Wireless Protocol Gateway
ARP600 Dual SIM Variants
User Manual
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The devices mentioned in this manual are to be used only according to the instructions described in this manual. Faultless and safe operation of the devices can be guaranteed only if the transport, storage, operation and handling of the devices is appropriate. This also applies to the maintenance of the products.
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1 Introduction

1.1 About the Wireless Protocol Gateway ARP600

The Wireless Protocol Gateway ARP600 product is an industrial grade wireless router for demanding IP connectivity applications.

For the rest of this documentation, the Wireless Protocol Gateway ARP600 is referred to as the device.

1.2 Wireless Protocol Gateway ARP600 features

Wireless Protocol Gateway ARP600 offers different advanced features. Flexible design allows the system to gain extra features if required.

High speed wireless connectivity

Wireless Protocol Gateway ARP600 has support for the latest mobile technologies, such as 4G network and HSPA+ in 3G network. This allows the remote control of wide bandwidth services such as video surveillance or high amount of measurement and control channels.

Flexible routing

Wireless Protocol Gateway ARP600 can be configured to fit in all kinds of networks. It also has full support for Serial - Ethernet routing of industrial network protocols.

High security

Wireless Protocol Gateway ARP600 has highly configurable firewall and secure VPN support for secured connectivity.

Redundancy and reliability

Wireless Protocol Gateway ARP600 offers redundancy against network breakdowns and remote VPN endpoint breakdowns. This allows the overall system to achieve high availability numbers. These functionalities added to high reliability of both the hardware and software make very robust system suitable in harsh and demanding industrial environments.

Remote management

Wireless Protocol Gateway ARP600 can be managed remotely and it is easy to move configurations between units.

1.3 Packaging information

The product package should contain the following items:

- 3-pin power connector
- Antenna
- Quick Start Guide
- Wireless Protocol Gateway ARP600

1.4 Related documentation

<table>
<thead>
<tr>
<th>Name of the document</th>
<th>Description</th>
<th>Document ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARG600 User Manual</td>
<td>Single SIM Variants</td>
<td>1MRS758456</td>
</tr>
<tr>
<td>Name of the document</td>
<td>Description</td>
<td>Document ID</td>
</tr>
<tr>
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<td>-----------------------------------------------------------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>ARG600 User Manual Dual SIM Variants</td>
<td></td>
<td>1MRS758460</td>
</tr>
<tr>
<td>ARP600 User Manual Single SIM Variants</td>
<td></td>
<td>1MRS758457</td>
</tr>
<tr>
<td>ARR600 User Manual</td>
<td></td>
<td>1MRS758458</td>
</tr>
<tr>
<td>3G/LTE configuration guide Technical Note</td>
<td>Configuring Wireless Gateways, Controllers and M2M Gateway</td>
<td>1MRS758449</td>
</tr>
<tr>
<td>OpenVPN server in Wireless Gateway/ Controller Technical Note</td>
<td>Configuring and using a static key OpenVPN server/client in Wireless Gateway and Controller products</td>
<td>1MRS758450</td>
</tr>
<tr>
<td>3G/LTE Wireless Gateway firmware update Technical Note</td>
<td>Updating firmware of Wireless Gateway devices</td>
<td>1MRS758451</td>
</tr>
</tbody>
</table>
2 Hardware description

This section describes the physical interfaces on the device.

2.1 Front panel

The device’s front panel is shown in the figure below.

Figure 1. Front Panel

1. Reset button (Power switch and reset button on page 12)
2. Error LED (section LEDs on page 7)
3. Ethernet WAN port (section Ethernet WAN on page 8)
4. Ethernet LAN ports (section Ethernet LAN)
5. LEDs (section LEDs on page 7)
6. Serial console port (section Serial console port on page 9)
7. SIM card slots (section SIM card slots on page 9)

2.2 Back Panel

The back panel is shown below.

Figure 2. Back Panel

Connectors (from left to right):
2.3 LEDs

2.3.1 Status LEDs

The device has 11 status LEDs. They are located on the front panel (see section Front panel).

<table>
<thead>
<tr>
<th>LED number</th>
<th>LED</th>
<th>LED status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ERR</td>
<td>On</td>
<td>Unit is restarting. LED should turn off after restart (usually about 30 seconds)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blinking</td>
<td>Error with power supply. Device restarts constantly.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off</td>
<td>Device is operating normally</td>
</tr>
<tr>
<td>2</td>
<td>RUN</td>
<td>Blinking</td>
<td>Device is operating normally</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off</td>
<td>If the unit is turned on and RUN led is not blinking, the system has caught an error and is waiting for restart. The unit should restart soon.</td>
</tr>
<tr>
<td>3</td>
<td>VPN</td>
<td>On</td>
<td>VPN connection is up</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blinking</td>
<td>VPN connection is starting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off</td>
<td>VPN connection is disabled</td>
</tr>
<tr>
<td>4</td>
<td>FW</td>
<td>-</td>
<td>Reserved for future use</td>
</tr>
<tr>
<td>5</td>
<td>SIM</td>
<td>On</td>
<td>SIM card has been initialized and it is ready for use</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blinking</td>
<td>SIM card initialization is in progress</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off</td>
<td>SIM card is not in used</td>
</tr>
<tr>
<td>6</td>
<td>SIG</td>
<td>On</td>
<td>Signal level is normal or good</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blinking</td>
<td>Signal level is weak</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off</td>
<td>There is no signal</td>
</tr>
<tr>
<td>7</td>
<td>COM</td>
<td>On</td>
<td>Cellular network (Wireless WAN) connection is up</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blinking</td>
<td>Cellular connection is starting. If the connection is not coming up, check the SIM and SIG LEDs</td>
</tr>
</tbody>
</table>
### 2.3.2 Ethernet LEDs

All Ethernet ports have two LEDs to indicate the ports link and activity status.

**Table 1: Ethernet LED description**

<table>
<thead>
<tr>
<th>LED number</th>
<th>LED</th>
<th>LED status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>APP</td>
<td>Off</td>
<td>Reserved for future use</td>
</tr>
<tr>
<td>9</td>
<td>USR</td>
<td>Off</td>
<td>Reserved for future use</td>
</tr>
<tr>
<td>10</td>
<td>RS1</td>
<td>Off</td>
<td>Reserved for future use</td>
</tr>
<tr>
<td>10</td>
<td>RS2</td>
<td>Off</td>
<td>Reserved for future use</td>
</tr>
</tbody>
</table>

### 2.4 Networking

#### 2.4.1 Mobile WAN

The device has a high speed wireless functionality which allows the use of bandwidth demanding wireless applications.

#### 2.4.2 Ethernet WAN

The device has one physical port for Ethernet WAN. Specifications are shown in the table below.

**Table 2: Ethernet WAN specifications**

<table>
<thead>
<tr>
<th>Connector</th>
<th>Number of ports</th>
<th>Speed</th>
<th>Duplex</th>
<th>Auto-negotiation</th>
<th>Recommended cabling</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>10Base-T, 100Base-TX</td>
<td>Half and Full</td>
<td>Yes</td>
<td>Cat5 or better</td>
</tr>
</tbody>
</table>

**Figure 3. Connector**
If Ethernet WAN interface is directly connected to computer, crossover cable must be used. Ethernet WAN interface does not support automatic MDI/MDIX detection.

2.4.3 Ethernet LAN

The device has three physical ports for Ethernet LAN. These ports are connected to a common switch. Specifications are shown in the table below.

Table 3: Ethernet LAN Specifications

<table>
<thead>
<tr>
<th>Speed</th>
<th>10Base-T, 100Base-TX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duplex</td>
<td>Half and Full</td>
</tr>
<tr>
<td>Auto-negotiation</td>
<td>Yes</td>
</tr>
<tr>
<td>Recommended cabling</td>
<td>Cat5 or better</td>
</tr>
</tbody>
</table>

If Ethernet LAN interface is directly connected to computer, both crossover and straight cables can be used. Ethernet LAN interface supports automatic MDI/MDIX detection.

2.5 Serial ports

The device has two application serial ports and one serial console port. The application serial ports have the following differences:

- Serial port 1 is configurable to multiple serial formats (RS-232/422/485).
- Serial port 2 supports only RS-232 data mode.

The serial port connectors are 9-pin D-sub (male) connectors. Serial ports enact as DTE devices.

2.5.1 Serial console port

Serial console connector is located in the device’s front panel. The connector type is RJ45. The connector is described in the table below.

Table 4: Serial console

Table 5: Connector pinout

<table>
<thead>
<tr>
<th>Pin</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CTS</td>
</tr>
<tr>
<td>2</td>
<td>DSR</td>
</tr>
<tr>
<td>3</td>
<td>RXD</td>
</tr>
<tr>
<td>4</td>
<td>GND</td>
</tr>
<tr>
<td>5</td>
<td>GND</td>
</tr>
<tr>
<td>6</td>
<td>TXD</td>
</tr>
<tr>
<td>7</td>
<td>DTR</td>
</tr>
</tbody>
</table>

Table 6: Serial port configuration

<table>
<thead>
<tr>
<th>Baud rate</th>
<th>115200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data bits</td>
<td>8</td>
</tr>
<tr>
<td>Parity</td>
<td>No parity</td>
</tr>
<tr>
<td>Stop bits</td>
<td>1</td>
</tr>
<tr>
<td>Flow control</td>
<td>No flow control</td>
</tr>
</tbody>
</table>
Console port can be connected from a PC by using a Cisco compatible serial console cable.

To open serial console access a terminal program is needed. Recommended terminal programs are Tera Term and Putty. Open the connection using Ethernet LAN settings.

2.5.2 Serial port 1

Serial port 1 is configurable to multiple serial formats (RS-232/422/485).

Table 7: Serial port 1

<table>
<thead>
<tr>
<th>Pin</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>RTS</td>
</tr>
</tbody>
</table>

Figure 5. Connector diagram

<table>
<thead>
<tr>
<th>Pin</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DCD</td>
</tr>
<tr>
<td>2</td>
<td>RXD</td>
</tr>
<tr>
<td>3</td>
<td>TXD</td>
</tr>
<tr>
<td>4</td>
<td>DTR</td>
</tr>
<tr>
<td>5</td>
<td>GND</td>
</tr>
<tr>
<td>6</td>
<td>DSR</td>
</tr>
<tr>
<td>7</td>
<td>RTS</td>
</tr>
<tr>
<td>8</td>
<td>CTS</td>
</tr>
<tr>
<td>9</td>
<td>RI</td>
</tr>
</tbody>
</table>

Table 8: Connector pinout (RS-232 mode)

<table>
<thead>
<tr>
<th>Pin</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DCD</td>
</tr>
<tr>
<td>2</td>
<td>RXD</td>
</tr>
<tr>
<td>3</td>
<td>TXD</td>
</tr>
<tr>
<td>4</td>
<td>DTR</td>
</tr>
<tr>
<td>5</td>
<td>GND</td>
</tr>
<tr>
<td>6</td>
<td>DSR</td>
</tr>
<tr>
<td>7</td>
<td>RTS</td>
</tr>
<tr>
<td>8</td>
<td>CTS</td>
</tr>
<tr>
<td>9</td>
<td>RI</td>
</tr>
</tbody>
</table>

Table 9: Serial port configuration

<table>
<thead>
<tr>
<th>Baud rate</th>
<th>115 - 230400</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data bits</td>
<td>8</td>
</tr>
<tr>
<td>Parity</td>
<td>No parity</td>
</tr>
<tr>
<td>Stop bits</td>
<td>1</td>
</tr>
<tr>
<td>Flow control</td>
<td>CTS/RTS</td>
</tr>
</tbody>
</table>

DIP switch configuration for serial port 1 is described in table 12. By default all are set to "0" position (RS-232 mode). DIP switches 2-4 apply only when port is set in RS-485 mode (DIP switch 1 on "1" position).

Table 10: Serial port 1 DIP switches

<table>
<thead>
<tr>
<th>Number</th>
<th>Function</th>
<th>State</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RS-232 / RS-485</td>
<td>0 = RS-232, 1 = RS-485</td>
<td>Selects serial port operation mode</td>
</tr>
<tr>
<td>2</td>
<td>FULL / HALF</td>
<td>0 = FULL, 1 = HALF</td>
<td>Selects between half (2-wire) and full duplex (4-wire)</td>
</tr>
<tr>
<td>3</td>
<td>BIAS</td>
<td>0 = OFF, 1 = ON</td>
<td>RS-485 biasing</td>
</tr>
</tbody>
</table>
Serial port pinouts in RS-422 and RS-485 modes are described in the table below.

**Table 11: Serial port 1 pinouts in RS-422/485 modes**

<table>
<thead>
<tr>
<th>Pin</th>
<th>RS-485 full-duplex (4-wire)</th>
<th>RS-485 half-duplex (2-wire)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>RXD+ (in)</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>TXD- (out)</td>
<td>TXD/RXD- (out/in)</td>
</tr>
<tr>
<td>4</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>GND</td>
<td>GND</td>
</tr>
<tr>
<td>6</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>7</td>
<td>TXD+ (out)</td>
<td>TXD/RXD+ (out/in)</td>
</tr>
<tr>
<td>8</td>
<td>RXD- (in)</td>
<td>-</td>
</tr>
<tr>
<td>9</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Note!**
Make sure that RS-422 or RS-485 cables are not connected to a serial port configured to RS-232 mode. This can damage the port and the connected equipment.

### 2.5.3 Serial port 2

**Table 12: Serial port 2**

![Connector diagram](image)

**Table 13: Connector pinout**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DCD</td>
</tr>
<tr>
<td>2</td>
<td>RXD</td>
</tr>
<tr>
<td>3</td>
<td>TXD</td>
</tr>
<tr>
<td>4</td>
<td>DTR</td>
</tr>
<tr>
<td>5</td>
<td>GND</td>
</tr>
<tr>
<td>6</td>
<td>DSR</td>
</tr>
<tr>
<td>7</td>
<td>RTS</td>
</tr>
<tr>
<td>8</td>
<td>CTS</td>
</tr>
</tbody>
</table>

**Table 14: Serial port configuration**

<table>
<thead>
<tr>
<th>Baud rate</th>
<th>115 - 230400</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data bits</td>
<td>8</td>
</tr>
<tr>
<td>Parity</td>
<td>No parity</td>
</tr>
<tr>
<td>Stop bits</td>
<td>1</td>
</tr>
<tr>
<td>Flow control</td>
<td>No flow control</td>
</tr>
</tbody>
</table>
Serial port 2 supports only RS-232 data mode.

2.6 Power switch and reset button

Power switch is located on the back panel. It turns the unit on and off.

Reset button is located on the front panel. Press shortly to reset the unit. Reset button can be used to restore factory default settings. To restore factory default settings, reset the unit by keeping the reset button pressed down until all the status LEDs blink. This indicates the factory presets have been applied.

2.7 Power connector

The device has a 3-pin power connector. Pinout and voltage limits are described in the table below. Supplied plug type is Phoenix Contact MC 1,5 / 3-STF-3,5 with screw fastening.

Table 15: Power supply connector

<table>
<thead>
<tr>
<th>Pin</th>
<th>Symbol</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+</td>
<td>Voltage in, positive / 12 ... 36 VDC, 400 mA</td>
</tr>
<tr>
<td>2</td>
<td>-</td>
<td>Voltage in, negative</td>
</tr>
<tr>
<td>3</td>
<td>GND</td>
<td>Extra ground connection</td>
</tr>
</tbody>
</table>

The device can be also used with 2-pin power connector, pin 3 left unconnected. The unit is protected against reversed polarity within the limits of the specified voltages.

2.8 Antenna connector

The device has a FME antenna connector (male type) for an external antenna. It is possible to use any kind of external 50 Ω quad-band antenna.
2.9 SIM card slots

<table>
<thead>
<tr>
<th>Note!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do not insert or remove the SIM card while the device is in operation. The SIM card contents may become corrupted if the card is removed while data is being written to it.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Note!</th>
</tr>
</thead>
<tbody>
<tr>
<td>If the SIM card requires a PIN code, do not install the SIM card before you set up the device's PIN code settings. The SIM card may become locked if the settings are not made first.</td>
</tr>
</tbody>
</table>

The device's wireless connection requires SIM card with data transfer service enabled. The device can use two SIM cards, which can be used to make connection to two different operators. The device can be operated using only one SIM card.

To operate with SIM card follow the procedure below:
1. Power off the device.
2. The SIM card holder contains a tray with a yellow eject button. Push this button to eject the tray from the holder.
3. Put the SIM card onto the tray.
4. Insert the tray carefully back to the holder and press the tray until it is locked.

If two SIM cards are used, repeat the procedure for SIM slot 2.

2.10 DIN rail mounting

The device has mounting holes for optional DIN rail mounting brackets. The order code for DIN rail mounting kit is 2RCA028233 (DIN rail clips set consisting of a plastic clip and screws).

Mounting instructions:
1. Required tools and accessories are: DIN rail mounting kit (2 mounting brackets and 4 screws), screw driver.
2. Use the screw driver to attach the screws to the bottom panel of the device. DIN rail brackets are installed to either diagonally or horizontally depending on the wanted DIN rail installation angle.

2.11 Product label

Product label is on the bottom of the device and it contains the basic information about the unit such as product name, serial number and Ethernet MAC address.
3 Quick Installation

This chapter describes how to configure the WAN network interfaces on the device.

3.1 Connection Principle

The device has three configurable network interfaces, Ethernet WAN or Ethernet LAN for a cable network, and Mobile WAN (3G) for wireless communication. The WAN interfaces are used for connecting the device to public Internet or private APN. Ethernet LAN is used for connecting other Ethernet devices to the device's local network.

The WAN interfaces can be configured to get redundant system where one WAN automatically gets traffic if the other one goes down. For example, if the primary Ethernet connection goes down, the traffic is automatically switched to mobile WAN (secondary connection) and back when the Ethernet interface comes up again. This way the availability of the remote system is better than with just one interface.

3.2 Connecting cables

1. Verify that the power switch is in the OFF position.
2. Connect the Ethernet cable between the device (Ethernet LAN connector) and the computer used for the configuration.
3. Connect power supply to the device and toggle the power switch to ON position.
4. The error LED should turn on immediately after the power switch is turned on.
5. After the system has initialized, the Error LED turns off and the function LED starts to blink.

3.3 Logging in

This section describes how to log in to the device using web configuration menu.
1. Configure the computer to use the same IP address space as the device (laptop IP for example 10.10.10.11 with netmask 255.0.0.0). Check with ping command.

2. Connect to the device using the web browser. The default IP address of device is 10.10.10.10 (netmask 255.0.0.0). Please make sure to connect to a HTTPS port (see the figure below).

*Figure 8. Browser https example*

![Browser https example](image)

**Note!**
You can ignore the browser’s warning about a self-signed certificate.

3. Enter the username and password and press **Login** button in the log-in screen. The actual screen depends on the used web browser.

**Note!**
Default username is **arctic-adm** and default password is **arcticm2m**. It is recommended that the default password is changed before the product is connected to a public network.

4. White texts on the blue background on the left are the primary navigation texts and they are always visible on the screen. Individual screens may have their own tabs which split the configuration fields on larger screens.

*Figure 9. Configuration menu*

3.4 Configuring Ethernet LAN

1. Select **Network > Ethernet LAN** from the left menu.
2. Enter the preferred configuration to the configuration fields.
3. Press **Submit** button on the bottom to save the settings.
4. Select **Tools > Reboot** from the left menu and press **Reboot** button to restart the unit
   If the IP addresses are changed, the existing web browser connection hangs up once the settings are applied, so open a new connection to the new IP address (check the Ethernet cabling)
5. Connect to the device with a new IP address.
3.5 Configuring Mobile WAN (cellular network interface)

The Mobile WAN interface is used for connecting the device to a cellular network. The device can use a GPRS (2G), UMTS (3G) or LTE (4G) cellular network connection depending on the product model.

Install the SIM card before configuring the Mobile WAN. See Back Panel Description for the location of the SIM card slot.

1. Select **Network > Mobile WAN** from the left menu.
2. Enter the preferred configuration to the configuration fields.
3. Press **Submit** on the bottom to save the settings.

3.6 Configuring default gateway

1. Select **Network WAN Failover** from the left menu.
2. Set "WAN Default Route"="Yes". This has to be enabled to use either WAN as default route interface.
3. If the mobile WAN has to be set as a default gateway, set "Primary WAN Interface"="Mobile WAN".
   This is a typical setting.
4. If Ethernet WAN has to be set as a default gateway:
   a) Select **Network > Ethernet port settings > WAN**.
   b) Set "Primary WAN Interface"="Ethernet WAN"
5. If both Ethernet WAN and Mobile WAN configured, define the Backup WAN Interface. If the primary WAN interface comes down, the device automatically switches default route to backup WAN interface. The figure below shows example configuration where Ethernet WAN is configured as default route.

   **Figure 10. Ethernet WAN default route example**

   ![Configuration Table]

6. Press **Submit** on the bottom to save the settings.
7. Select **Tools > Reboot** from the left menu and press **Reboot** button to restart the unit.
4 Network Configuration

This chapter describes how to configure network interfaces.

4.1 Configuration screens

The web user interface has a navigation menu that is always visible on the left pane. In the menu, the items are grouped together in sections such as System, Network, VPN and Firewall.

4.1.1 Host and domain names

Host and domain names can be set from the System General Settings screen.

Figure 11. General Settings

4.1.2 Ethernet WAN

This screen configures the Ethernet WAN interface on the device.

Figure 12. Ethernet WAN configuration

Connectivity Monitor settings are used when WAN redundancy functionality is required. Monitor keeps checking the connection to the given remote host to determine the network status. If the ping does not get an answer for a given time window, it informs the WAN switch logic to try the secondary interface.

If the WAN redundancy is implemented by using two separated Ethernet connections with different gateways, the Backup Gateway parameter needs
to be configured towards the correct backup gateway. Backup Gateway parameter is not needed if WAN redundancy is implemented with wireless connection.

See section **WAN Failover and backup routing settings** on page 19 for more details about WAN redundancy.

### 4.1.3 Mobile WAN

The mobile WAN screen configures the Mobile WAN interface on the device. The configuration screen fields are described below.

<table>
<thead>
<tr>
<th>PIN code</th>
<th>The 2G/3G/LTE cellular networks use a SIM card. The SIM card can be protected by PIN code (personal identification number). If the PIN code is used, it must be entered to device Mobile WAN settings. Leave the PIN code field empty if no PIN code is used. If a wrong PIN code is entered, correct the code and enter the correct PIN code to the SIM by using a mobile phone.</th>
</tr>
</thead>
<tbody>
<tr>
<td>APN Type</td>
<td>By default automatic APN discovery is used. The device tries default APN values based on network ID received from cellular network. If automatic settings do not work, set to APN Type parameter from Automatic to Manual.</td>
</tr>
<tr>
<td>APN</td>
<td>The APN parameter defines the cellular access point name. If APN Type is set to Manual the access point works as a gateway from the cellular network to internet. There are public and private access points. A public access point is usually defined. A private access point requires contract with a cellular operator. Define the access point name as according to information received from the cellular operator.</td>
</tr>
<tr>
<td>Authentication, username, password</td>
<td>If the cellular network requires authentication for using the access point, the access point’s username and password need to be defined in the device. In this case, select the authentication type (PAP, password authentication protocol or CHAP, challenge handshake authentication protocol) as according to information received from the cellular operator.</td>
</tr>
<tr>
<td>DNS selection, DNS servers</td>
<td>Allows user defined DNS servers, receiving DNS server IP addresses from cellular network or leaving DNS configuration as disabled. The DNS servers are used for resolving names to IP addresses.</td>
</tr>
</tbody>
</table>
To configure the mobile WAN, enable the connection by selecting "Enable"="Yes" on the top of the page and enter PIN code if set, APN name and authentication details if needed.

If the device acts as a wireless router to Ethernet devices and DNS is needed, enter DNS configuration as well. When ready, press the Submit button on the bottom of the page to save settings.

The device needs to be restarted before the mobile WAN configuration is active.

### 4.1.4 WAN Failover and backup routing settings

WAN Failover screen configures the default gateway settings on the device.

**Figure 13. WAN Failover configuration**

<table>
<thead>
<tr>
<th>General Settings</th>
<th></th>
<th>Usually &quot;Yes&quot; if default route is defined by Static Routing select &quot;No&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>WAN Default Route</td>
<td>&quot;Yes&quot;</td>
<td>Select &quot;Yes&quot; to activate the Mobile WAN interface only when required. Select &quot;No&quot; to have all the WAN interfaces to be available simultaneously for e.g. VPNs.</td>
</tr>
<tr>
<td>Mobile WAN On Demand</td>
<td>&quot;No&quot;</td>
<td>How often the availability of higher priority WAN is checked when using lower priority WAN. Leave empty to try only when lower priority terminates.</td>
</tr>
<tr>
<td>Force WAN restart</td>
<td>&quot;Yes&quot;</td>
<td>Restart VPN when WAN interface changes.</td>
</tr>
<tr>
<td>Recovery Interval</td>
<td></td>
<td>How many seconds the higher priority WAN must be unavailable before starting to use it again (empty: 60 seconds)</td>
</tr>
<tr>
<td>Recovery Hysteresis</td>
<td>[seconds]</td>
<td>How many seconds the higher priority WAN must be unavailable before starting to use it again (empty: 60 seconds)</td>
</tr>
</tbody>
</table>

**Primary WAN**

- **Mobile WAN**
  - Select the primary WAN interface

**Backup WAN**

- **Interface**
  - None (disabled)
  - Select the backup WAN interface

**Secondary Backup WAN**

- **Interface**
  - None (disabled)
  - Select the second backup WAN interface

To enable any default routes, set "WAN Default Route"="Yes". Any route settings are not effective if this parameter is not enabled.

Set "On Demand"="Yes" if the backup WAN interface to come up only when primary interface goes down. Disable if both wireless and wired WAN interfaces have to be up all the time.

### 4.1.5 Ethernet LAN

This screen configures the Ethernet LAN interface on the device.

**Figure 14. Ethernet LAN Configuration**

**Network monitor**

This screen configures the interface connectivity monitor on the device.
4.2 Routing

4.2.1 Routing parameters

There are multiple configuration options that define the routing on the device:

- **Ethernet WAN - Gateway (IP address)**
  - IP address of router used to reach the internet. Leave empty if unused.

- **Ethernet WAN - Backup Gateway (IP address)**
  - IP address of backup router used to reach the internet. Leave empty if unused.

- **WAN Failover - WAN Default Route (selection: Yes/No)**
  - Usually "Yes" if default route is defined by "static routes". If the selection logic is done on VPN level select "No".

- **WAN Failover - On Demand (selection: Yes/No)**
  - Select "Yes" to activate the backup interfaces only when required. Select "No" to have all the WAN interfaces to be available simultaneously for e.g. VPNs.

- **WAN Failover - Primary WAN Interface (selection: None/Mobile WAN/ Ethernet WAN/Ethernet WAN Secondary)**

- **WAN Failover - Backup WAN Interface (selection: None/Mobile WAN/ Ethernet WAN/Ethernet WAN Secondary)**
4.2.2 Default route

Default route can be configured from WAN Failover screen. See section WAN Failover and backup routing settings on page 19.

4.2.3 WAN redundancy/failover

To configure redundancy between WAN interfaces, configure multiple WAN interfaces to WAN Failover. See section WAN Failover and backup routing settings on page 19.

4.2.4 Routing serial <-> Ethernet

See section Serial Port Configuration on page 23.

4.3 Network services

4.3.1 DNS proxy

To use this feature, configure the device to use the device's Ethernet LAN IP address as its DNS server. This way, the DNS queries from the device get routed through the device.

4.4 Network status information

4.4.1 System status screen

Network status information can be seen from System > Status screen.
4.4.2 Mobile WAN status LEDs

Status of mobile WAN interface can be viewed from the front panel LEDs. The initialization sequence is:

1. COM LED starts to blink when the connection is started.
2. SIM LED starts to blink when SIM card is searched and turns on when the card is found and PIN code accepted.
3. SIM LED starts to blink when the operator network is searched and gets lit when the network is found.
4. COM LED gets lit when the connection is up.

4.4.3 Modem info screen

In troubleshooting situations, checking the system logs helps to identify the problem. Also modem info page (Tools > Modem info) can be used to check the status of the wireless modem.
5 Serial Port Configuration

5.1 Configuring serial gateway

This section describes how to configure serial <-> IP functionality.

The serial gateway feature enables data from the serial port attached device to be routed to Ethernet/mobile network (serial over IP) and vice versa. Serial gateway processes the transmitted data transparently and does not alter it any way except for buffering it for transmission. Because of the transparent communication, any protocols can be used in actual communication between nodes.

*Figure 17. Serial gateway configuration screen*

Serial gateway configuration depends on used protocols.

Both serial ports have their own configuration screens, located in Applications->Serial Gateway (RS1) and Applications->Serial Gateway (RS2).
6 Additional System Configuration

6.1 Changing system password

Username and password can be changed from **Tools > User Config** screen. It is always recommended to change the password from the factory default when the device is connected to a public network.

*Figure 18. User Config screen*

6.2 Date and time

Date and time can be changed from **System > Time** screen. Date and time can be configured either manually entering the time or automatically from connected PC.

*Figure 19. System time configuration screen, automatic setting*

*Figure 20. Manual setting*

To set time manually, enter the time and then press Submit button.

To copy time from PC, press Copy PC button and answer "Yes" to question about changing time. Note that the PC may not necessarily have correct time set and that needs validation. Also note that the copy functionality requires JavaScript support from the browser.
6.3 System log

System log is visible on the Tools > System Log screen. To refresh the system log, use web browser reload button.

6.4 Factory default settings

Factory default settings can be applied by restarting the unit pressing down reset button until the LEDs blink.

6.5 Firmware update

Create a backup of the current configuration starting the firmware update. Current running firmware version can be viewed from the System > Status screen. The device's firmware can be updated in the Tools > Firmware Update screen.

*Figure 21. Firmware update screen*

1. Verify for a valid firmware on the PC before attempting to update the firmware.
2. Select Select file button to open file browsing dialog. The actual dialog depends on the used browser.
3. Select the updated firmware from the file dialog and return to the firmware update screen.
4. Press Update button to start the firmware update.
5. Confirm the update.
   The update takes a few minutes.
6. Once the update is finished, restart the device.

6.6 Configuration profiles

Profiles can be configured and saved for future use. Several profiles are created and selected for the activation. It is possible to import, export and clone profiles, and also reset them to factory default settings.
**Figure 22. Configuration profiles**

### Tools: Configuration Profiles

<table>
<thead>
<tr>
<th>Configuration Profiles</th>
<th>Name</th>
<th>MD5 Checksum</th>
<th>Last Modified</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device Configuration</td>
<td></td>
<td>653f53026d50c25a16322fc6678a900</td>
<td>2011-08-23 13:34:04</td>
<td>Rename, View, Export, Clone, Delete</td>
</tr>
<tr>
<td>Example-Arctic-3G-Gateway</td>
<td>762f5a181b413c041f5a8df9594f9</td>
<td>2011-08-23 13:42:16</td>
<td>Rename, View, Export, Clone</td>
<td></td>
</tr>
<tr>
<td>Last Boot</td>
<td>762f5a181b413c041f5a8df9594f9</td>
<td>2011-08-23 13:42:16</td>
<td>View, Export, Clone</td>
<td></td>
</tr>
<tr>
<td>Factory Default Settings</td>
<td>14d27a2713a39e16027709640f9078</td>
<td></td>
<td>View, Export, Clone</td>
<td></td>
</tr>
</tbody>
</table>

**Actions:**
- Create a new profile
- Import a profile from an XML file
- Reset a profile to factory defaults
7 IEC-104 application settings

The IEC-104 and IEC-101 protocols share the same ASDU level messaging but differ on the link level. The IEC-104 is intended for packet-switched TCP/IP communication whereas the IEC-101 is intended for serial communication. By using the device, the IEC-101 slaves (e.g. RTUs) can be connected to a IEC-104 master (e.g. SCADA). The device requests event from the IEC-101 slave locally and sends them to the IEC-104 master. This eliminates the need to continuously poll the data remotely and therefore reduces the communication costs on pay-per-use wireless network. This approach also eliminates the IEC-101 parameter adjutancy problems caused by variable round-trip delays on wireless networks and makes the information exchange faster and more reliable.

You can view and change the application settings in Serial Port and I/O > IEC-104 Gateway (RSx).

Figure 23. IEC-104 Application Settings

<table>
<thead>
<tr>
<th>System</th>
<th>IEC-104 Gateway settings (RS1).</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Enable IEC-104 gateway</td>
</tr>
<tr>
<td></td>
<td>Serial port</td>
</tr>
<tr>
<td></td>
<td>Speed</td>
</tr>
<tr>
<td></td>
<td>Data bits</td>
</tr>
<tr>
<td></td>
<td>Parity</td>
</tr>
<tr>
<td></td>
<td>Stop bits</td>
</tr>
<tr>
<td></td>
<td>Use RX flow control</td>
</tr>
<tr>
<td>Network</td>
<td>TCP</td>
</tr>
<tr>
<td>Network</td>
<td>network port to listen</td>
</tr>
<tr>
<td>Network</td>
<td>New connection priority</td>
</tr>
<tr>
<td>Network</td>
<td>Max clients</td>
</tr>
<tr>
<td>IEC-104</td>
<td>TX window size (k)</td>
</tr>
<tr>
<td>IEC-104</td>
<td>RX window size (v)</td>
</tr>
<tr>
<td>IEC-104</td>
<td>I frames TX timeout (t)</td>
</tr>
<tr>
<td>IEC-104</td>
<td>I frames RX timeout (t0)</td>
</tr>
<tr>
<td>IEC-104</td>
<td>Link level interval (t3)</td>
</tr>
<tr>
<td>IEC-104</td>
<td>Test link on suspended state</td>
</tr>
<tr>
<td>IEC-104</td>
<td>Suspended timeout</td>
</tr>
<tr>
<td>IEC-104</td>
<td>Max sequence number (Seq-max)</td>
</tr>
<tr>
<td>IEC-104</td>
<td>Flush buffer events on connection</td>
</tr>
<tr>
<td>IEC-104</td>
<td>Cause of transmission length</td>
</tr>
<tr>
<td>IEC-104</td>
<td>Common address length</td>
</tr>
<tr>
<td>IEC-104</td>
<td>Info object address length</td>
</tr>
</tbody>
</table>

7.1 General settings

IEC-104 gateway enabled

Enables or disables IEC-104 to IEC-101 gateway functionality.
Table 16: IEC-104 gateway enabled

<table>
<thead>
<tr>
<th>IEC-104 gateway enabled</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Boolean</td>
</tr>
<tr>
<td>Units</td>
<td>N/A</td>
</tr>
<tr>
<td>Value range</td>
<td>No, Yes</td>
</tr>
<tr>
<td>Note</td>
<td></td>
</tr>
</tbody>
</table>

7.2 Serial settings

The serial settings define the properties of physical serial communication between the device and an IEC-101 slave. The selection between RS-232/422/485 is done with physical DIP switches located below the RS2 serial port.

Figure 24. Serial Settings

<table>
<thead>
<tr>
<th>Serial settings</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed (bps)</td>
<td>9600</td>
</tr>
<tr>
<td>Data bits</td>
<td>8</td>
</tr>
<tr>
<td>Parity</td>
<td>Even</td>
</tr>
<tr>
<td>Stop bits</td>
<td>1</td>
</tr>
<tr>
<td>Use HW flow control</td>
<td>No</td>
</tr>
</tbody>
</table>

Speed (bps)

Table 17: IEC-101 serial communication speed (bps)

<table>
<thead>
<tr>
<th>IEC-101 serial communication speed (bps)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Serial speed</td>
</tr>
<tr>
<td>Units</td>
<td>Bits per second</td>
</tr>
<tr>
<td>Value range</td>
<td>1200, 2400, 4800, 9600, 19200, 38400, 57600</td>
</tr>
<tr>
<td>Note</td>
<td></td>
</tr>
</tbody>
</table>

Data bits

Table 18: Number of data bits used on IEC-101 serial communication

<table>
<thead>
<tr>
<th>Number of data bits used on IEC-101 serial communication</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Serial data bits</td>
</tr>
<tr>
<td>Units</td>
<td>Bits</td>
</tr>
<tr>
<td>Value range</td>
<td>5, 6, 7, 8</td>
</tr>
<tr>
<td>Note</td>
<td></td>
</tr>
</tbody>
</table>
Parity

Table 19: Parity method used on IEC-101 serial communication

<table>
<thead>
<tr>
<th>Parity method used on IEC-101 serial communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
</tr>
<tr>
<td>Units</td>
</tr>
<tr>
<td>Value range</td>
</tr>
</tbody>
</table>

Stop bits

Table 20: Number of stop bits used on IEC-101 serial communication

<table>
<thead>
<tr>
<th>Parity method used on IEC-101 serial communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
</tr>
<tr>
<td>Units</td>
</tr>
<tr>
<td>Value range</td>
</tr>
</tbody>
</table>

Use HW flow control

Table 21: Number of stop bits used on IEC-101 serial communication

<table>
<thead>
<tr>
<th>HW flow control mechanism (RTS/CTS) on IEC-101 serial communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
</tr>
<tr>
<td>Units</td>
</tr>
<tr>
<td>Value range</td>
</tr>
<tr>
<td>Note</td>
</tr>
</tbody>
</table>

7.3 Network settings

The Network settings define the general TCP/IP networking properties between the device and the IEC-104 master.

Figure 25. Network Settings

Network protocol

Network protocol defines the network transmission layer protocol (either TCP or UDP) used on IEC-104 network communication. The IEC-104 standard protocol uses TCP but for reliable slow speed packet switched networks (e.g. Mobitex), the UDP protocol can be used to minimize the packets transmitted over network.
### Table 22: Network protocol on IEC-104 communication

<table>
<thead>
<tr>
<th>Type</th>
<th>Network transmission layer protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units</td>
<td>N/A</td>
</tr>
<tr>
<td>Value range</td>
<td>UDP, TCP</td>
</tr>
<tr>
<td>Note</td>
<td>The IEC-104 standard specifies only TCP protocol.</td>
</tr>
</tbody>
</table>

### Network port to listen

### Table 23: TCP or UDP port to listen for incoming IEC-104 connections

<table>
<thead>
<tr>
<th>Type</th>
<th>Network port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units</td>
<td>Port number</td>
</tr>
<tr>
<td>Value range</td>
<td>0 - 65000</td>
</tr>
<tr>
<td>Note</td>
<td>The IEC-104 standard specifies TCP port 2404.</td>
</tr>
</tbody>
</table>

### Network idle timeout

It defines the idle timeout of the network connection in seconds. If there is no network data received during the specified interval, the connection is closed by the device. This parameter is required in order to detect partially closed connections and release the resources for new connections especially if the "New connection priority" parameter is disabled. Value 0 disables the network idle timeout detection.

### Table 24: Network idle timeout for IEC-104 connections

<table>
<thead>
<tr>
<th>Type</th>
<th>Timeout</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units</td>
<td>Seconds</td>
</tr>
<tr>
<td>Value range</td>
<td>0 – 65000</td>
</tr>
<tr>
<td>Note</td>
<td>The network idle timeout must be longer than IEC-104 link test interval (t3).</td>
</tr>
</tbody>
</table>

### New connection priority

It defines the action when a new connection request arrives while a connection is already active. If the set value is "No", the new connection is rejected. If the set value is "Yes", the present connection is terminated and the new connection is accepted.

### Table 25: New connection priority for IEC-104 connections

<table>
<thead>
<tr>
<th>Type</th>
<th>Boolean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units</td>
<td>N/A</td>
</tr>
</tbody>
</table>
New connection priority for IEC-104 connections

<table>
<thead>
<tr>
<th>Value range</th>
<th>No, Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Note</td>
<td>It is recommendable to set this value to “Yes” in normal configurations having only one IEC-104 master.</td>
</tr>
</tbody>
</table>

7.4 IEC-104 Settings

The IEC-104 settings define the properties of IEC-104 link layer and application layer parameters as described in the IEC 60870-5-104 standard. The IEC-104 communication is carried out between the device and the IEC-104 master over the TCP/IP network.

Figure 26. IEC-104 Settings

<table>
<thead>
<tr>
<th>IEC-104 settings</th>
<th>Value</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>TX window size (k)</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>RX window size (w)</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>I frames TX timeout (t1)</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>I frames RX timeout (t2)</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Link test interval (t3)</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>Test link on suspended state</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Suspended timeout</td>
<td>300</td>
<td></td>
</tr>
<tr>
<td>Max sequence number (0=def)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Flush buffered events on connection</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Cause of transmission length</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Common address length</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Info object address length</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

TX window size (k)

TX window size defines the maximum number of I format APDUs the device may send before requiring the IEC-104 master to acknowledge them. If there are \( k \) unacknowledged frames sent the device will stop polling IEC-101 slave for events until acknowledgement is received.

Table 26: IEC-104 TX windows size (k)

<table>
<thead>
<tr>
<th>IEC-104 TX windows size (k)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Window size</td>
</tr>
<tr>
<td>Units</td>
<td>Packets</td>
</tr>
<tr>
<td>Value range</td>
<td>1-20</td>
</tr>
<tr>
<td>Note</td>
<td>The ( k ) must be always less than the maximum sequence number defined below. The IEC-104 standard suggests ( k ) to be 12.</td>
</tr>
</tbody>
</table>

RX window size (w)

It defines the maximum number of I format APDUs the device may receive before sending acknowledgement to the IEC-104 master.
Table 27: IEC-104 RX windows size (w)

<table>
<thead>
<tr>
<th>IEC-104 RX windows size (w)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
</tr>
<tr>
<td><strong>Units</strong></td>
</tr>
<tr>
<td><strong>Value range</strong></td>
</tr>
<tr>
<td><strong>Note</strong></td>
</tr>
</tbody>
</table>

I frames TX timeout (t1)

It defines the timeout in seconds the device waits for acknowledgement from IEC-104 master after sending last I format APDU or control frame (e.g. link test). If no acknowledgement is received during the defined time the device will close the network connection and the IEC-101 link.

Table 28: IEC-104 I frames TX timeout (t1)

<table>
<thead>
<tr>
<th>IEC-104 I frames TX timeout (t1)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
</tr>
<tr>
<td><strong>Units</strong></td>
</tr>
<tr>
<td><strong>Value range</strong></td>
</tr>
<tr>
<td><strong>Note</strong></td>
</tr>
</tbody>
</table>

I frames RX timeout (t2)

This defines the timeout in seconds from the last received I format APDU before sending acknowledgement.

Table 29: IEC-104 I frames RX timeout (t2)

<table>
<thead>
<tr>
<th>IEC-104 I frames RX timeout (t2)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
</tr>
<tr>
<td><strong>Units</strong></td>
</tr>
<tr>
<td><strong>Value range</strong></td>
</tr>
<tr>
<td><strong>Note</strong></td>
</tr>
</tbody>
</table>

Link test interval (t3)

This defines the interval in seconds how often the IEC-104 link is tested if there is no other activity.

Table 30: IEC-104 link test interval (t3)

<table>
<thead>
<tr>
<th>IEC-104 link test interval (t3)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
</tr>
</tbody>
</table>
**IEC-104 link test interval (t3)**

<table>
<thead>
<tr>
<th>Units</th>
<th>Seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value range</td>
<td>1-65000</td>
</tr>
</tbody>
</table>

**Note**

Adjust this parameter according to the criticality of the link. The IEC-104 standard suggests 20 seconds but for pay-per-use GPRS connections the practical value may be substantially longer.

**Suspended timeout**

This defines the time in seconds how long a connected IEC-104 link can be in suspended state (STOPD) before the device closes the connection.

**Table 31: IEC-104 suspended timeout**

<table>
<thead>
<tr>
<th>Type</th>
<th>Timeout</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units</td>
<td>Seconds</td>
</tr>
<tr>
<td>Value range</td>
<td>1-65000</td>
</tr>
</tbody>
</table>

**Note**

Using this parameter increases the probability of detecting partially closed network connections especially in UDP mode.

**Max sequence number**

These are the maximum sequence number used in IEC-104 communication. The value zero selects the standard value 32767.

**Table 32: IEC-104 suspended timeout**

<table>
<thead>
<tr>
<th>Type</th>
<th>Sequence number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units</td>
<td>Packets</td>
</tr>
<tr>
<td>Value range</td>
<td>1-32767</td>
</tr>
</tbody>
</table>

**Note**

0 = 32767 as suggested by the IEC-104 standard.

**Cause of transmission length (IEC-104)**

It defines the length of IEC-104 Cause of transmission ASDU header field in bytes.

**Table 33: IEC-104 ASDU cause of transmission length**

<table>
<thead>
<tr>
<th>Type</th>
<th>Field length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units</td>
<td>Bytes</td>
</tr>
<tr>
<td>Value range</td>
<td>1-3</td>
</tr>
</tbody>
</table>

**Note**

The IEC-104 standard defines value 2.
Common address length (IEC-104)
This defines the length of IEC-104 Common address ASDU header field in bytes.

Table 34: IEC-104 ASDU common address length

<table>
<thead>
<tr>
<th>IEC-104 ASDU common address length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
</tr>
<tr>
<td>Units</td>
</tr>
<tr>
<td>Value range</td>
</tr>
<tr>
<td>Note</td>
</tr>
</tbody>
</table>

Info object address length (IEC-104)
This defines the length of IEC-104 Information object address ASDU header field in bytes.

Table 35: IEC-104 ASDU information object address length

<table>
<thead>
<tr>
<th>IEC-104 ASDU information object address length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
</tr>
<tr>
<td>Units</td>
</tr>
<tr>
<td>Value range</td>
</tr>
<tr>
<td>Note</td>
</tr>
</tbody>
</table>

7.5 IEC-101 settings
The IEC-101 settings define the properties of IEC-101 link layer and application layer parameters as described in the IEC 60870-5-101 standard. The IEC-101 communication is carried out between the device and a IEC-101 slave.

Figure 27. IEC-101 Settings
Slave link address (IEC-101)

Table 36: IEC-101 slave link address

<table>
<thead>
<tr>
<th>IEC-101 slave link address</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Link address</td>
</tr>
<tr>
<td>Units</td>
<td>N/A</td>
</tr>
<tr>
<td>Value range</td>
<td>1-65000</td>
</tr>
<tr>
<td>Note</td>
<td>The link-level address of IEC-101 slave.</td>
</tr>
</tbody>
</table>

Link address field length
Defines the length of the IEC-101 link-level address field in bytes.

Table 37: IEC-101 slave link address field length

<table>
<thead>
<tr>
<th>IEC-101 slave link address field length</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Field length</td>
</tr>
<tr>
<td>Units</td>
<td>Bytes</td>
</tr>
<tr>
<td>Value range</td>
<td>1, 2</td>
</tr>
<tr>
<td>Note</td>
<td>The link-level address of IEC-101 slave.</td>
</tr>
</tbody>
</table>

Event poll interval
It defines the IEC-101 event polling interval in 0.1 second increments (class 1 or 2 poll).

Table 38: IEC-101 event poll interval

<table>
<thead>
<tr>
<th>IEC-101 event poll interval</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Interval</td>
</tr>
<tr>
<td>Units</td>
<td>0.1 seconds</td>
</tr>
<tr>
<td>Value range</td>
<td>1-65000</td>
</tr>
<tr>
<td>Note</td>
<td>The events are polled only when the IEC-104 connection is active.</td>
</tr>
</tbody>
</table>

Link test interval
It defines the IEC-101 link test interval in 0.1 second increments. Link test is performed if there is no other activity.

Table 39: IEC-101 link test interval

<table>
<thead>
<tr>
<th>IEC-101 link test interval</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Interval</td>
</tr>
<tr>
<td>Units</td>
<td>0.1 seconds</td>
</tr>
<tr>
<td>Value range</td>
<td>1-65000</td>
</tr>
<tr>
<td>Note</td>
<td>The link test is performed if there is no other activity during defined interval.</td>
</tr>
</tbody>
</table>
Keep link open
Defines that the IEC-101 link is kept always open even when there is no active IEC-104 connection. If the functionality is enabled the device sends link test frames and restarts the IEC-101 link if the test fails. The events are still not polled before the IEC-104 connection is active.

Table 40: IEC-101 keep link open

<table>
<thead>
<tr>
<th>IEC-101 keep link open</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Boolean</td>
</tr>
<tr>
<td>Units</td>
<td>N/A</td>
</tr>
<tr>
<td>Value range</td>
<td>No, Yes</td>
</tr>
<tr>
<td>Note</td>
<td>Some IEC-101 slaves require the link to be continuously open in order to operate.</td>
</tr>
</tbody>
</table>

Reply header timeout
Defines the timeout the device waits the reply to start from IEC-101 slave after command or request.

Table 41: IEC-101 reply start timeout

<table>
<thead>
<tr>
<th>IEC-101 reply start timeout</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Timeout</td>
</tr>
<tr>
<td>Units</td>
<td>Milliseconds</td>
</tr>
<tr>
<td>Value range</td>
<td>1-65000</td>
</tr>
<tr>
<td>Note</td>
<td></td>
</tr>
</tbody>
</table>

Reply end timeout
Defines the maximum duration of IEC-101 slave response.

Table 42: IEC-101 reply end timeout

<table>
<thead>
<tr>
<th>IEC-101 reply end timeout</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Timeout</td>
</tr>
<tr>
<td>Units</td>
<td>Seconds</td>
</tr>
<tr>
<td>Value range</td>
<td>1-65000</td>
</tr>
<tr>
<td>Note</td>
<td></td>
</tr>
</tbody>
</table>

Retry limit
Defines the number of retries sent to a IEC-101 slave in case of no reply. If no reply is still received the device closes the IEC-101 and IEC-104 connections.

Table 43: IEC-101 retry limit

<table>
<thead>
<tr>
<th>IEC-101 retry limit</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Retry limit</td>
</tr>
</tbody>
</table>
### IEC-101 retry limit

<table>
<thead>
<tr>
<th>Units</th>
<th>Retries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value range</td>
<td>0-65000</td>
</tr>
</tbody>
</table>

#### Cause of transmission length (IEC-101)

Defines the length of IEC-101 Cause of transmission ASDU header field in bytes.

**Table 44: IEC-101 ASDU cause of transmission length**

<table>
<thead>
<tr>
<th>IEC-101 ASDU cause of transmission length</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
</tr>
<tr>
<td>Units</td>
</tr>
<tr>
<td>Value range</td>
</tr>
<tr>
<td>Note</td>
</tr>
</tbody>
</table>

#### Common address length (IEC-101)

Defines the length of the IEC-101 Common address ASDU header field in bytes.

**Table 45: IEC-101 ASDU common address length**

<table>
<thead>
<tr>
<th>IEC-101 ASDU common address length</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
</tr>
<tr>
<td>Units</td>
</tr>
<tr>
<td>Value range</td>
</tr>
<tr>
<td>Note</td>
</tr>
</tbody>
</table>

#### Info object address length (IEC-101)

Defines the length of IEC-101 Information object address ASDU header field in bytes.

**Table 46: IEC-101 ASDU information object address length**

<table>
<thead>
<tr>
<th>IEC-101 ASDU information object address length</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
</tr>
<tr>
<td>Units</td>
</tr>
<tr>
<td>Value range</td>
</tr>
<tr>
<td>Note</td>
</tr>
</tbody>
</table>

### 7.6 ASDU Converter

The ASDU converter can be used to convert ASDU header field lengths between IEC-101 and IEC-104 protocols.
**Figure 28. ASDU Converter**

<table>
<thead>
<tr>
<th>ASDU Converter</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Use ASDU converter</td>
<td>Yes □</td>
<td></td>
</tr>
<tr>
<td>Use ASDU type replacer</td>
<td>Yes □</td>
<td></td>
</tr>
<tr>
<td>IEC-101 ASDU type</td>
<td></td>
<td>128</td>
</tr>
<tr>
<td>IEC-104 ASDU type</td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>Convert short IEC-101 time stamps</td>
<td>No □</td>
<td></td>
</tr>
</tbody>
</table>

**Use ASDU converter**

This defines if the ASDU header level IEC-101 <-> IEC-104 conversion performed. If enabled the ASDU header field lengths are converted between IEC-104 and IEC-101. This parameter must be enabled if the ASDU header lengths differ between the IEC-104 and the IEC-101.

**Table 47: Use ASDU converter**

<table>
<thead>
<tr>
<th>Use ASDU converter</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Boolean</td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Value range</td>
<td>No, Yes</td>
<td></td>
</tr>
<tr>
<td>Note</td>
<td>The information on the field must fit in the shorter one of the two. It's not possible to convert e.g. value 12000 to a one byte field.</td>
<td></td>
</tr>
</tbody>
</table>

**Use ASDU type replacer**

The ASDU type replace function can be used to convert an ASDU type (Original type) to another (Applied type) type e.g. in cases when the IEC implementation differs between master and slaves.

**Table 48: Use ASDU type replacer**

<table>
<thead>
<tr>
<th>Use ASDU type replacer</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Boolean</td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Value range</td>
<td>No, Yes</td>
<td></td>
</tr>
<tr>
<td>Note</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Original type**

The original ASDU type searched by ASDU type replacer.

**Applied type**

The new ASDU type is replaced by the original type.

### 7.7 Packet collector

The packet collector can be used to collect many IEC-101 messages/events to a single network packet instead of sending every message separately.
This function is useful for slow packet switched communication network (e.g. Mobitex) for speeding up especially the general interrogation response.

**Figure 29. Packet Collector**

<table>
<thead>
<tr>
<th>Packet collector</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use packet collector</td>
<td>No</td>
</tr>
<tr>
<td>Max bytes</td>
<td>500</td>
</tr>
<tr>
<td>Max time (( \times 0.1 ) s)</td>
<td>20</td>
</tr>
<tr>
<td>Max packets</td>
<td>5</td>
</tr>
</tbody>
</table>

### Use packet collector

**Table 49: Use packet collector**

<table>
<thead>
<tr>
<th>Use packet collector</th>
<th>Type</th>
<th>Units</th>
<th>Value range</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Boolean</td>
<td>N/A</td>
<td>No, Yes</td>
<td></td>
</tr>
</tbody>
</table>

### Max bytes

Max bytes is defined as the maximum bytes trigger for packet collector. Before a new packet is inserted into the packet collector buffer the amount of bytes is checked. If the insertion of the new packet would cause the number of bytes in the packet collector to exceed MAX BYTES the old content is sent to the network before inserting the new one.

**Table 50: Maximum collected bytes**

<table>
<thead>
<tr>
<th>Maximum collected bytes</th>
<th>Type</th>
<th>Units</th>
<th>Value range</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Packet size</td>
<td>Bytes</td>
<td>1-1500</td>
<td>The value should be smaller than the MTU/MRU of network used.</td>
</tr>
</tbody>
</table>

### Max time

Max time is derived as the maximum collect time trigger for packet collector in 0.1 secs increments for packet collector. If there has been data on packet collector over MAX TIME the data is sent to network.

**Table 51: Maximum collected time**

<table>
<thead>
<tr>
<th>Maximum collected time</th>
<th>Type</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Timeout</td>
<td>0.1 seconds</td>
</tr>
</tbody>
</table>
### Maximum collected time

<table>
<thead>
<tr>
<th>Value range</th>
<th>1-255</th>
</tr>
</thead>
<tbody>
<tr>
<td>Note</td>
<td>The value must be smaller than ( t1 ).</td>
</tr>
</tbody>
</table>

### Max packets

Max packets are defined as the maximum amount of IEC-101 packets stored into the packet collector before sending the data to the network.

**Table 52: Maximum collected packets**

<table>
<thead>
<tr>
<th>Maximum collected packets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
</tr>
<tr>
<td>Units</td>
</tr>
<tr>
<td>Value range</td>
</tr>
<tr>
<td>Note</td>
</tr>
</tbody>
</table>

### 7.8 Other settings

#### Write syslog

It defines whether the error messages are stored to system log file or not.

**Table 53: Write system log**

<table>
<thead>
<tr>
<th>Write system log</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
</tr>
<tr>
<td>Units</td>
</tr>
<tr>
<td>Value range</td>
</tr>
<tr>
<td>Note</td>
</tr>
</tbody>
</table>
8 Troubleshooting

Q: Wireless WAN is not coming up
A: Check settings (Mobile WAN on page 18), SIM card and signal level. An easy way to check the connection status is checking the LEDs, see section Mobile WAN status LEDs on page 22.

Q: OpenVPN is not working
A: For more information, see OpenVPN application note.

Q: Serial ports are not working
A: For more information, see serial port chapter notes. Verify DIP switch configuration if RS-422 or 485 modes are being used.

Q: Can not access web user interface
A: Web user interface uses HTTPS for secure web access and it must be specified on the web browser address field like in this example: https://10.10.10.10.

Q: Cannot access the Internet with laptop connected to the device
A: Testing the wireless connection:
1. Configure wireless connection and verify if it connected to the network
2. Connect a laptop to Ethernet LAN
3. Check that S-NAT rule on the firewall is set as "Action"="Masquerade" and "Destination Inter-face"="Mobile WAN".
4. Check that DNS Proxy is enabled from Services > Common screen.
5. Configure network settings on laptop to use the device's Ethernet LAN address as gateway and DNS server.

With these setting, the Internet should be accessible on the laptop.
Specifications

Table 54: Technical specifications

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor</td>
<td>400MHz</td>
</tr>
<tr>
<td>Memory (RAM)</td>
<td>64MB</td>
</tr>
<tr>
<td>Hard Drive (flash)</td>
<td>32MB</td>
</tr>
<tr>
<td>Input voltage (nominal)</td>
<td>12-36VDC</td>
</tr>
<tr>
<td>Power consumption</td>
<td>7W max</td>
</tr>
<tr>
<td>Power connector</td>
<td>Phoenix Contact MC 1,5/ 3-STF-3,5</td>
</tr>
<tr>
<td>Casing</td>
<td>Aluminium sheet</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-30 ... +70 °C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-40 ... +85 °C</td>
</tr>
<tr>
<td>Humidity</td>
<td>0 ... 85 % RH (non-condensing)</td>
</tr>
<tr>
<td>Network connection</td>
<td>10/100M</td>
</tr>
<tr>
<td>Approvals</td>
<td>CE</td>
</tr>
<tr>
<td>Size</td>
<td>167 x 114 x 46 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>0.6 kg</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Product variants</th>
<th>Networks</th>
<th>Frequencies</th>
<th>Data speed max</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARP600A2651NA</td>
<td>GPRS/EDGE</td>
<td>1900 / 1800 / 900 / 850 MHz</td>
<td>85.2 Kbps / 236.8 kbps</td>
</tr>
<tr>
<td></td>
<td>WCDMA/HSPA+</td>
<td>2100 / 1900 / 900 / 850 MHz</td>
<td>21 Mbps</td>
</tr>
<tr>
<td>ARP600A2560NA</td>
<td>GPRS/EDGE</td>
<td>1900 / 1800 / 900 / 850 MHz</td>
<td>85.2 Kbps / 236.8 kbps</td>
</tr>
<tr>
<td></td>
<td>WCDMA/HSPA+</td>
<td>2100 / 1900 / 900 / 850 MHz</td>
<td>21 Mbps</td>
</tr>
<tr>
<td></td>
<td>LTE</td>
<td>2600 (band 7) / 2100 (band 1) / 1800 (band 3) / 900 (band 8) / 800 (band 20) MHz</td>
<td>100 Mbps</td>
</tr>
</tbody>
</table>

Antenna connector type is FME (male).

Table 55: Application serial port specifications

<table>
<thead>
<tr>
<th>Serial mode (RS1)</th>
<th>RS-232 / 422 / 485</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial mode (RS2)</td>
<td>RS-232</td>
</tr>
<tr>
<td>Baud rate</td>
<td>300 - 460800</td>
</tr>
<tr>
<td>Data bit</td>
<td>7 / 8</td>
</tr>
<tr>
<td>Feature</td>
<td>Options</td>
</tr>
<tr>
<td>---------------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>Parity</td>
<td>None / Even / Odd</td>
</tr>
<tr>
<td>Stop bits</td>
<td>1 / 2</td>
</tr>
<tr>
<td>Flow control</td>
<td>None / Hardware (RTS/CTS)</td>
</tr>
</tbody>
</table>

Technical specifications can be changed without notification.