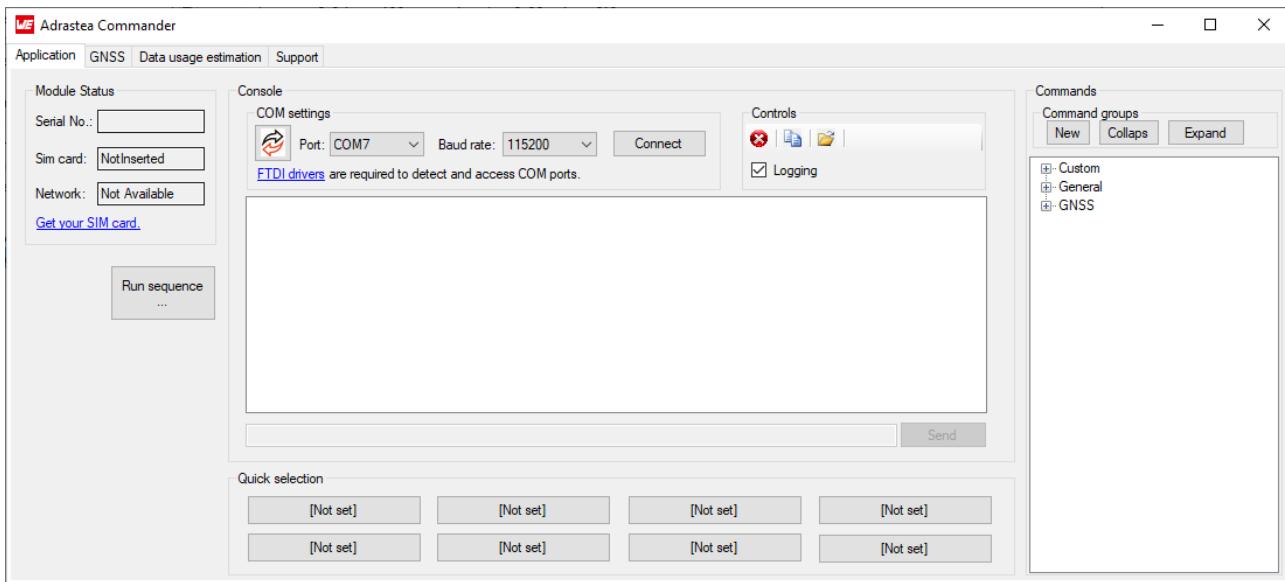

Figure 1: Adrastea Commander after start up

4.2 Connect/Disconnect

To open the communication with the module:

1. Refresh com ports by clicking the refresh button to the left.

2. Select the port from the drop-down list.

3. Select the baud rate from the drop-down list.

4. Click the "Connect" button.
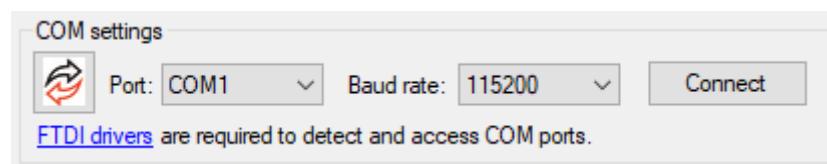
Figure 2: Com settings

The default baud rate of the modules is 115200 baud.

If the selected baud rate does not match the configured module baud rate, communication is not possible. If baud rate setting has been changed in previous module operation, last configured baud rate has to be chosen on the PC-tool.

After connection, the text of the button will change to "Disconnect". Press this button to close the COM port and stop the communication with the module. If connection with the module is stopped successfully message flow stops in the navigation view.

4.3 Console

The console view shows the commands sent to and output received from the Adrastea-I module. Commands can be typed in the text field and sent by clicking on the "Send"-button or by pressing the "Return"-key.

When sending a command via the console, the command is saved in the history during runtime. Use arrow-up and arrow-down keys to scroll through the history. Commands sent via quick selection or command list are not added to the console history.
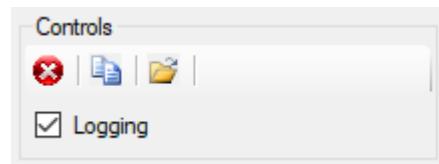

Figure 3: Buttons to clear or copy content of console and to open the log file

The console controls can be used to clear and copy the content of the console and to open the log file. "Copy" will copy only the selected lines into the clipboard. Multiple lines can be

selected while holding "Ctrl"-key pressed.

The current log file can be opened in the default editor. Logging can be enabled and disabled using the checkbox "Logging". The log file is saved in the installation folder of the Adrastea Commander.

4.4 Module status

Module status contains basic information about the Adrastea-I module. Once the UART connection is open, the information is polled automatically. Network information is updated constantly with the reception of a +cereg event. For more information about the +cereg command, see Adrastea-I AT commands manual chapter 6.1 "+CEREG: EPS Network Registration Status".
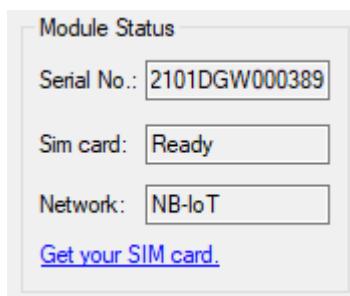
Figure 4: Module status

Field name	Description	Possible values
Serial No.	Serial number of the module	
Sim card	Status of the SIM card	• Not inserted • Ready
Network	Status of the cellular network	• Not available • Searching... • Available

Table 2: Description of the status group

4.5 Quick selection

The quick selection allows to send commands with a mouse click. The command will be shown as text on the button. When hovering over the button with the mouse, the description is shown as an overlay. The command can be sent by clicking the respective button.
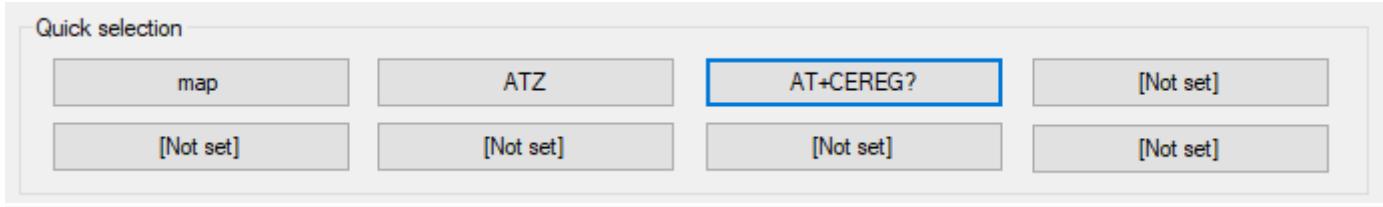
Figure 5: Quick selection for commands

With a right-click the context menu is opened to edit the entries. Commands are saved in the file QuickSelection.xml in the installation directory upon closing the application.
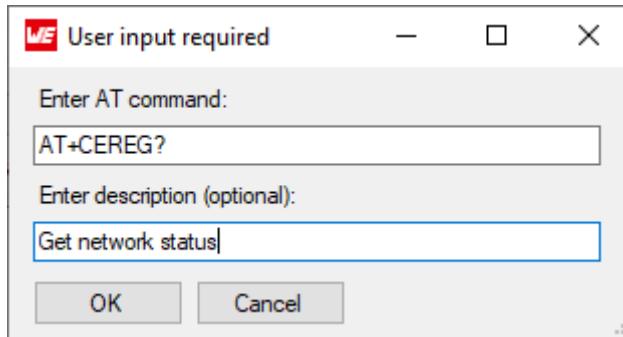

Figure 6: Edit or add a new command including tooltip

4.6 Command list

The command list offers the same function as the quick selection but is not limited in size. Additionally command are organized in groups.
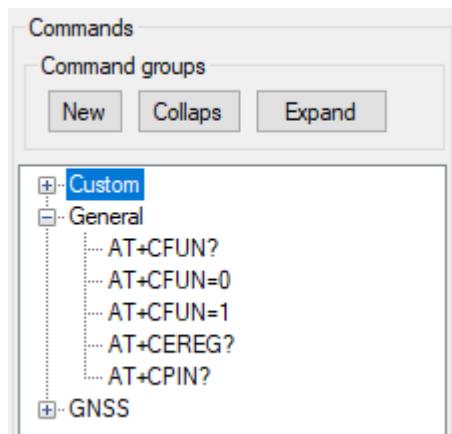
Figure 7: Quick selection for commands

The command will be shown as text and can be sent by double-clicking on it. When hovering over the button with the mouse, the description is shown as an overlay.
A new group can be created by clicking on the "New"-Button. To add a new command to a group, open the context menu via right-click and add a new command. All groups can be expanded or collapsed with the respective buttons.
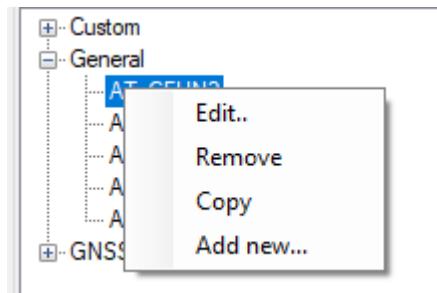
Figure 8: Context menu to edit a group

Commands are saved in the file CommandList.xml in the installation directory upon closing the application.

4.7 Run command sequence

It is possible to define a sequence of commands which is then sent with a button click. A new window will be opened when clicking on the "Run sequence..."-button. Each line is sent one after another with a fixed delay of 100ms between, so each line shall contain one command. The current sequence can be saved in a text file and be loaded for later use.
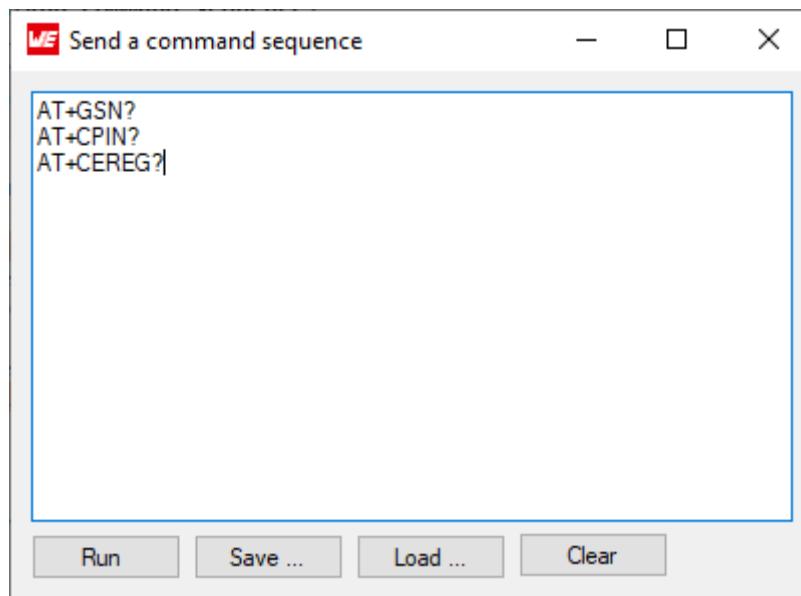
Figure 9: Run, Save or Load a command sequence

4.8 GNSS

The GNSS and cellular functionality can not be used simultaniously.

In addition to the cellular technology the Adrastea-I module supports the GNSS technologies GPS and GLONASS. To use the GNSS feature the following AT commands have to be performed after each restart:

1. AT+CFUN=0 (disable cellular)

2. AT%IGNSSCFG="SET","NMEA","GGA","GSA","GSV","GNS","RMC" (enable required NMEA messages)

3. AT%IGNSSEV="NMEA",1 (enable NMEA message output)

4. AT%IGNSSACT=1,1 (enable GNSS - cold start)

4.8.1 Navigation View

The navigation view prints the received messages relevant for the navigation and shows the collected information like

- fix status
- position
- velocity
- date and time

The parsed messages allow faster understanding of the information delivered by the module. The raw messages can be used to become familiar with the communication protocols used by the Adrastea-I module.
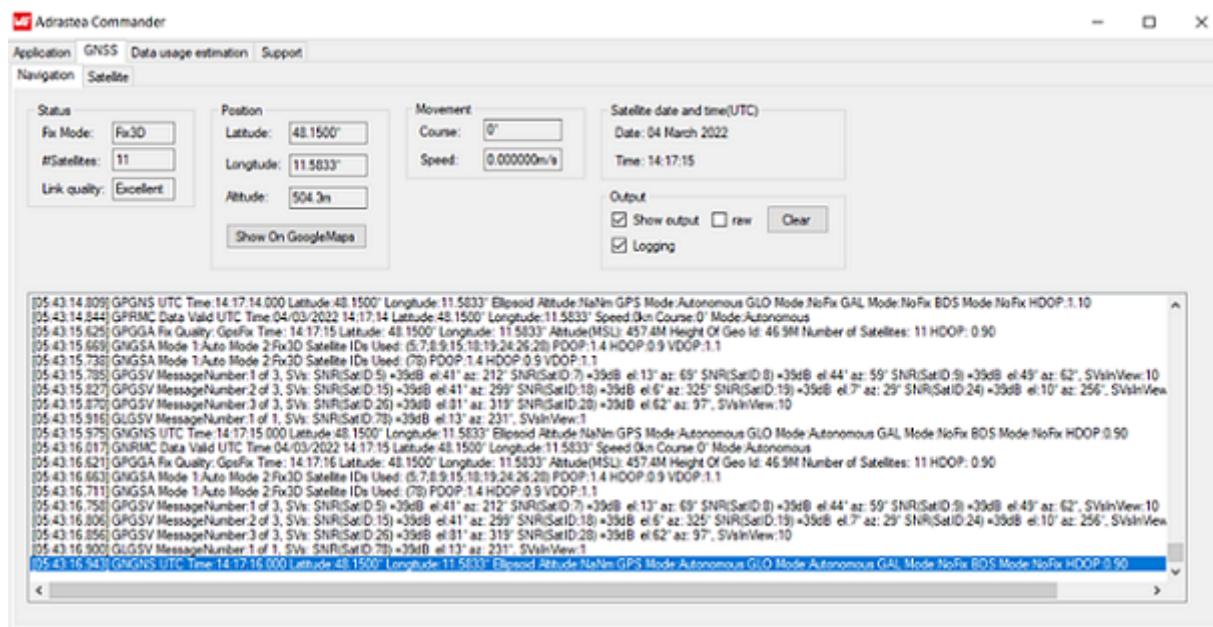
Figure 10: Navigation view when a fix is acquired

4.8.1.1 Status

Status contains general information about the position fix and the quality of the link with the GNSS satellites. Data is extracted from NMEA message GSA. If these messages are deactivated, this part of the GUI will not be updated anymore.
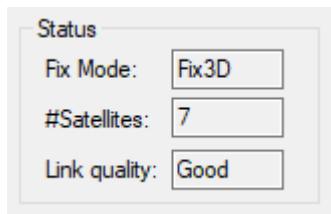
Figure 11: Status group of navigation view

Field name	Description	Possible values
Fix mode	Shows current fix mode	• No fix • Fix2D • Fix3D
#Satellites	Number of satellites used for fix	• No fix • number ≥ 0
Link quality	Quality of the link with GNSS satellites. Shows dilution of precision (DOP) when hovering over with mouse. Based on the PDOP as stated in brackets to the right.	• No fix • Ideal (1) • Excellent (1-2) • Good (2-5) • Moderate (5-10) • Bad (> 10)

Table 3: Description of the status group

4.8.1.2 Position

Position contains the values describing the position of the receiver. By clicking the button "Show on GoogleMaps" the link is created using the received longitude and latitude and opened in the internet browser. This requires internet connection.
Data is extracted from NMEA messages GGA, GNS, GLL and RMC. If these messages are deactivated, this part of the GUI will not be updated anymore.
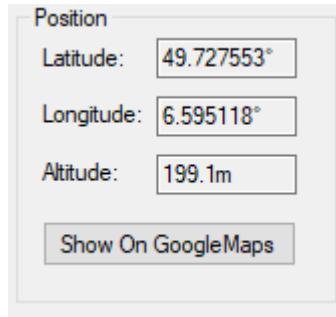
Figure 12: Position group of navigation view

Field name	Description	Possible values
Latitude	Shows current latitude in degree. Negative value southwards, positive value northwards	(-90)° to 90°
Longitude	Shows current longitude in degree. Negative value westwards, positive value eastwards	(-180)° to 180°
Altitude	Shows current altitude in meter based on WGS-84 ellipsoid	

Table 4: Description of position group

4.8.1.3 Movement

In the movement group course and speed are shown. This allows to determine the direction and velocity of the receiver. Data is extracted from NMEA messages VTG and RMC. If these messages are deactivated, this part of the GUI will not be updated anymore.
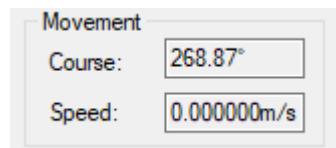

Figure 13: Movement group of navigation view

Field name	Description	Possible values
Course	0° and 360° represent true north	0° to 360°
Speed	Current speed in m/s	

Table 5: Description of the movement group

4.8.1.4 Date and Time

In this area the date and UTC-time are shown. The format of the date is "weekday, month day, year" whereas weekday and month are written out. Time is based on a 12 hour system and AM or PM is given. Data is extracted from NMEA messages ZDA and RMC. If these messages are deactivated, this part of the GUI will not be updated anymore.
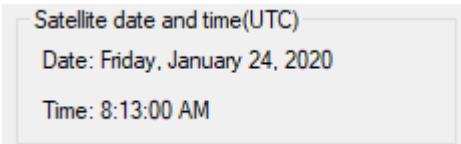
Figure 14: Time and date group of navigation view

4.8.1.5 Output

The output controls allow to change the display of the received messages. By toggeling the "Show output" checkbox, the output of the messages can be enabled or disabled. Disabling the output of the messages can be helpful when analyzing message history.
Messages can be shown or logged just as received by the module
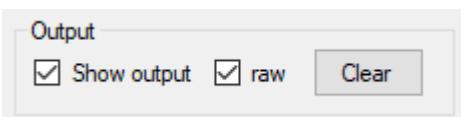
Figure 15: Show/Log messages as received by module

or parsed and interpreted.
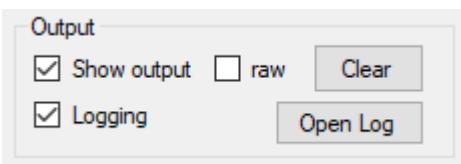
Figure 16: Show/Log messages parsed and interpreted

By default the GNSS messages will be logged to a file. The messaged will be logged as shown in the navigation message view, so either interpreted or as raw NMEA messages. Logging can be controlled with the "Logging"-checkbox. These control options only change the behaviour of the GUI. The module is not affected by the changes. With the "Clear" button the received messages are cleared in the log field. The log file is not affected.

4.8.2 Satellite View

The satellite view shows information about the satellites in view and in use. The information is shown both in a table view and in a sky view. Satellites disappear from the table and view once they are not in sight anymore. Data is extracted from NMEA message GSV. If these messages are deactivated, this part of the GUI will not be updated anymore.
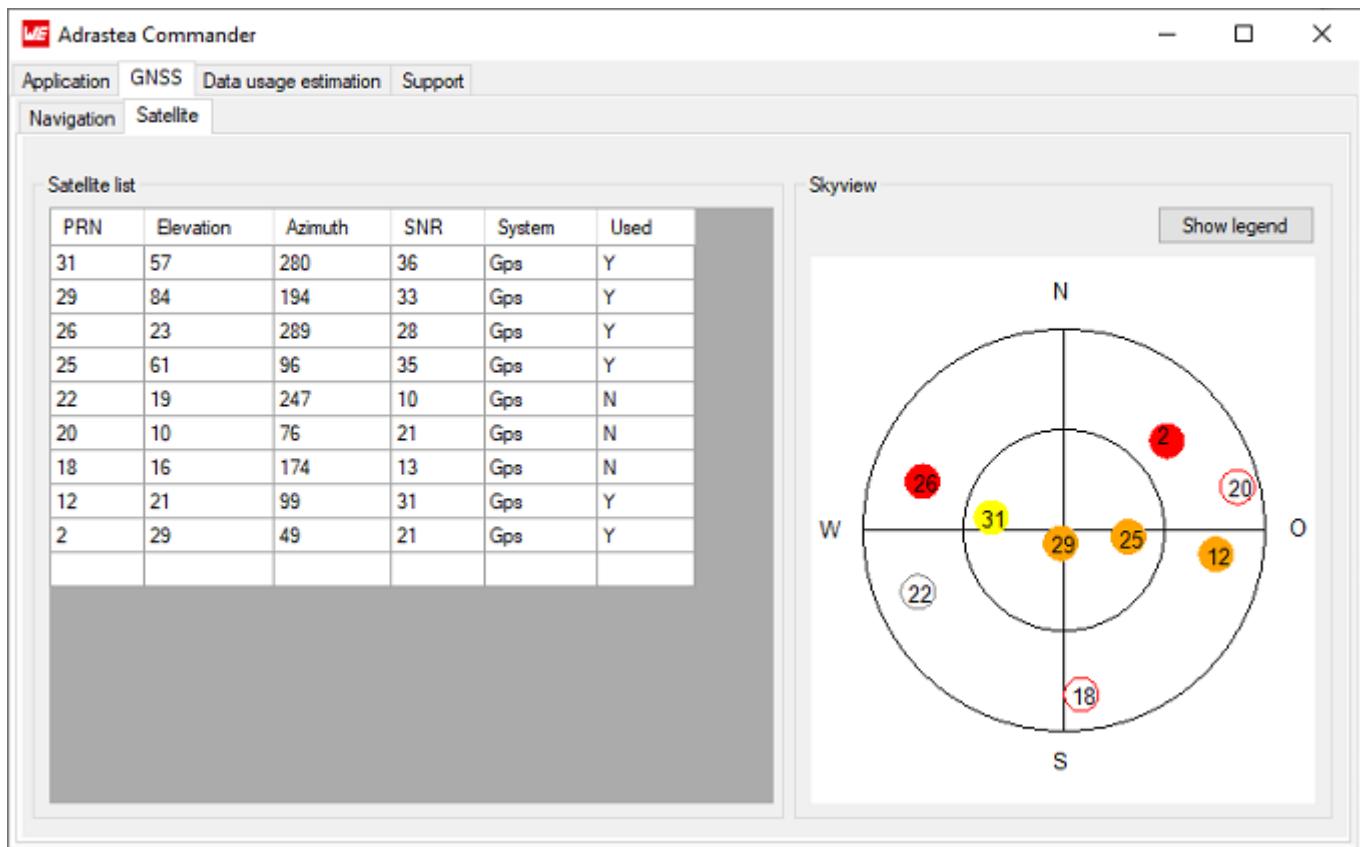

Figure 17: Satellite view when a fix is aquired

4.8.2.1 Table

The table contains the information about the satellites in readable form. The columns can be sorted by clicking on the header row.

Figure 18: Information about satellite in view shown as table

Field name	Description
PRN	Pseudo Random Noise. Unique for every satellite. Is used as ID.
Elevation	The angle above the horizon. An angle of 90° represents the zenith.
Azimuth	The angle between the north vector and the satellites' vector on the horizontal plane.
SNR	Signal-to-noise ratio. Indicator for signal strength. The higher SNR the better the signal.
System	GNSS the satellite belongs to.
Used	Indicates if the satellite is used for the fix. "Y" indicates used for fix.

Table 6: Description of satellite table

4.8.2.2 Skyview

All modules in view are shown on the sky view. The outer line represents the horizon while the centre represents the zenith.
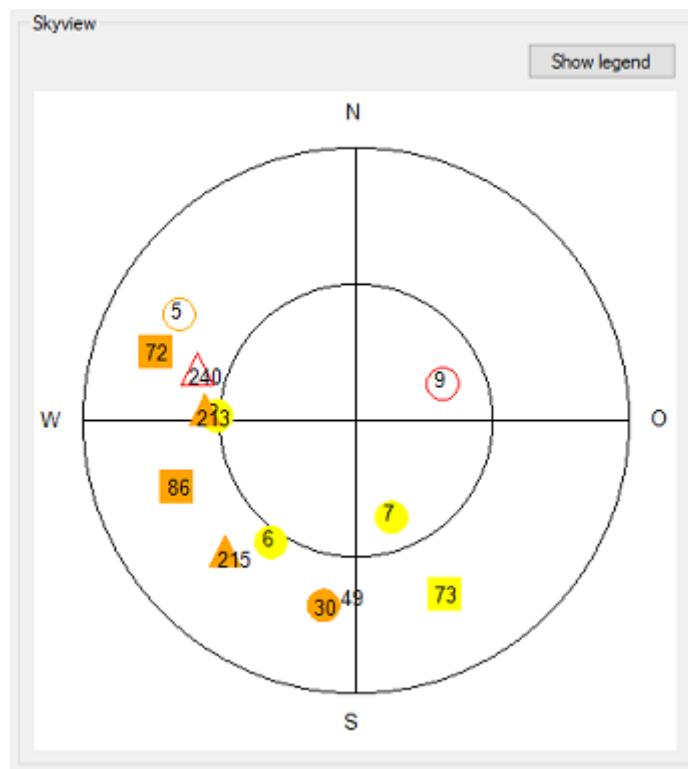
Figure 19: Satellites in view shown as skyview

If a satellite is used for the fix the figure is filled out. Otherwise only the outer lining is drawn. The PRN of the satellite is written within the symbol for identification. The colour indicates the signal strength. The representation for the satellites is as follows:
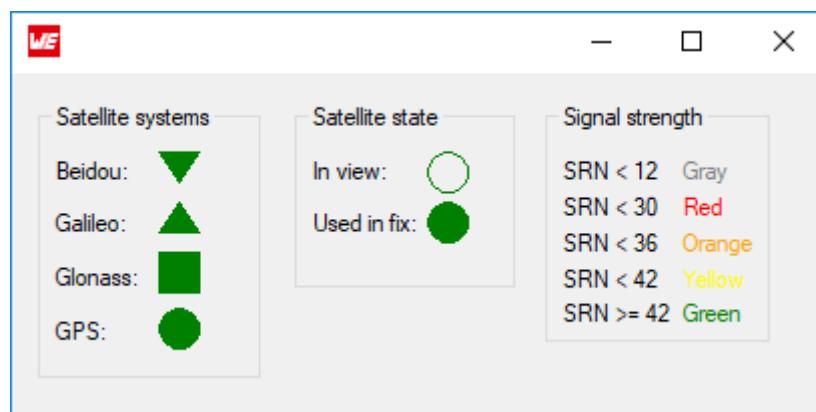
Figure 20: Legend of satellite representation

4.9 Log file

NMEA messages are logged according to the current protocol, update rate and message rates. Start and end of the log file correspond to the start and end of the communication with the module (Connect button, see section ...). Log files can be used to analyze message history and evaluate module behaviour. The navigation messages will be logged as defined in the GUI as mentioned in chapter 4.8.1.5.

The log files can be found in the "logFiles" folder next to the executable of Adrastea Commander.

4.10 Data usage Estimation

LTE-NB-IoT and LTE-Cat.M both require a SIM-card and connectivity provider (e.g. Deutsche Telekom)to be usable in an application. As providers have different plans with various data limits the data usage estimation can be used to get an idea how much data is required for the application.
The estimation to the right is automatically updated when new data is entered to the left.
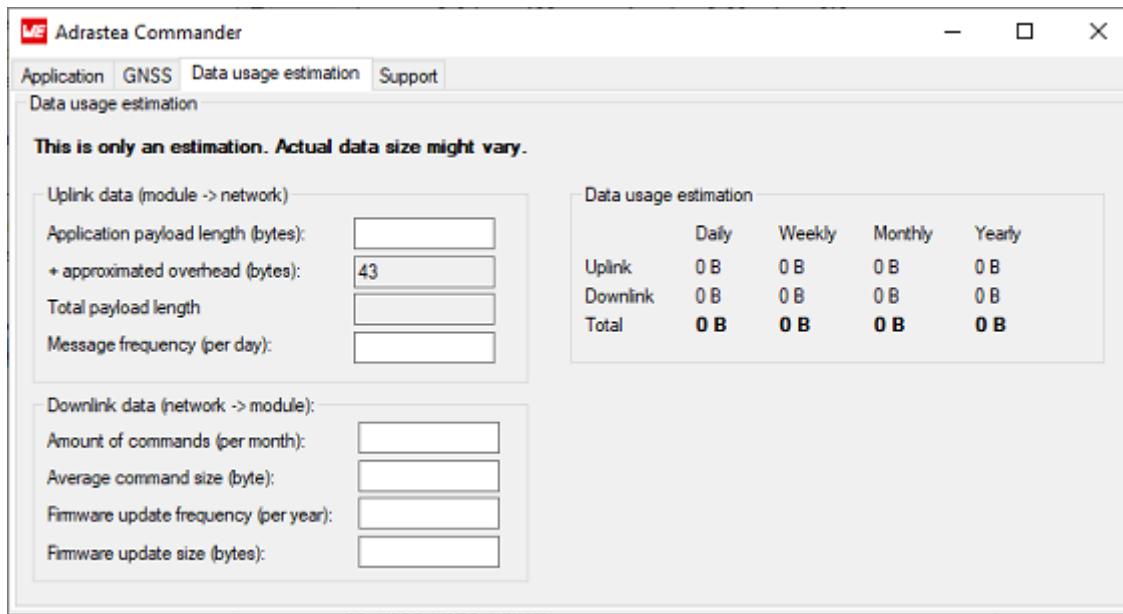
Figure 21: Estimate data usage of an application

4.11 Support

In the last tab contains information about the software and links to further information about the modules like:

- Product site
- Manual of the supported modules
- Support

We appreciate any feedback about our software tool Adrastea Commander. Please use to link below to sent an email with your improvement, ideas or general feedback: wireless-sales@we-online.com

5 Software history

Version 1.0.0 "Release"

- First released version of the tool.

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Würth Elektronik eiSos' products with the incorporated Firmware are not authorized for use in safety-critical applications, or where a failure of the product is reasonably expected to cause severe personal injury or death. Moreover, Würth Elektronik eiSos' products with the incorporated Firmware are neither designed nor intended for use in areas such as military, aerospace, aviation, nuclear control, submarine, transportation (automotive control, train control, ship control), transportation signal, disaster prevention, medical, public information network etc. You shall inform Würth Elektronik eiSos about the intent of such usage before design-in stage. In certain customer applications requiring a very high level of safety and in which the malfunction or failure of an electronic component could endanger human life or

health, you must ensure to have all necessary expertise in the safety and regulatory ramifications of your applications. You acknowledge and agree that you are solely responsible for all legal, regulatory and safety-related requirements concerning your products and any use of Würth Elektronik eiSos' products with the incorporated Firmware in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by Würth Elektronik eiSos. YOU SHALL INDEMNIFY WÜRTH ELEKTRONIK EISOS AGAINST ANY DAMAGES ARISING OUT OF THE USE OF WÜRTH ELEKTRONIK EISOS' PRODUCTS WITH THE INCORPORATED FIRMWARE IN SUCH SAFETY-CRITICAL APPLICATIONS.

8.3 Ownership

The incorporated Firmware created by Würth Elektronik eiSos is and will remain the exclusive property of Würth Elektronik eiSos.

8.4 Firmware update(s)

You have the opportunity to request the current and actual Firmware for a bought wireless connectivity Product within the time of warranty. However, Würth Elektronik eiSos has no obligation to update a modules firmware in their production facilities, but can offer this as a service on request. The upload of firmware updates falls within your responsibility, e.g. via ACC or another software for firmware updates. Firmware updates will not be communicated automatically. It is within your responsibility to check the current version of a firmware in the latest version of the product manual on our website. The revision table in the product manual provides all necessary information about firmware updates. There is no right to be provided with binary files, so called "Firmware images", those could be flashed through JTAG, SWD, Spi-Bi-Wire, SPI or similar interfaces.

8.5 Disclaimer of warranty

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8.8 Severability clause

If a provision of this license terms is or becomes invalid, unenforceable or null and void, this shall not affect the remaining provisions of the terms. The parties shall replace any such provisions with new valid provisions that most closely approximate the purpose of the terms.

8.9 Miscellaneous

Würth Elektronik eiSos reserves the right at any time to change this terms at its own discretion. It is your responsibility to check at Würth Elektronik eiSos homepage for any updates. Your continued usage of the products will be deemed as the acceptance of the change.
We recommend you to be updated about the status of new firmware and software, which is available on our website or in our data sheet and manual, and to implement new software in your device where appropriate.
By ordering a wireless connectivity product, you accept this license terms in all terms.

List of Figures

List of Tables

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