RACOM
RADIO DATA NETWORKS

UNI protocol for MORSE

version 9.0.28.0
1/31/2008

1. Introduction

UNI is a very simple Master-Slave type protocol suitable, for example, for development work in Master-Slave networks. The CU in the RADIOSLAVE function is able to send an unchanged packet to a specific address. In the RADIOMASTER function it sends a response to the sender´s address upon request (without time limitation). The modem connected to the Slave PLC cannot send a packet to the MORSE network spontaneously, i.e. without a RADIOSLAVE's query.

⚠️ **Important**

The terminology is unified from Setr version 9.0.17.0 according next schedule:

```
PLC Master - CU RADIOSLAVE ... CU RADIOMASTER - Slave PLC
```

CU (radiomodem) connected via SCC to PLC Master is called Radioslave (RS), CU connected to PLC Slave is called Radiomaster (RM).
Changes appear at a new Setr version, the firmware version has not influence.

The older Setr uses the reverse terminology, also:

```
( PLC Master - CU RADIOMASTER ... CU RADIOSLAVE - Slave PLC )
```

From firmware release 7.07 and up the UNI protocol in the Master function is able to send a broadcast type packet. The Slave does not send any reply after receiving the broadcast packet.

The protocol does not use a CRC.

2. Data Format

The packet may contain arbitrarily arranged data, for example in the format of one of the Master-Slave protocols. The only condition is that a known position (nth byte) contains the lowest byte of the target Slave´s address. The number of this position is stored as parameter `(a)` of the UNI protocol.

There are no special requirements imposed on the format of the data entering the CU RM.

3. Implementation in Morse system

The UNI protocol uses only the lowest byte of the address. The other bytes are either added using a mask from the actual address of the node or whole MORSE addresses are prepared in the Art conversion table.

Example of sending a packet from the CU RADIOSLAVE,

An 8-bit mask is used for creating a MORSE address:

```
       RS            data          RM
    69AABBFF ---------------> 69AABB22
               112233AAAA
```

Parameters:

```
UNI parameters:
PLC Master - CU RADIOSLAVE ... CU RADIOMASTER - Slave PLC
(m)ode :RADIOSLAVE (wired to master)
(a):2
(A)ddress mode:BINARY (1 Byte)
```

```
>>
Monitoring: source 69AABBFF|4.
10:29:56.325 rxsim   5 | S00
1122 33AA AA
10:29:56.340|                 |00000022 000000FF|S00I   OUT   5| 89 0user
1122 33AA AA
Monitoring: source 69AABB22|2.
10:29:56.342|                 |00000022 000000FF|S01I    IN   5|89 6user
1122 33AA AA
10:29:56.342 tx      5 | S01
1122 33AA AA
```

According to parameter `(a)` the second byte of data was selected and inserted as the lowest byte of the destination address.

Data was received from the source address `69AABBFF`, and therefore the nearest data, which entered through the SCC01 port, is sent by protocol RM to this address:

```
>>
Monitoring: source 69AABB22|3.
10:30:32.874 rxsim   2 | S01
BBBB
10:30:32.889|                 |000000FF 00000022|S01I   OUT   2| 89 0user
BBBB
Monitoring: source 69AABBFF|7.
10:30:32.891|                 |000000FF 00000022|S00I    IN   2|89 1user
BBBB
10:30:32.892 tx      2 | S00
BBBB
```

Transmitting to a broadcast address,

The address is configurable, e.g. 127 = 0x7F:

Parameters:

```
PLC Master - CU RADIOSLAVE ... CU RADIOMASTER - Slave PLC
(m)ode :RADIOSLAVE (wired to master)
(a):2
(A)ddress mode:BINARY (1 Byte)
(b)roadcast:ON  (B)roadcast Address:127
(C)TS sig:OFF   T(1):0ms        T(2):0ms
```

Monitoring:

```
11:06:48.483 rxsim   5 | S00
117F 33AA AA
11:06:48.498|                 |0000007F 000000FF|S00I  OUT 5||89 0user brc
117F 33AA AA
RF mon      |toa      frm     |dst       src      |lNo!DQ!RSS size|TT N
11:06:48.529|69AABBFF 69AABBFF|69AAB87C 69AABBFF|008  RFTX    5 09 4datbrc
```

Data 117F33AAAA is addressed for 0x7F (127 dec). This coincides with the Broadcast address, which is why it is sent to the network with a set BRC bit.

Note - the appropriate parameters must be filled in in the Broadcast menu.

In RADIOMASTER mode the modem has broadcast switched on in the UNI protocol parameters. The Broadcast address does not need to be filled in. The RADIOMASTER does not expect any reply to Broadcast data from SCC. If any arrives it is discarded.

```
PLC Master - CU RADIOSLAVE ... CU RADIOMASTER - Slave PLC
(m)ode :RADIOMASTER (wired to slave)
(a):0
(A)ddress mode:BINARY (1 Byte)
(b)roadcast:ON (B)roadcast Address:0
(C)TS sig:OFF   T(1):0ms        T(2):0ms
```

Use of the CTS signal

Switching on the CTS parameter causes the CTS signal to be set up when sending data to the port with a lead of T1 and a lag of T2 ms.

```
11:33:42.524|                 |00000022 000000FF|S01I   IN   5|*89 6user
1122 33AA AA
11:33:42.525 ---    0 | S01;CTS ON
11:33:42.529 tx     5 | S01
1122 33AA AA
11:33:42.536 ---    0 | S01;CTS OFF
```

4. Configuration parameters

The main parameters are Master-Slave resolution and for the CU RADIOSLAVE parameter (a) which defines the byte number of data containing the destination address.

```
UNI parameters:
PLC Master - CU RADIOSLAVE ... CU RADIOMASTER - Slave PLC
(m)ode :RADIOSLAVE (wired to master)
(a):5
(A)ddress mode:BINARY (1 Byte)
(b)roadcast:ON   (B)roadcast Address:127
(C)TS sig:OFF    T(1):0ms         T(2):0ms
Accept (r)epeats:OFF     (t)imeout:0ms
Check (N)etNo:OFF
(q)uit
>>
```

(m)od   (m)ode - protocol mode

  • (S) RADIOSLAVE - CU connected to PLC Master

  • (M) RADIOMASTER - CU connected to PLC Slave

       ATTENTION - The Setr older than 9.0.17.0 uses the reverse labelling !

(a)   the address position in the packet (which byte contains the address)

(A)dd   (A)ddress mode - the address writing mode in the packet has two possibilities:

  • (B) BINARY (1 Byte) - 1 byte on (a) position contains the address in the hexadecimal notation

  • (H) ASCII/HEX (2 Bytes) - 2 bytes on the positions (a), (a+1) are translated from ascii to hex and create 1 address byte

An example of using parameter (A)dd with value (H):

```
UNI parameters:
PLC Master - CU RADIOSLAVE ... CU RADIOMASTER - Slave PLC
(m)ode :RADIOSLAVE (wired to master)
(a):2
(A)ddress mode:ASCII/HEX (2 Bytes)
```

```
>>
10:39:57.905 rxsim  5 | S00
1161 62CC CC
10:39:57.921|                  |000000AB 000000FF|S00I   OUT    5| 89 0user
1161 62CC CC
```

ASCII data 61 62 was transferred as 0xAB and a packet was sent to this address.

(b)ro   (b)roadcast - In RADIOSLAVE mode it sends data, whose addressee is the same as the Broadcast address, to the network with a set BRC bit. InRADIOMASTER mode it permits transmission to the port, no matter what the address is. In both modes

(RADIOMASTER and RADIOSLAVE) it is necessary to have parameters in the Broadcast menu correctly filled in.

(B)ro   (B)roadcast Address - Address for broadcast packet definition, write here the last address byte in decimal form.

(C)TS   (C)TS sig:ON - Switching on the CTS parameter causes the CTS signal to be set up when sending data to the port with a lead of T1 and a lag of T2 ms.

T(1)   T(1):5ms - lead

T(2)   T(2):5ms - lag

(r)ep   Accept (r)epeats: — receiving of repeated packets, set in the RS

- ON — RS accepts the repeated packets from PLC MASTER and send them to RFC

- OFF — RS accepts the repeated (equal) packet from PLC only after (t)imeout expiry. It is used in this case when Master PLC is not able wait for the answer for the time necessary for transfer data through the radio network.

(t)im   (t)imeout:0ms — Within this dellay the incoming repeated packets from PLC MASTER are discarded.

(N)et   Check (N)etNo: — Checking the net numbers in the responses from RM to RS, set in the RS.

- OFF — RS accepts all responses and send them to PLC MASTER

- ON — RS accepts the first response having the net number consistent with the already sent request. If the request was sent like broadcast then more responses is accepted.

5. History

- release 612   03/2003 - updated with format ASCII/HEX

- release 707   03/2005 - updated with Broadcast

- release 712   04/2005 - updated with CTS signal

- release 9.0.17.0   06/2007 - unification of terms RS/RM in the Setr

- release 10.0.19.0   11/2007 - added the checking of repeated packets

- release 10.0.21.0   11/2007 - added the net number check