SIEMENS

SIMATIC RTLS

Localization systems

SIMATIC RTLS Network Configuration

Application manual

08/2019

C79000-G8976-C531-02

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We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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1 Overview

1.1 Audience and scope

This manual outlines the operation of the application “Network Configuration” client of the Locating Manager.

1.2 Network Configuration

The application “Network Configuration” can be utilized to add, manage or delete Gateways, Anchors or transponders to/of the localization system. Furthermore, these devices can be pooled into groups. Additionally, “Network Configuration” offers a plethora of options regarding settings and management. These options are listed in 3.1.

1.3 Program start-up

Start “Network Configuration”’ (NWConfig.exe) under “Start > SIMATIC RTLS Locating Manager > Network Configuration”.

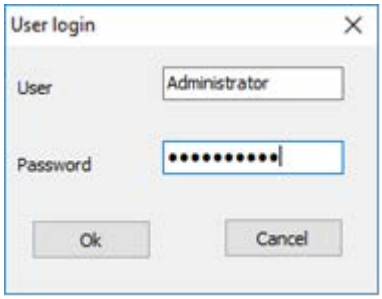
1.4 Drop-down menu options

1.4.1 Connect and disconnect

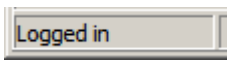
After starting the program, establish a connection to the Locating Manager by pressing the

icon. All devices (Gateways, Anchors and transponders) set up will be displayed thereafter. Alternatively, the connection can be established via the drop-down menu (“File > Connect”).

By default, the password "RTLS-LM_74" is specified for login as "Administrator". You can create additional users with the "User Configuration" client.



The status bar at the bottom left of the GUI displays the connection status.



The connection icon will switch to

as soon as a connection has been established, thus confirms the connection. The red icon

signals the lack of a connection.

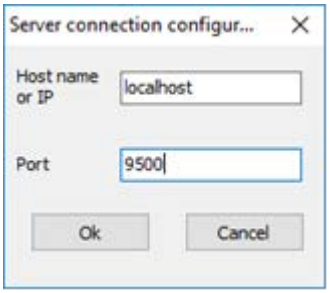
An error message will be displayed after approximately 20 seconds in case the client failed to connect to the Locating Manager server. The connection icon switches back to

, the status bar will read

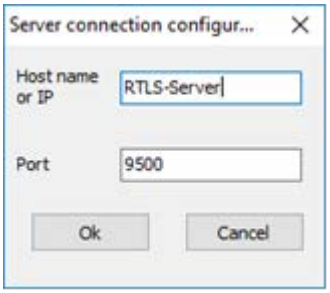
. A list of various error messages is attached to this document.

1.4.2 Connection settings

Insofar as no valid connection to the Locating Manager has been set, enter the connection parameters accordingly. The default host name is “localhost”, the default port is “9500”. The host name is the name of the server within the network the Locating Manager server is installed onto. These settings can be altered within the drop-down menu under “Options > Connection” at any time.



Provided that the Locating Manager server has been installed on the same computer as the user configuration, “localhost” can be set as “Host name or IP”. Otherwise, enter the Locating Manager server’s network name or the IP address.



Notice

Ensure that communication between the Locating Manager server, the infrastructure and the current client is not blocked by a firewall or incorrect configuration on the local network.

1.4.3 Change password

The current (logged in) user's password can be changed under "Options > Change password…".

Notice

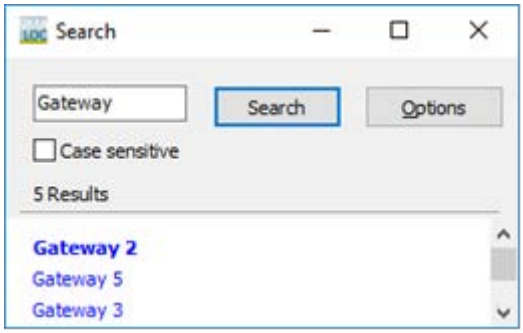
The password is valid for access of this user to all clients within the Locating Manager.

1.4.4 Language

The language settings of the GUI can be switched from German to English and vice versa under "Options > Language".

1.4.5 Search

It is possible to search for any term in the log window using the drop-down menu option "Options > Search". Messages that are to be searched must be loaded.

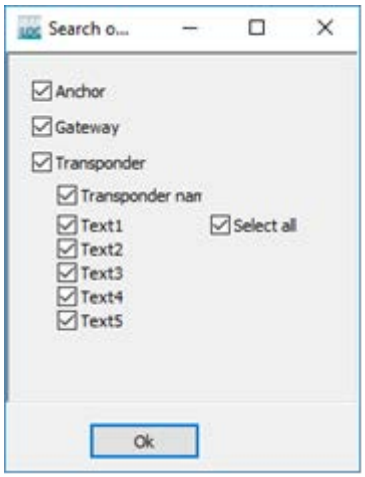


In case of distinct search results, the found device will be highlighted in the main window (hierarchic structure) immediately. The result marked in the search result window will be highlighted in the main window should there be more than one search result. Using the F3 key, you can switch from one result to the next.

1.4.6 Search Options

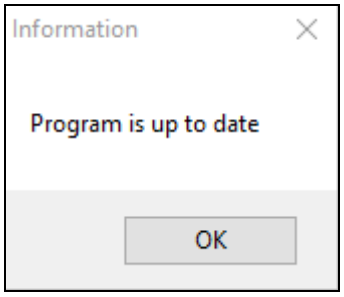
The query can be narrowed down to particular node types, transponders or certain text fields via “Options > Search options”. The selectable text fields concerning the transponders are individually allocable using the client “System Management”.

The window “Search options” can also be prompted by pressing the icon “Options” within the search window (2.3.5).



1.4.7 Check for update

Confirm this option to check whether a different known version of the client is available on the server.



1.4.8 Update picture automatically

If activated the client will automatically check for updated pictures (for any visualization) upon its start and implement them automatically, too.

1.4.9 Clear Log

Messages in the log window (bottom right of the GUI) can be deleted by pressing ‘Options > Clear log’. New messages will be displayed instantaneously thereafter.

1.4.10 Show devices without license in tree

Activate this option to have devices currently without a license displayed in the hierarchic structure.

1.5 Symbols in the hierarchic structure

The operational status of devices can be read from the symbols in the hierarchic structure. These symbols are similar in all clients displaying anchors, gateways and transponders.

Anchor	Gateway	Transponder	Description
			Device is offline, sends no life-sign
			Device is online and operational
			Device is online and operational, but signals undervoltage (Check power supply! Replacing batteries or charging accumulator).

2 Configuration

2.1 Overview

The network configuration enables to:

- add, configure and delete gateways
- create, configure and delete gateway groups
- add, configure and delete anchors
- create, configure and delete anchor groups
- add, configure and delete transponders
- create, configure and delete transponder groups
- update the firmware
- create and manage routes
- create and manage metrics
- start the exploration
- globally activate or deactivate the localization
- refresh the state of the Data Export Service
- reload statistics
- backup the database configuration
- administer the license
- administer the protocolling of the localization results
- ex- and import device coordinates
- display system information
- configuring event management

All settings of gateways, anchors and transponders can be managed by highlighting the corresponding device type within the hierarchic structure. New nodes can be added manually here or found automatically via the exploration (Hierarchic structure > System > Network > Start). The process of the exploration is described in detail below (see 3.4.1.2).

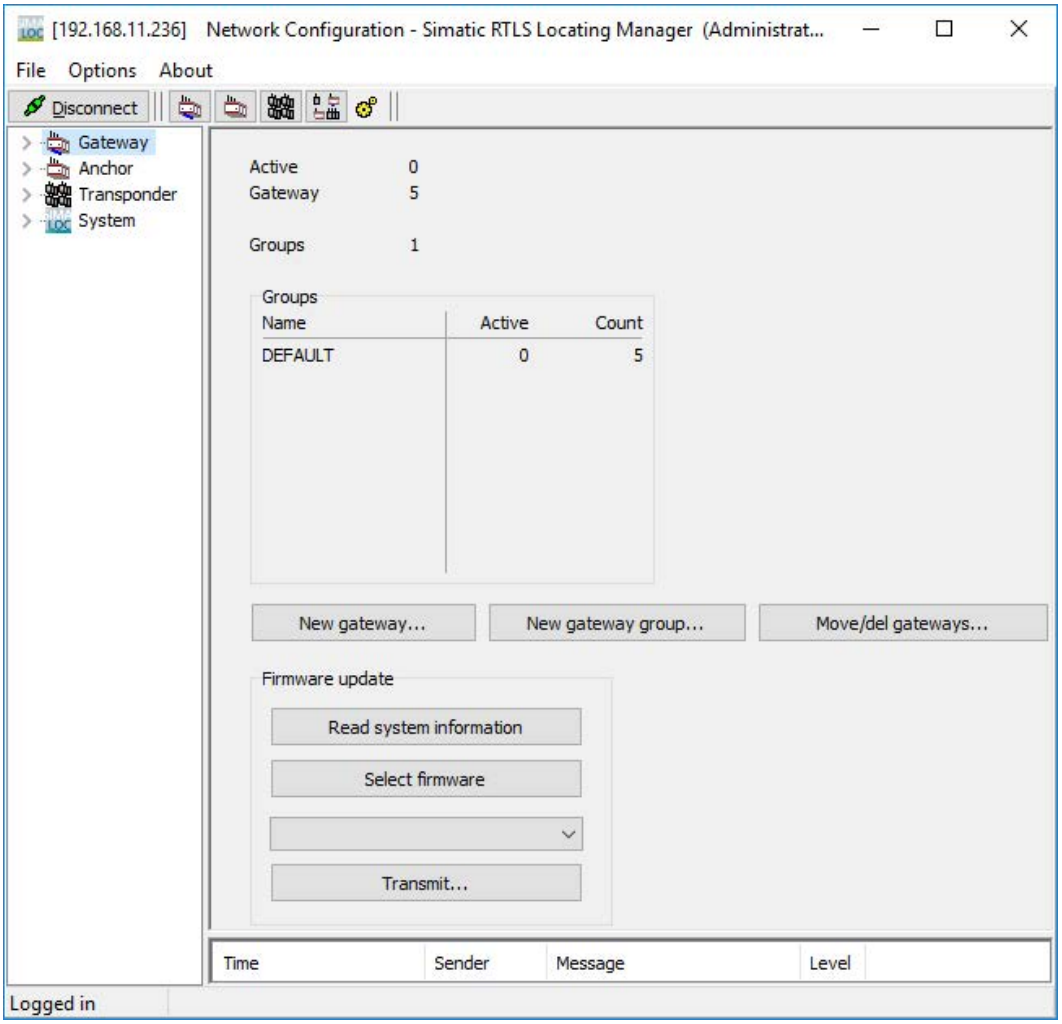
Notice

Any change to the settings of a device has to be activated by pressing the button “Save”. Otherwise the changes will be discarded.

2.2 Gateways, anchors (nodes) and transponders

The gateway establishes the connection between the radio network and the Locating Manager server and acts as a measuring point for the localization whilst also serving as a collection and transmission point for the date coming from the anchors. Anchors are measuring points for the localization in the radio network. Transponders are the mobile units of the localization network. Their positions are determined by the nodes.

Gateways, anchors or transponders (devices) and their respective groups can be added by highlighting “Gateway”, “Anchors” or “Transponders” in the hierarchic structure and pressing the appropriate buttons on the screen.



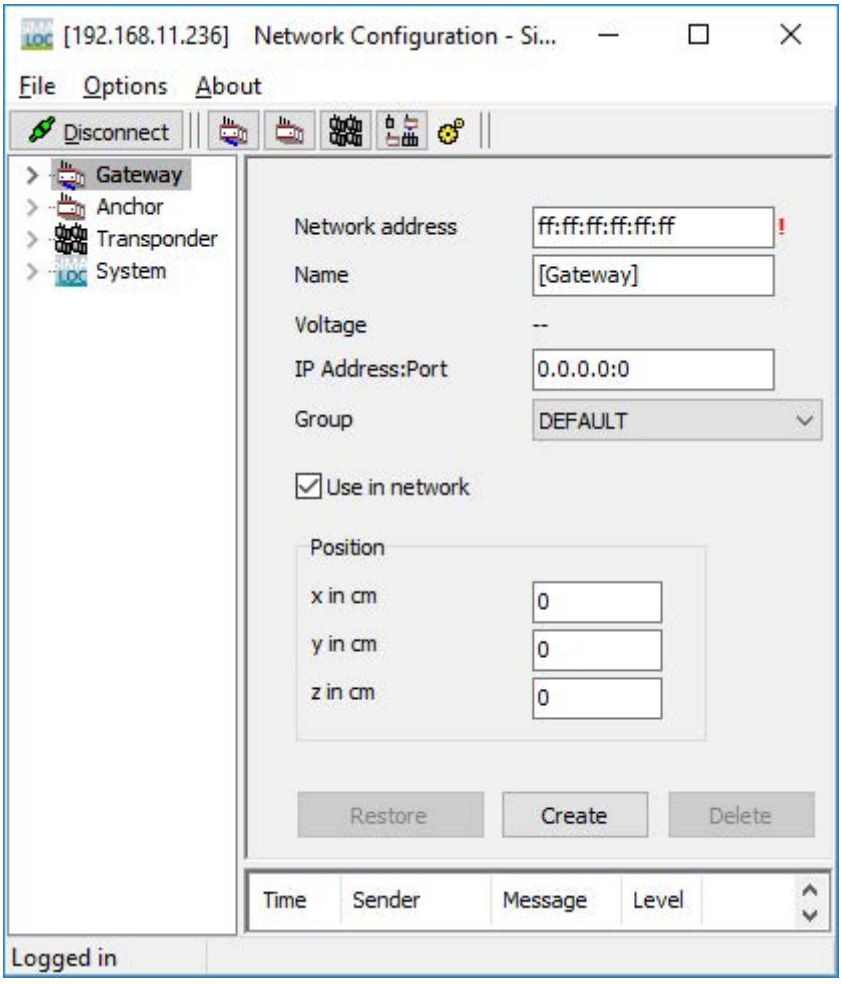
Devices can be renamed, deleted, moved into a gateway, anchor or transponder group, their firmware can be updated and the positions of gateways and anchors can be set and altered by selecting a particular device within the hierarchic structure.

2.2.1 Adding gateways, anchors or transponders manually

The respective buttons “New gateway/New anchor/New transponder”’ enable to manually add devices to the Locating Manager. However, gateways are usually found by the localization system automatically whilst anchors can be detected automatically utilizing the exploration (see 3.4.1.2). transponders are usually detected without further action as soon as they are switched on. Hence, the manual addition of devices should only be necessary in exceptional situation.

Enter the device’s network address (printed on the type label of every device), the freely selectable name, the device group (via the drop-down menu) and for gateways and anchors the position. Gateways also require the IP address and port within the local IT network. Activate in order to employ the device for localization within the Locating Manager.

Press the button ‘Create’ to add the device to the localization system.

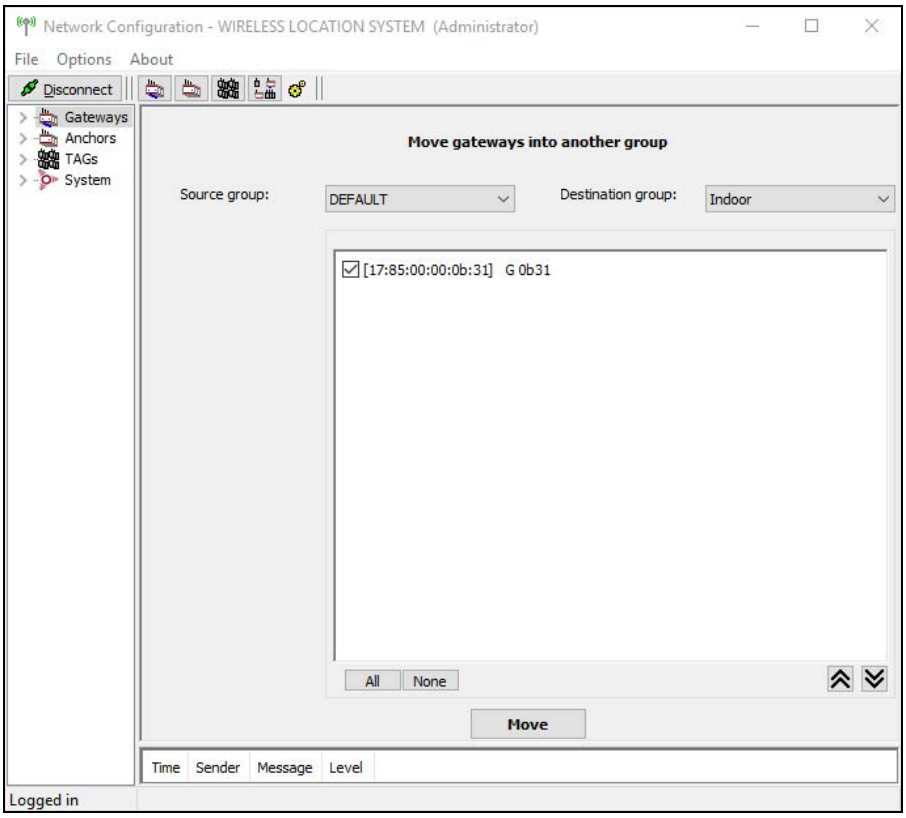


2.2.2 Gateway, Anchor and Transponder-Groups

The standardly set-up “Default gateway/anchor/transponder Group” cannot be deleted but renamed.

A new device group can be created by pressing the button “New gateway/anchor/tag group”. The group’s name can be selected freely.

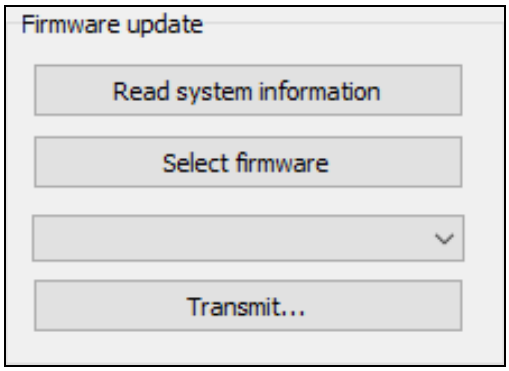
Furthermore, any number of devices can be moved from one group to another by pressing the button “Move gateways/anchors/transponders” and then executing the selection made using the button ‘Move’.



A single device can be placed in a group by highlighting it in the hierarchic structure and selecting the desired group from the drop-down menu “Group”.

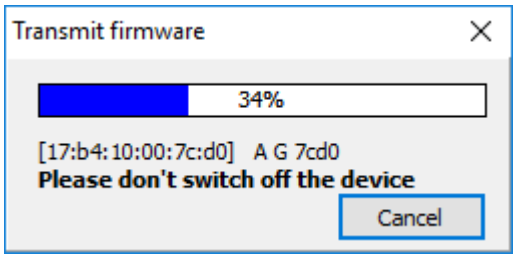
2.2.3 Firmware updates for device classes

A selection window “Firmware update” can be found on the right hand side of the screen when highlighting “Gateway”, “Anchor” or “Transponder” in the hierarchic structure. This window enables to read the system information of the selected device class and to transmit a distinct firmware to all devices of the selected class. The update procedure for single devices is described below (see 3.3.5)



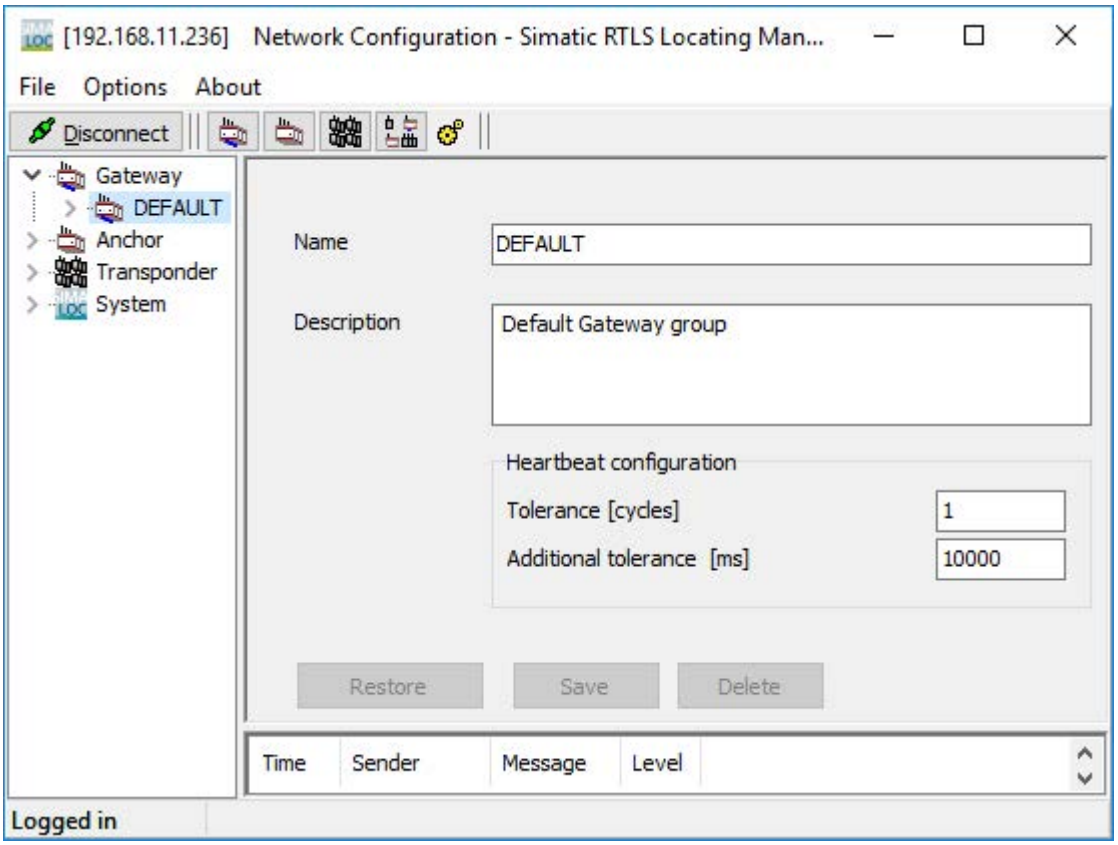
Use only Siemens firmware for the Locating Manager. Siemens firmware files can be identified by their file extension “cagl”. The firmware is stored in the Locating Manager installation folder in “C:\Program Files (x86)\SIMATIC RTLS_LM\Server\Firmware”.

The available firmware will be displayed after pressing the button “Select firmware”. Select the desired software from the selection menu and transfer it to all devices of the selected type by clicking the "Transfer…" button. This process may take a few minutes. Do not switch off the devices during the process. Status messages and errors will be displayed in the log-window.



2.2.4 Heartbeat tolerance

The tolerance (cycles) within the heartbeat configuration determines the accepted number of absent heartbeats of single devices in that particular device group before the device is displayed as disconnected. The additional tolerance [ms] determines the latency time between two heartbeats and serves the purpose of compensating for signal runtime effects. It is imperative to press the button “Save” whenever a setting has been made or altered. Otherwise the change will be discarded.

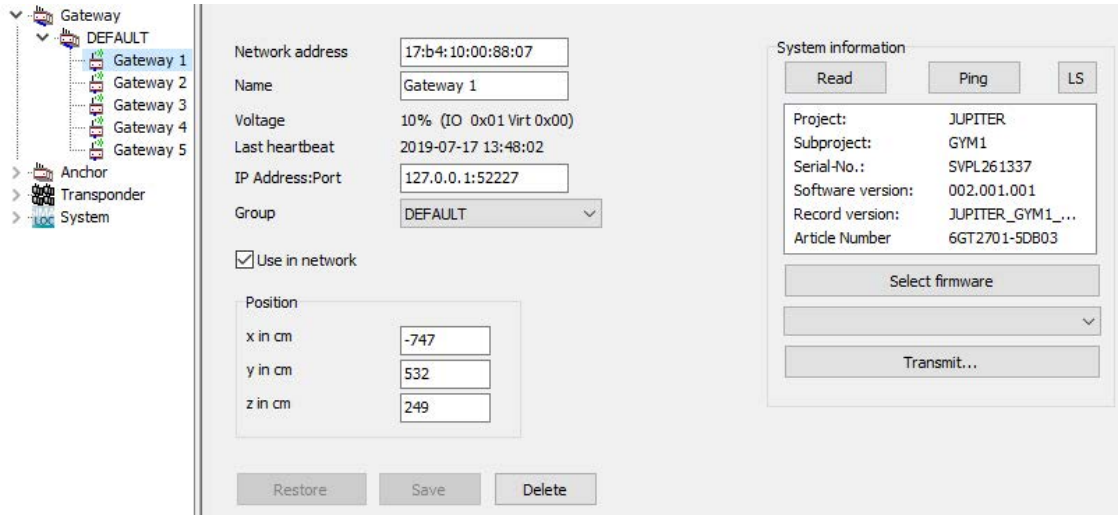


2.3 Device settings and configuration

The view of a distinct gateway, anchor or transponder displays the network address which constitutes the radio address of the device within the Locating Manager. This address is printed onto the device's label and has to be entered when a device is added to the Locating Manager manually.

The name of the device can be altered as desired.

It is possible to switch a device into another group selected in the drop-down menu "Group".



Notice

Any change to the settings of a device has to be activated by pressing the button "Save". Otherwise the changes will be discarded.

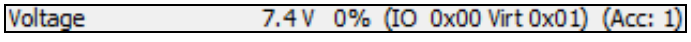
2.3.1 System information

The information on the device firmware is output in the system information area.

When a device has a software whose firmware file is missing on the server, this device cannot be configured or loaded with a new firmware. This is marked by a red output. When you position the mouse over the output, information on the firmware becomes visible.

2.3.2 Voltage

The info panel "Voltage" not only displays the current input voltage measured by the device, but also informs about the IO signals (Input/Output) received. Transponders also display whether they are currently in motion (Acc: 1) or standing still (Acc: 0).

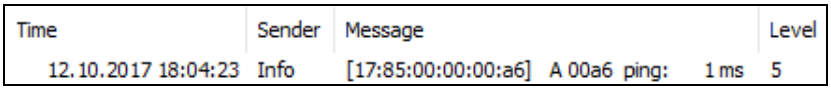


2.3.3 Last heartbeat

The info panel ‘Last heartbeat’ displays the time the devices last heartbeat was received. It is possible to request the device to send a heartbeat by pressing the button “LS” within the section ‘System information’ on the screen.

2.3.4 Ping

Pressing the button “Ping” within the section “System information” will prompt a ping sent to the device. The time until an answer is received for the ping request is output in the log window.

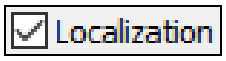


2.3.5 Using device in network/activating localization

To use a gateway, an anchor or a transponder in the localization network for which you have logged in via "Network Configuration", the "Use in network" check box must be selected.

If "Use in the network" is not set in a device, it is not used by the transponder for the transmission of messages. These devices are only displayed in the "Network Configuration" and "DeviceAssistant" and are not visible in the other clients. Nodes (gateways and anchors) found by the exploration process will be automatically activated for use in the network. The use of a transponder in a network, though, has to be activated manually.

In order to locate transponders their localization has to be activated by ticking the appropriate box within the view of each transponder.



2.3.6 System information and firmware update of individual nodes

The control field “System information” serves the purpose of reading the system information of the device highlighted in the hierarchic structure, as well as the transmission of firmware exclusively to this device.

The firmware version and further information concerning the gateway, anchor or transponder will be updated in the output field after pressing the button “Read”.

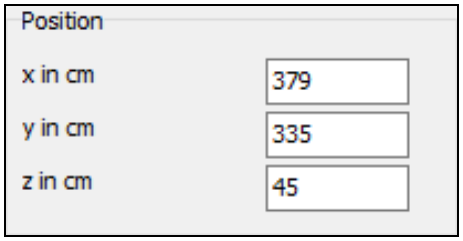
The firmware to be transferred can be selected from the drop-down menu below the output field. Confirm the firmware selection by pressing the button “Select firmware” and transmit it to the device by pressing the button “Transmit…”.

Status messages and errors will be displayed in the log-window.

Sender	Message				Level
Info	[17:85:00:00:09:4d]	A 094d	ping:	15 ms	5
Info	[17:85:00:00:01:b6]	A 01b6	ping:	36 ms	5
Info	[17:85:00:00:00:a6]	A 00a6	ping:	21 ms	5
Info	[17:85:00:00:0b:31]	G 0b31	ping:	30 ms	5

2.3.7 Spatial position of the nodes

The spatial position of the individual gateways and anchors has to be entered manually as their x-, y- and z-coordinate, insofar as no corresponding .csv-file containing these values exists. The input screen appears for the node highlighted in the hierarchic structure. The position relates to the freely selectable point of origin, which constitutes the reference point for all measurements and the visualization. Press “Save” after entering the coordinates.



It is possible to export all spatial positions entered into a .csv-file under “System > Network” in the hierarchic structure to enable a later import of these dates.

The data in the csv-file has to be made up as follows to be readable and assignable

by the Locating Manager.

```
Name;x;y;z
Gateway 2;-618;-66;0
Gateway 1;96;-43;85
```

The name represents the freely selectable device name as described in 3.3, in the example above it is “Gateway 1” and “Gateway 2”. The .csv-file for example can be created from the Excel sheet containing the device’s positional data filled in by the surveyor.

2.3.8 IP configuration of the gateways using “IP Configuration”

The gateway establishes a connection between radio network and Locating Manager. The gateway will be integrated into an existing TCP/IP-network via Ethernet. Gateways are usually delivered with the following standard configurations:

- Module IP address 192.168.1.232
- Subnet mask 255.255.255.0
- Gateway 0.0.0.0 (deactivated)
- Server IP address 192.168.1.12

The ‘Server IP address’ constitutes the address of the Locating Manager server.

Notice

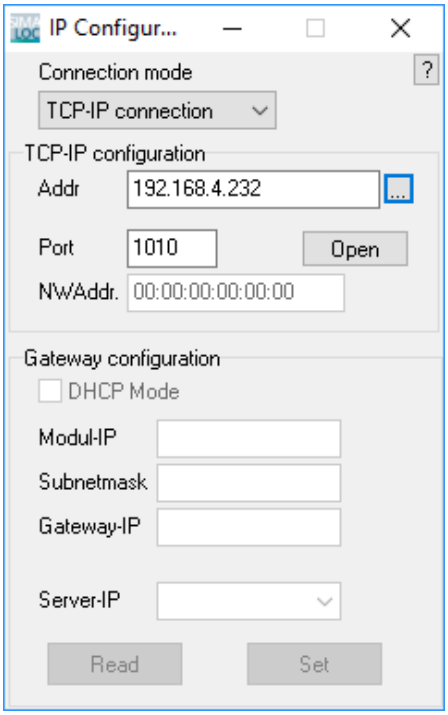
If the PC on which the Locating Manager is installed is protected by a firewall, the TCP port 8000 must be opened for incoming connections of the gateways. The TCP ports 9500 and 9501 must be enabled for incoming connections when the client or the "data export service" are to be executed on other PCs.

In the case that the default settings cannot be used, those settings have to be changed manually using the tool ‘IP Configuration’. Where required, IP addresses within your network have to be allocated for the gateway.

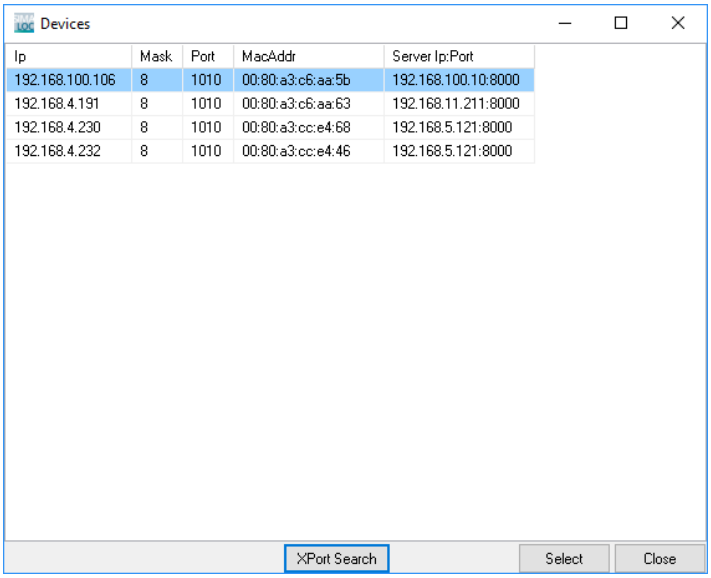
Depending on the type of gateway used, the IP configuration can be carried out via Ethernet, WLAN or a serial connection. Insofar as the gateway cannot be operated in the network due to address conflicts, configuration via serial connection is envisaged.

2.3.8.1 Altering setting via the TCP/IP protocol

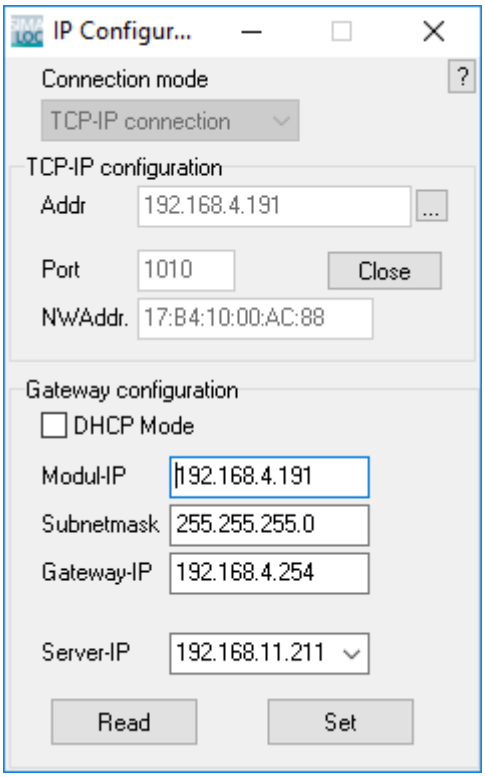
Connect the gateway to the network and switch it on. Halt the Locating Manager services under ‘Start > SIMATIC RTLS Locating Manager > Services > Stop Services’ and subsequently start the tool ‘IP Configuration’ under ‘Start > SIMATIC RTLS Locating Manager > IP Configuration’ or the user-defined path respectively. Select ‘TCP-IP connection’ from the drop-down menu. The module IP address and port 1010 are displayed by default. A list containing every available device will be displayed when pressing the button … to the right of the address array.



Press the button “XPort Search” to prompt a search for missing devices. Highlight the desired device and press the button “Select” to transfer its IP address into the address array.



By pressing ‘Open’ the data from the gateway will be read and displayed in the input field ‘Gateway Configuration’. The gateway’s network address within the localization network (NWAddr.) is displayed for good measure and double-checking whether or not the desired gateway is configured. The same address is printed on the device’s label.



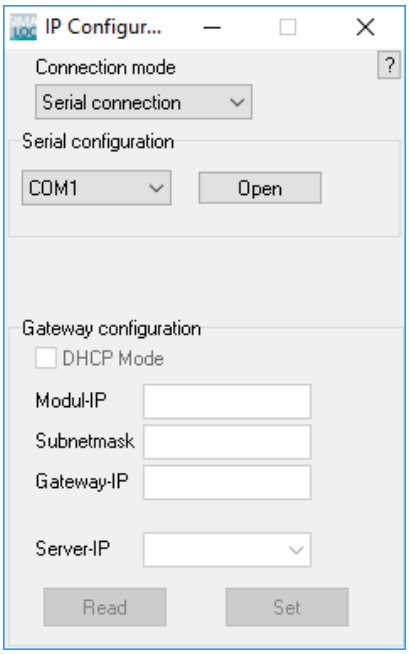
Mind pressing the button ‘Set’ insofar you have made any changes within the section ‘Gateway Configuration’. This will save the parameters to the gateway permanently. Press the button ‘read’ in order to discard any changes made in that section. The original values will be read from the device.

Use the changed IP address whenever you try to read the settings anew. Settings can only be changed, when the gateway is not connected to the Locating Manager server. Therefore, the server has to be stopped (‘Start > SIMATIC RTLS Locating Manager > Services > Stop Services’).

2.3.8.2 Altering setting via serial connection

Not all designs of the gateway are equipped with a serial interface. Consequently, settings on devices without a COM-Port have to be made as described in 3.3.8.1.

The gateway has to be connected to any PC, preferably the Locating Manager server, via a serial connection. After starting the tool ‘IP Configuration’ under ‘Start > SIMATIC RTLS Locating Manager > IP Configuration’ select ‘Serial connection’ and the appropriate serial (COM) port from the respective drop-down menus. By pressing the button ‘Open’ the current settings will be read from the gateway and displayed in the input field ‘Gateway configuration’.



Check whether all settings are correct, for instance whether the gateway is in the correct subnet.

Possible changes will be transmitted to the gateway by pressing the button “Set”.

2.3.9 Values on node (gateways)

Notice

All settings regarding the IP configuration shall be carried out by personnel with knowledge in network configuration only.

2.3.9.1 Gateways without Wi-Fi and/or battery

Section “Values”on node’ allows to read the current values, set new values or set the default value regarding a device’s network operation. Please consider pressing the button ‘Reset’ after any change in order to activate the change made.

This section enables to alter the values for Duplex mode, DHCP mode, Module IP (device IP), Server IP (Locating Manager server), subnet mask and the Gateway IP. Changing these values might become necessary, for instance, during the commissioning of the Locating Manager in order to adjust them according to the local IT network or in case of changes in the local IT infrastructure.

2.3.9.2 Optionally equipped gateways

Devices may have two sections within the ‘Values on node’ insofar they are optionally equipped. Devices equipped with a battery have a section “Accumulator configuration” and/or ones with Wi-Fi have two additional tabs in the IP configuration section. The latter is particular relevant, if the gateway is supposed to act as an access point.

2.3.9.3 Accumulator configuration

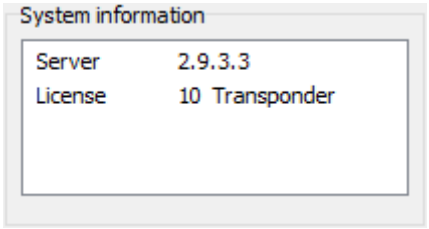
Devices containing an accumulator will be delivered with this battery turned off in order to prevent it being discharged upon delivery. Switch on the accumulator, if the devices should be operated even when the power grid is down. First connect the device to the power grid. Then press the button “Accumulator on” followed by the button “Set”.

The current setting can be read by pressing the respective button whilst the button “Default” will reset the device to the factory setting.

Activate the tick box “Accumulator active after reset”, if you do not want the accumulator to stay switched off after a reset or any other interruption of the power supply. Tick the box accordingly and press the button “Set”.

2.4 System

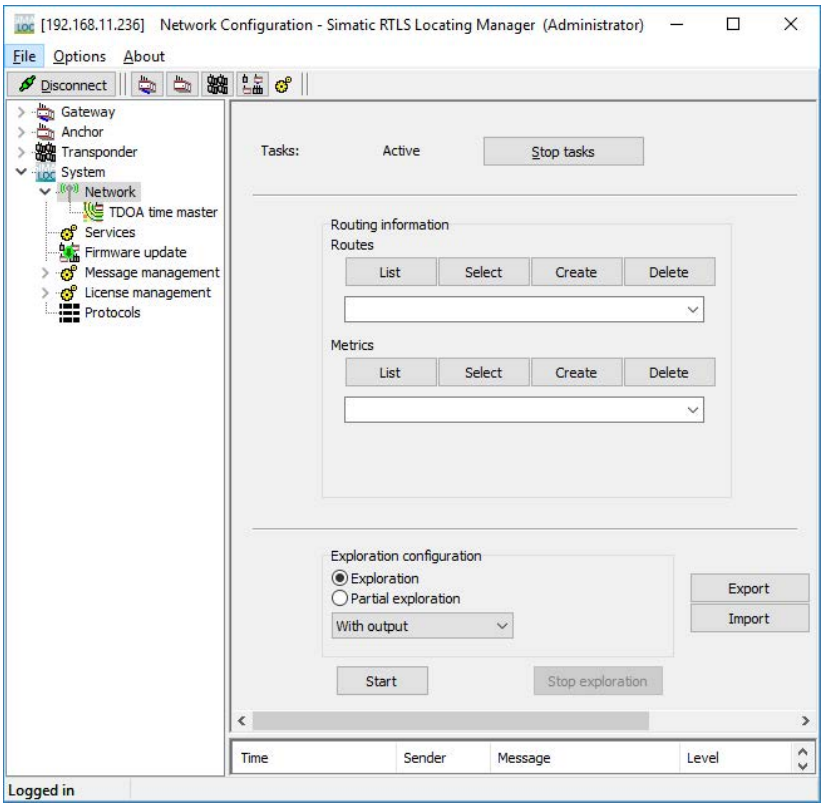
The section “System”“ in the hierarchic structure enables to carry out network relating actions such as performing the exploration, activating or deactivating the localization service, updating the device’s firmware, backing up the database settings, managing the license or make settings concerning the protocol logging. Initially this section offers an overview stating the current (Locating Manager) server version and the extent of the license.



2.4.1 Network

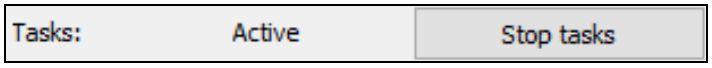
The section “Network” serves the controlling of the radio network and its functionality. The radio network can be activated or deactivated, the exploration started, preconfigured device coordinates imported or existing coordinates backed-up and backed-up coordinates imported respectively or the route information retrieved and displayed here.

Subsection “TDOA time master” serves the purpose of determining the time master for the ‘time difference of arrival’ technology. A TDOA network is a time synchronized network where the transponders cyclically send signals received by said network. The runtime difference of the signals is measured and the Locating Manager server computes the transponder positions based on these measurements.



2.4.1.1 Activating/deactivating the network

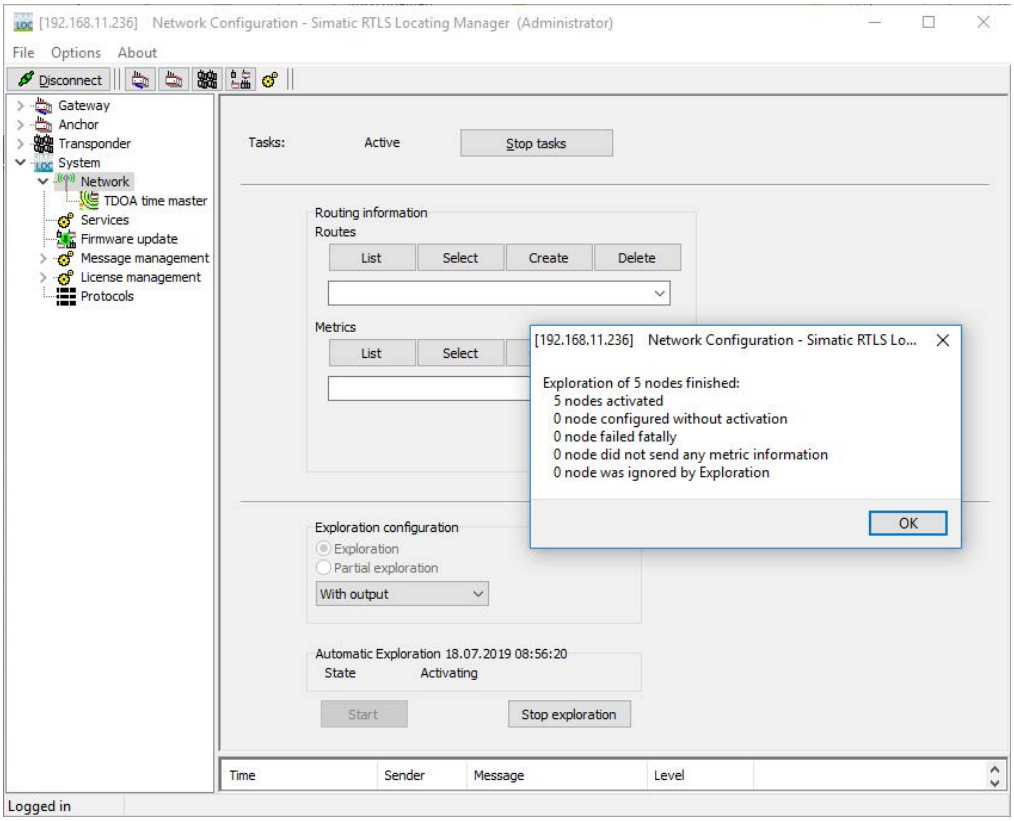
Tasks of the Locating Manager relevant for the localization and the communication regarding the localization can be stopped and started using the button “Stop tasks/Start tasks”. Changes will be displayed in the log-window at the lower end of the GUI. Localization only works in an activated network.



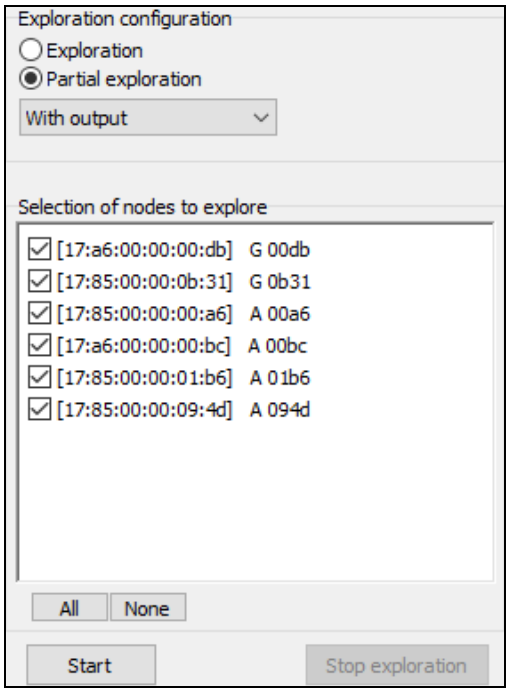
2.4.1.2 Exploration

The localization network can be explored (“System > Network > Section “Exploration configuration”“) automatically using the exploration process, if at one gateway has been set up and switched on. Starting from this gateway the exploration scours the radio network for further infrastructure devices. In the first instance all radio receivers within range are detected, integrated into the network via static routes, placed in their respective default group (gateways, anchors) and configured. Starting from the resulting network further radio systems, which could not be reached in the first step, are searched for. The exploration is completed as soon as no further gateways or anchors can be found. The exploration may take a few minutes depending on the size of the localization network. The button “Start” underneath the exploration configuration is inactive during this time. The progress of the exploration is protocolled in the log-window.

Transponders will not be found by the exploration, but added to the system automatically, if the localization network is set up correctly. Tick the box ‘Localization’ on a transponders screen to have them located in the network already (see 3.3.4).



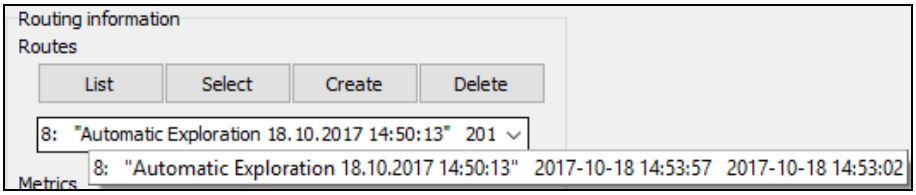
Choosing “Partial exploration” enables to select single nodes as the starting point for a new exploration.



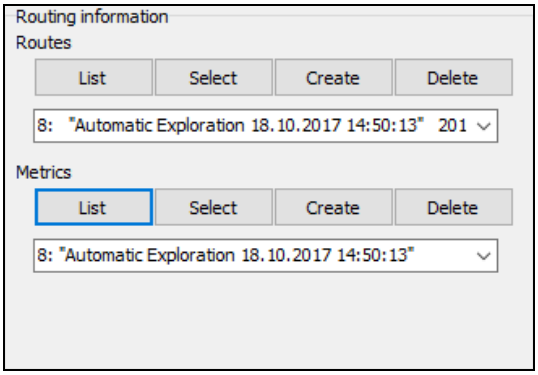
2.4.1.3 Routing information

The positions of the devices have to be entered first in order to make meaningful use of the functionalities offered in the section “Routing information”. Furthermore, the visualization of what is done increases dramatically as soon as a “View area” has been added and scaled in “Localization Configuration”. Please refer to the “Localization Configuration Manual” regarding a detailed procedure.

Section “Route information” comprises the routes and metrics. The routes describe the path of data from the transponders to the server and vice versa, hence the relation of communication between the devices. The metrics show which devices can reach each other via radio and how good such a radio connection is. Both routes and metrics are created with each exploration automatically and are labeled accordingly in the drop-down menu. Find the full information about a selected route or metrics dataset in a pop-up window appearing with a mouseover.



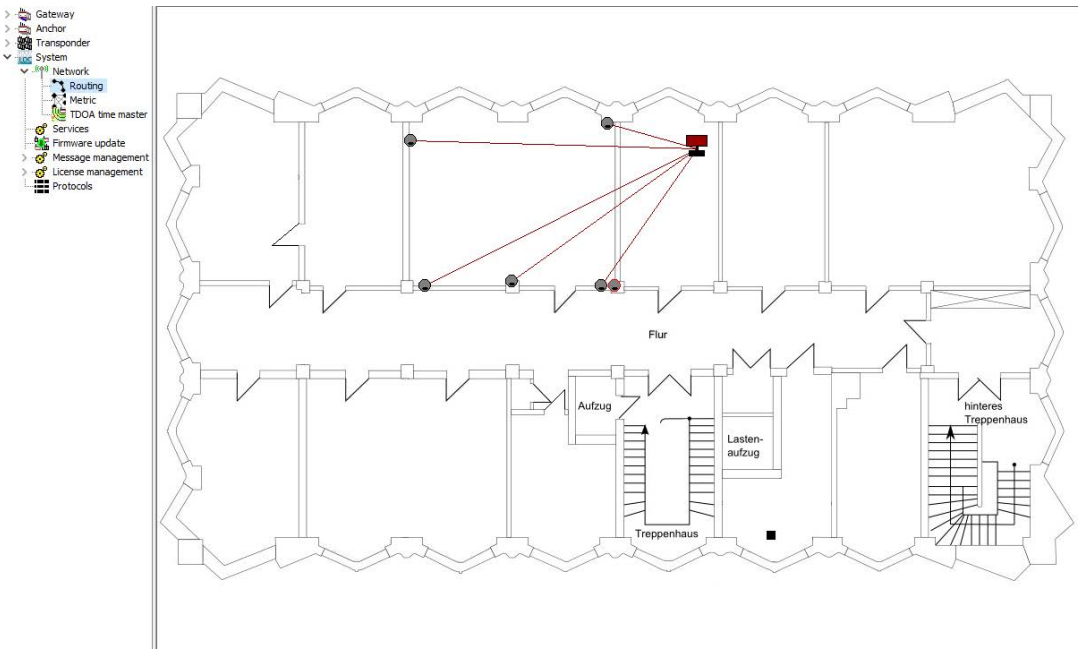
Routes and metrics are relevant when creating routes manually.



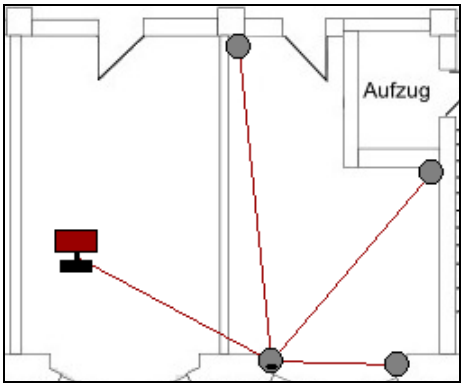
Displaying routes or metrics

Controlling routes and metrics is identical. Press the button “List” for all available route or metrics datasets to appear in a drop-down menu. Highlight the desired dataset and press the button “Select”. This will prompt the visualization of the dataset.

Press “Create” to manually create route or metrics datasets. In this case the visual output will come without any routes or metrics. Delete the selected dataset irretrievably by pressing the button “Delete”.



Infrastructure devices are displayed as grey circles with the gateways showing an additional small black bar within the circle.



Notice

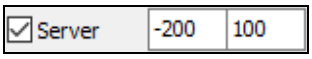
Use the scroll wheel to navigate more swiftly through route or metrics maps. Turn the wheel to shift the visualization vertically or keep the shift key pressed whilst turning the wheel to alter the visualization horizontally. Zoom into or out of the map by pressing the control key whilst turning the scroll wheel. In this case the cursor will act as the focal point.

2.4.1.3.1 Routes

Generally speaking we suggest using the routes created automatically during the exploration. In isolated cases it may be helpful to create additional routes. This might be the case, if the radio connectivity is occasionally disturbed, for instance, by tall objects such as a very tall bus or a stack of pallets. In such cases additional routes would safeguard the permanent reachability of the infrastructure devices. The routes with the highest priority will be displayed in red, lower priority routes in blue.

Display localization server

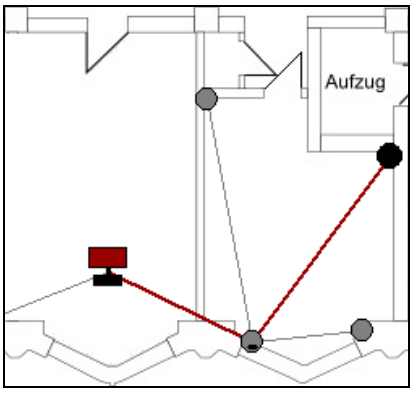
Show or hide the localization server within the display by ticking the box “Server” in the control panel on the right hand side. You may enter any position (x/y) convenient for your use case.

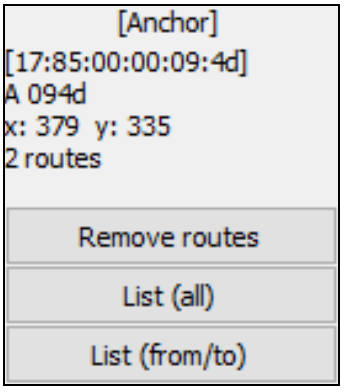


In localization networks with many infrastructure devices it usually is not very helpful to show the localization server as every route from a gateway will be displayed and turn the view into a confusing mess.

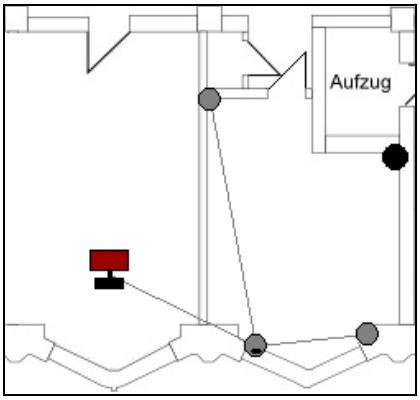
Select routes

Activate the arrow symbol on the right to select single routes or devices in the visualization. The direct routes to other devices will be highlighted when selecting a device or the localization server. Selecting a device will also prompt the display of its route information in the control panel on the right.





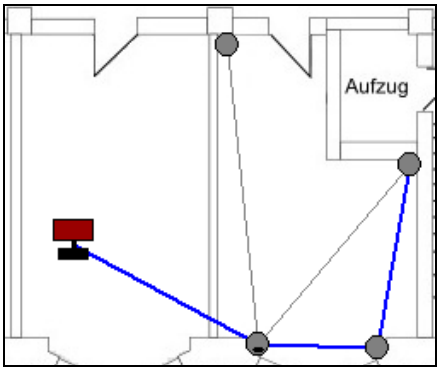
Pressing the button “Remove routes” will delete all routes from and to the selected device. When using this option please make sure to create new routes to keep the device accessible. A device without route to the Locating Manager server does not take part in the communication. You can continue to use it for localization if it was configured as active for localization last.



Create routes

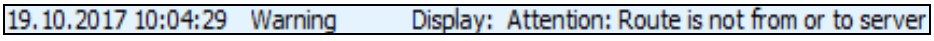
Generally speaking we suggest using the routes created automatically and to merely create additional alternative routes.

Activate the button to create routes. Then keep the shift key pressed while left-clicking on the target device, then on the device or devices via which the route should until you reach the server. In case the Locating Manager server is hidden (not displayed), double-click on the last gateway ahead of the server. This will extend the route to the server.

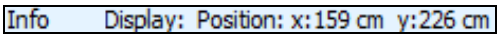


When creating a number of devices you might activate the button to stay in the creating mode once a route is finished. Any route will be automatically created bidirectional (from the device to the Locating Manager server and back) when the button is activated.

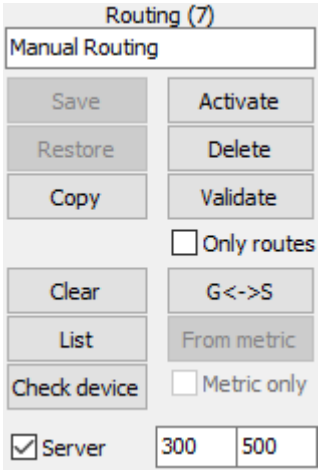
When the box ‘Server warning’ is ticked a warning will be put out in the log window insofar a route does not reach to the server.



Sometimes it might be helpful to know positions in the map related to the reference point/origin. Activate the button to then click into the map at the desired position. The x and y coordinates of this position will be displayed in the log window.



Please find further options for the creation and management of routes in the control panel in the top right corner of the GUI.



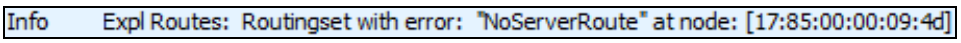
Any changes made will be saved by pressing the button “Save”. Press the button “Activate” to actually make the new routes usable. This will also transfer the information to the nodes.

Restore deleted routes by pressing “Restore”. This only works unless the deletion has not been saved.

The entire routing dataset displayed will be deleted when pressing the button “Delete”.

Press “Copy” to create an exact copy of the displayed routing dataset. This enables to, for instance, add routes to the automatically created routing dataset without altering the original dataset. The original dataset can be reactivated any time.

Have the routing dataset checked by pressing “Validate”. Any errors like missing server connection of single devices will be put out in the log window. Tick the box “Only routes” to have only devices with existing routes checked.



Press “Clear’” to delete all routes of the routing dataset. After doing this press “Gate <-> Server” to create routes from the Locating Manager server to every gateway.

All routes will be listed in the log window, if the button “‘List’” is pressed. Devices will be identified by their network address with the actual priority (weight) of every route put out, too.

```
Info    11:11:11:11:11:11 -> 17:85:00:00:0b:31 -> 17:85:00:00:09:4d weight 3
Info    17:85:00:00:09:4d -> 17:85:00:00:0b:31 -> 11:11:11:11:11:11 weight 3
Info    17:85:00:00:01:b6 -> 17:85:00:00:0b:31 -> 11:11:11:11:11:11 weight 2
Info    11:11:11:11:11:11 -> 17:85:00:00:0b:31 -> 17:85:00:00:01:b6 weight 2
Info    17:85:00:00:00:a6 -> 17:85:00:00:0b:31 -> 11:11:11:11:11:11 weight 2
Info    11:11:11:11:11:11 -> 17:85:00:00:0b:31 -> 17:85:00:00:00:a6 weight 2
Info    11:11:11:11:11:11 -> 17:a6:00:00:00:db weight 1
Info    17:a6:00:00:00:db -> 11:11:11:11:11:11 weight 1
Info    11:11:11:11:11:11 -> 17:85:00:00:0b:31 weight 1
Info    17:85:00:00:0b:31 -> 11:11:11:11:11:11 weight 1
```

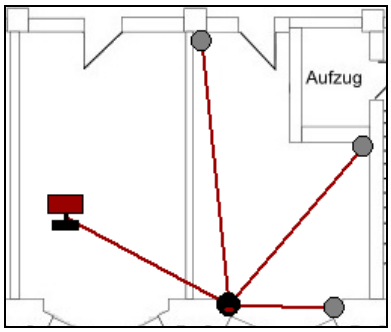
By pressing the "From metric" button, new routes are created from the last available metric set if a metric set was loaded to the client.

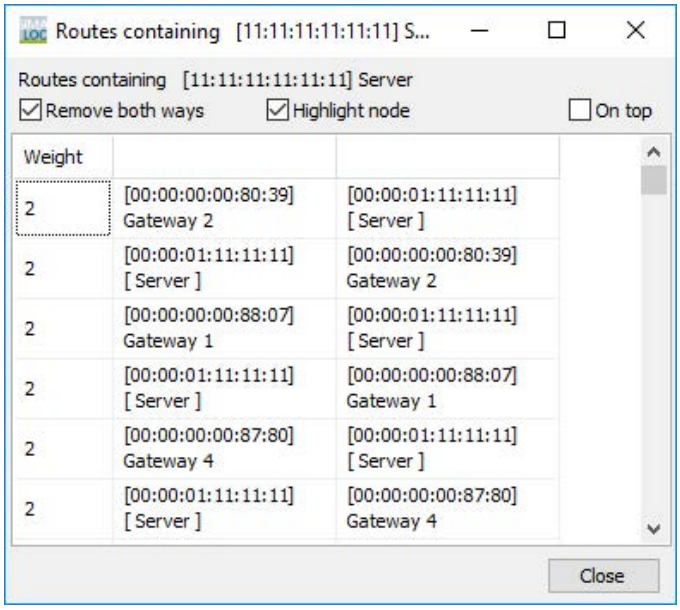
“Check device” checks whether the routes displayed match the ones stored in the devices. The result will be displayed in the log window.

Message
Routes from the server are the same as the device routes

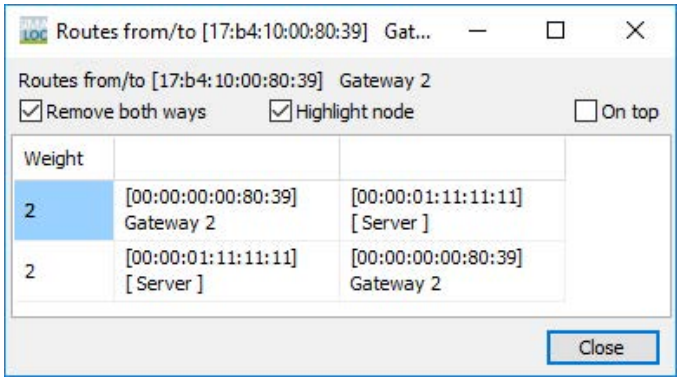
Show route information (List)

Press “List (all)” to create a pop-up list of all routes concerning the device highlighted in the display.





Press “List (from/to)” to create a pop-up list containing only the routes from the highlighted device do the Locating Manager server.



The routing table reads from left to right as follows:

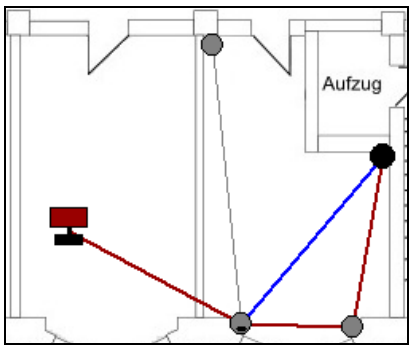
- Column 1: The cost of a route states, initially for the automatically created routes, how good and fast a route is (internally computed from the number of hops to the Locating Manager server and the field strength). In practice the cheapest route will be used.

Priority of the route

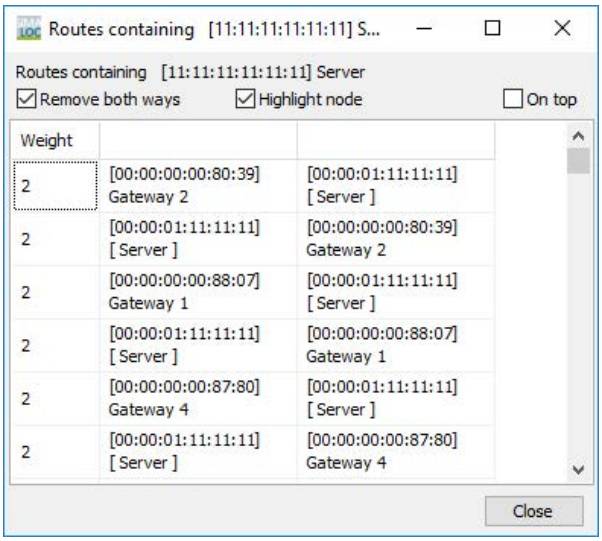
Additionally created routes will get a value of hops +1, hence not be used preferentially. The order by which routes are used can be altered manually, though, simply by altering the cost. A button ‘Weights -> Cost’ will appear at the lower end of the table as soon as a cost array has been changed. Press this button to transmit the changes made to the nodes. From then on the newly created priority will be used whenever a device has to choose a route.

Please note that two entries exist for every route, one for the route from the device to the Locating Manager server and one for the route from the server to the device. Change the cost for both directions as appropriate.

The now preferably used route will be displayed in red accordingly.

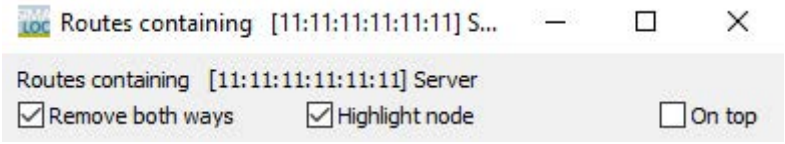


- Column 2: Information source or sender (the device sending its data to the Locating Manager server or the Locating Manager server for information going the other direction)
- Columns 3 to n-1: Interconnected router (other infrastructure devices/nodes) via which the sender stated in column 2 transmits to the recipient stated in column n.
- Column n: Recipient



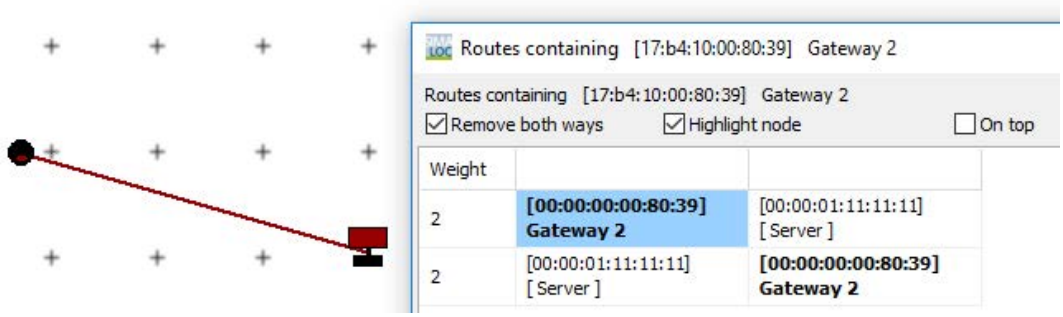
Selection bar and menu in the table

The selection bar offers further settings:



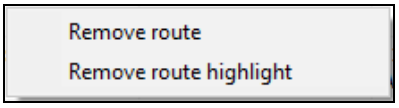
Activate “Remove both ways” to automatically delete the return route, too, when deleting a route (a single line) from the list. Delete a line from the list by right-clicking on it and selecting “Remove route” from the menu appearing.

The related device and route will be highlighted in the display, it the box ‘Highlight node’ is activated, as soon as a table element is marked.



Ticking the box “On top” will keep the table in the in the foreground, for instance when clicking in the display. The table will disappear behind the GUI, if the box is not ticked.

A menu offering further settings will appear upon a right mouse-click into the table.

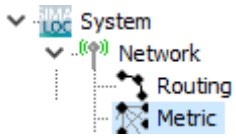


The route marked in the table will be deleted by pressing “Remove route”. Check beforehand whether “Remove both ways” has been activated.

All devices and routes will be displayed the same way in the view by pressing “Remove route highlight”.

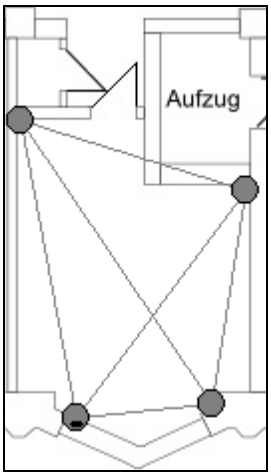
2.4.1.3.2 Metrics

The metrics are relevant insofar routes shall be optimized or created manually. Furthermore, metrics can be used for error diagnosis, especially when trying to find out whether or not an infrastructure device is reachable by radio.



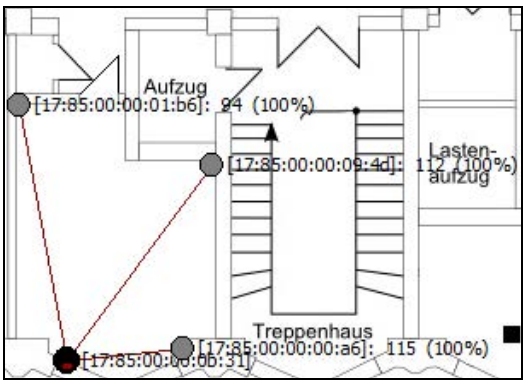
A metrics dataset displays for the time of its creation which devices can reach each other by radio and how good. A metrics dataset will be created with every exploration.

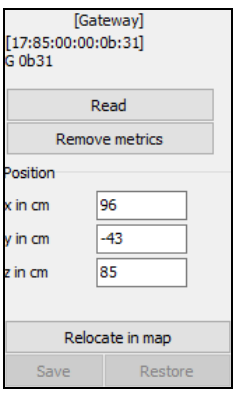
Every possible radio connection (metrics) between the individual devices will be displayed.



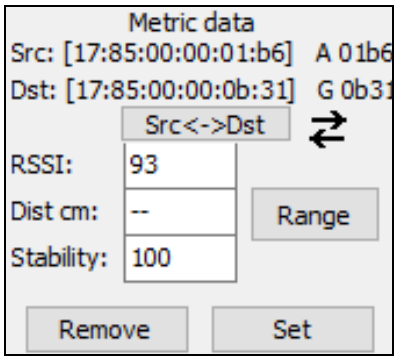
Activate the arrow to select objects in the map. It us up to the user whether he or she wants to select infrastructure devices , metrics or both by activating the appropriate button.

An individual information and control panel will appear on the right hand side of the GUI once a device has been selected in the view. This panel tells the type, radio address and name of the device selected. Press the button “Read” to have the current reception field strength and the stability of the radio connections measured. Pressing the button “Remove metrics’” will, obviously, delete all metrics of the selected device or remove the selected metric.





A different control panel telling the metric data will appear on the right hand side of the GUI once an individual metric has been selected in the view.



This panel tells both the network and device name of the source (Src) device and destination (Dst) device concerned. Press the button “Src <-> Dst” to change the direction of the metric. Activate the button ⇄ to alter or create a metric in both directions.

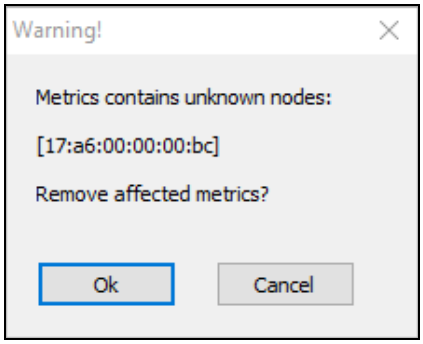
RSSI indicates the quality of the reception field strength with 127 being the maximum value.

Pressing the button “Range” will prompt a ranging (a distance measuring) between the two devices. The result will be displayed in the array “Dist cm”.

“Stability” tells the stability of the radio connection between the two devices on this metric, whereas the value can range from 0 to 100.

Metrics are of practical use when it comes to creating alternative routes manually. In this case read the metrics for the device to be connected via such a route several times in a short interval. It will become clear via which device the most stable route has to run.

An error message will occur, if the metrics dataset contains nodes that aren’t existing anymore (e.g. when the device has been replaced with another one).

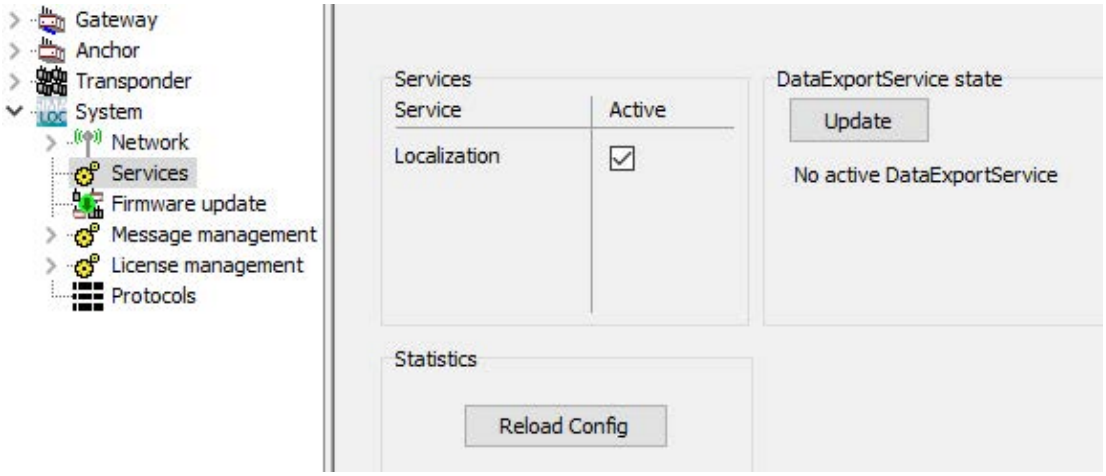


Create a new node to the target device in case the removed node was a hop in the route to this target. Alternatively, you may start another exploration.

2.4.2 Services

2.4.2.1 Activating/deactivating the localization

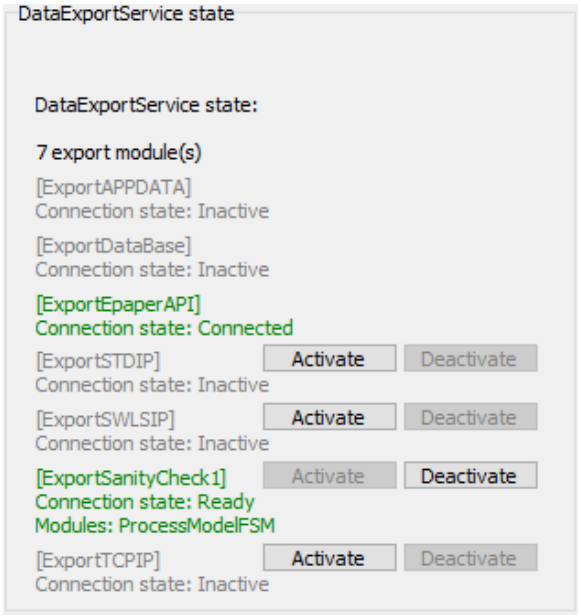
The section “Services” (“System > Services”) serves the purpose of activating or deactivating the localization. No positional data will be computed, if the localization is deactivated. The radio network starts measuring distances and sends the results to the localization server for it to convert them into positional data as soon as the localization has been activated.



2.4.2.2 Data Export Service state

The data export service can be operated with one or multiple interfaces. Whilst the Data Export Service is commonly run on a mono-modular basis, thus as a separate interface to the customer’s system (for instance a yard management system), it may also be operated on a multi-modular basis. For example, this may be the case when using different yard management systems on different sites within one traffic enterprise. These systems will be fed with the localization data computed by the Locating Manager. The data from different sites will then be balanced by a number of Data Export Service modules.

Press the button “Update” within the section “DataExportService” to receive a list of all configured modules of the Data Export Service. Modules working correctly will be displayed in green, those not working correctly in red and not connected ones in orange. The buttons appearing with that list can be used to activate or deactivate single modules.



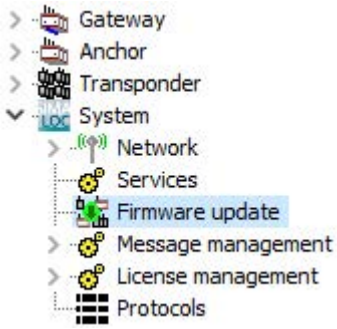
2.4.2.3 Statistics

Certain processes in depots, factories or other localization areas are monitored and captured statistically as a process model by the Locating Manager. The statistics, for instance, capture and analyze the number of busses on a depot and which of those busses were not captured in the entrance area.

Using the button in the "Statistics" section, the configuration files for the statistic module of the Locating Manager are read in again without stopping the localization server. This process does not require the localization server to be halted. Reloading the configurations is reasonable, if the configuration files have been altered. The reload process signals to all Locating Manager services that they have to read the altered configuration file “StatisticConfig.xml” and “StatisticProjectConfiguration.xml”.

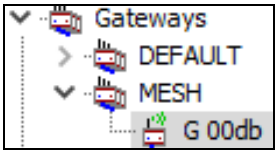
2.4.3 Firmware update

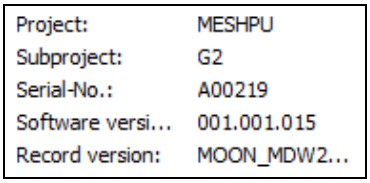
Update the firmware on the infrastructure devices and transponders in this section of the hierarchy. This functionality especially aims at the update of a larger number of devices of the same type. Updating single devices is much easier done by selecting it in the hierarchic structure an starting the process from section “System information” on the device’s screen (see 3.3.6).



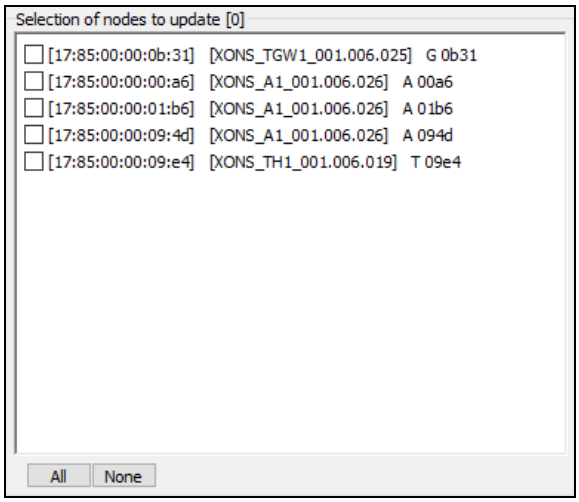
Generally, a firmware file (.agl or .cagl) is required to conduct an update. These kind of files have to be located on the localization server and there in the directory “C:\Program Files (x86)\SIMATIC RTLS_LM\Server\Firmware”.

Usually, the name of the file makes it recognizable regarding the model series it belongs to. For instance, MESHCH_A* stands for an anchor or XONS_TR for a XONS TAG RAIL. Please find the information regarding the firmware currently on a device on the device’s screen in section “System information’. In the example depicted below it is a gateway (Series 2) running on software version 1.1.15. The firmware updating this device to this software version would then have had the name MESHPU_G2_1_1_15.agl.

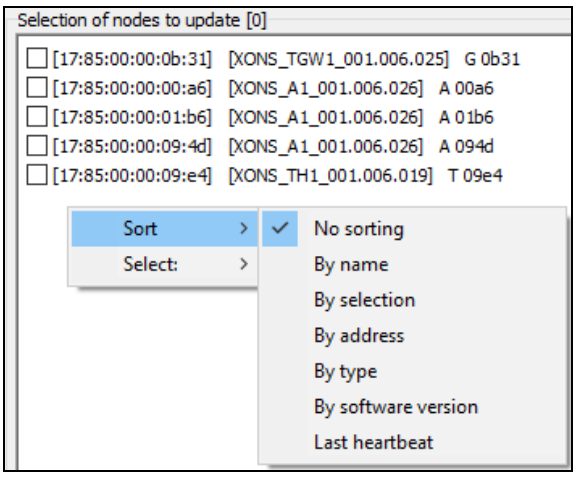




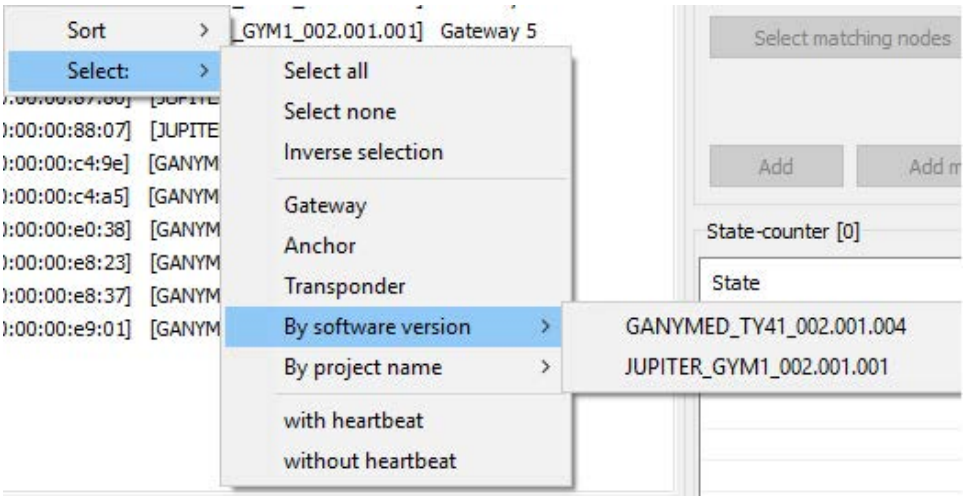
In the firmware section you will find a list containing all devices of the localization network. This list includes those devices switched off or inactive. A possible update for these will be commenced once the device is active again or can be reached via the localization network respectively.



In smaller networks it might be more comfortable to tick every device considered for updating manually. To make the update function practical for larger networks, a right-click in the selection field opens a shortcut menu. This menu offers a few self-explanatory sorting options for the list of nodes.

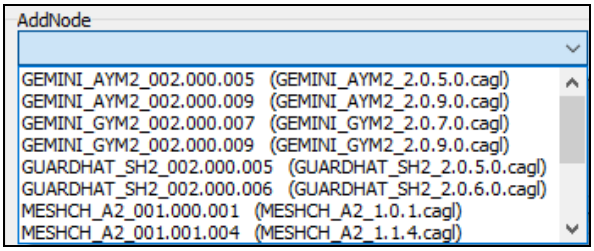


Menu item “Select” offers a plethora of criteria by which the devices in the list can be selected automatically.



The best choice strongly depends on the state of the project. Please consider that choices made here add up. In other words, if you select “Transponders” and then “Anchors”, all transponders and anchors will have been selected.

The drop-down menu in section “AddNode” offers a list of all firmware files available. Press the button R to refresh this list, for instance after copying a new file into the firmware directory.

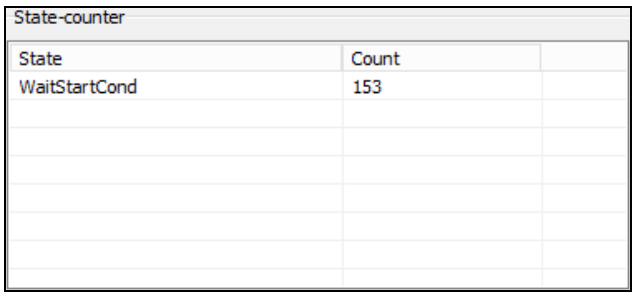


Select the firmware you wish to transfer to the devices selected before. Enhance the clearness of the list by activating the box ☑ List only matching. Firmware files not matching the selected devices will be hidden after pressing the button R.

Activating ☐ Show idle nodes will keep devices in the list at the bottom of the screen when their update is completed. Those devices will disappear after a while, if this box is not activated.

Anyway, press the button “Add” to start the updating process.

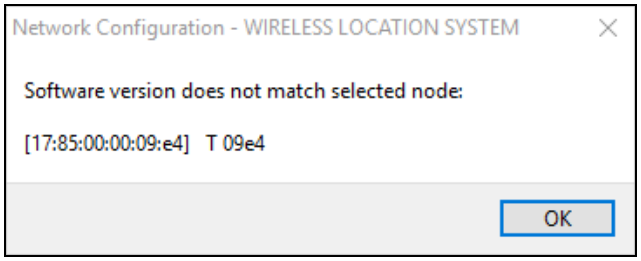
The number of devices selected for updating and the current state of the update will be displayed in section “State counter”.



Below this section you will find every single device selected for updating listed. “Address” is the respective (Locating Manager) network address, “Description” it the name of the device, “Current” the current firmware version, “Target” the firmware version once the device is updated, “State” the state of the update, “StateID” the related status number whilst “Counter” will display the current progress of the update.

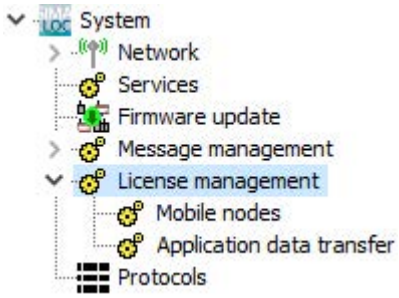
Address	Description	Current	Target	State	StateId	Counter
17:b4:10:00:78:bd	T 78bd	TAURI_TAW2_002.000.002	TAURI_TAW2_002.000.004	WaitStartCond	2	0
17:b4:10:00:78:c0	T 78c0	TAURI_TAW2_002.000.002	TAURI_TAW2_002.000.004	WaitStartCond	2	0
17:b4:10:00:78:c1	T 78c1	TAURI_TAW2_002.000.002	TAURI_TAW2_002.000.004	WaitStartCond	2	0
17:b4:10:00:78:c2	T 78c2	TAURI_TAW2_002.000.002	TAURI_TAW2_002.000.004	WaitStartCond	2	0

The update will not be carried out, if a firmware version unsuitable for the device has been select. A warning message will pop up instead.

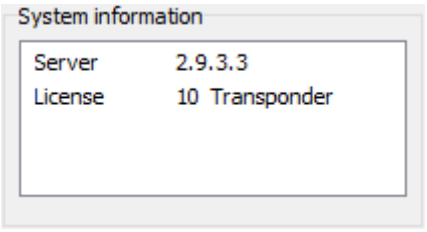


2.4.4 License management

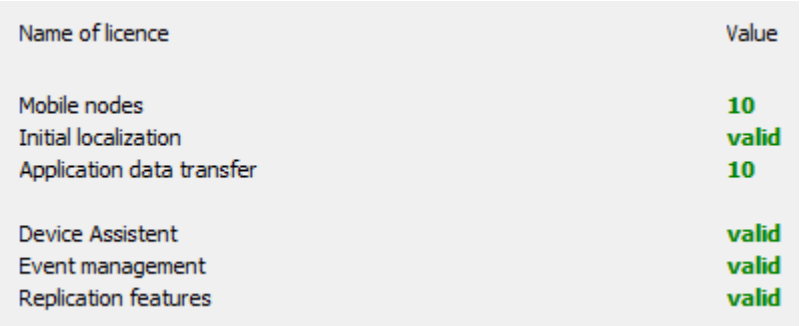
This section, apart from checking the sufficient size of the license, enables to allocate license to single devices. Open the license section by pressing the button in the menu bar at the top of the GUI.



Highlight “System” in the hierarchic structure to get an overview regarding the number of transponders the license is valid for.

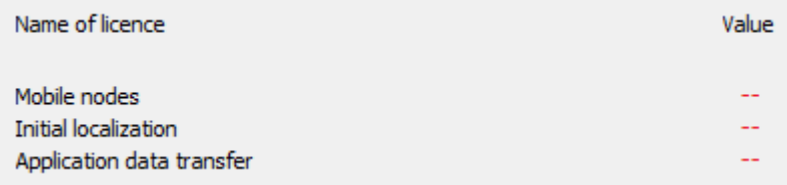


The license management itself allows for a much more detailed view regarding the extent of the license.

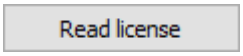


2.4.4.1 No license or invalid license

The license management will look as follows insofar there is no license or the license expired:



In this case the localization is inactive and the devices do not appear in “Localization configuration” anymore. Read a new and valid license file into the Locating Manager by pressing the button “Read license”.

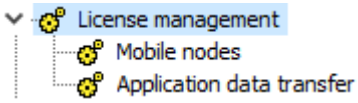


Please make sure that only one license file is situated in this folder.

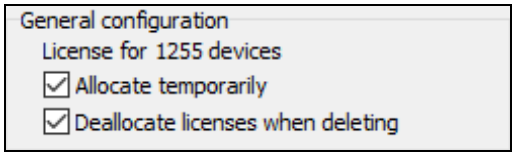
Alternatively to actively starting the process of reading the license into the system you may wait for approximately one minute. The Locating Manager will read the license itself within this period.

2.4.4.2 Allocating license capacity

Every subsection of the license management in the hierarchic structure allows to allocate the license contingent to the respective types of devices or functionalities.



Licenses can be automatically allocated temporarily to devices without license and deallocated as soon as a device is deleted.

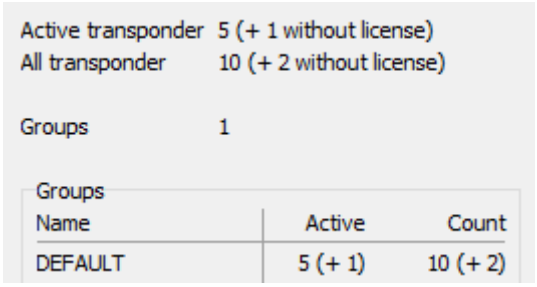


In this case “Allocate temporarily” means that free (unused) licenses will be allocated temporarily to devices without license.

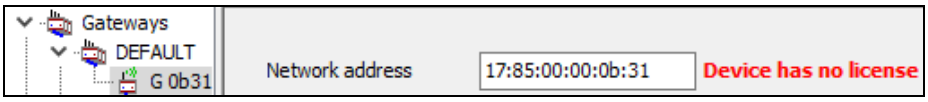
Manually allocated licenses will be automatically deallocated as soon as a node is deleted from the system, if ‘Deallocate licenses when deleting’ is activated.

Manual allocation

The overview of each device group in the hierarchic structure offers information about devices without a license and those that have not had one allocated automatically.

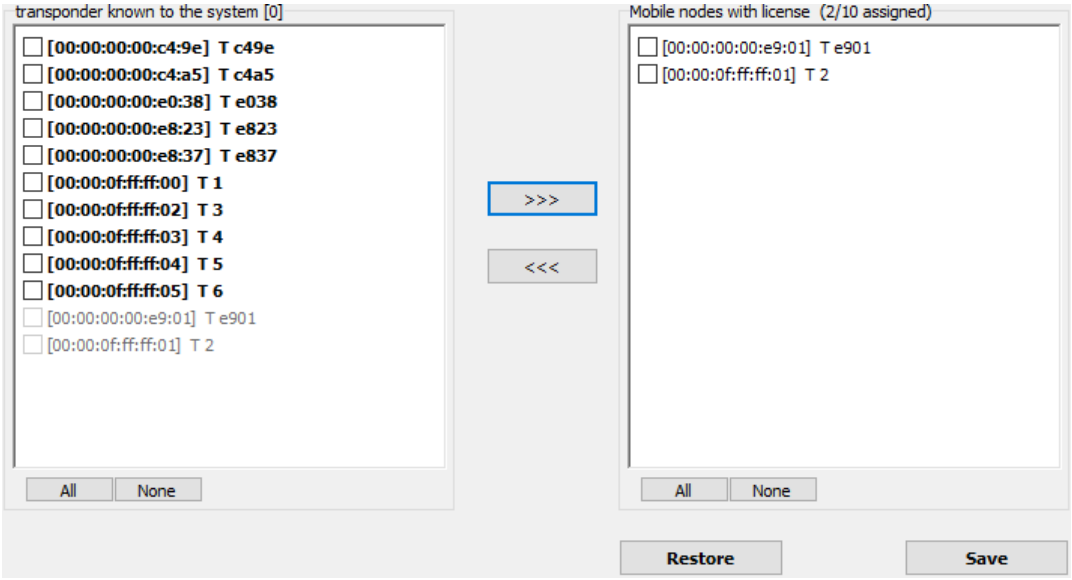


The device's screen offers a warning, too.



Highlight the respective subitem within the license management to allocate a license to a device. In the example shown above this subitem would be "Transponder".

Select the device (or devices) concerned from the selection window "Transponder known in system" and move it or them into the list "Nodes with license'" using the arrow button. Then press "Save" to activate the allocation.



Use the button "Restore" to undo any unsaved change made.

Notice

Usually the license is large enough to cover all devices. Therefore, we suggest using the automatic (temporary) allocation as described above. The manual allocation of single licenses is only useful in exceptional cases.

2.4.5 Protocols

Changes to these settings should only be carried out by very experienced users.

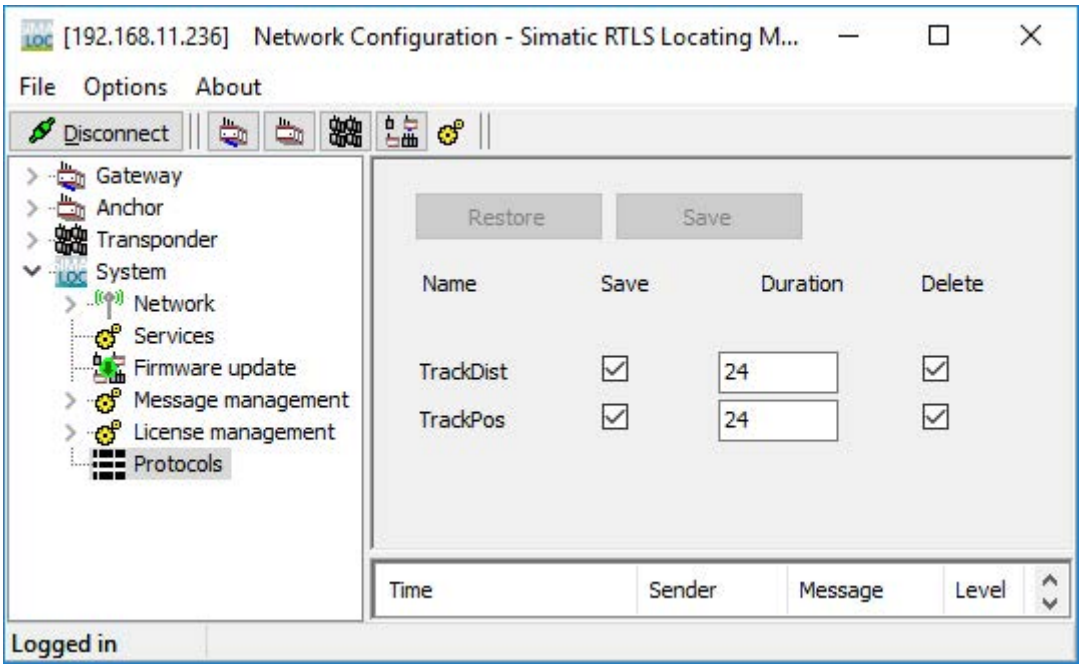
Settings concerning the protocolling of the transponder's localization data can be made in the section "Protocols". It is possible to define whether, and if so, for how long the localization data will be stored and whether old protocol entries should be deleted automatically.

The TrackDist protocol saves the transponder to anchor distance debug data, the TrackPos protocol the computed transponder positions.

Tick the column "Save" to activate the storage of the protocolled data and the column "Delete" to delete old protocols. Double-click the column headers in order to activate or deactivate the entire column.

The protocolling duration in hours can be set in the input fields in the column "Duration". When you position the mouse over the text box for the duration, you will see the duration in days. You can also enter days or weeks in the text box. To do so, enter "2d" for "2 days" or "3w" for "3 weeks". This input is automatically converted into hours.

All settings made or changed have to be confirmed by pressing the button "Save".



3 Appendix

Error number	Text	Possible cause
10050	Network is down	Dead network for a socket operation has occurred. This could be the result of a network system failure, network interface failure or an error concerning Windows™ protocol stacks.
10051	Network unreachable	Network was unreachable for a socket operation. Usually the reason for this error is that the local software does not know the route to the remote host.
10052	Network dropped connection on reset	Connection was disconnected during operation, because of an erroneous life-sign signal.
10053	Software caused connection abort	The host computer's software cut an established connection. Probable reasons for this error are time-out in data transmission and protocol errors.
10054	Connection reset by peer	Server cut existing connection. This is usually caused by the server (software) being closed (program quit, computer shut down or rebooted).
10055	No buffer space available	Could not perform a socket operation due to insufficient system buffer space or a busy computer.
10056	Socket is already connected	A connect request was made to an already connected socket.
10060	Connection timed out	Attempt to establish a connection or an already established connection failed, because host or peer did not respond in time or at all.
10061	Connection refused	The targeted computer rebutted an attempt to establish a connection. Reasons for this behavior include a firewall denying access and the server not running.
10064	Host is down	Reasons for this error could be that the targeted computer is switched off, does not send a reply or failure/malfunction of a Windows™ network driver.
10065	No route to host	A socket operation could not reach the predefined host. The likely reason for this error is that the server connection setting is incorrect.