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Siemens 3964 protocol for MORSE

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1. Introduction

This protocol is compatible with protocol Siemens 3964 used in equipment such as CP521 SI, CP523 SI, CP524 SI, CP525 SI produced by Siemens.

2. Data format

2.1. The physical layer

Protocol is normally used for asynchronous communication on a full duplex V.24 interface (RS232), using only data signals RXD, TXD, and ground (3- wire communication).

2.2. The link layer

The link layer behaves according to the description of Siemens 3964 protocol.

2.3. Network layer

When a programmer needs to send a datagram from some Siemens equipment over MORSE network, he must send the network layer header prior the data. Receiving process should strip this information from received buffer (there is address of the sender).

```
| NETWORK HEADER | DATA | DLE | ETX |
```

Header structure (including example):

```
| T/8 | R/5 | N/3 | DST/16 | SRC/16 | L/16 |  
0000 1001 00000 111 5505 55FF 0002
```

Network layer data:

```
| DATA |  
AAAA
```

T - Packet type

R - Reserved, must be zero

N - Network number (transferred over the network)

DST - Destination Address

SRC Source Address

L Length of data field

DLE 10

ETX 03

- Packet numbering is not compulsory. Only the lowest three bits from the number are transmitted. The entered number is transported to the destination address, and can serve to control the order of the delivered packets (the MORSE network does not guarantee a perfect order for packets).
- The maximum allowable length of data in the MORSE network layer is 1626 bytes. Longer packets are not defined within the system. The optimum packet size for MORSE system is 200-400 bytes.
- All 2-byte and 4-byte values are transferred in normal order. The highest byte is transmitted first, and then the lower ones (beware, as the Intel processor format is typically the opposite).

3. Communication example

```
>>
11:45:05.588|                |690F5505 690F55FF|S01I    IN    2|89 7user
AAAA
11:45:05.601 tx      1 | S01
02
11:45:05.610 rx;i   1 | S01
10
11:45:05.611 tx     12 | S01
0907 5505 55FF 0002 AAAA 1003
11:45:05.628 rx;i   1 | S01
10
```

The data AAAA came from the MORSE system to the SCC1 channel having set the Siemens 3964(R) protocol. The protocol sends the character 02 (=STX) to the link, obtains the character 10 (=DLE) from connected equipment Siemens. Then it sends the frame in Siemens format containing the data AAAA and the characters 1003 (=DLE ETX) on the end. The communication is terminated by receiving the character 10 (=DLE).

4. Protocol parameter settings

Since release 723 the protocol MARS-E was extended to be use as 3963R by Siemens.

```
MARS-E parameters:
(m):3964R
(t)arget:0000
(a):400ms (r):1
(s):OFF (b):OFF (p):LOW
(q)uit
>>
```

The link layer protocol is always configured using the protocol parameters:

- (m):MARS_E - Protocol 3963R is enhanced to Mars E capability.
- (m):3964R - Siemens 3964R mode. Response is send to the last received source address.
- (m):3964R Target - Siemens 3964R mode. Response is send to the configured address by target parameter.
- (t)arget:0000 - Destination address. Parameter target is only valid in "3964R Target" mode.
- (a):400ms - ACK timeout - the time after transmitting a data frame in which the transmitting station waits for an ACK frame. If the ACK does not arrive, the frame is repeated.
- (r):1 - Number of repeats - if the number of repeats is exhausted and the ACK timeout expires, the network layer is informed that the packet is lost.
- (s):OFF - security - obsolete, set off
substituted by Security parameter in the Sle menu
- (b):OFF - Use BRR 3964R compatibility. Don't escape data with DLE and don't send final DLE | ETX.
- (p):LOW - Priority on the wires. If set to LOW prefer received STX even if STX was already sent. Equipment communicating using the Siemens 3964(R) link layer must have a priority setting in case of collision. Setting:
 - Setting High - a packet is repeated after a collision
 - Setting Low - is silent after a collision Obviously, two pieces of equipment which are communicating together must be set so that one has High priority and the second has Low.

5. History

Former name of this protocol within MORSE equipment is MARS-E.

2015-02-05 - added extended parameters used since release 723
