

S.A.NE CLIENT INSTALLATION MANUAL FOR TELTONIKA ROUTERS

Version RUTX_R_00.07.02.x

Models RUTX50
RUTX12
RUT950/955
RUT360
RUT240

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Dear Customer,

Thank you for purchasing a Bondix S.A.NE WAN Bonding subscription!

Installing our software on your existing, supported infrastructure is easy and you'll be finished in a few minutes. This manual will show you step by step what you need to do and be careful about. The last chapter is for troubleshooting, should you run into difficulties.

All screenshots were taken on a Teltonika RUTX12 and may vary on other Teltonika router models.

In case you won't find the answers you need in this manual or have suggestions on how to improve it, please don't hesitate to contact us:

write to info@bondixintelligence.com

or

call +49 15678 723 101

We'll be happy to help.

For now, we wish you joyful installing!

Your Bondix team

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1 PREPARATIONS

To install the Bondix S.A.NE Client on your Teltonika router, you will need a few minutes of stable Internet, a web browser, and possibly some coffee or tea.

1.1 Supported Browsers

The following browsers have been tested to function properly with Bondix S.A.NE:

- Google Chrome
- MS Edge
- Mozilla Firefox

1.2 Teltonika Firmware

Bondix S.A.NE Clients are available for many Teltonika firmware versions. In order to fully benefit from all new features to their full extend though, we recommend you update your Teltonika router model to its latest Teltonika stable firmware at

https://wiki.teltonika-networks.com/view/Main_Page.

2 CLIENT INSTALLATION



We strongly recommend you reset all router settings before starting the installation.

Visit <https://www.bondixintelligence.com/releases - Teltonika> and download the *.TAR.GZ file* matching your Teltonika router's firmware version.

To install the Bondix S.A.NE Client, you will need administration rights on your Teltonika router. For that, make sure you have chosen the option "Advanced" in the section "System" > "Administration" > "General Settings" > "Configuration Mode".

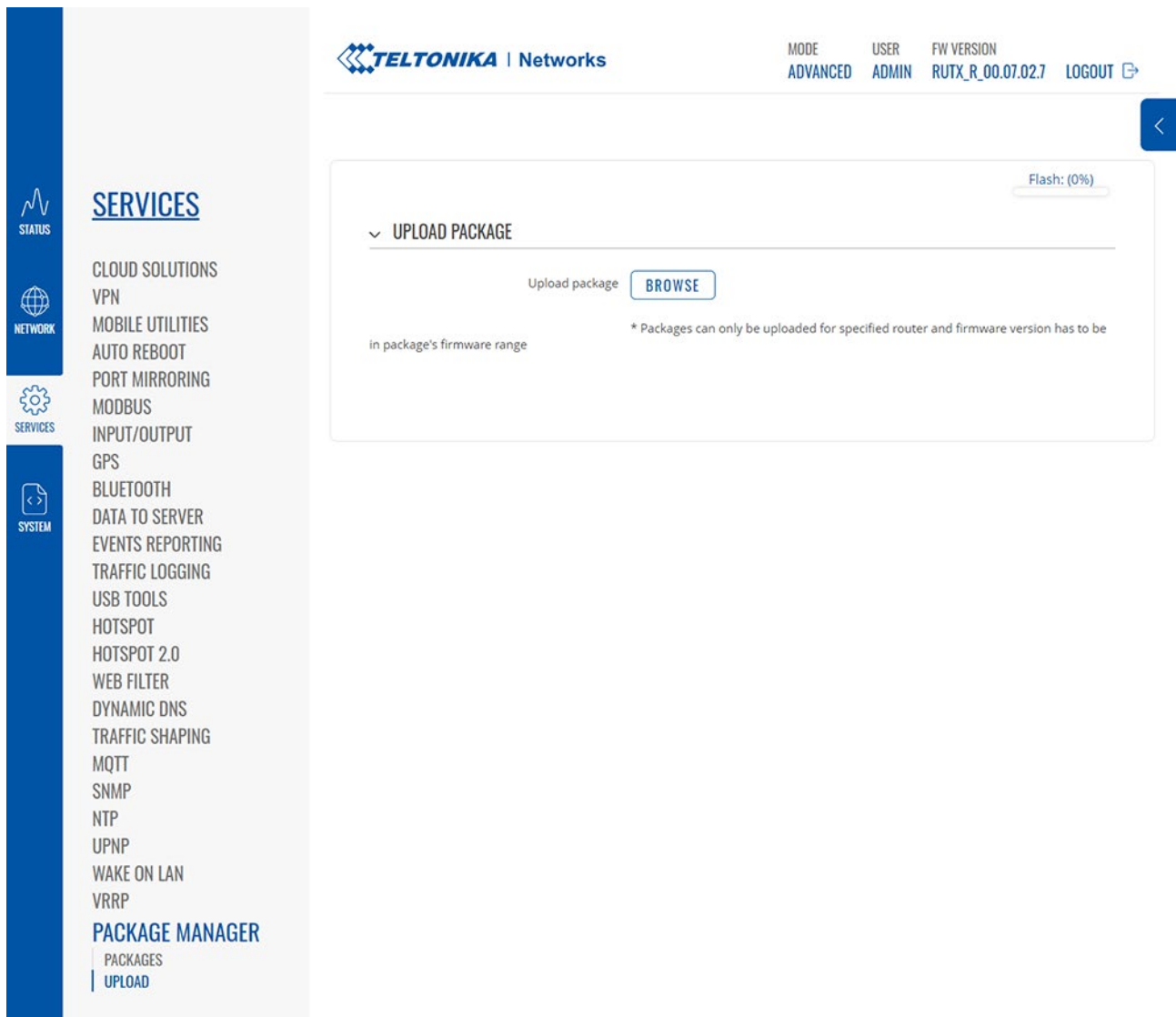
The screenshot shows the Teltonika Networks web interface. The top navigation bar includes the Teltonika logo, the text "TELTONIKA | Networks", and user information: "MODE: ADVANCED", "USER: ADMIN", "FW VERSION: RUTX_R_00.07.02.7", and a "LOGOUT" button. A left sidebar contains navigation icons for "STATUS", "SYSTEM", "NETWORK", and "SERVICES". The "SYSTEM" menu is expanded, showing options like "ADMINISTRATION", "GENERAL", "ACCESS CONTROL", "RECIPIENTS", "CERTIFICATES", "TROUBLESHOOT", "FIRMWARE", "SYSTEM USERS", "BACKUP", "PROFILES", "CLI", "LICENSE", "CUSTOM SCRIPTS", "SPEED TEST", "SETUP WIZARD", and "REBOOT".

The main content area is titled "GENERAL SETTINGS" and includes a "Configuration Mode" dropdown menu set to "Advanced". Below this is the "DEVICE NAME AND HOSTNAME" section with input fields for "Device name" (RUTX12) and "Hostname" (Teltonika-RUTX12.com). The "LED INDICATION" section has an "Enable" toggle switch set to "on". The "RESET BUTTON CONFIGURATION" section contains a table with columns for "ACTION", "MIN TIME", "MAX TIME", and a toggle switch.

ACTION	MIN TIME	MAX TIME	Toggle
Reboot	0	5	on
User's defaults configuration	6	11	on
Factory defaults configuration	12	20	on

A "SAVE & APPLY" button is located at the bottom right of the configuration area.

Open your Teltonika router menu, navigate to the menu item "Services" > "Package Manager" > "Upload". Click on "Browse", choose the file you just downloaded to upload it to the router, and then press "Install Package".



There will be a package verification popup dialogue telling you the Bondix S.A.NE Client is an unauthorized package. Click on "proceed" to continue with the installation.

Also, there will be a popup dialogue telling you that the package installation needs a reboot. Click on "Reboot" to finish the installation. If this prompt doesn't appear which may happen due to technical issues, reload your Teltonika router's web interface (STRG+F5 / Command+R) and reboot manually ("System" > "Reboot").

If the Bondix S.A.NE Client was installed correctly, you'll find a new menu item "Bondix S.A.NE" in the section "Network" of your Teltonika router.

3 GENERAL ROUTER SETTINGS

3.1 Load Balancing

Check that Teltonika Load Balancing functionality is deactivated on the router, as this would have a negative impact on Bondix S.A.NE performance and functionality.

The screenshot shows the Teltonika Networks web interface. The left sidebar has a menu with 'NETWORK' selected. The main content area is titled 'FAILOVER / LOAD BALANCING INTERFACES'. At the top right, it shows 'MODE: ADVANCED', 'USER: ADMIN', 'FW VERSION: RUTX_R_00.07.02.7', and a 'LOGOUT' button. Below the title is a dropdown menu set to 'Failover'. A table lists three interfaces:

	METRIC	NAME	TYPE	INTERVAL	STATUS		
+	1	wan	Wired	3	Disabled	<input type="checkbox"/>	
+	2	mob1s1a1	Mobile	3	Disabled	<input type="checkbox"/>	
+	3	mob2s1a1	Mobile	3	Disabled	<input type="checkbox"/>	

3.2 DNS

Ensure that you have configured DNS forwarding to e.g. Google (8.8.8.8) to receive DNS through the tunnel.

The screenshot shows the Teltonika Networks web interface. The left sidebar has a menu with 'DNS' selected. The main content area is titled 'DNS CONFIGURATION'. At the top right, it shows 'MODE: ADVANCED', 'USER: ADMIN', 'FW VERSION: RUTX_R_00.07.02.7', and a 'LOGOUT' button. The configuration is split into 'GENERAL SETTINGS' and 'ADVANCED SETTINGS':

- GENERAL SETTINGS:** Log queries (off/on)
- ADVANCED SETTINGS:** DNS forwardings: +
- Rebind protection: (off/on)
- Local Service Only: (off/on)
- Listen Interfaces:
- Exclude interfaces:

A 'SAVE & APPLY' button is located at the bottom right of the configuration area.

4 BONDIX S.A.NE SETTINGS

4.1 Settings

4.1.1 GENERAL SETTINGS

In the general settings for the Bondix S.A.NE Client, you'll be able to configure your tunnel via different modes of configuration:

TELTONIKA | Networks MODE: **ADVANCED** USER: **ADMIN** FW VERSION: **RUTX_R_00.07.02.7** LOGOUT

NETWORK

MOBILE INTERFACES
BONDIX S.A.NE
SETTINGS
MONITOR
STATUS
WIRELESS
FAILOVER
FIREWALL
VLAN
ROUTING
DNS

SETTINGS

GENERAL Enabled: off on

ADVANCED

LAYER 2

Config Mode:

Tunnel:

Password:

Server:

Backup Server:

Tunnel Preset:

RESTART SERVICE **SAVE & APPLY**

INTERFACES

ENABLED	INTERFACE	PRESET	PRIORITY	MAX UPSTREAM (MBIT/S)	MAX DOWNSTREAM (MBIT/S)	
<input checked="" type="checkbox"/> off on	<input type="text" value="wan"/>	<input type="text" value="Speed"/>	<input type="text" value="Default"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="button" value="X"/>
<input checked="" type="checkbox"/> off on	<input type="text" value="mob1s1a1"/>	<input type="text" value="Speed"/>	<input type="text" value="Default"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="button" value="X"/>
<input checked="" type="checkbox"/> off on	<input type="text" value="mob2s1a1"/>	<input type="text" value="Speed"/>	<input type="text" value="Default"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="button" value="X"/>

ADD

SAVE & APPLY

4.1.1.1 Config Mode

The Config Mode is the method with which you want to enter your Bondix S.A.NE tunnel credentials. It can either be done manually, via certificate, or via Bondix S.A.NE connection code.

4.1.1.1.1 Manual

✓ SETTINGS

The screenshot shows a settings panel for Bondix S.A.NE. On the left, there are three tabs: 'GENERAL' (selected), 'ADVANCED', and 'LAYER 2'. The 'Enabled' toggle is turned on. The 'Config Mode' dropdown menu is set to 'Manual'. The 'Tunnel' text input field contains 'Sylviaho1'. The 'Password' text input field is masked with dots. The 'Server' text input field contains '54.130.117.47'. The 'Backup Server' text input field is empty. The 'Tunnel Preset' dropdown menu is set to 'Bonding'. At the bottom right of the settings panel, there are two buttons: 'RESTART SERVICE' and 'SAVE & APPLY'.

Field	Value
Tunnel	Your tunnel's name. This is either part of the credentials you've received from your Bondix S.A.NE server provider, or the tunnel name you've created in your self-hosted Bondix S.A.NE server.
Password	Your password. This is either part of the credentials you've received from your Bondix S.A.NE server provider, or the password you've created in your self-hosted Bondix S.A.NE server.
Server	Your server IP. This is either part of the credentials you've received from your Bondix S.A.NE server provider, or the IP address or host name of your self-hosted Bondix S.A.NE server.
Backup Server	A backup server acts as a fallback in case the server you've specified under "Server" in this section fails. This is either part of the credentials you've received from your Bondix S.A.NE server provider, or the IP address or host name of your self-hosted Bondix S.A.NE backup server. Otherwise, leave the field empty.

4.1.1.1.2 Certificate

SETTINGS

GENERAL

Enabled off on

Config Mode ^

Tunnel Certificate No file selected

Certificate Key No file selected

Server

Backup Server

Tunnel Preset ^

Field	Value
Tunnel Certificate	Browse for and upload the Tunnel Certificate which should be in PEM format.
Certificate Key	Browse for and upload the Certificate Key which should be in PEM format.
Server	Your server IP or host name.
Backup Server	Your backup server IP or host name.

4.1.1.1.3 Connection Code

The Bondix S.A.NE connection code is an alphanumeric string that is used to automatically configure your tunnel connection. Just copy and paste.

SETTINGS

GENERAL

Enabled off on

ADVANCED

LAYER 2

Config Mode

Connection Code

Tunnel Preset

RESTART SERVICE **SAVE & APPLY**



To save your changes, always click on *“Save and Apply”*, then *“Restart Service”*.

4.1.1.2 Tunnel Preset

Field	Value
Bonding	Ensures best performance in regards to bandwidth.
Packet Duplication	Used for scenarios where reliability is key: Each packet is sent with a copy. Please choose this option wisely as it decreases bandwidth to a certain degree.
Packet Duplication 2x	Used for scenarios where reliability is key. Each packet is sent with two copies. Please choose this option wisely as it decreases bandwidth to an even greater degree.
Satellite	Mandatory for scenarios where at least one of the bonded WAN links is a satellite connection (does not apply to Starlink).

4.1.2 INTERFACES

In this section, you can prioritize the use of WAN connections with two sets of options according to your needs.

INTERFACES

ENABLED	INTERFACE	PRESET	PRIORITY	MAX UPSTREAM (MBIT/S)	MAX DOWNSTREAM (MBIT/S)	
<input checked="" type="checkbox"/>	wan	Speed	Default	0	0	<input type="button" value="X"/>
<input checked="" type="checkbox"/>	mob1s1a1	Speed	Default	0	0	<input type="button" value="X"/>
<input checked="" type="checkbox"/>	mob2s1a1	Speed	Default	0	0	<input type="button" value="X"/>

4.1.2.1 Preset

Every type of WAN link has different properties that make them suitable for different needs. You can configure them individually to ideally suit your use cases by choosing from 4 Interface presets:

Setting	Effect
Speed	The default setting that works for most scenarios.
Low Latency	Keeps latency as low as possible at the expense of bandwidth. Often used for latency-sensitive scenarios, e.g. streaming.
Satellite	Mandatory setting for a high-latency WAN link (e.g. satellite). Does not apply to Starlink.
TCP Mode	Useful if UDP traffic is expected to be problematic (e.g. UDP blocking by provider or local network). May cause higher base latency due to the nature of TCP.



To save your changes, always click on *“Save and Apply”*, then *“Restart Service”*.

4.1.2.2 Priority

Per default, WAN connections are prioritized in using their available bandwidth according to their latency. S.A.NE usually prioritizes low-latency connections like Ethernet connections. The higher a connection's latency gets, the lower Bondix S.A.NE sets its priority per default. In this section, you can set individual priorities for your WAN links by choosing from the following 4 options:

Default / High Priority / Higher Priority / Highest Priority



To save your changes, always click on "Save and Apply", then "Restart Service".

4.1.2.3 Up- / Downstream Limit

By design, Bondix S.A.NE normally finds the maximum bandwidth of a WAN link by continually evaluating data traffic generated by users over time. This can cause fluctuating bandwidths and/or increased buffering especially with, but not limited to, mobile connections. Setting a hard up- and/or downstream limit about 5% lower than the known maximum gives S.A.NE a base to work with, stabilizing and increasing the WAN link's performance.

4.1.2.4 Example

You have 4 WAN links, 2 of which are 5G/LTE connections, and you only want to use those 2 evenly. To achieve that, you disable your 2 other WAN links, while giving your 2 mobile links the preset "Speed" and the priority "Default":

INTERFACES

ENABLED	INTERFACE	PRESET	PRIORITY	MAX UPSTREAM (MBIT/S)	MAX DOWNSTREAM (MBIT/S)	
<input type="checkbox"/>	wan	Speed	Highest	0	40	✕
<input checked="" type="checkbox"/>	mob1s1a1	Speed	Default	0	0	✕
<input checked="" type="checkbox"/>	mob2s1a1	Speed	Default	0	0	✕
<input type="checkbox"/>	WAN2	Speed	Higher	0	130	✕

ADD

SAVE & APPLY

4.1.3 ADVANCED SETTINGS

Make sure to choose the following advanced settings for the S.A.NE Client on your Teltonika router:

Field	Value
Enable Bonding Proxy	On Enable this proxy if you're bonding connections with vastly different latencies (e.g. DSL and 5G/LTE), since it optimizes TCP connections and increases your overall throughput.
Maximum Packet Size	1400 Change to lower setting if S.A.NE's automatic MTU packet size detection fails.
Packet HMAC	Disabled Set this value to "SHA256" only if you need tampering-proof data transfer since it reduces the general Bondix S.A.NE performance.
Verify Server Certificate	If required, a server certificate can be uploaded here. Set option to "on" and browser for your CA file to upload.

4.1.4 LAYER 2

With this option, you can set up a layer-2 tunnel directly with S.A.NE. A layer-2 tunnel is a virtual interface that is created on both client and server for each tunnel—packets coming in on one end will come out the other and vice versa. This is an advanced feature; further configuration must be done server-side depending on the usage scenario.

If you need more information on how to use layer 2 with your Teltonika router, please contact Teltonika directly.

The screenshot displays the Teltonika Networks web interface. At the top, the logo 'TELTONIKA | Networks' is on the left, and user information 'MODE: ADVANCED', 'USER: ADMIN', 'FW VERSION: RUTX_R_00.07.02.7', and 'LOGOUT' is on the right. A left sidebar contains navigation options: STATUS, NETWORK, MOBILE INTERFACES, BONDIX S.A.NE (with sub-options: SETTINGS, MONITOR, STATUS), WIRELESS, FAILOVER, FIREWALL, VLAN, and ROUTING. The main content area is titled 'SETTINGS' and has three tabs: 'GENERAL', 'ADVANCED', and 'LAYER 2'. The 'LAYER 2' tab is active, showing a 'Layer 2 Tunnel' toggle switch currently set to 'off'. Below the toggle, there is explanatory text: 'If layer 2 tunnel is not configured on the server, the tunnel will fall back to regular layer 3 operation. We recommend to create a separate port based VLAN & interface to bridge the tunnel with, interface must have "Bridge Interfaces" enabled. While bridging the LAN interface also works, it can be more difficult to keep the router accessible, and can create other unintended side effects.' At the bottom right of the settings area are two buttons: 'RESTART SERVICE' and 'SAVE & APPLY'.

4.2 Monitor

With this release version, the local Bondix Web Monitor has been integrated in the Teltonika router menu. The monitor will enable you to have a look at the performance of your WAN links and configure their settings in real time. This is especially helpful if one of your WAN links does not perform as expected.

The monitor is only available if you're connected to your router via HTTP. Due to technical reasons, the monitor will not show if you're using HTTPS to connect to your router (e.g. via Teltonika RMS).

4.2.1 SETUP

To set up the monitor, choose the following settings in the Advanced Settings section:

▼ SETTINGS

GENERAL

ADVANCED

LAYER 2

Enable Bonding Proxy off on

Maximum Packet Size

Packet HMAC ^

Verify Server Certificate off on

Enable Monitor off on

Monitor HTTP Port

Monitor API Key

[RESTART SERVICE](#) [SAVE & APPLY](#)

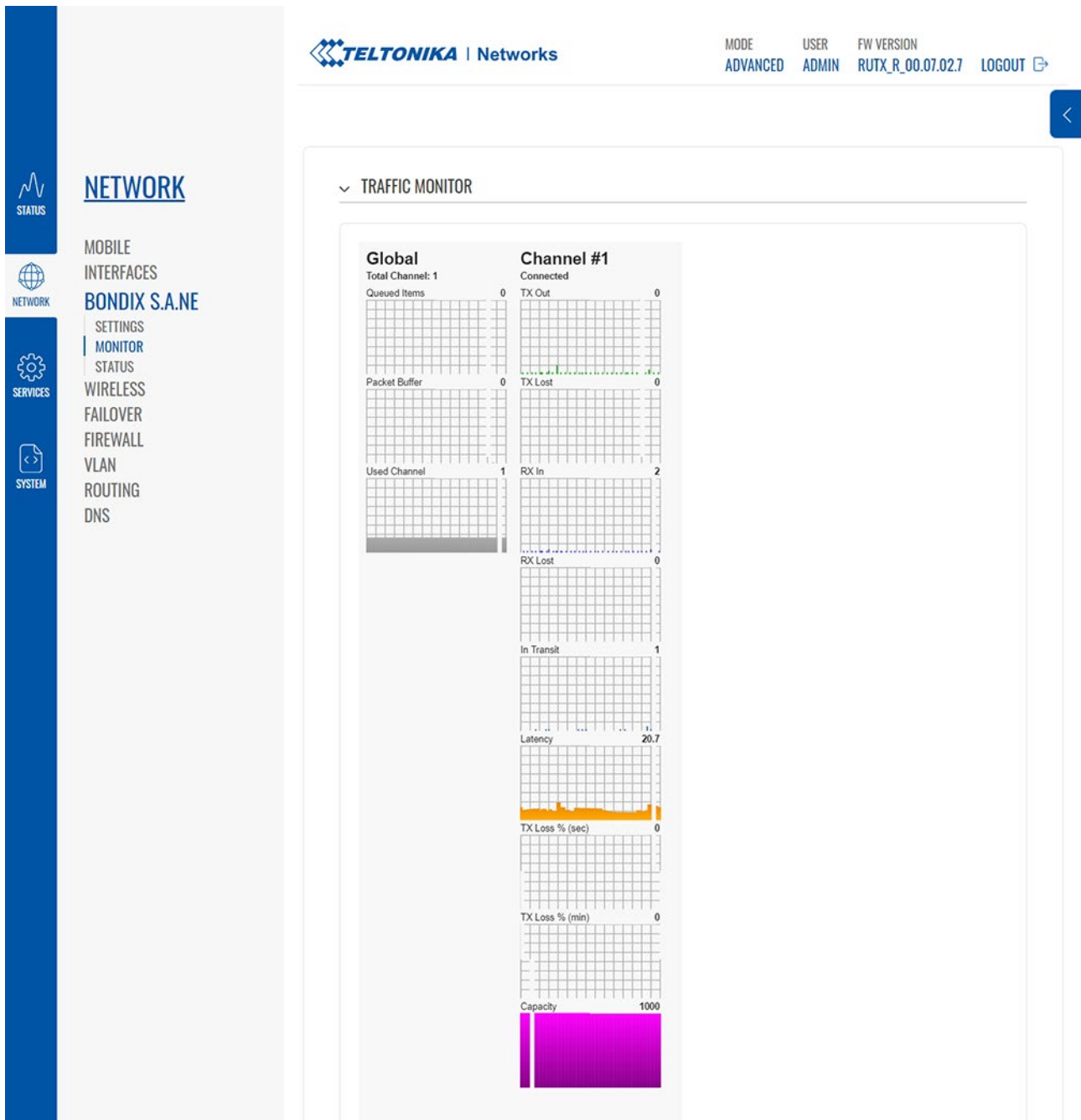
Field	Value
Enable Monitor	On
Monitor HTTP Port	This port is set automatically.
Monitor API Key	This automatically generated API key is used to show the monitor in the Teltonika router's Bondix S.A.NE menu.



To save your changes, click on *"Save and Apply"*, then *"Restart Service"*.

4.2.2 TRAFFIC MONITOR

Clicking on the "Monitor" link in your Teltonika router's Bondix S.A.NE menu will give you a graphical overview of the data traffic and the connection status of your tunnel's connected WAN links:



4.2.2.1 Global

Value	Description
Queued Items	Packets that have been received locally but haven't been sent yet.
Packet Buffer	Total amount of packets in cache.
Used Channel	Number of active channels.

4.2.2.2 Channel

Value	Description
TX Out	Number of outgoing traffic packets.
TX Lost	Number of lost outgoing traffic packets.
RX In	Number of incoming traffic packets.
RX Lost	Number of lost incoming traffic packets.
In Transit	Packets that have been sent but not acknowledged yet.
Latency	Latency in ms.
TX Loss % (sec)	Measured outgoing packet loss over the last second.
TX Loss % (min)	Measured outgoing packet loss over the last minute.
Capacity	Number of packets that can be sent out through the channel.

4.3 Status

The screenshot shows the Teltonika Networks web interface. The top navigation bar includes the logo, 'MODE ADVANCED', 'USER ADMIN', 'FW VERSION RUTX_R_00.07.02.7', and a 'LOGOUT' button. The left sidebar contains a 'NETWORK' menu with options like 'MOBILE INTERFACES', 'BONDIX S.A.NE', 'SETTINGS MONITOR', 'STATUS', 'WIRELESS', 'FAILOVER', 'FIREWALL', 'VLAN', 'ROUTING', and 'DNS'. The main content area is titled 'STATUS INFORMATION' and contains the following data:

Tunnel	Sylviaho1
Status	connected
Connected Channel	1
Client IP	111.222.333.444/555.666.777.888
Current Endpoint	123.456.789.012:123
Total Traffic	6.0 Mbyte / 2.9 Mbyte
Build Version	20221018-1458-2436f54 HEAD

Below this is the 'CHANNEL INFORMATION' section, which is a table with the following data:

NAME	STATUS	LATENCY	RX	TX	LAST ERROR
eth1	connected	12ms	11126	8439	

A 'REFRESH' button is located at the bottom right of the channel information table.

4.3.1 STATUS INFORMATION

In the Status Information, you can quickly see all facts to your Bondix S.A.NE Client, regarding your overall bonding as well as your individual channels.

Entry	Information
Tunnel	Shows the name of your tunnel.
Status	Tells you whether your Bondix S.A.NE Client is connected at all.
Connected Channels	Gives you the number of WAN links currently active.
Client IP	Shows IP/DNS addresses.
Current Endpoint	Shows Bondix S.A.NE server's IP/port.
Total Traffic	Shows total upload/download traffic.
Build Version	Shows which Bondix S.A.NE Client build you have installed.

4.3.2 CHANNEL INFORMATION

The Channel Information shows you which of your WAN links are available, connected and active, or faulty:

Entry	Information
Name	Shows the name you assigned to the specific WAN link.
Status	Tells you whether the WAN link is connected, disabled, or faulty.
Latency	Shows the WAN link's current latency.
RX	Shows incoming traffic.
TX	Shows outgoing traffic.
Last Error	Displays the error message of a faulty WAN link.