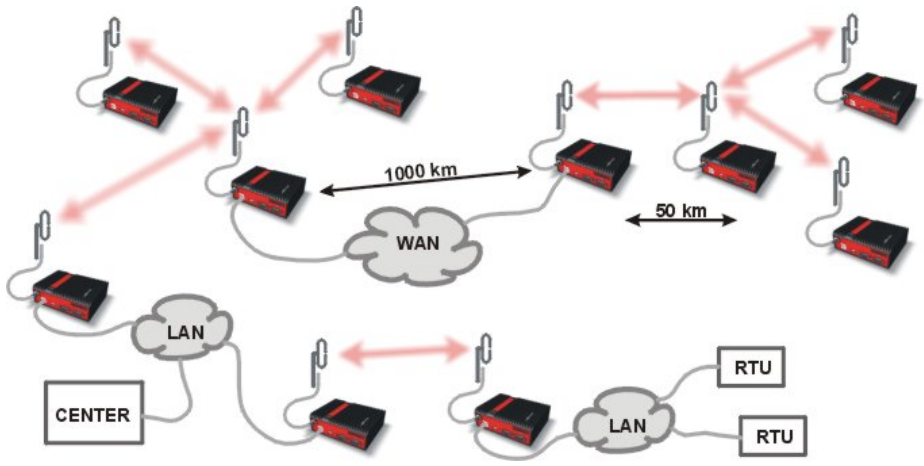
RACOM
RADIO DATA NETWORKS

Application notes



RipEX
UNI Protocol

version 1.0
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Table of Contents

UNI protocol 5
1. MASTER – SLAVE communication 6
2. MASTER – SLAVE with several Masters 8
3. MASTER – MASTER 9
4. MASTER UNI – ASYNC LINK SLAVES 10
A. Revision History 11

UNI protocol

UNI is the "Universal" protocol utility designed by RACOM. It is not a new SCADA protocol, it can actually process different protocols of different vendors. It supports both the standard MASTER -SLAVE and the MULTI MASTER types of communication. At least one Master is required in the network.

The SCADA protocol to be handled by the UNI has to meet solely the following condition: There has to be an 8 or 16 bit* protocol address in every message generated by a Master station and the address position in all messages has to be the same. The position of address in the reply from an RTU is not relevant, because the reply is always send back to the address where the request originated.

Note

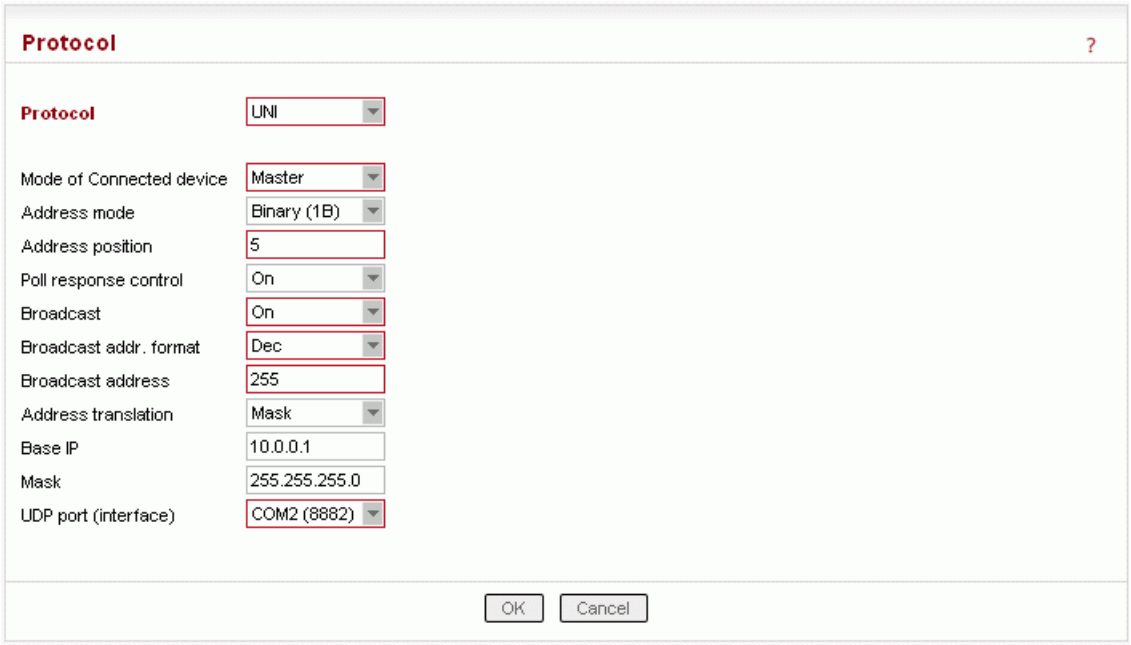
Some SCADA protocols use two byte ASCII address, which is an ASCII representation of an 8 bit address in the hexadecimal format (e.g. "8C" means 8-bit value 0x8C in hex / 140 in decimal notation).

Address bytes for some protocols:

PR2000	3rd Byte
RDS	2nd Byte
Mars-A	8th Byte (without local ACK)
Hirsch	2nd Byte

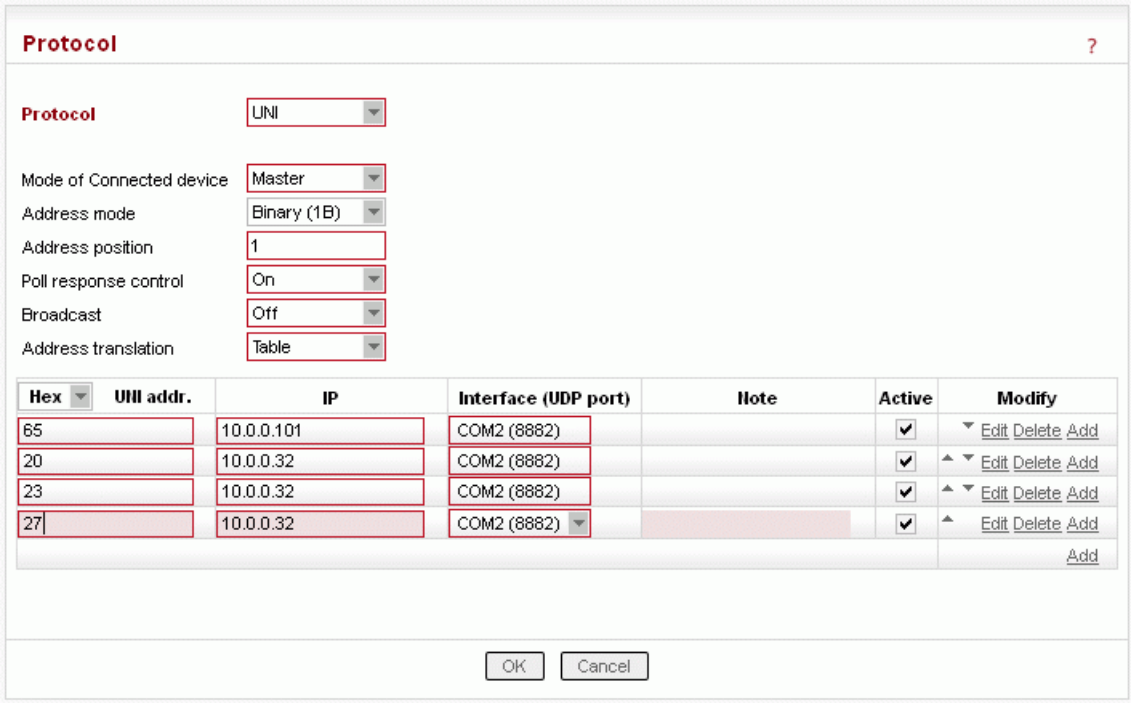
1. MASTER – SLAVE communication

Master reads the address byte defined by configuration and generates the destination IP address using the mask or the translation table. The message is then delivered to that IP address and the respective UDP port (e.g. the port No 8882 which is assigned to the COM2 interface).



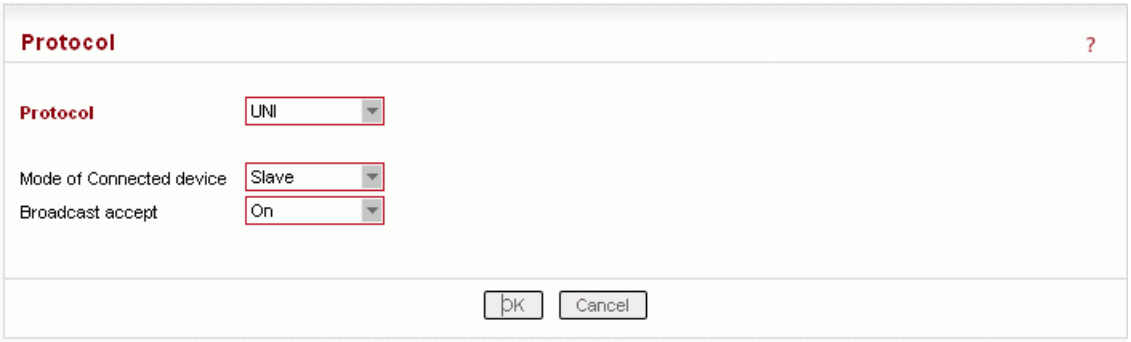
An example of Master configuration is in the picture above. The address translation then proceeds as follows:
The 5th byte from the incoming message from SCADA centre is used to replace the last byte of the Base IP and the resulting IP address is used as the destination of the UDP datagram which contains the original SCADA message.
Let assume that the content of 5th byte is 0x65 - then the IP destination address will be 10.0.0.101 and the UDP port 8882.

The translation by a table is more versatile, however it requires an extra line of configuration for every remote in the network. The table has to be used when addresses of RipEX radiomodems and SCADA RTUs do not match or different ports (interfaces) at different remotes have to be configured.



The example of table in the picture above demonstrates a situation when there are three SCADA devices connected to the COM2 of a single RipEX unit over a RS485 bus.

The configuration of a Slave radiomodem is very simple, as demonstrated in the picture below. When a UNI Slave receives the UDP datagram from RF channel, it takes the original SCADA message and transmits it over the respective interface (the COM2 in our example).



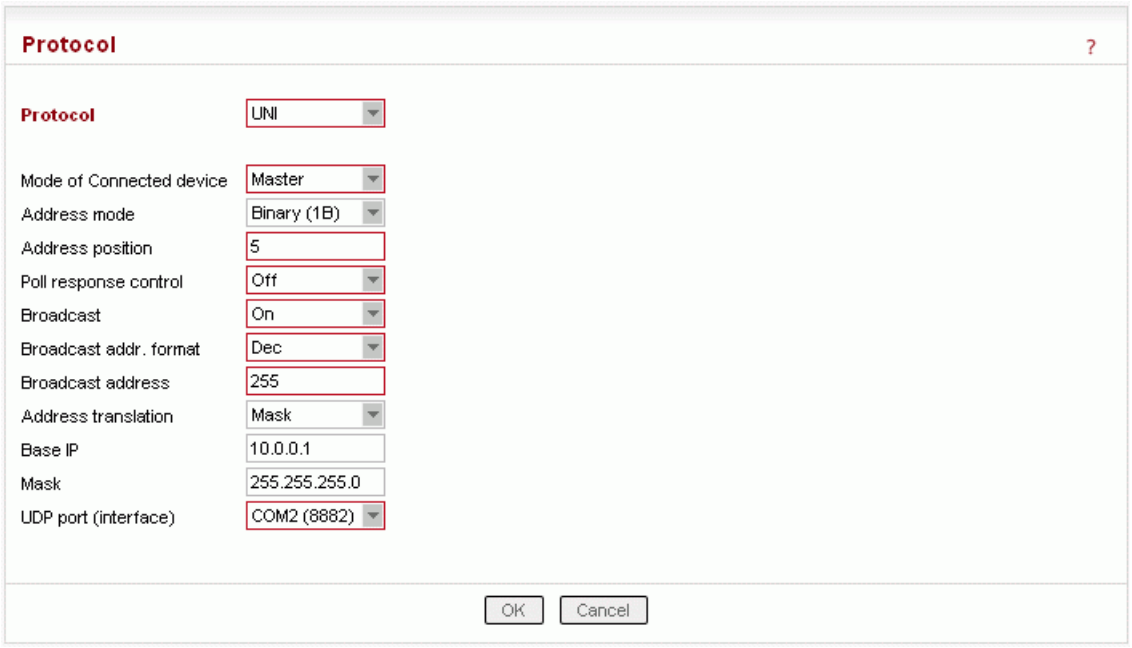
If the SCADA device connected responds to the message within a timeout of 500 ms, the source IP address of the received UDP datagram is used as the destination for the response.(Note only one packet is accepted as a response). When the timeout expires, all messages received by the serial interface are discarded.

2. MASTER – SLAVE with several Masters

The behaviour of Master and Slave is exactly the same as in the previous scenario, i.e. a Slave always responds to the address from which the request was sent. If by chance two simultaneous requests from different Masters are received by a slave radiomodem, the RipEX radio modem waits for the first reply from the connected SCADA device before transmitting the request which arrived second. The 500 ms timeout applies again, i.e. when there is no reply for the first request, the second one is transmitted after the timeout expires.

3. MASTER – MASTER

The Master - Master communication is possible. The translation of addresses is proceeded with every packet incoming to the RipEX radio modem from connected SCADA equipment, thus it is suitable for SCADA protocols containing the destination address in all packets.



The Poll Response Control has to be set to OFF for the MASTER-MASTER type of communication.

4. MASTER UNI – ASYNC LINK SLAVES

The combination of the UNI and the ASYNC LINK protocols is useful for networks where one application master communicates with many slaves and the slaves are allowed to spontaneously send messages to the master. The UNI-Master RipEX§s address is configured as the ASYNC LINK protocol destination address at all the slaves. This arrangement makes the syntax of application protocol messages generated by slave completely arbitrary. All slave messages are transparently delivered to the application master.

Note that, similarly to the MASTER-MASTER mode, the Poll Response Control at the Master RipEX has to be set to Off.

Appendix A. Revision History

Revision 1.0 2017-11-23

First issue