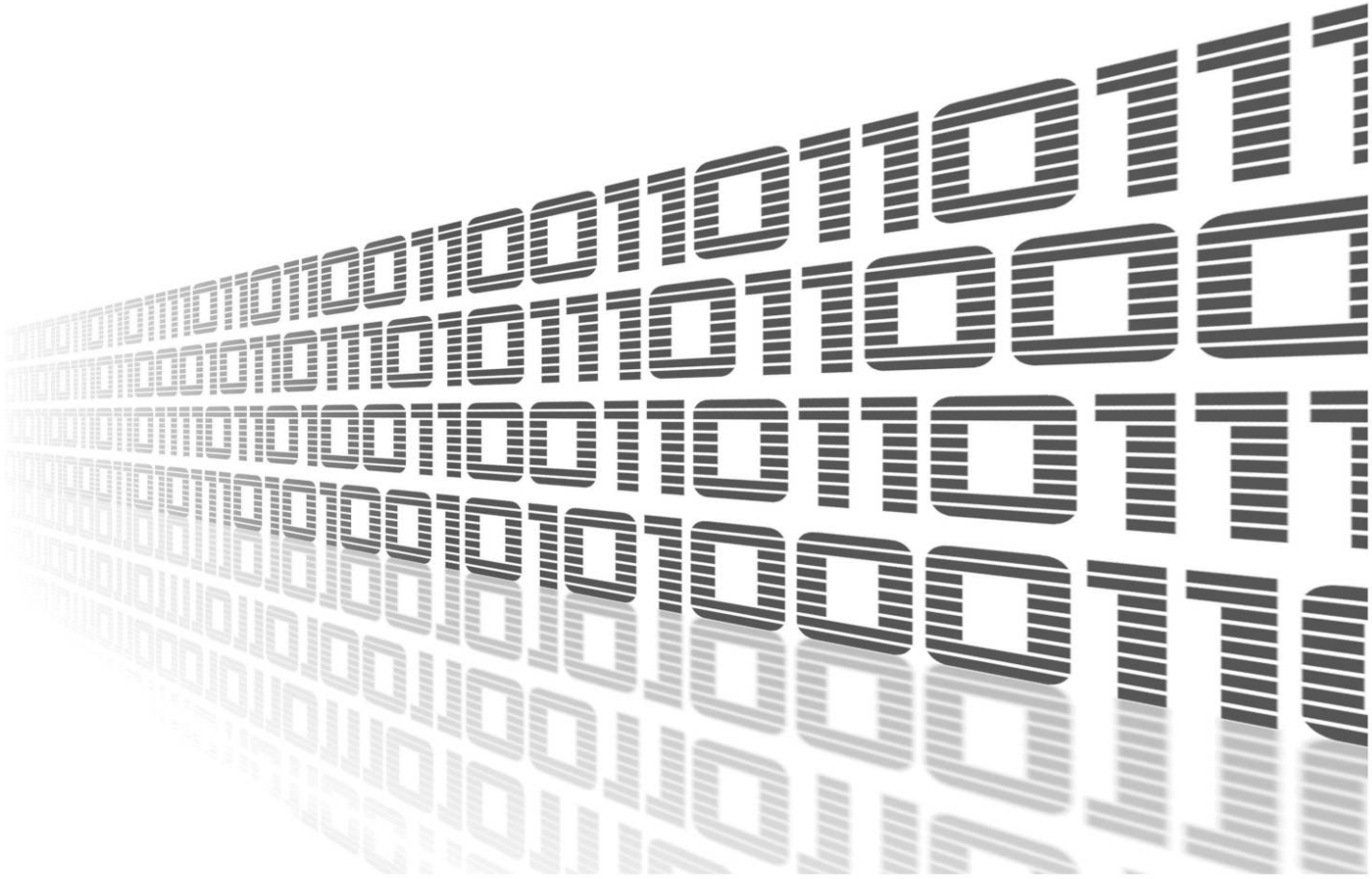
ADVANTECH

RouterApp

DNP3 Outstation



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Used symbols

Danger – Information regarding user safety or potential damage to the router.

Attention – Problems that can arise in specific situations.

Information – Useful tips or information of special interest.

Contents

List of Figures

List of Tables

1. Description of Router App

- This router app is not included in the standard router firmware. For instructions on how to upload and install router apps, refer to the *Configuration Manual*.
- This router app was tested on firmware version 6.3.10. If you update the router's firmware, please check for a compatible version of this app, as an update may be required.
- This manual is intended for the version of the router app that is not compatible with the v2 router platform.

The *DNP3 Outstation* router app enables the router to communicate using the DNP3 (Distributed Network Protocol v.3) protocol. The app provides two main functionalities:

- **DNP3 Outstation:** The router acts as an outstation (or slave device), collecting data from its own inputs (e.g., digital inputs, voltage, temperature) and system variables. It reports this data to a DNP3 master, which is typically a SCADA server.
- **DNP3 Gateway:** The router can also function as a gateway, routing DNP3 messages between the IP-based master and other DNP3 devices connected to the router's serial ports.

Figure 1: Menu of Web Interface

The *DNP3 Outstation* router app has a web interface for configuration, which can be accessed by clicking the app's name on the *Router Apps* page of the main router web interface. The left pane of the web interface contains a menu for configuring and monitoring the app. It includes sections for *Information*, *Configuration*, and *Administration*. The *Administration* section contains the *Return* link, which takes you back to the main router web interface.

2. Configuration

If you are logged in with the *Usr* role, you will have read-only access to all configuration pages.

The *DNP3 Outstation* app is configured using the *Global*, *Data Points*, *Routing Targets*, and *Routing Table* pages, located in the *Configuration* section of the app's web interface.

2.1 Global

The *Global* page contains settings for the primary UDP/TCP connection and for verifying an established TCP connection. The *Enable DNP3 Outstation* checkbox activates the app. The other settings are described below.

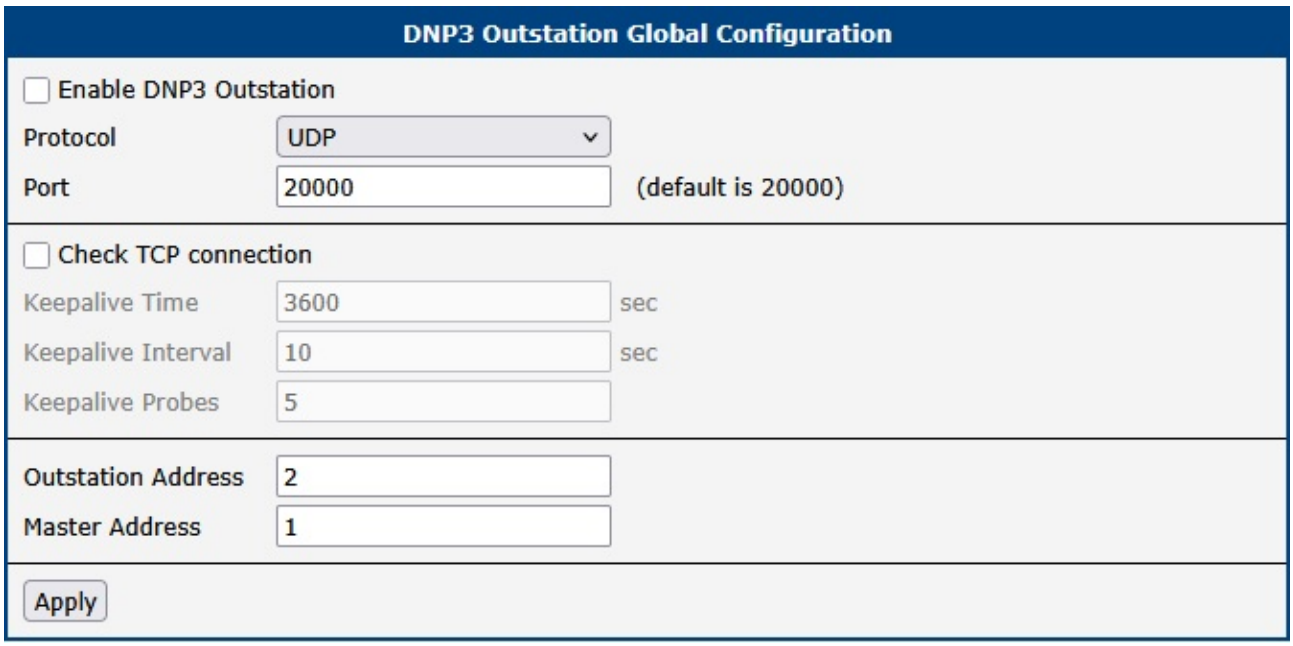

Figure 2: Configuration Form *Global*

Protocol
Selects the communication protocol. • **TCP – The connection-oriented TCP protocol.** • **UDP – The connectionless UDP protocol.**
Port
Specifies the port on which the router will listen for connections (default: 20000).

Table 1: Connection Configuration

Selecting the *Check TCP connection* checkbox enables keepalive probes to verify that an established TCP connection is still active. The following parameters can be configured:

Keepalive Time
The idle time in seconds before sending the first keepalive probe (default: 3600).
Keepalive Interval
The time in seconds to wait for a response to a keepalive probe (default: 10).
Keepalive Probes
The number of unacknowledged probes to send before considering the connection dropped (default: 5).

Table 2: An Established TCP Connection Check

It is also necessary to specify the master and outstation device addresses:

Outstation Address
The DNP3 address of this router (the outstation).
Master Address
The DNP3 address of the master device that will connect to this outstation.

Table 3: Device Specification

2.2 Data Points

The *Data Points* page is used to configure which data points are enabled and how they are reported, refer to figure below.

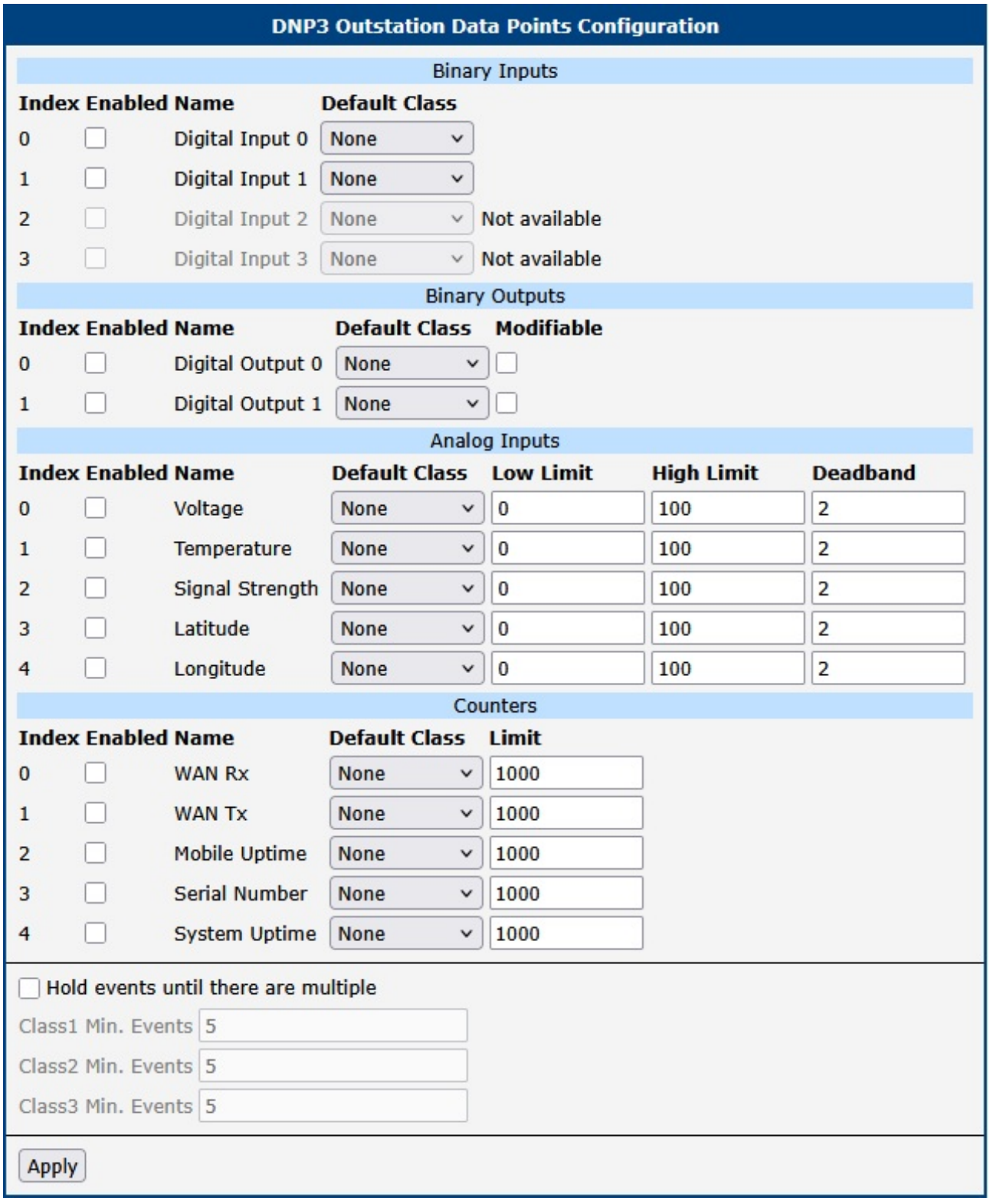

Figure 3: Configuration Form *Data Points*

Data points are enabled using the checkbox in the *Enabled* column. In the *Default Class* column, you can assign a class to each data point. This class determines how event data is reported.

The following subsections describe the available data points, grouped by type.

2.2.1 Binary Inputs

Index	Description
0	Digital Input 0 – The first digital input
1	Digital Input 1 – The second digital input
2	Digital Input 2 – The third digital input
3	Digital Input 3 – The fourth digital input

Table 4: Binary Inputs

2.2.2 Binary Outputs

Index	Description
0	Digital Output 0 – The first digital output
1	Digital Output 1 – The second digital output

Table 5: Binary Outputs

When *Modifiable* column is checked, it is possible to change value of the binary output with a control command (selec-operate or direct operate). Only CROB LATCH variation is supported.

2.2.3 Analog Inputs

For *Analog Inputs*, you can also configure *Low Limit*, *High Limit*, and *Deadband* values for event generation. *Low Limit* and *High Limit* define the thresholds for the analog value. The *Deadband* value prevents multiple events from being generated when an analog value fluctuates near a limit. After a limit is crossed, the value must return past the limit by the deadband amount before it is considered to have returned to the normal range.

For example, if *Low Limit* is 10 and *Deadband* is 2, an event is triggered when the value drops below 10. The value is considered back to normal only after it rises above 12 (*Low Limit* + *Deadband*). Similarly, if *High Limit* is 50, an event is triggered when the value exceeds 50, and it returns to normal only after dropping below 48 (*High Limit* – *Deadband*).

Index	Description
0	Input supply voltage. The value must be divided by 1000 to get the voltage in Volts.
1	Internal router temperature in degrees Celsius (°C).
2	Signal strength of the cellular connection.
3	GPS Latitude in degrees. The value must be divided by 1,000,000.
4	GPS Longitude in degrees. The value must be divided by 1,000,000.

Table 6: Analog Inputs

- Note that the ability to read input voltage and router temperature is not available on all router models.
- GPS values are only available on routers with GNSS hardware. The *GPS* router app must also be installed and running on these devices.

2.2.4 Counters

Index	Description
0	Received data on the primary WAN interface (in bytes).
1	Transmitted data on the primary WAN interface (in bytes).
2	Duration of the current mobile WAN connection (in minutes).
3	Serial number cut to only last 9 digits.
4	Total system uptime since the last reboot (in seconds).

Table 7: Counters

The limit, configured in *Limit* column, specifies how much a counter must increase a value to send an event.

2.2.5 Number of Events

The settings at the bottom of the page let you control when unsolicited event messages are sent. If the *Hold events until there are multiple* checkbox is unchecked, messages are sent immediately. If the checkbox is checked, messages are held until the queue for a given class reaches the number specified by *ClassX Min. Events*. Setting this value to 1 also causes messages to be sent immediately.

2.3 Routing Targets

The *Routing Targets* page is used to define communication endpoints (targets) for routing DNP3 messages. These targets can be local serial ports or remote IP connections. If the router has a serial expansion port, a section for configuring it will be displayed. This section is hidden if no serial port is available.

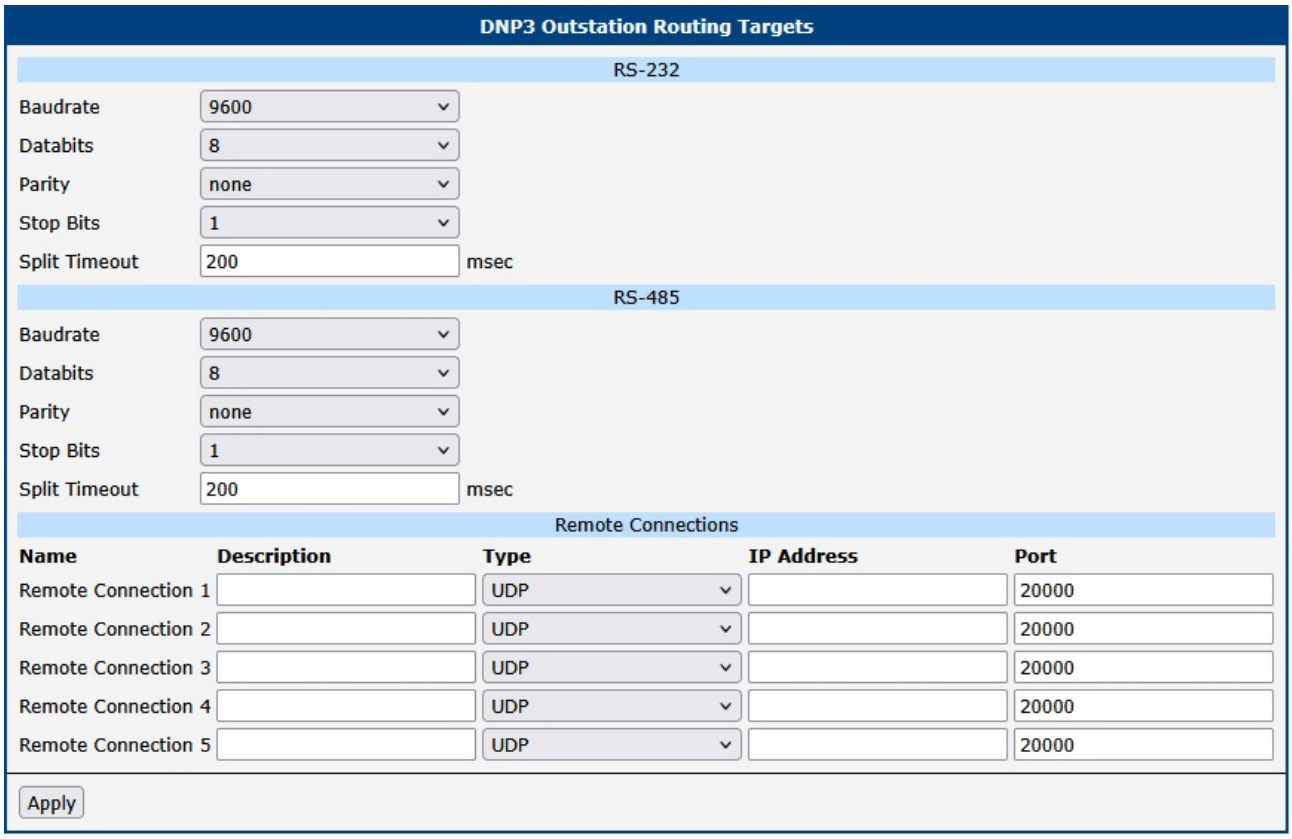

Figure 4: Configuration Form *Routing Targets*

The user can specify the following serial port parameters:

Baudrate
Serial communication speed in bits per second (bps).
Databits
The number of data bits per character.
Parity
Parity bit for error checking. • **none – No parity bit is used.** • **even – Even parity is used.** • **odd – Odd parity is used.**
Stop Bits
The number of stop bits to indicate the end of a character.
Split Timeout
The timeout in milliseconds for assembling message fragments. If a pause between received characters on the serial line exceeds this value, the router assumes the message is complete and processes the received data.

Table 8: Configuration of Expansion Ports

The *Remote Connections* section allows you to define network targets. These defined targets will be available for selection in the DNP3 routing table.

Description
A user-friendly name or description for the remote connection.
Type
The network protocol to use for the connection. • **TCP – The connection-oriented TCP protocol.** • **UDP – The connectionless UDP protocol.**
IP Address
The IP address of the remote DNP3 device.
Port
The TCP or UDP port number of the remote DNP3 device.

Table 9: Configuration of *Remote Connections*

2.4 Routing Table

The *Routing Table* page allows you to create static routes for DNP3 messages. Each rule maps a destination *DNP3 Address* to a specific communication *Target* that was configured on the *Routing Targets* page. When the router receives a message for a specific DNP3 address, it forwards it to the corresponding target.

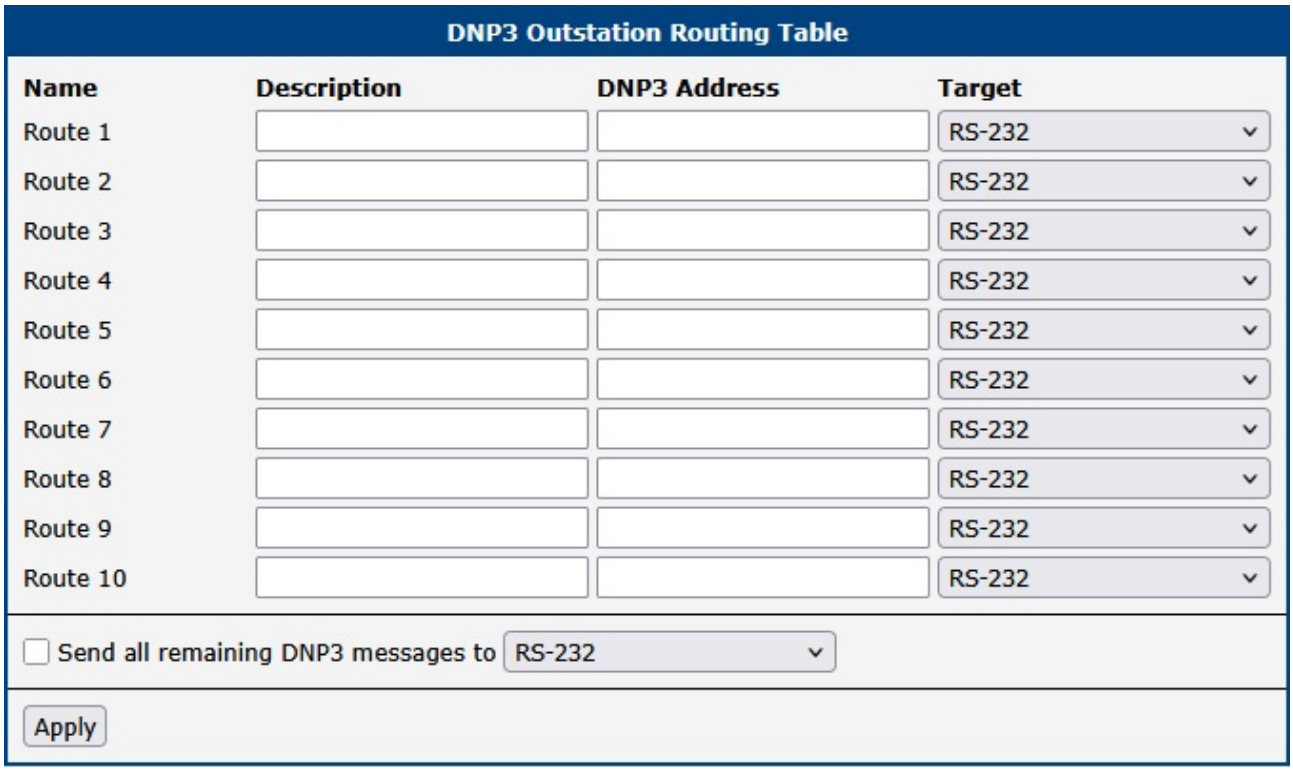

Figure 5: Configuration Form *Routing Table*

The individual columns have the following meaning:

Name
The name of the route (e.g., *Route 1*).
Description
An optional description for the route.
DNP3 Address
The destination DNP3 address for this route.
Target
The communication endpoint for this route. The dropdown list contains all serial ports and remote connections defined on the *Routing Targets* page.

Table 10: Configuration Form *Routing Table*

The *Send all remaining DNP3 messages to* option defines a default route. Any message for a DNP3 address not explicitly defined in the routing table will be sent to this selected target.

3. Application Activity Monitoring

3.1 Statistics

To view communication statistics, navigate to *Information* → *Statistics* in the app's web interface. This page displays low level statistics, including the number of frames sent and received, and the count of CRC errors.

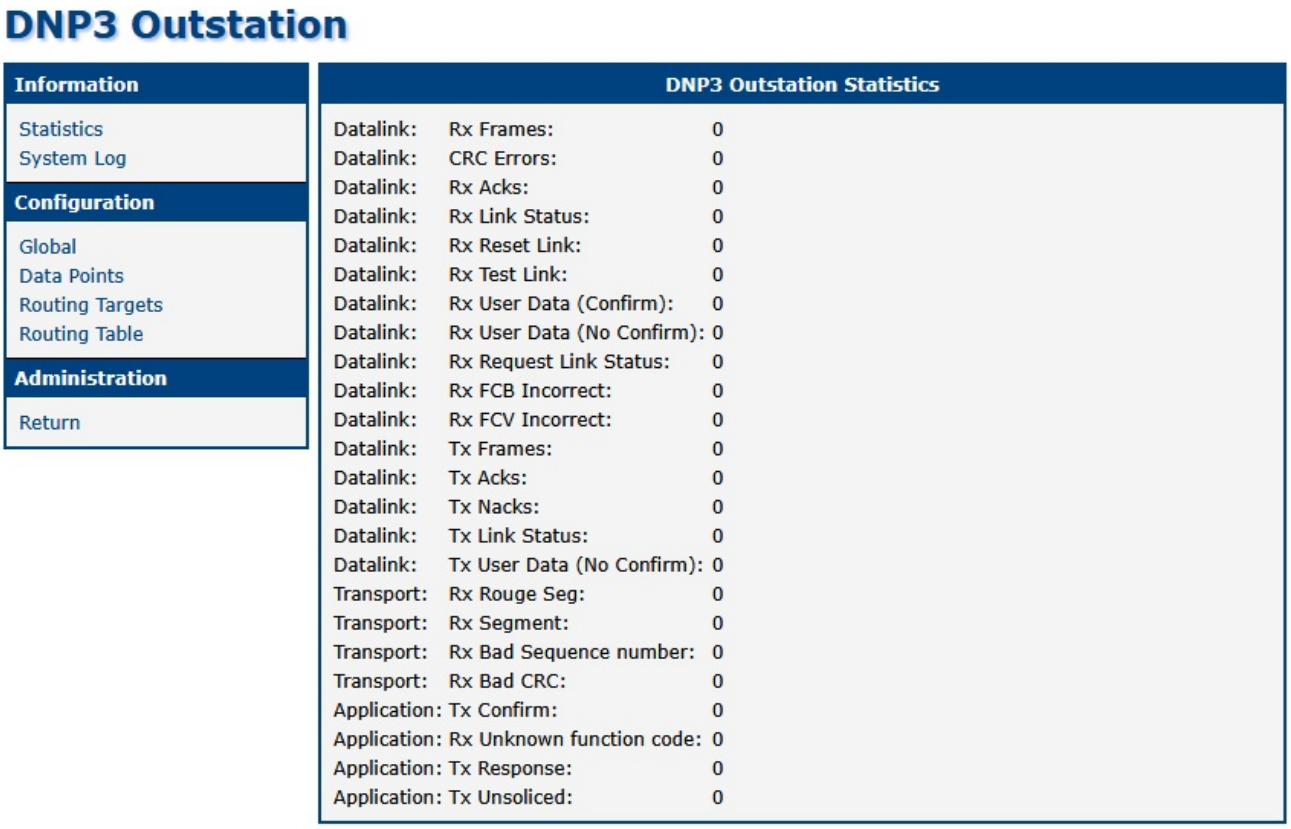

Figure 6: Statistics

3.2 System Log

For troubleshooting, you can view detailed log messages by navigating to the *Information* → *System Log* page within the app's interface. This log is filtered to show only messages from the *DNP3 Outstation* app. To view the complete, unfiltered system log, navigate to *Status* → *System Log* in the main router web interface.

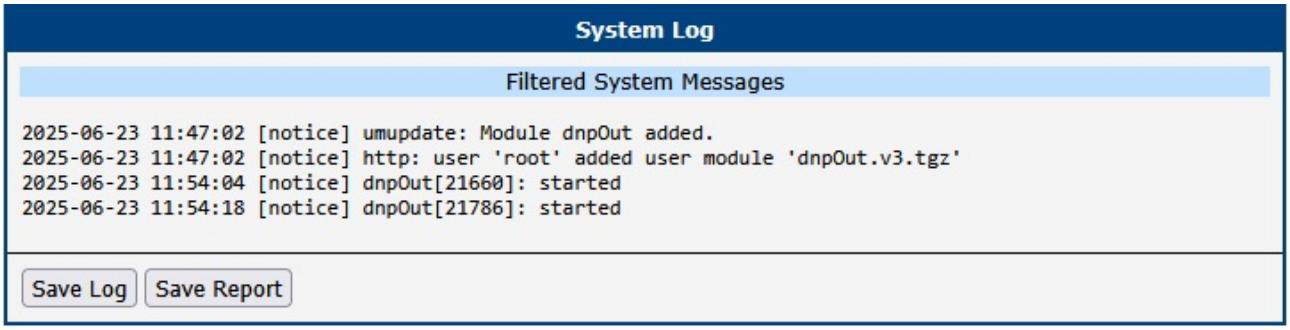

Figure 7: System Log

4. Related Documents

You can obtain product-related documents on the *Engineering Portal* at *icr.advantech.com*.

To get your router's *Quick Start Guide*, *User Manual*, *Configuration Manual*, or *Firmware*, go to the *Router Models* page, find the required model, and switch to the *Manuals* or *Firmware* tab, respectively.

The *Router Apps* installation packages and manuals are available on the *Router Apps* page.

For *Development Documents*, go to the *Development* page.