Wireless Protocol Gateway
ARP600 Dual SIM Variants
User Manual

Power and productivity
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Dangerous voltages can occur on the connectors, even though the auxiliary voltage has been disconnected.

Non-observance can result in death, personal injury or substantial property damage.

Only a competent electrician is allowed to carry out the electrical installation.

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To prevent damage both the product and any terminal devices must always be switched off before connecting or disconnecting any cables. It should be ascertained that different devices used have the same ground potential. The output voltage of the power supply should be checked before connecting any power cables.

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.

Contents

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

Name of the document	Description	Document ID
ARG600 User Manual Single SIM Variants		1MRS758456

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

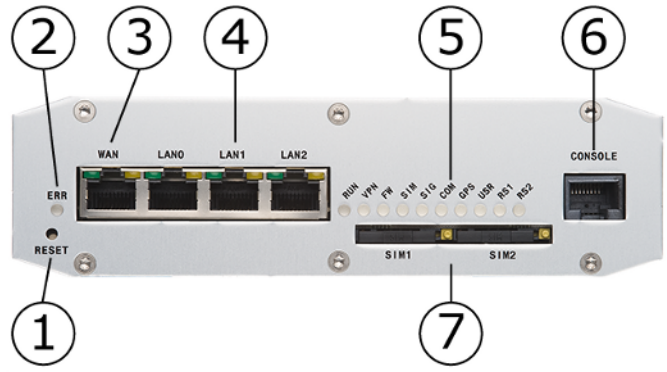
2 Hardware description

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*



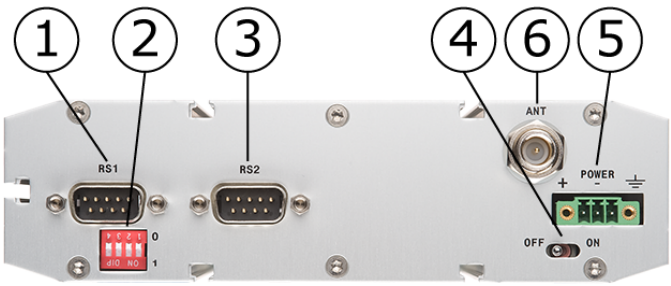
LEDs and switches (from left to right) with section reference to more detailed information:

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 13)

2.2 Back Panel

The back panel is shown below.

Figure 2. *Back Panel*



Connectors (from left to right):

1. Serial port 1 (section *Serial port 1* on page 10)
2. Serial port 1 configuration DIP switches (section *Serial port 1* on page 10)
3. Serial port 2 (section *Serial port 2* on page 11)
4. Power switch
5. Power connector (section *Power connector* on page 12)
6. Antenna connector (section *Antenna connector* on page 12)

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*).

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

LED number	LED	LED status	Description
		Off	Cellular connection is stopped
8	APP	-	Reserved for future use
9	USR	-	Reserved for future use
10	RS1	-	Reserved for future use
10	RS2	-	Reserved for future use

2.3.2 Ethernet LEDs

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

Table 1: Ethernet LED description

LED	State	Meaning
Green	On	Link on
	Blink	Data received
	Off	Link off
Yellow	On	Full duplex
	Off	Half duplex

2.4 Networking

2.4.1 Mobile WAN

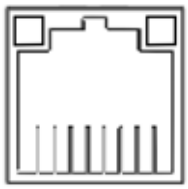
The device has a high speed wireless functionality which allows the use of bandwidth demanding wireless applications.

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

Figure 3. *Connector*



Number of ports	1
Speed	10Base-T, 100Base-TX
Duplex	Half and Full
Auto-negotiation	Yes
Recommended cabling	Cat5 or better

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

Speed	10Base-T, 100Base-TX
Duplex	Half and Full
Auto-negotiation	Yes
Recommended cabling	Cat5 or better

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

Figure 4. *Connector diagram*

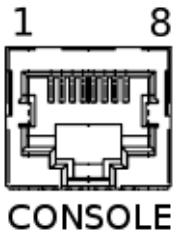


Table 5: Connector pinout

Pin	Function
1	CTS
2	DSR
3	RXD
4	GND
5	GND
6	TXD
7	DTR

Table 6: Serial port configuration

Baud rate	115200
Data bits	8
Parity	No parity
Stop bits	1
Flow control	No flow control

Pin	Function
8	RTS

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

Figure 5. *Connector diagram*

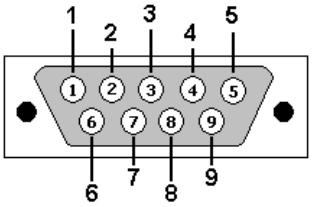


Table 8: Connector pinout (RS-232 mode)

Pin	Function
1	DCD
2	RXD
3	TXD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

Table 9: Serial port configuration

Baud rate	115 - 230400
Data bits	8
Parity	No parity
Stop bits	1
Flow control	CTS/RTS

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

Number	Function	State	Explanation
1	RS-232 / RS-485	0 = RS-232, 1 = RS-485	Selects serial port operation mode
2	FULL / HALF	0 = FULL, 1 = HALF	Selects between half (2-wire) and full duplex (4-wire)
3	BIAS	0 = OFF, 1 = ON	RS-485 biasing

Number	Function	State	Explanation
4	TERMINATION	0 = OFF, 1 = ON	RS-485 termination

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

Pin	RS-485 full-duplex (4-wire)	RS-485 half-duplex (2-wire)
1	-	-
2	RXD+ (in)	-
3	TXD- (out)	TXD/RXD- (out/in)
4	-	-
5	GND	GND
6	-	-
7	TXD+ (out)	TXD/RXD+ (out/in)
8	RXD- (in)	-
9	-	-

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

Figure 6. *Connector diagram*

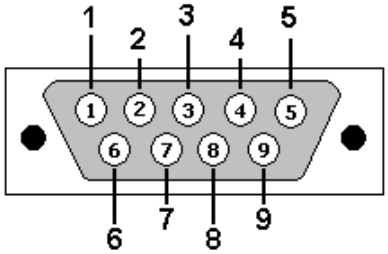


Table 13: Connector pinout

Pin	Function
1	DCD
2	RXD
3	TXD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS

Table 14: Serial port configuration

Baud rate	115 - 230400
Data bits	8
Parity	No parity
Stop bits	1
Flow control	No flow control

Pin	Function
9	RI

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.

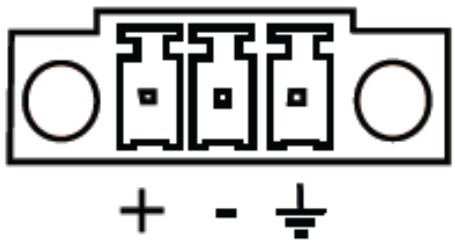
Reset button is located on the front panel. Press shortly to reset the unit. Reset button can be used to restore factory default settings. To restore factory default settings, reset the unit by keeping the reset button pressed down until all the status LEDs blink. This indicates the factory presets have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

Figure 7. *Connector*



Pin	Symbol	Function
1	+	Voltage in, positive / 12 ... 36 VDC, 400 mA
2	-	Voltage in, negative
3	GND	Extra ground connection

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

Note!

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.

Note!

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.

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 horisontally 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*

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

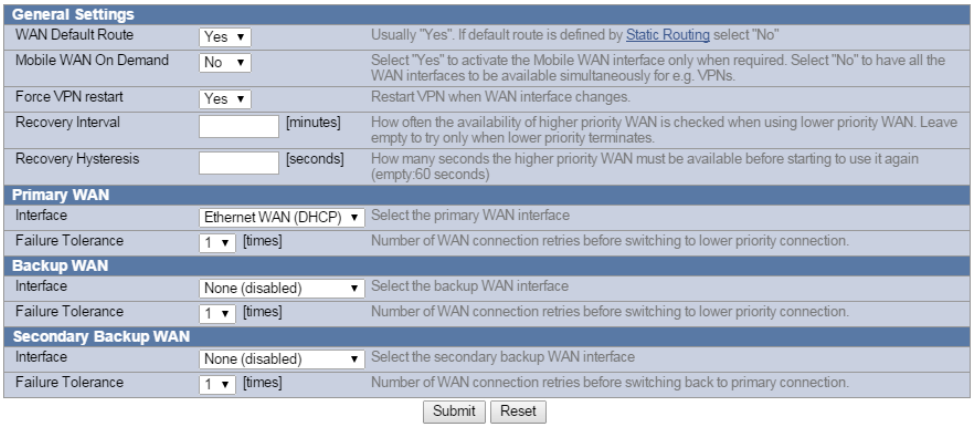
1. Select **Network WAN Failover** from the left menu.
2. Set **"WAN Default Route"="Yes".** This has to be enabled to use either WAN as default route interface.
3. If the mobile WAN has to be set as a default gateway, set **"Primary WAN Interface"="Mobile WAN".**

   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 **"PrimaryWAN Interface"="EthernetWAN"**
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*



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.

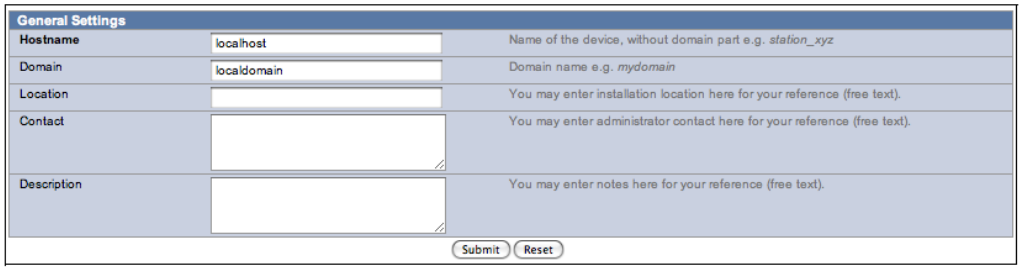
4.1 Configuration screens

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.

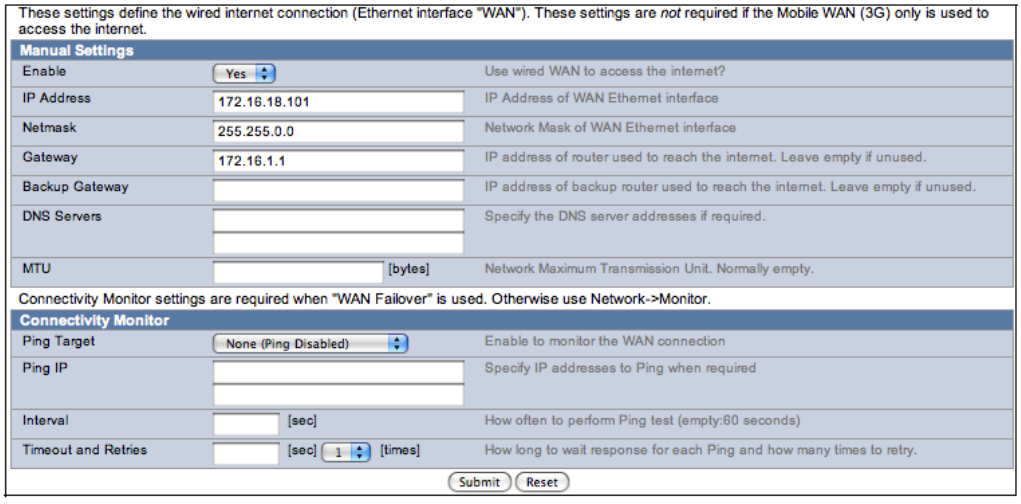
Figure 11. *General Settings*



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.

PIN code	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.
APN Type	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.
APN	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.
Authentication, username, password	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.
DNS selection, DNS servers	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.

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.

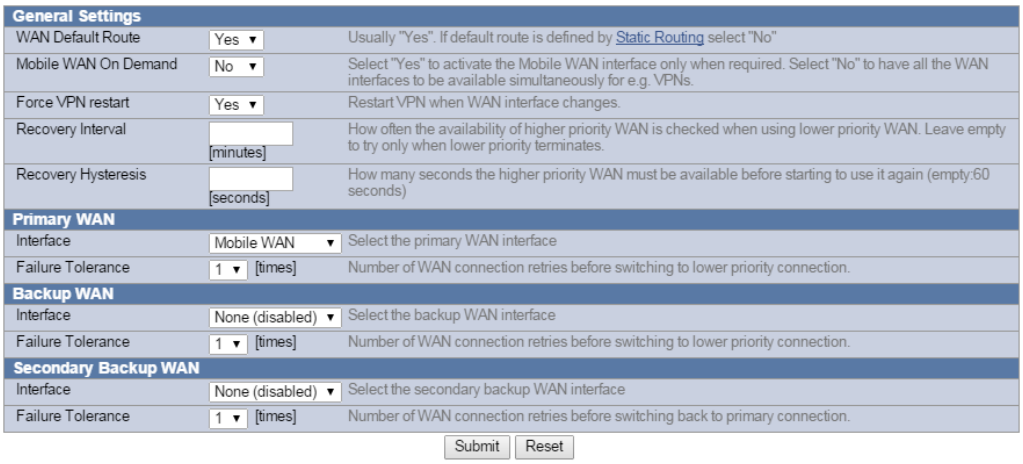
If the device acts as a wireless router to Ethernet devices and DNS is needed, enter DNS configuration as well. When ready, press the Submit button on the bottom of the page to save settings.

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*



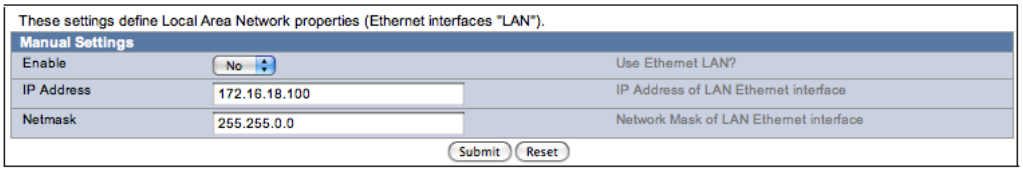
To enable any default routes, set **"WAN Default Route"="Yes"**. Any route settings are not effective if this parameter is not enabled.

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.

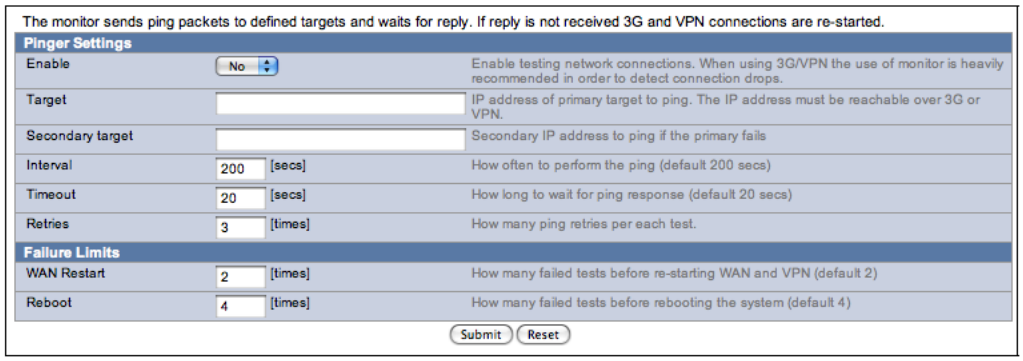
Figure 14. *Ethernet LAN Configuration*



4.1.6 Network monitor

This screen configures the interface connectivity monitor on the device.

Figure 15. *Network monitor configuration*



The usage of the monitor is heavily recommended to detect the connection drops.

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)

- WAN Failover - Secondary Backup WAN Interface (selection: None/Mobile WAN/Ethernet WAN/Ethernet WAN Secondary)
  - These three settings configure the high level default gateways. Must be configured to enable default route.
- OpenVPN Client Settings - Interface (selection: Any WAN/Ethernet WAN/ Wireless WAN/Ethernet LAN)
  - Which Interface to use for connection
- OpenVPN Client Settings - Routing mode (selection: None/host/net/default route)
  - This defines how the routing is configured with OpenVPN. See OpenVPN application note.

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

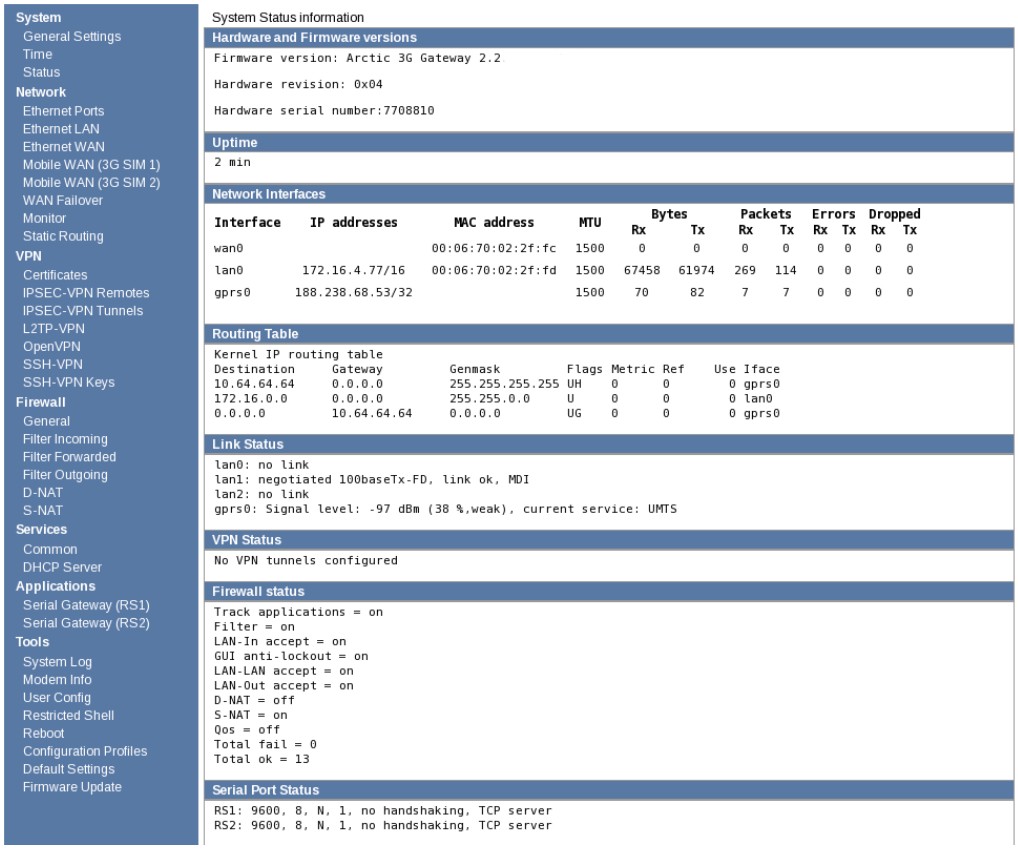
To use this feature, configure the device to use the device's Ethernet LAN IP address as its DNS server. This way, the DNS queries from the device get routed through the device.

4.4 Network status information

4.4.1 System status screen

Network status information can be seen from **System > Status screen** .

Figure 16. *Network 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:

See *Table 1*.

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.

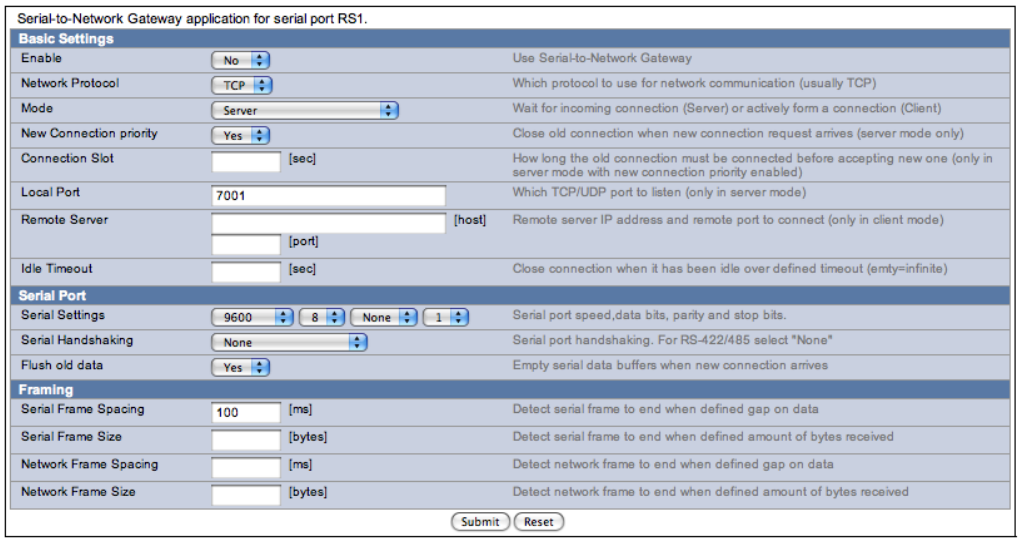
5 Serial Port Configuration

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.

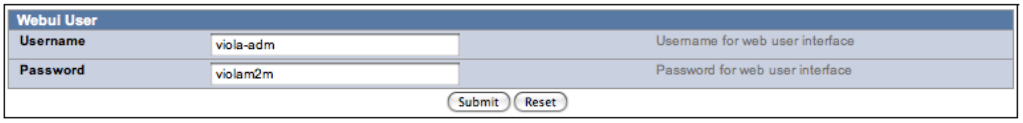
Both serial ports have their own configuration screens, located in **Applications->Serial Gateway (RS1)** and **Applications->Serial Gateway (RS2)**.

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*

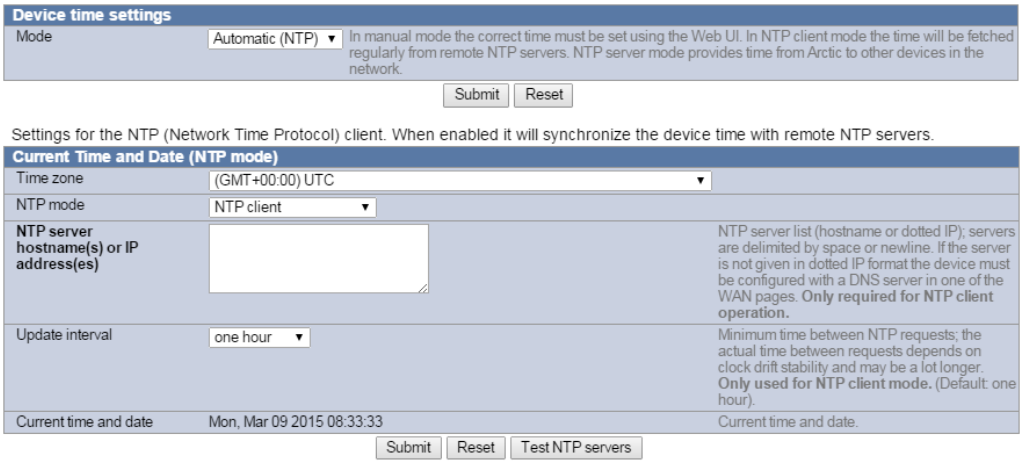
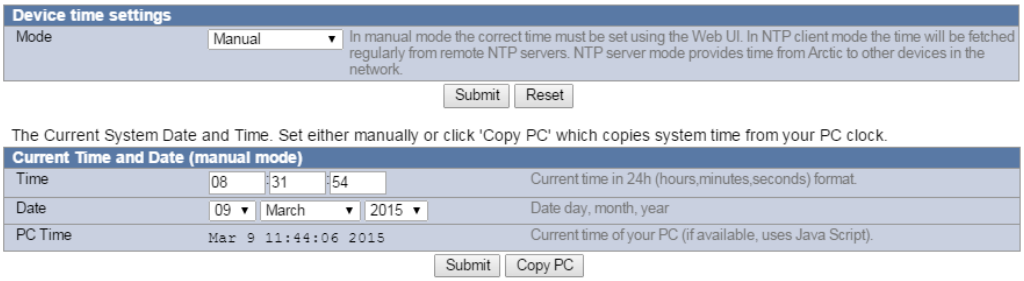


Figure 20. *Manual setting*



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

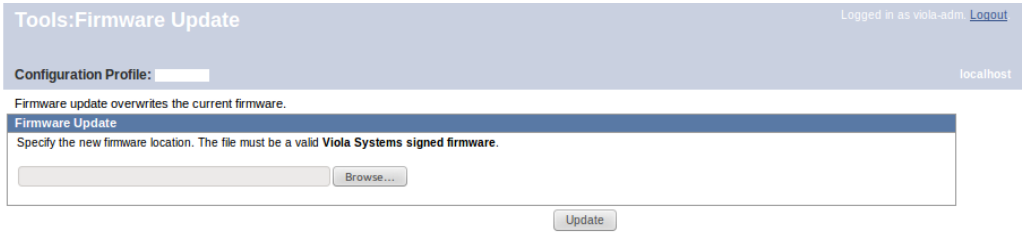
Factory default settings can be applied by restarting the unit pressing down reset button until the LEDs blink.

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*



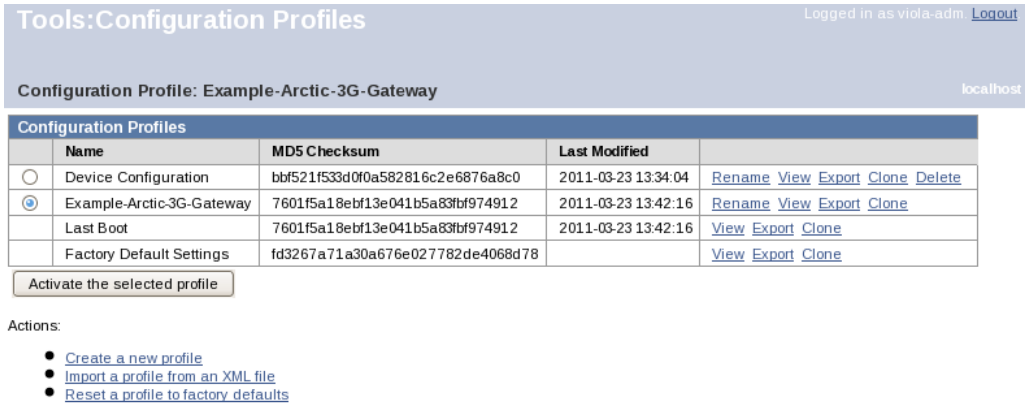
1. Verify for a valid firmware on the PC before attempting to update the firmware.
2. Select **Select file** button to open file browsing dialog. The actual dialog depends on the used browser.
3. Select the updated firmware from the file dialog and return to the firmware update screen.
4. Press **Update** 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*

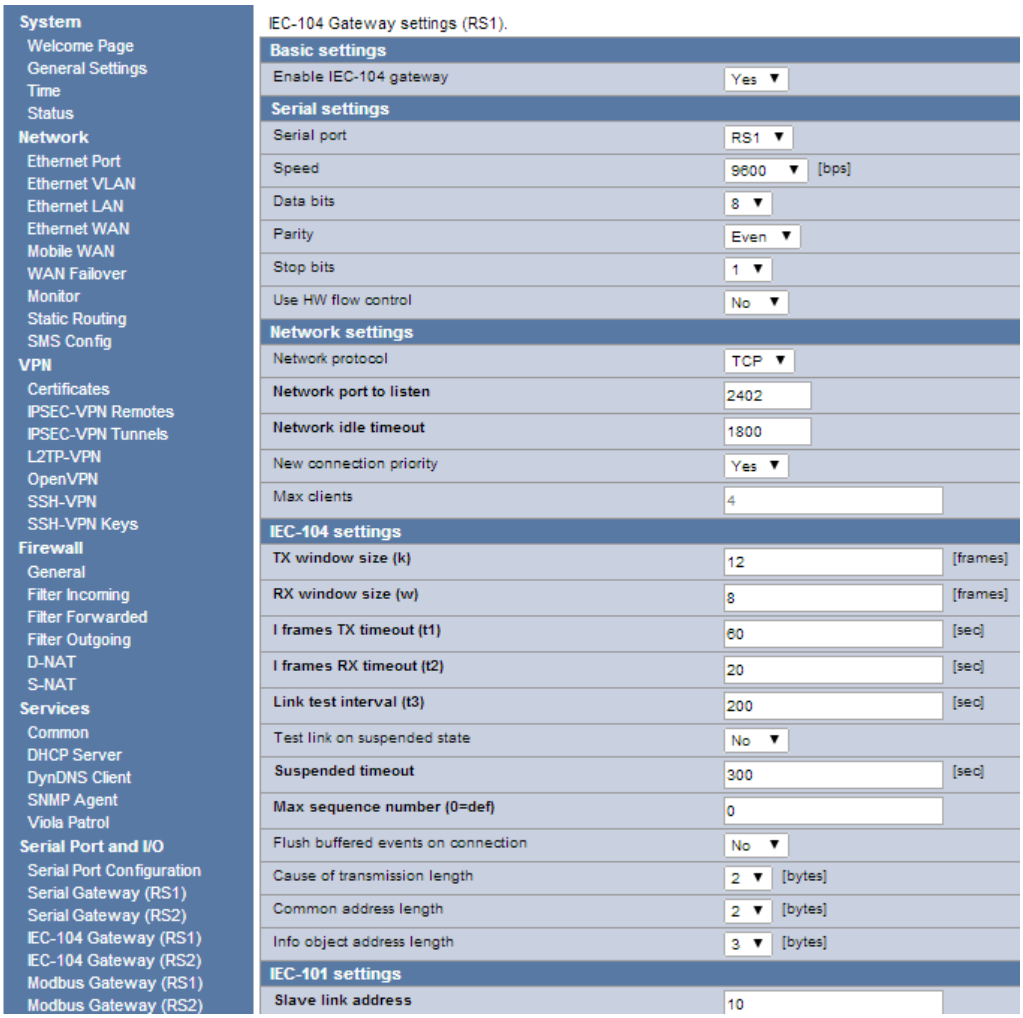


7 IEC-104 application settings

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*



7.1 General settings

IEC-104 gateway enabled

Enables or disables IEC-104 to IEC-101 gateway functionality.

Table 16: IEC-104 gateway enabled

IEC-104 gateway enabled	
Type	Boolean
Units	N/A
Value range	No, Yes
Note	

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*

Speed (bps)

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

IEC-101 serial communication speed (bps)	
Type	Serial speed
Units	Bits per second
Value range	1200, 2400, 4800, 9600, 19200, 38400, 57600
Note	

Data bits

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

Number of data bits used on IEC-101 serial communication	
Type	Serial data bits
Units	Bits
Value range	5, 6, 7, 8
Note	

Parity

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

Parity method used on IEC-101 serial communication	
Type	Serial data parity
Units	Bits
Value range	None, Even, Odd
Note	

Stop bits

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

Parity method used on IEC-101 serial communication	
Type	Serial data stop bits
Units	Bits
Value range	1, 2

Use HW flow control

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

HW flow control mechanism (RTS/CTS) on IEC-101 serial communication	
Type	Boolean
Units	N/A
Value range	Yes, No
Note	The HW handshaking is available only on RS-232 mode.

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

Network protocol on IEC-104 communication	
Type	Network transmission layer protocol
Units	N/A
Value range	UDP, TCP
Note	The IEC-104 standard specifies only TCP protocol.

Network port to listen

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

TCP or UDP port to listen for incoming IEC-104 connections	
Type	Network port
Units	Port number
Value range	0 - 65000
Note	The IEC-104 standard specifies TCP port 2404.

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

Network idle timeout for IEC-104 connections	
Type	Timeout
Units	Seconds
Value range	0 – 65000
Note	The network idle timeout must be longer than IEC-104 link test interval (t3).

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

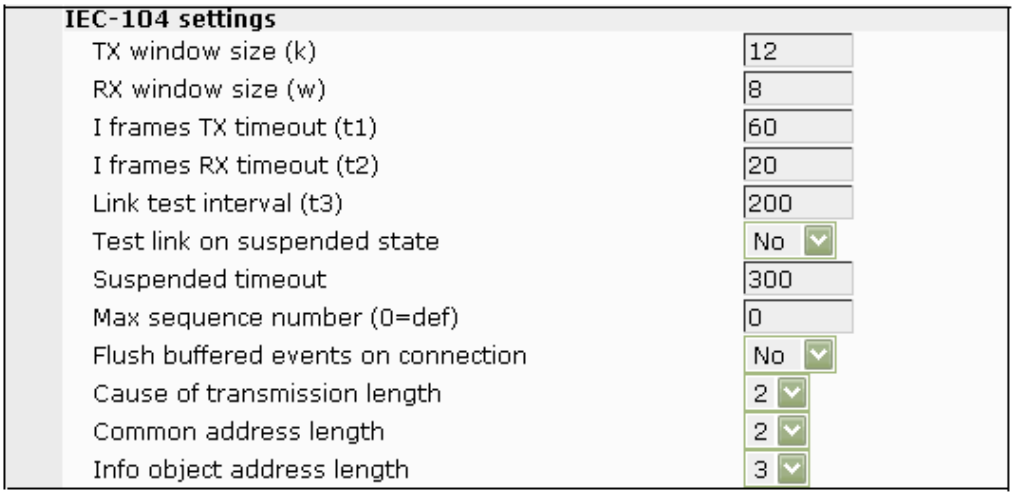
New connection priority for IEC-104 connections	
Type	Boolean
Units	N/A

New connection priority for IEC-104 connections	
Value range	No, Yes
Note	It is recommendable to set this value to “Yes” in normal configurations having only one IEC-104 master.

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*



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)

IEC-104 TX windows size (k)	
Type	Window size
Units	Packets
Value range	1-20
Note	The *k* must be always less than the maximum sequence number defined below. The IEC-104 standard suggests *k* to be 12.

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)

IEC-104 RX windows size (w)	
Type	Window size
Units	Packets
Value range	1-20
Note	The *w* should not exceed two-thirds of TX window size *k*. The IEC-104 standard suggests *w* to be 8.

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)

IEC-104 I frames TX timeout (t1)	
Type	Timeout
Units	Seconds
Value range	1-255
Note	The t1 must be longer than the network round-trip-time. The IEC-104 standard suggests 15 seconds.

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)

IEC-104 I frames RX timeout (t2)	
Type	Timeout
Units	Seconds
Value range	1-255
Note	The t2 must be smaller than t1. The IEC-104 standard suggests 10 seconds.

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)

IEC-104 link test interval (t3)	
Type	Timeout

IEC-104 link test interval (t3)	
Units	Seconds
Value range	1-65000
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

IEC-104 suspended timeout	
Type	Timeout
Units	Seconds
Value range	1-65000
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

IEC-104 suspended timeout	
Type	Sequence number
Units	Packets
Value range	1-32767
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

IEC-104 ASDU cause of transmission length	
Type	Field length
Units	Bytes
Value range	1-3
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

IEC-104 ASDU common address length	
Type	Field length
Units	Bytes
Value range	1-3
Note	The IEC-104 standard defines value 2.

Info object address length (IEC-104)

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

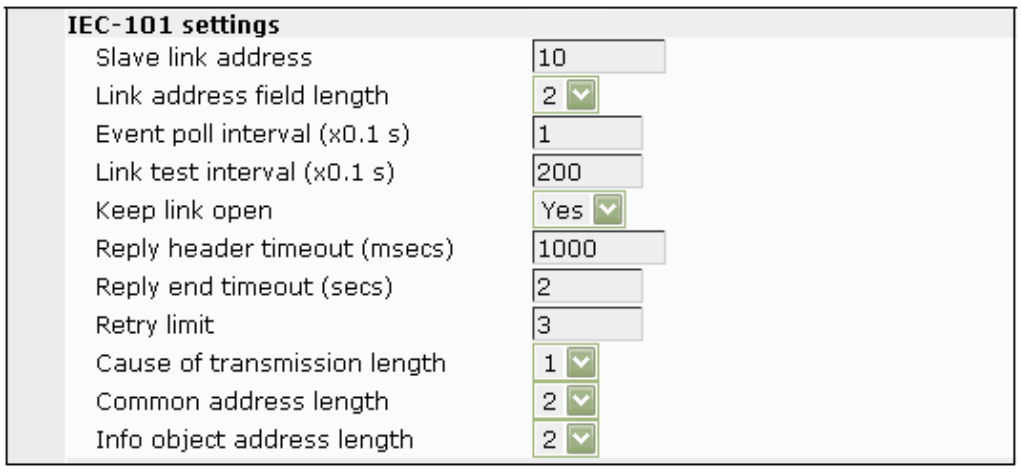
Table 35: IEC-104 ASDU information object address length

IEC-104 ASDU information object address length	
Type	Field length
Units	Bytes
Value range	1-3
Note	The IEC-104 standard defines value 3.

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

IEC-101 slave link address	
Type	Link address
Units	N/A
Value range	1-65000
Note	The link-level address of IEC-101 slave.

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

IEC-101 slave link address field length	
Type	Field length
Units	Bytes
Value range	1, 2
Note	The link-level address of IEC-101 slave.

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

IEC-101 event poll interval	
Type	Interval
Units	0.1 seconds
Value range	1-65000
Note	The events are polled only when the IEC-104 connection is active.

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

IEC-101 link test interval	
Type	Interval
Units	0.1 seconds
Value range	1-65000
Note	The link test is performed if there is no other activity during defined interval.

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

IEC-101 keep link open	
Type	Boolean
Units	N/A
Value range	No, Yes
Note	Some IEC-101 slaves require the link to be continuously open in order to operate.

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

IEC-101 reply start timeout	
Type	Timeout
Units	Milliseconds
Value range	1-65000
Note	

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

Table 42: IEC-101 reply end timeout

IEC-101 reply end timeout	
Type	Timeout
Units	Seconds
Value range	1-65000
Note	

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

IEC-101 retry limit	
Type	Retry limit

IEC-101 retry limit	
Units	Retries
Value range	0-65000
Note	

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

IEC-101 ASDU cause of transmission length	
Type	Field length
Units	Bytes
Value range	1-3
Note	The IEC-101 standard defines value 1.

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

IEC-101 ASDU common address length	
Type	Field length
Units	Bytes
Value range	1-3
Note	The IEC-101 standard defines value 2.

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

IEC-101 ASDU information object address length	
Type	Field length
Units	Bytes
Value range	1-3
Note	The IEC-101 standard defines value 2.

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*

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

Use ASDU converter	
Type	Boolean
Units	N/A
Value range	No, Yes
Note	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.

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

Use ASDU type replacer	
Type	Boolean
Units	N/A
Value range	No, Yes
Note	

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*

Use packet collector

Table 49: Use packet collector

Use packet collector	
Type	Boolean
Units	N/A
Value range	No, Yes
Note	

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

Maximum collected bytes	
Type	Packet size
Units	Bytes
Value range	1-1500
Note	The value should be smaller than the MTU/MRU of network used.

Max time

Max time is deived 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

Maximum collected time	
Type	Timeout
Units	0.1 seconds

Maximum collected time	
Value range	1-255
Note	The value must be smaller than t1.

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

Maximum collected packets	
Type	Packet count
Units	Packets
Value range	1-255
Note	

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

Write system log	
Type	Boolean
Units	N/A
Value range	No, Yes
Note	The system log is available by using WEB UI.

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

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

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

Antenna connector type is FME (male).

Table 55: Application serial port specifications

Serial mode (RS1)	RS-232 / 422 / 485
Serial mode (RS2)	RS-232
Baud rate	300 - 460800
Data bit	7 / 8

Parity	None / Even / Odd
Stop bits	1 / 2
Flow control	None / Hardware (RTS/CTS)

Techical specifications can be changed without notification.

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