

USER MANUAL

ADRASTEIA COMMANDER

VERSION 1.1.0

MAY 22, 2023

WÜRTH ELEKTRONIK MORE THAN YOU EXPECT

Revision history

Manual version	SW version	Notes	Date
1.0.0	1.0.0	<ul style="list-style-type: none">• Initial release	April 2021
1.1.0	1.0.0	<ul style="list-style-type: none">• New corporate design	May 2023

Abbreviations

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 ratio	An indicator used in GNSS
UART	Universal asynchronous receiver-transmitter	Serial communication

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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 3 of which 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.

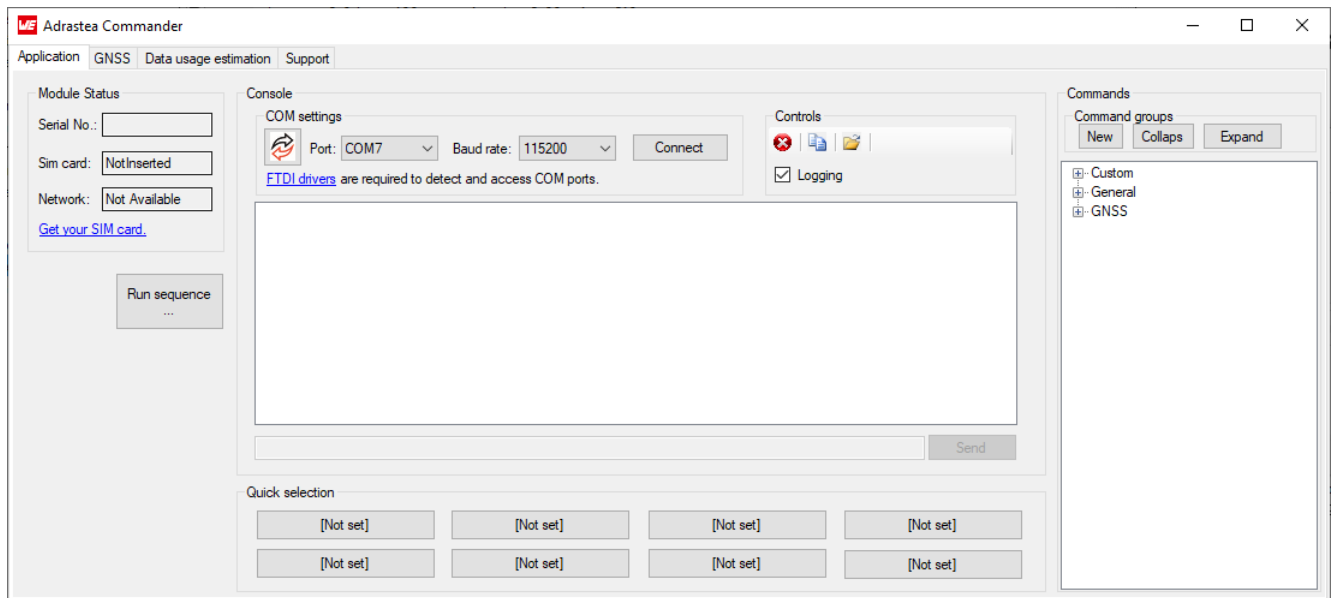


Figure 1: Adrastea Commander after start up

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.

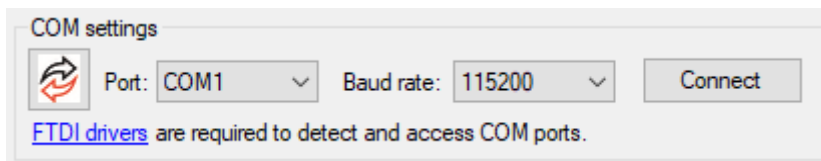


Figure 2: Com settings



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 the baud rate setting has been changed in previous module operation, the last configured baud rate has to be chosen in 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.

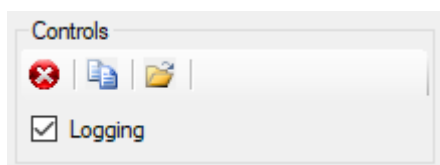


Figure 3: Buttons to clear or copy content of console and to open the log file

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".

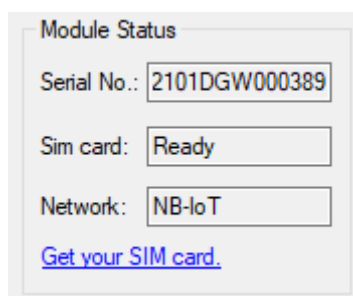


Figure 4: Module status

Field name	Description	Possible values
Serial No.	Serial number of the module	
Sim card	Status of the SIM card	<ul style="list-style-type: none"> • Not inserted • Ready
Network	Status of the cellular network	<ul style="list-style-type: none"> • 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.

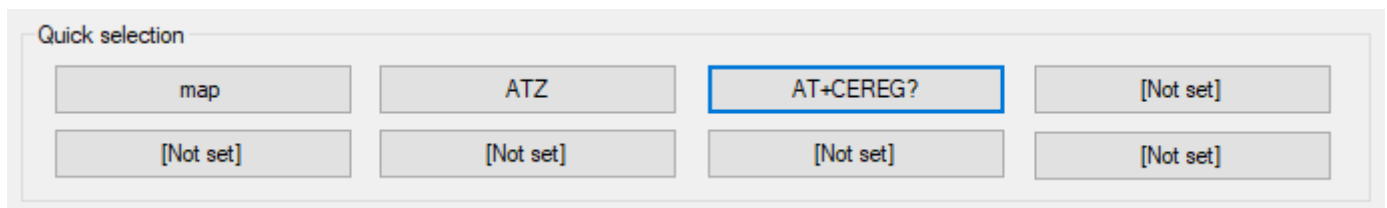


Figure 5: Quick selection for commands

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.

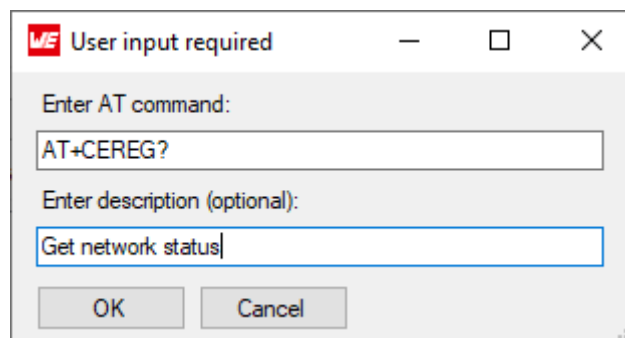


Figure 6: Edit or add a new command including tooltip

4.6 Command list

The command list offers the same function as the quick selection but is not limited in size. Additionally, commands are organized in groups.

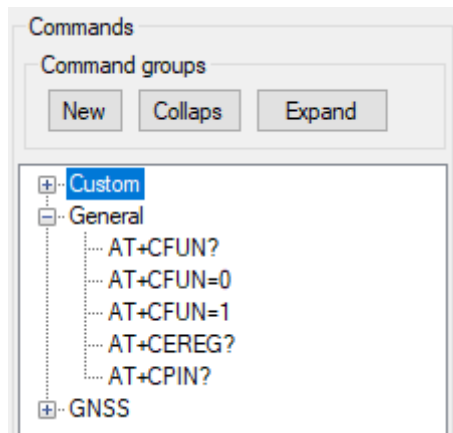


Figure 7: Quick selection for commands

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.

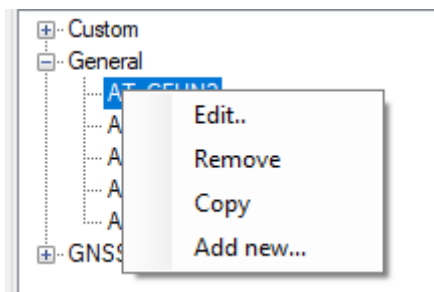


Figure 8: Context menu to edit a group

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.

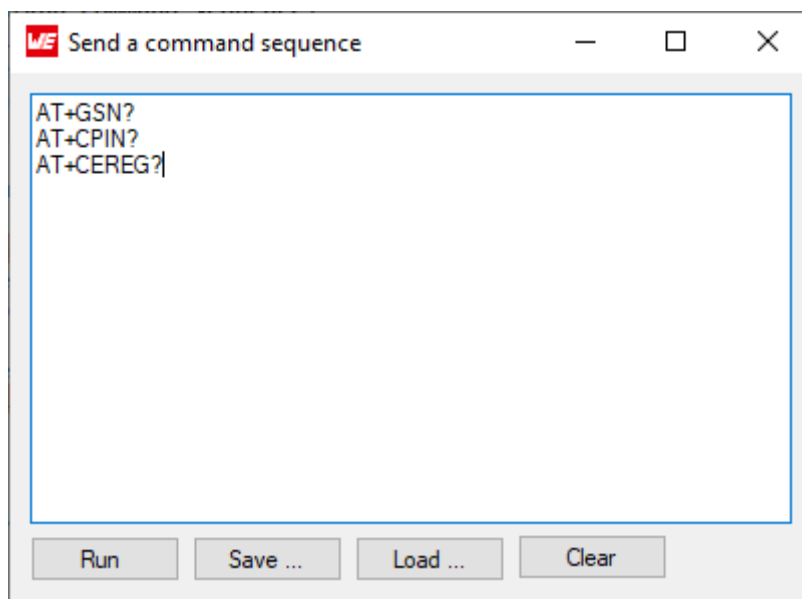


Figure 9: Run, Save or Load a command sequence

4.8 GNSS



The GNSS and cellular functionality can not be used simultaneously.

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.

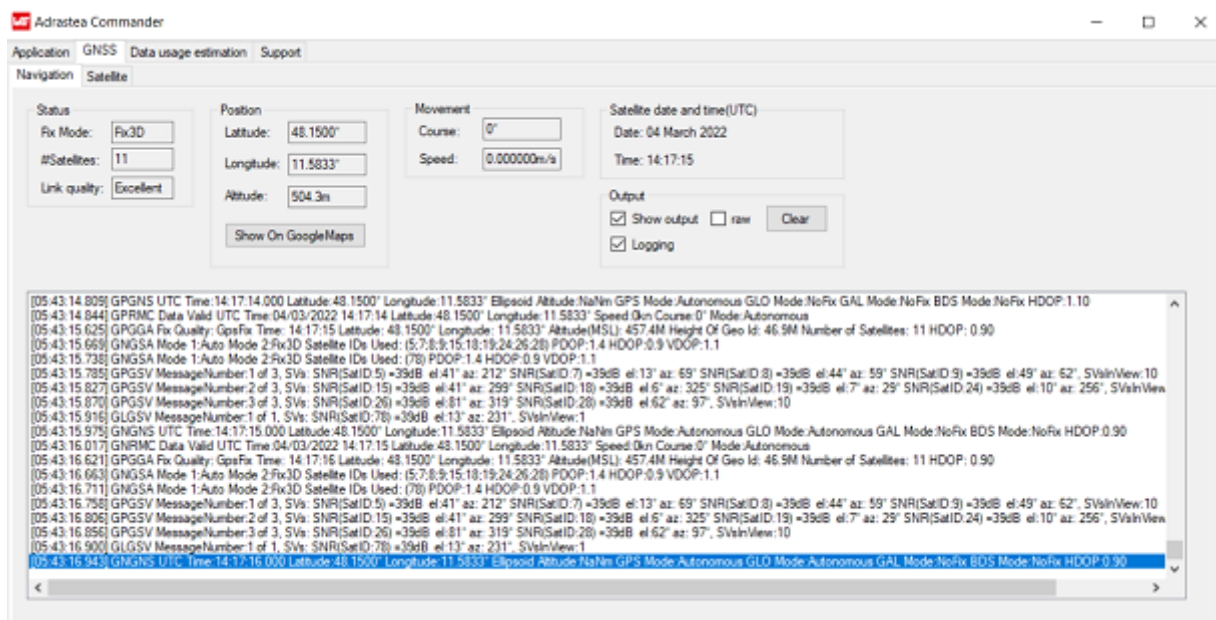


Figure 10: Navigation view when a fix is acquired

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.

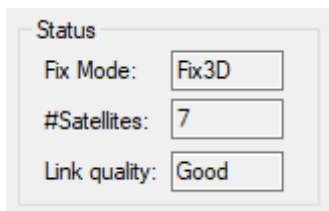


Figure 11: Status group of navigation view

Field name	Description	Possible values
Fix mode	Shows current fix mode	<ul style="list-style-type: none"> • No fix • Fix2D • Fix3D
#Satellites	Number of satellites used for fix	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • 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.

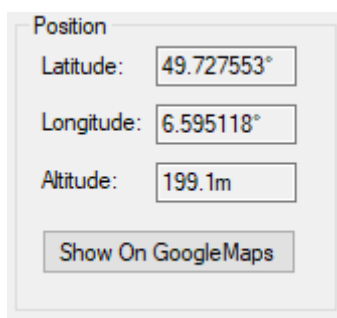


Figure 12: Position group of navigation view

Field name	Description	Possible values
Latitude	Shows current latitude in degrees. Negative value southwards, positive value northwards.	$(-90)^{\circ}$ to 90°
Longitude	Shows current longitude in degrees. Negative value westwards, positive value eastwards.	$(-180)^{\circ}$ to 180°
Altitude	Shows current altitude in meters 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.

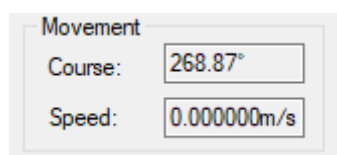


Figure 13: Movement group of navigation view

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" where 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.

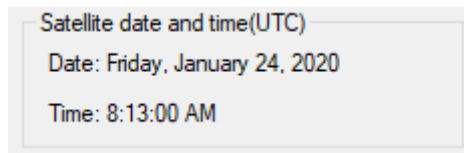


Figure 14: Time and date group of navigation view

4.8.1.5 Output

The output controls allow to change the display of the received messages. By toggling 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

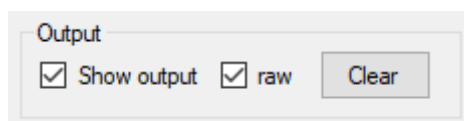


Figure 15: Show/Log messages as received by module

or parsed and interpreted.

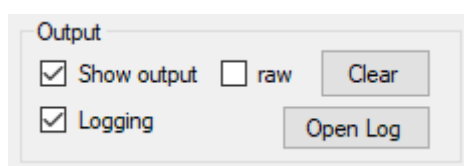


Figure 16: Show/Log messages parsed and interpreted

By default the GNSS messages will be logged to a file. The messages 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.

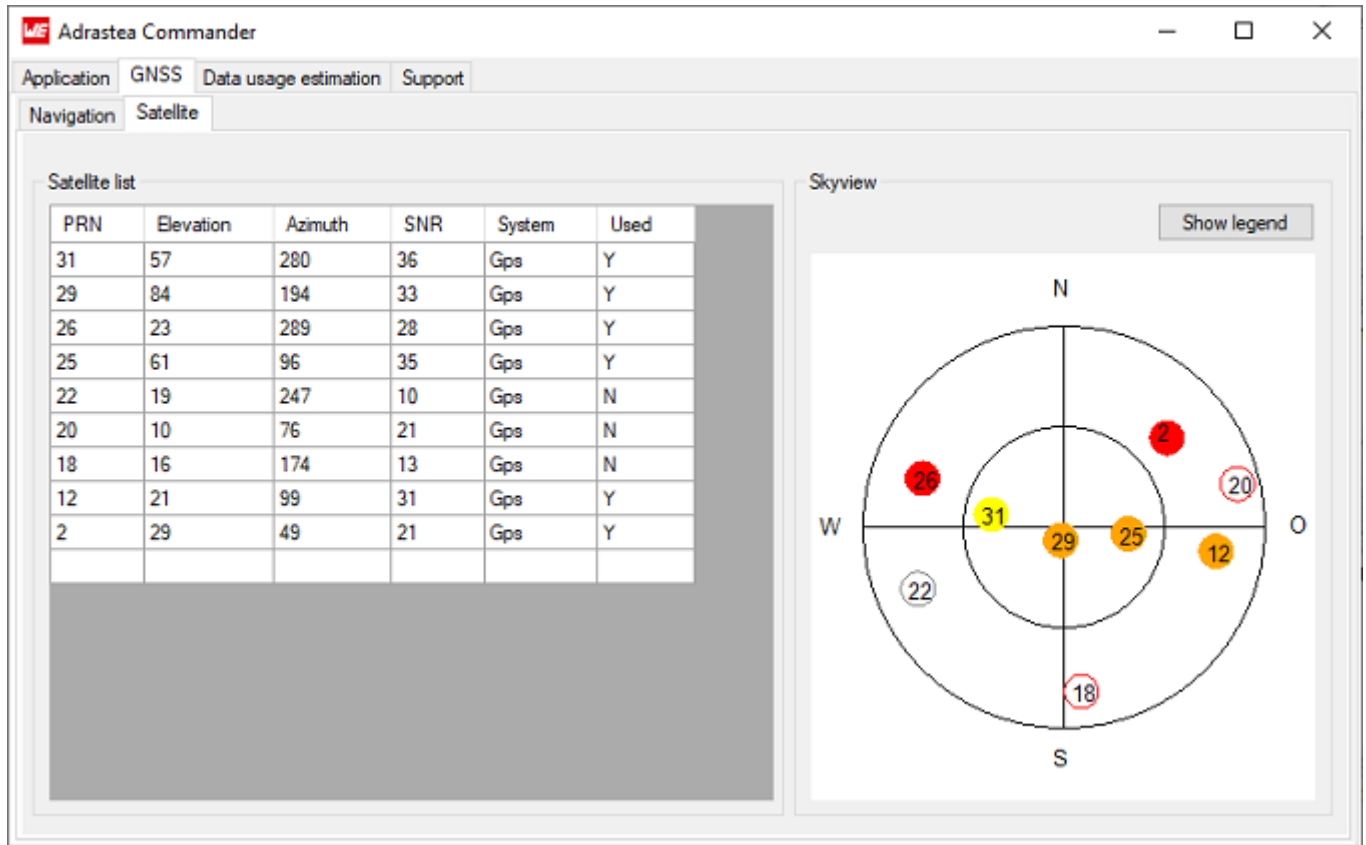


Figure 17: Satellite view when a fix is acquired

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.

PRN	Elevation	Azimuth	SNR	System	Used
9	59	67	25	Gps	N
5	22	301	33	Gps	N
30	28	190	35	Gps	Y
2	44	272	37	Gps	Y
7	56	160	37	Gps	Y
49	32	182	34	Waas	N
240	35	288	27	Galileo	N
213	40	274	31	Galileo	Y
215	29	225	33	Galileo	Y
72	20	289	33	Glonass	Y
86	27	250	34	Glonass	Y
73	26	153	38	Glonass	Y
6	41	215	41	Gps	Y

Figure 18: Information about satellites 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 the 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 Sky view

All modules in view are shown on the sky view. The outer line represents the horizon while the centre represents the zenith.

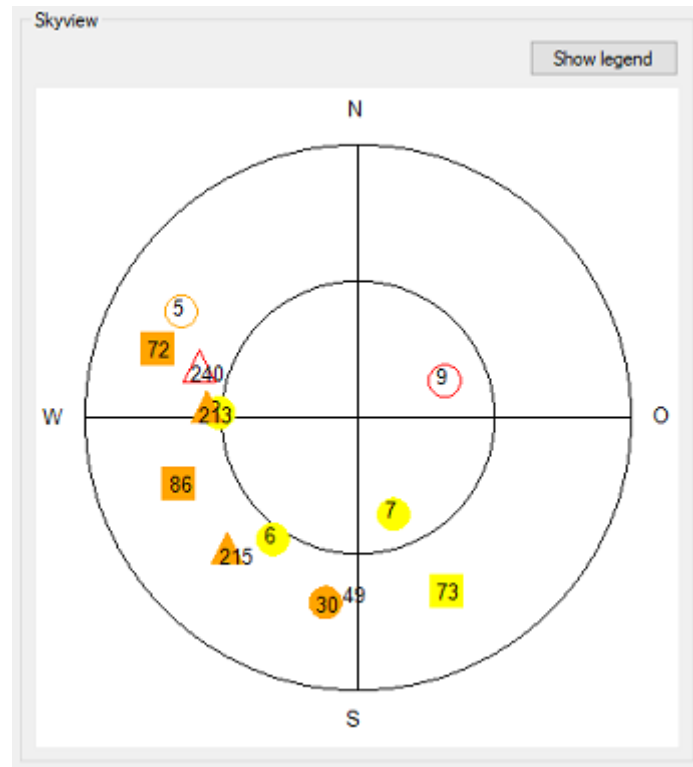


Figure 19: Satellites in view shown as skyview

If a satellite is used for the fix the figure is filled out. Otherwise only the contour 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:

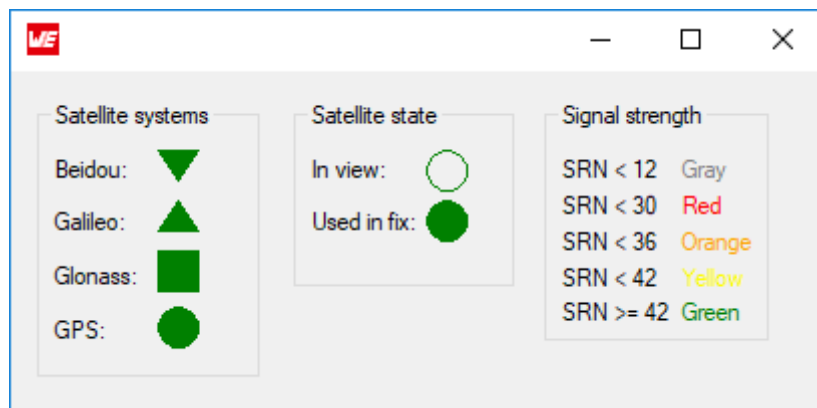


Figure 20: Legend of satellite representation

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 4.2). Log files can be used to analyze message history and

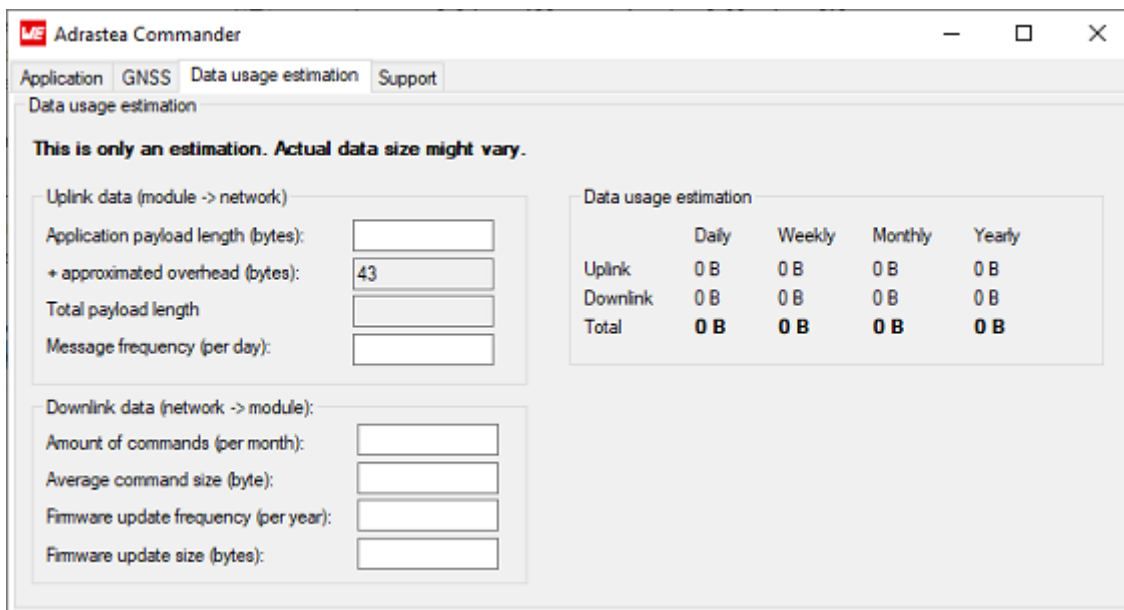
evaluate module behaviour. The navigation messages will be logged as defined in the GUI as mentioned in chapter 4.8.1.5.

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 of how much data is required for the application.

The estimation to the right is automatically updated when new data is entered to the left.



This is only an estimation. Actual data size might vary.

Uplink data (module -> network)

Application payload length (bytes):

+ approximated overhead (bytes):

Total payload length:

Message frequency (per day):

Downlink data (network -> module):

Amount of commands (per month):

Average command size (byte):

Firmware update frequency (per year):

Firmware update size (bytes):

Data usage estimation

	Daily	Weekly	Monthly	Yearly
Uplink	0 B	0 B	0 B	0 B
Downlink	0 B	0 B	0 B	0 B
Total	0 B	0 B	0 B	0 B

Figure 21: Estimate data usage of an application

4.11 Support

The last tab contains information about the software and links to further information about the modules such as:

- *Product site*
- *Manual of the supported modules*
- *Support*

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

5 Software history

Version 1.0.0 "Release"

- First released version of the tool.

6 Important notes

The following conditions apply to all goods within the wireless connectivity product range of Würth Elektronik eiSos GmbH & Co. KG:

6.1 General customer responsibility

Some goods within the product range of Würth Elektronik eiSos GmbH & Co. KG contain statements regarding general suitability for certain application areas. These statements about suitability are based on our knowledge and experience of typical requirements concerning the areas, serve as general guidance and cannot be estimated as binding statements about the suitability for a customer application. The responsibility for the applicability and use in a particular customer design is always solely within the authority of the customer. Due to this fact, it is up to the customer to evaluate, where appropriate to investigate and to decide whether the device with the specific product characteristics described in the product specification is valid and suitable for the respective customer application or not. Accordingly, the customer is cautioned to verify that the documentation is current before placing orders.

6.2 Customer responsibility related to specific, in particular safety-relevant applications

It has to be clearly pointed out that the possibility of a malfunction of electronic components or failure before the end of the usual lifetime cannot be completely eliminated in the current state of the art, even if the products are operated within the range of the specifications. The same statement is valid for all software sourcecode and firmware parts contained in or used with or for products in the wireless connectivity and sensor product range of Würth Elektronik eiSos GmbH & Co. KG. In certain customer applications requiring a high level of safety and especially in customer applications in which the malfunction or failure of an electronic component could endanger human life or health, it must be ensured by most advanced technological aid of suitable design of the customer application that no injury or damage is caused to third parties in the event of malfunction or failure of an electronic component.

6.3 Best care and attention

Any product-specific data sheets, manuals, application notes, PCN's, warnings and cautions must be strictly observed in the most recent versions and matching to the products firmware revisions. This documents can be downloaded from the product specific sections on the wireless connectivity homepage.

6.4 Customer support for product specifications

Some products within the product range may contain substances, which are subject to restrictions in certain jurisdictions in order to serve specific technical requirements. Necessary information is available on request. In this case, the field sales engineer or the internal sales person in charge should be contacted who will be happy to support in this matter.

6.5 Product improvements

Due to constant product improvement, product specifications may change from time to time. As a standard reporting procedure of the Product Change Notification (PCN) according to the JEDEC-Standard, we inform about major changes. In case of further queries regarding the PCN, the field sales engineer, the internal sales person or the technical support team in charge should be contacted. The basic responsibility of the customer as per section 6.1 and 6.2 remains unaffected. All wireless connectivity module driver software "wireless connectivity SDK" and its source codes as well as all PC software tools are not subject to the Product Change Notification information process.

6.6 Product life cycle

Due to technical progress and economical evaluation we also reserve the right to discontinue production and delivery of products. As a standard reporting procedure of the Product Termination Notification (PTN) according to the JEDEC-Standard we will inform at an early stage about inevitable product discontinuance. According to this, we cannot ensure that all products within our product range will always be available. Therefore, it needs to be verified with the field sales engineer or the internal sales person in charge about the current product availability expectancy before or when the product for application design-in disposal is considered. The approach named above does not apply in the case of individual agreements deviating from the foregoing for customer-specific products.

6.7 Property rights

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6.8 General terms and conditions

Unless otherwise agreed in individual contracts, all orders are subject to the current version of the "General Terms and Conditions of Würth Elektronik eiSos Group", last version available at www.we-online.com.

7 Legal notice

7.1 Exclusion of liability

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