RUT955 Serial Utilities

The information in this page is updated in accordance with firmware version **RUT9_R_00.07.06.14**.

***Note**: **click here** for the old style WebUI (FW version RUT9XX_R_00.06.09.5 and earlier) user manual page.*

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Contents

Summary

The **Serial Utilities** page is used to make serial communication configurations of different types. To make a **new serial configuration** instance select a serial type from the left-hand navigation menu. In the next page enter a custom name for the new config, select a serial device and click the Add button.

Example from the Modem Configuration page:

Then, click the Edit button next to the instance:

This manual page provides an overview of the Serial Utilities page in RUT955 devices.

General information

RS232

Connector pinout

The RS232 connector type on this device is a **DCE female**. DCE stands for Data Communication Equipment.

PIN	NAME*	DESCRIPTION*	DIRECTION ON THIS DEVICE
1	DCD	Data Carrier Detect	Output
2	RXD	Receive Data	Output
3	TXD	Transmit Data	Input
4	DTR	Data Terminal Ready	Input
5	GND	Signal Ground	-
6	DSR	Data Set Ready	Output
7	RTS	Ready To Send	Input
8	CTS	Clear To Send	Output
9	RI	Ring Indicator	Output (connected to +5V permanently via a 4.7k resistor)

Cables

There are two types of RS232 serial devices: **DTE** and **DCE**. DTE typically refers to the serial port on a PC or terminal, while DCE refers to communication devices. Connectors mounted on DTE are likely to be male, and those mounted on DCE are likely to be female.

This device is DCE and has a female connector.

To connect a standard DTE device, use a straight-through Female/Male RS232 cable:

See straight cable pinout below:

To connect another DCE device to RUT/TRB, a Null-modem (crossed) Male/Male cable should be used:

See straight crossed cable pinout below:

Maximum cable length is 15 meters or the cable length equal to a capacitance of 2500 pF (for a 19200 baud rate). Using lower capacitance cables can increase the distance. Reducing communication speed can also increase maximum cable length.

RS485

Connector pinout

Below is a depiction of the RS485 connector pins:

RS485 connector pinout		
Pin	Name	Description
1	D_N	Driver negative signal
2	R_N	Receiver negative signal
3	GND	Device ground
4	D_P	Driver positive signal
5	R_P	Receiver positive signal
6	NC	Power input 9-30 VDC

Cable type

Recommended cable parameters:

PARAMETER	VALUE
Cable Type	22-24 AWG, 2 – pair (used for full-duplex networks) or 1-pair (used for half duplex networks). One addtitional wire for ground connection is needed
Characteristic cable Impedance	120 Ω @ 1MHz
Capacitance (conductor to conductor)	36 pF/m
Propagation Velocity	78% (1.3 ns/ft)

Maximum data rate vs. transmission line length

The RS485 standard can be used for network lengths up to 1200 meters, but the maximum usable data rate decreases as the transmission length increases. A device operating at the maximum data transfer rate (10 Mbps) is limited to a transmission length of about 12 meters, while a distance up to 1200 meters can be achieved at 100 Kbps. A rough relation between maximum transmission length

and data rate can be calculated using this approximation:

Where:

- $\mathbf{L_{max}}$ - maximum cable length in meters.
- **DR** - maximum data rate in bits per second.

Twisted pair is the preferred cable type for RS485 networks. Twisted pair cables pick up noise and other electromagnetically induced voltages as common mode signals, which are rejected by the differential receivers.

2-Wire and 4-Wire Networks

Below is an example of a 4-wire network electrical connection. There are 3 devices shown in the example. One of the devices is the "master" and other two are "slaves". Termination resistors (120 Ω each) are placed at each cable end. Four-wire networks consists of one master with its transmitter connected to each of the slaves' receivers on one twisted pair. The slave transmitters are all connected to the master receiver on a second twisted pair:

Example 2-wire network electrical connection: to enable a 2-wire RS485 configuration you need to connect D_P to R_P and D_N to R_N on the device's RS485 socket. Termination resistors are placed at each cable end (120 Ω each):

Modem Control

The **Modem** serial type is used to manage modem functionality which could be accessed using shell interface. For this purpose you may want use CR/LF (Carriage Return, Line Feed) capable applications like PuTTY on Windows and microcom, minicom, cutecom or similar applications on Linux.

Field	Value	Description
Enable	off | on; default: **off**	Turns the instance on or off.
Name	string; default: **none**	Instance name, generated by the user when first creating the configuration.
Device	RS232 | RS485 | USB RS232 interface; default: **RS232**	Specifies which serial port will be used for serial communication.
Baud rate	integer [300..3000000]; default: **9600**	Data rate for serial data transmission (in bits per second (bps)).
Data bits	5 | 6 | 7 | 8; default: **8**	Number of data bits for each character.

Stop bits	1 | 2; default: **1**	Stop bits sent at the end of every character allow the receiving signal hardware to detect the end of a character and to resynchronise with the character stream. Electronic devices usually use one stop bit. Two stop bits are required if slow electromechanical devices are used.
Parity	None | Odd | Even | Mark | Space; default: **None**	In serial transmission, parity is a method of detecting errors. An extra data bit is sent with each data character, arranged so that the number of 1 bits in each character, including the parity bit, is always odd or always even. If a byte is received with the wrong number of 1s, then it must have been corrupted. However, an even number of errors can pass the parity check. • **None** (**N**) - no parity method is used. • **Odd** (**O**) - the parity bit is set so that the number of "logical ones (1s)" has to be odd. • **Even** (**E**) - the parity bit is set so that the number of "logical ones (1s)" has to be even.
Flow control	None| RTS/CTS | Xon/Xoff; default: **None**	In many circumstances a transmitter might be able to send data faster than the receiver is able to process it. To cope with this, serial lines often incorporate a "handshaking" method, usually distinguished between hardware and software handshaking. • **RTS/CTS** - hardware handshaking. RTS and CTS are turned OFF and ON from alternate ends to control data flow, for instance when a buffer is almost full. • **Xon/Xoff** - software handshaking. The Xon and Xoff characters are sent by the receiver to the sender to control when the sender will send data, i.e., these characters go in the opposite direction to the data being sent. The circuit starts in the "sending allowed" state. When the receiver's buffers approach capacity, the receiver sends the Xoff character to tell the sender to stop sending data. Later, after the receiver has emptied its buffers, it sends an Xon character to tell the sender to resume transmission.
Mode	Partial control | Full control; default: **Partial control**	Specifies modem control mode. • **Partial control**- enables modem control with AT commands, mobile connection will be controlled by RUTOS. • **Full control**- enables modem control with AT commands, mobile connection will be controlled by user.
RS485: Full Duplex	off | on; default: **off**	Turns Full Duplex mode on or off. This option is available only on the RS485 device.
Start up message	string; default: **none**	Message to print to serial device when modem control is ready.

Console

Console mode requires no further configuration than the settings above and is used as a direct-access method to the device's shell interface. For this purpose you may want use such applications as PuTTY on Windows and microcom, minicom, picocom or similar applications on Linux.

Field	Value	Description

Enable	off | on; default: **off**	Turns the instance on or off.
Name	string; default: **none**	Instance name, generated by the user when first creating the configuration.
Device	RS232 | RS485 | USB RS232 interface; default: **RS232**	Specifies which serial port will be used for serial communication.
Baud rate	integer [300..3000000]; default: **9600**	Data rate for serial data transmission (in bits per second (bps)).
Data bits	5 | 6 | 7 | 8; default: **8**	Number of data bits for each character.
Stop bits	1 | 2; default: **1**	Stop bits sent at the end of every character allow the receiving signal hardware to detect the end of a character and to resynchronize with the character stream. Electronic devices usually use one stop bit. Two stop bits are required if slow electromechanical devices are used.
Parity	None | Odd | Even | Mark | Space; default: **None**	In serial transmission, parity is a method of detecting errors. An extra data bit is sent with each data character, arranged so that the number of 1 bits in each character, including the parity bit, is always odd or always even. If a byte is received with the wrong number of 1s, then it must have been corrupted. However, an even number of errors can pass the parity check. • **None** (**N**) - no parity method is used. • **Odd** (**O**) - the parity bit is set so that the number of "logical ones (1s)" has to be odd. • **Even** (**E**) - the parity bit is set so that the number of "logical ones (1s)" has to be even.
Flow control	None| RTS/CTS | Xon/Xoff; default: **None**	In many circumstances a transmitter might be able to send data faster than the receiver is able to process it. To cope with this, serial lines often incorporate a "handshaking" method, usually distinguished between hardware and software handshaking. • **RTS/CTS** - hardware handshaking. RTS and CTS are turned OFF and ON from alternate ends to control data flow, for instance when a buffer is almost full. • **Xon/Xoff** - software handshaking. The Xon and Xoff characters are sent by the receiver to the sender to control when the sender will send data, i.e., these characters go in the opposite direction to the data being sent. The circuit starts in the "sending allowed" state. When the receiver's buffers approach capacity, the receiver sends the Xoff character to tell the sender to stop sending data. Later, after the receiver has emptied its buffers, it sends an Xon character to tell the sender to resume transmission.
RS485: Full Duplex	off | on; default: **off**	Turns Full Duplex mode on or off. This option is available only on the RS485 device.

Over IP

The **Over IP** serial type is used to manage serial connections over a TCP/IP network.

Serial Device Configuration

Configure serial port communication parameters in the **Serial Device Configuration** section.

Field	Value	Description
Enable	off | on; default: **off**	Turns the instance on or off.
Name	string; default: **none**	Instance name, generated by the user when first creating the configuration.
Device	RS232 | RS485 | USB RS232 interface; default: **RS232**	Specifies which serial port will be used for serial communication.
Baud rate	integer [300..3000000]; default: **9600**	Data rate for serial data transmission (in bits per second (bps)).
Data bits	5 | 6 | 7 | 8; default: **8**	Number of data bits for each character.
Stop bits	1 | 2; default: **1**	Stop bits sent at the end of every character allow the receiving signal hardware to detect the end of a character and to resynchronise with the character stream. Electronic devices usually use one stop bit. Two stop bits are required if slow electromechanical devices are used.
Parity	None | Odd | Even | Mark | Space; default: **None**	In serial transmission, parity is a method of detecting errors. An extra data bit is sent with each data character, arranged so that the number of 1 bits in each character, including the parity bit, is always odd or always even. If a byte is received with the wrong number of 1s, then it must have been corrupted. However, an even number of errors can pass the parity check. • **None** (**N**) - no parity method is used. • **Odd** (**O**) - the parity bit is set so that the number of "logical ones (1s)" has to be odd. • **Even** (**E**) - the parity bit is set so that the number of "logical ones (1s)" has to be even.
Flow control	None| RTS/CTS | Xon/Xoff; default: **None**	In many circumstances a transmitter might be able to send data faster than the receiver is able to process it. To cope with this, serial lines often incorporate a "handshaking" method, usually distinguished between hardware and software handshaking. • **RTS/CTS** - hardware handshaking. RTS and CTS are turned OFF and ON from alternate ends to control data flow, for instance when a buffer is almost full. • **Xon/Xoff** - software handshaking. The Xon and Xoff characters are sent by the receiver to the sender to control when the sender will send data, i.e., these characters go in the opposite direction to the data being sent. The circuit starts in the "sending allowed" state. When the receiver's buffers approach capacity, the receiver sends the Xoff character to tell the sender to stop sending data. Later, after the receiver has emptied its buffers, it sends an Xon character to tell the sender to resume transmission.

RS485: Full Duplex	off | on; default: **off**	Turns Full Duplex mode on or off. This option is available only on the RS485 device.
RS232: Echo	off | on; default: **off**	Enable serial device echo. This option is available only on the RS232 device.

Over IP Configuration Settings

You can configure network related parameters of the serial connection in the **Over IP Configuration** secion.

Field	Value	Description
Mode	Server | Client | Client + server | Bidirect; default: **Server**	This device's role in the connection: • **Server** - the device waits for incoming connections. • **Client** - the device initiates the connection. • **Client + server** - launches service in server and client(s) mode simultaneously. • **Bidirect** - acts as client by default but waits for incoming connections at the same time.
Protocol	TCP | UDP; default: **TCP**	Protocol used in the communication process.
Client: Destination address	IP | Port; default: **empty**	Specify server address and port for client to connect to. E.g first field for address second for port. 16 destination addresses are allowed.
Server: UDP: Predefined addresses	IP | Port; default: **empty**	Set predefined IP and port for UDP connection. E.g first field for address second for port.
Listening port	[1..65535]; default: **empty**	When enabled, all data will be transmitted transparently.

Field	Value	Description
Use TLS/SSL	off | on; default: **off**	Mark to use TLS/SSL for connection.
TLS version	Support all | tlsv1.0 | tlsv1.1 | tlsv1.2 | tlsv1.3; default: **Support all**	Minimum TLS version allowed to be used.

TLS type	Certificate based | Pre-Shared-Key based; default: **Certificate based**	Select the type of TLS encryption.
Require certificate	off | on; default: **on**	Demand certificate and key from peer and verify them against certificate authority.
Verify host	off | on; default: **off**	Check if the server certificates Common Name (CN) matches hostname to which client is connecting.
Certificate files from device	off | on; default: **off**	Choose this option if you want to select certificate files from device. Certificate files can be generated here.
Certificate file	.crt file; default: **none**	Upload certificate file.
Key file	.key file; default: **none**	Upload key file.
CA file	.ca file; default: **none**	Upload CA file.
Pre-Shared-Key	string; default: **none**	The pre-shared-key in hex format with no leading “0x”.
Identify	string; default: **none**	Specify the identity.

Field	Value	Description
Raw mode	off | on; default: **on**	When enabled, all data will be transmitted transparently.
Remove all zeros	off | on; default: **off**	When checked, indicates that the first hex zeros should be skipped.
Inactivity timeout	integer [0..36000]; default: **300**	Specifies period of time in seconds, where server connection must be inactive, to disconnect client. To disable timeout input 0.
Serial timeout	integer [0..1000]; default: **none**	Specifies the maximum milliseconds to wait for serial data.
Max clients	integer [1..32]; default: **4**	Specify how many clients are allowed to connect simultaneously.
TCP echo	on | off; default: **off**	Enable software TCP echo.
Close connections	on | off; default: **off**	Close TCP connections everytime data is sent or received (might result in serial data loss).
Keep alive time	integer [0..32000]; default: **0**	Close TCP connections everytime data is sent or received (might result in serial data loss).
Keep alive interval	integer [0..32000]; default: **0**	The interval between subsequential keepalive probes.

Keep alive probes	integer [0..32000]; default: **0**	The number of unacknowledged probes.

IP Filter

The **IP Filter** section is used for configuring which network is allowed to communicate with the device. You may add a new instance by selecting the Interface and pressing Add.

Then enter the IP address and save.