Technical Data Sheet

Netronix Protocol

NetronixProtocol-doc-1.3

Serial data transmission protocol for Netronix modules

1. <u>Introduction</u>

The Netronix modules have implemented serial data transmission protocol. During the data transmission module sends command frame, and after execution of the command by this device, it receives response frame.
In both frames, there is a parameter field, by mean of which devices exchange the data.
Additionally in the command frame, there is always an operation code byte, by means of which message is transmitted to the command sending device informing, that the command has been performed successfully.
In the most simply mode of operation, in case of event appears defined for the module, it sends response frame automatically.

2. <u>Serial transmission frame protocol</u>

General command frame format for the reader:

Module address 1 byte	Frame length 1 byte	Command 1 byte	Parameters 1..n n * bytes	CRCH 1 byte	CRCL 1 byte

Where:
Module address - module address in system (0x01 to 0xfe)
If:
Module address = 0   no module answers
Module address = 0xFF   all module in net will answer

Frame length - total number of bytes in frame
Command - even value
Parametry1...n - exist optionally and depends on command
CRCH, **CRCL** - older and younger byte of CRC16 value respectively

Content of fields marked with gray color depends on the module type. Refer please to documentation of the module.

General format of response frame for the reader:

Module address 1 byte	Frame length 1 byte	Response 1 byte	Parameters 1..n n * bytes	Operation code 1 byte	CRCH 1 byte	CRCL 1 byte

Where:

Module address – real defined address for the responding module
Module address – total bytes number of response frame
Odpowiedź = **Rozkaz** + 1 (odd value)
Parametry1...n - exist optionally and depend on command
Operation code – informs about correctness executed command
CRCH, **CRCL** - older and younger byte of CRC16 value respectively

Content of fields marked with gray color depends on the module type. Refer please to documentation of the module.

3. <u>Transmission parameters</u>

		Notes
Transmission standard	RS-232 similar as RS-232 TTL or RS-485	Depending on module type
Baud rates	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bps	Depending on module type
Number of data bits	8 data bits	For module of any type
Stop bit	1 stop bit	For module of any type
Parity bit	No parity	For module of any type

4. <u>Sending and receiving commands</u>

Module address 1 byte	Frame length 1 byte	Command 1 byte	Parameters 1..n n * bytes	CRCH 1 byte	CRCL 1 byte

We send query - command to device (module):

module performing atcommand
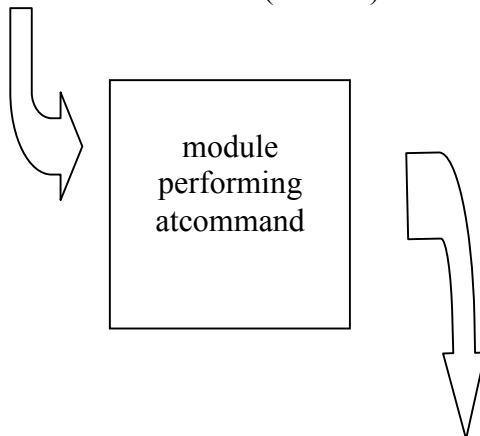
we receive response:

Module address 1 byte	Frame length 1 byte	Response 1 byte	Parameters 1..n n * bytes	Operation code 1 byte	CRCH 1 byte	CRCL 1 byte

5.   Calculation of CRC value

The CRC value is calculated from equation $x^{16}+x^{12}+x^5+1$ with initial value equal to 0x0000.
The CRC value is calculated in virtue of all the bytes except of CRCH and CRCL.
Example of calculation of CRC value, written in C language:

```c
void LiczCRC2(unsigned char *FromAddr, unsigned short *ToAddr,  unsigned char Size)
{
int    i,ByteNo;
 unsigned short C;
    *ToAddr=0;
    for (ByteNo=1;NrBajtu<=Size;ByteNo++,FromAddr++)
    {
        C=((*ToAddr>>8)^*FromAddr)<<8;
        for (i=0;i<8;i++)
            if (C&0x8000) C=(C<<1)^0x1021;
            else C=C<<1;
        *ToAddr=C^(*ToAddr<<8);
    }

}
```

where:
*FromAddr   - is the data first byte flag
Size   - informs how many data bytes will be used for calculation
*ToAddr   - is the flag for the calculated CRC value

6. Module modes depending on serial connection

Some modules feature implemented frame sending function, which is performed automatically, after proper event appears. This function is called operation in *automatic communication* mode. Depends on requirements, user can communicate with device (module), by means of *selective addressing (unicast) or group (broadcast)* mode, and every time he can use freely anyone combination of the these addressing types.

- Selective addressing causes, that given command sent will be performed only by the device, which has an address set earlier. In that case, response command will be sent back, right after the command has been performed.
- Group addressing is based on sending a command frame with the broadcast address 0xff, which makes, that all devices-modules will perform given command, but they will send response frames in a way, not to cause collision of data transmission simultaneously.

Notes:
- Check, which modes given device has implemented.
- If a device operates on selective addressing, but not on group addressing, so after having received the command with address 0xff, the device will perform the command and will send response frame back. It will do it, right after performing the command.
- Any module has default address 0x01, set in factory. If it is required to connect a lot o modules to one bus, change addresses of the modules to unique ones before. Configuration of all devices connected to bus should be done in this way: one master device – one module, it means no bus is allowed connected to many modules.

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6.1. Automatic communication

If module operates in automatic mode, and after suitable event has occurred, it sends frame to RS bus automatically.
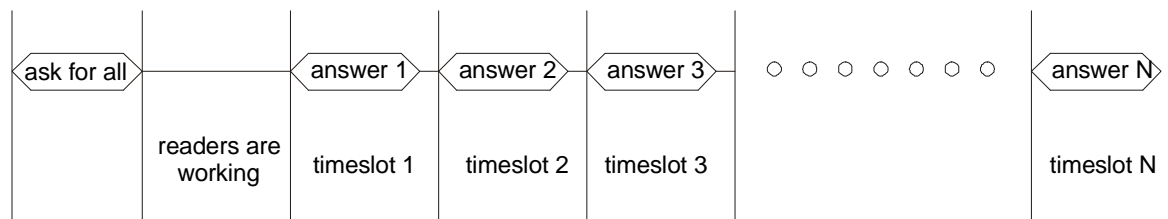
6.2. Selective addressing - UNICAST

In case of one module addressing, put its address to the command frame it sends. Module sends response frame back, right after performing the command.

○ ○ ○ 〈 ask 3 〉 reader 3 is working 〈 answer 3 〉 〈 ask 7 〉 reader 7 is working 〈 answer 7 〉 ○ ○ ○
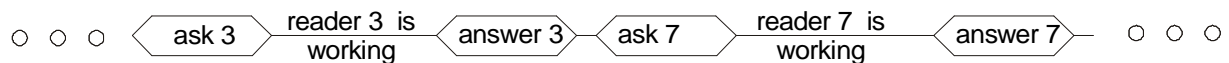
Drawing: Queering the reader with 0x03 and 0x07 addresses and responses of the readers.

6.3. Group addressing - BROADCAST

If many modules are addressed, put the address 0xff in frame send. In this case, modules perform the command simultaneously, but they will send response frames according to their address, one after another, in their time slots.
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〈ask for all〉   〈answer 1〉〈answer 2〉〈answer 3〉   ○ ○ ○ ○ ○ ○ ○   〈answer N〉

readers are working   timeslot 1   timeslot 2   timeslot 3   timeslot N

Drawing. Querying all readers and their responses.

7. Framer

Modules can be tested by means of FRAMER tool software , which is free of charge and makes work with frames easy.
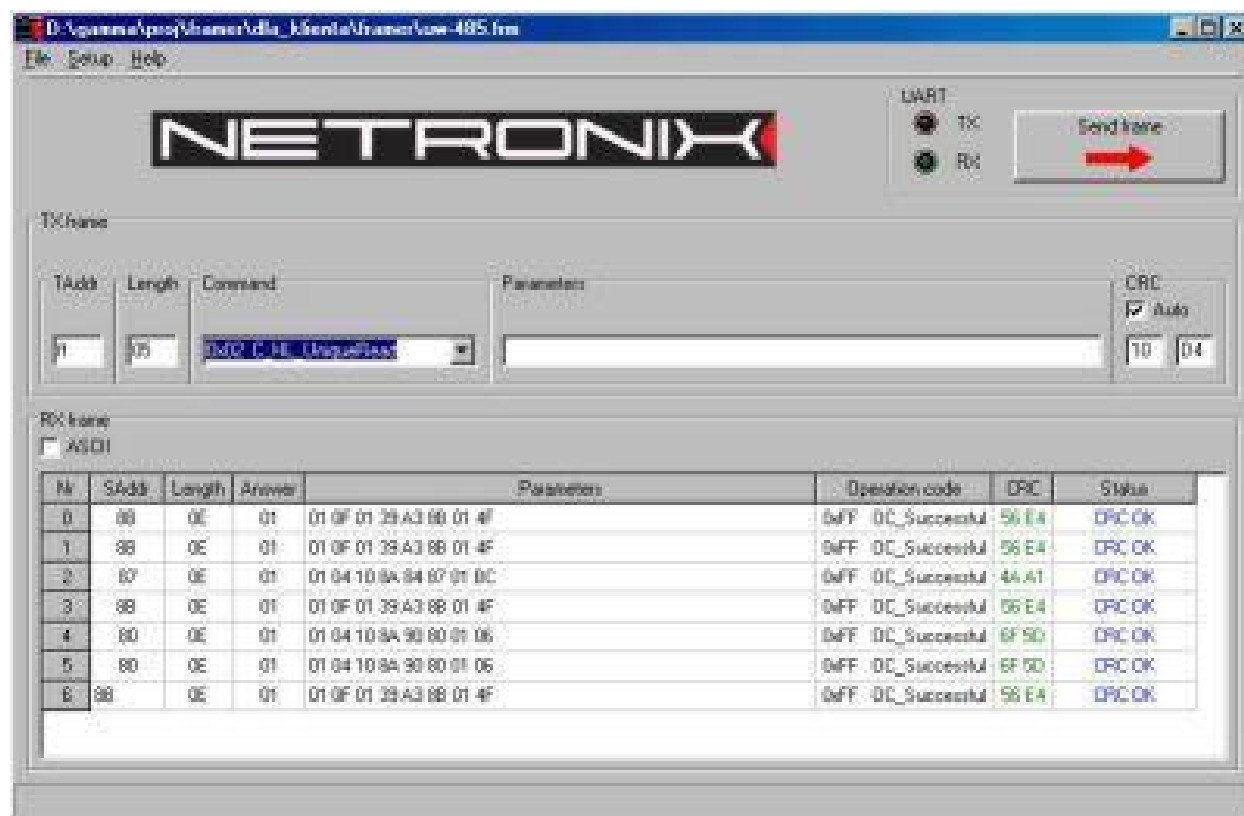
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