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Protocol Documents

Serial control Protocol

Document Conventions

Any numbers preceded by '0x' are hexadecimal.   (base 16)
All data byte string listed in examples are in hexadecimal.   (base 16)

Comms Ports Settings.

The Host Controller Serial Port should be configured as detailed in the table below

Baud Rate	9600
Start Bits	1
Data bits	8
Parity	None
Stop Bits	1

RS232/422 converter.

The Frame control interface uses RS422. A full duplex 4 wire balanced communications standard that allows communications to be multi-dropped to more than one Frame.

Since PCs only come with RS232 ports a small converter is required to convert the RS232 signals to RS422.

If you purchased any of Smart-e series of switching matrices you will have received a suitable converter and cable.

Connecting up

4.1. Plug the RS232 end of the RS232 to RS422 converter directly onto the selected comms port on the rear of your computer.

4.2. Plug the comms cable (D9 end) onto the end of the RS422 end of the RS232/RS422 converter.

4.3. Plug the RJ45 end of the comms cable into the IN port on the front of the matrix.

SmartNet Frame Switches

The communications port on the Smart-e matrix allows for multiple chassis to be connected together.

This is achieved by creating a loop between chassis using the comms IN and OUT ports on the front of the chassis i.e.

Address	Hex Switch Setting	Function	Inputs	Ouputs
0	0	**Master**	1-16	1-16
1	1	Slave	17-32	1-16
2	2	Slave	33-48	1-16
3	3	Slave	49-64	1-16
4	4	**Master**	1-16	17-32
5	5	Slave	17-32	17-32
6	6	Slave	33-48	17-32
7	7	Slave	49-64	17-32
8	8	**Master**	1-16	33-48
9	9	Slave	17-32	33-48
10	A	Slave	33-48	33-48
11	B	Slave	49-64	33-48
12	C	**Master**	1-16	49-64
13	D	Slave	17-32	49-64
14	E	Slave	33-48	49-64
15	F	Slave	49-64	49-64

In order to ensure good communications it is essential that the Hex address switch on the front of the matrix is set correctly. The hex switch can be adjusted using a small flat blade screwdriver.

An incorrect setting or having more than one chassis set to the same address will result in communication errors.

Smart-e Control Protocol

The general form of packets sent to the SmartNet switches are detailed below;

<Header Byte 0><Header Byte 1><Frame Address><Reserved><CMD><DATA BYTES><BCC>

<Header Byte 0> Always 0xBE
<Header Byte 1> Always 0xEF
<Address> Frame address. Set by Hex switch on front of unit.
<Reserved> Reserved for future use (Always 0x00)
<CMD> Command byte – Determines the number of bytes in DATA BYTES
<DATA BYTES> Number of bytes for associated CMD
<BCC> XOR of all bytes in the string up to but not including BCC

On receipt of a valid data packet the matrix will either respond with an <ACK> (0x06) or a valid packet containing the requested data.

The Commands are split into three categories:

1. Single Channel commands
Commands that make changes to individual switch outputs.

2. Salvo Commands
Commands that make changes to multiple switch outputs at one time.

3. Status Commands

No.	Command Description	Data value (HEX)
	Single	
1.1	Set Crosspoint	00
1.2	Set AV Crosspoint	07
1.3	Set RS232 Port	3C
1.4	Set Cat5 Matrix Port	3B
1.5	Set joint AVP Crosspoint	3E
1.6	Set IR Address	33
	Salvo	
2.1	Set Input channel	09
2.2	Disable output	34
2.3	RS232 routing	3D
	Status	
3.1	Get Crosspoint Status	08
3.2	Get Software Version	04
3.3	Get Serial Number	42
3.4	Get Matrix Size	03
3.5	Get IR Address	02
3.6	Status Dumping	45

1. Single Channel commands.

Note: *Commas shown in example byte strings below are not transmitted from the serial port they have only been added only to aid legibility.*

1.1 Set Crosspoint Command : CMD = 0x00
Sets specified switch output or Destination to the specified input or Source.

Send: <0xBE><0xEF><Address><0x00><0x00><Source><Destination><BCC>

Where:
<Source>   =   Single Byte, Switch Input channel -1
<Destination>   =   Single Byte, Switch output channel number -1

Response: If successful the unit will respond with an ACK (0x06)

Examples:
1. Sending the following byte string sets Source 1 to Destination 1 on chassis 0
                     0xBE,0xEF,0x00,0x00,0x00,0x00,0x00,0x51,

2. Sending the following byte string sets Source 2 to Destination 1 on chassis 0
                     0xBE,0xEF,0x00,0x00,0x00,0x01,0x00,0x50,

3. Sending the following byte string sets Source 2 to Destination 2 on chassis 0
                     0xBE,0xEF,0x00,0x00,0x00,0x01,0x01,0x51,

4. Sending the following byte string sets Source 16 to Destination 16 on Frame 15
                     0xBE,0xEF,0x0F,0x00,0x00,0x0F,0x0F,0x5E,

1.2 Split Video and Audio Crosspoint
Used to set specified Switch Destination/Output to Specified Video and Audio inputs.

CMD = 0x07
Databytes = <V><A><D>

Where:
        V = Video Input (0x00 – 0x0f)
        A = Audio Input (0x00 – 0x0f)
        D = Destination/Output (0x00 – 0x0f)

Examples:

i) To set Output 1 to Video Input 1 and Audio Input 1 send the packet

BE,EF,00,00,07,00,00,00,56

ii) To set Output 1 to Video Input 6 and Audio Input 7 send the packet

BE,EF,00,00,07,04,05,00,57

1.3 Select Comms Port
Used to route RS232 from rear of matrix to specified Cat5 output.

CMD = 0x3c
Databytes = <P>

Where:
>P = 0x00 to 0x0F then comms is routed to the specified Port.
>P = 0x7F all outputs are disabled.
>P = 0xFF then RS232 is routed to all Ports. (Return path is disabled)

Examples:

i) To route RS232 to Output/Port 1 send the following packet.

BE,EF,00,00,3C,00,6D

ii) To route RS232 to Output/Port 2 send the following packet.

BE,EF,00,00,3C,01,6C

iii) To route RS232 to Output/Port 10 send the following packet.

BE,EF,00,00,3C,09,64

1.4 Select Comms Port for Cat5 matrix
Used to route bi-directional RS232 data from Cat5 Transmit unit (SLX-TX111) to Cat5 Receiver unit (SLX-RX111/RX211/RX212) through the Cat5 matrix

CMD = 0x3b
Databytes = <R><T>

Format:
>   <BE><EF><Address><00><3B><Receiver Output>,<Transmitter Input>,<BCC>
Where:
>   R = Receiver Output 1-16 (0x00 – 0x0f)
>   T = Transmitter Input 1-16 (0x00 – 0x0f)

Examples:

i) To set receiver output 1 to transmitter input 1 send the packet

BE,EF,00,00,3B,00,00,6A

ii) To set receiver output 11 to transmitter input 6 send the packet

BE,EF,00,00,3B,0A,05,65

iii) To set receiver output 2 to transmitter input 14 send the packet

BE,EF,00,00,3B,01,0D,66

1.5 Set Split Video and Audio Crosspoint and Comms port

Used to set split cross points and comms port all at them same time.

CMD = 0x3E
Databytes = <V><A><D><P>

Where:

        V = Video Input (0x00 – 0x0f)
        A = Audio Input (0x00 – 0x0f)
        D = Destination/Output (0x00 – 0x0f)
        P = RS232 Ports/Output (0x00 – 0x0f)

Examples:

i) Sending the following packet of data will set output 1 to video input 1, audio input 1
and route RS232 comms to port 1. The comms need not be routed to the same
output as the video and audio.

BE,EF,00,00,3e,00,00,00,00,6f,

1.6 Set IR addressing on outputs

This command is used to change the IR addressing accepted by the Rx unit. The default address
is 0x0A (RC5 address 10)

CMD = 0x33
Databytes = <Output>< Data>

Format:

        <BE><EF><Address><00><33><Output><Data><BCC>

Where:

        Output = Output of matrix connecting Rx unit   (0x00 – 0xFF)
        Data = RC5 address, range of 1 - 32   (0x00 – 0x1F)

Examples:

i)   BE,EF,00,00,33,03,0C,6D

        This will change output 4 to accept RC5 address 12

ii)   BE,EF,00,00,33,06,12,7C

        This will change output 7 to accept RC5 address 18

A Salvo command is one that allows the host system to change the state of multiple outputs in one go.

2.1 Input Channel Select Salvo.
Allows all switch outputs to be changed to list of specified inputs.

CMD = 0x09
Databytes = <Byte0>< Byte1>< Byte2>………..< Byte15>

Where: The position of ByteN in the string of Databytes indicates the switch output and the value of ByteN denotes the input to which that output is to be set.

Examples:

i) To set all outputs to input 1 send the following packet.

   BE,EF,00,00,09,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,58,

ii) To set all outputs to input 16 send the following packet.

   BE,EF,00,00,09,0F,0F,0F,0F,0F,0F,0F,0F,0F,0F,0F,0F,0F,0F,0F,58,

iii) To set all outputs to input 1 but leave outputs 15 and 16 as they are send the following packet.

   BE,EF,00,00,09,00,00,00,00,00,00,00,00,00,00,00,00,00,FF,FF,58,

2.2 SLX-RX300 Local / Remote Video Select Salvo
Used to set all state of SLX-RX300.

CMD = 0x34
Databytes = <Byte0>< Byte1>< Byte2>………..< Byte15>

Where: The position of ByteN in the string of Databytes indicates the switch output and the value of ByteN denotes the state of the SLX-RX300

A value of: 0x00 = SLX-RX300 Displays it's Local Video
0x01 = SLX-RX300 Displays it's Remote Video
0xFF = SLX-RX300 on specified output is left unchanged

Examples:

i) All SLX-RX300 go to their Local input

   BE,EF,00,00,34,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,65

ii) All SLX-RX300 go to their Remote (CAT5) input

   BE,EF,00,00,34,01,01,01,01,01,01,01,01,01,01,01,01,01,01,01,65

ii) All SLX-RX300 go to their Local input except those connected to output 15 and 16

   BE,EF,00,00,34,00,00,00,00,00,00,00,00,00,00,00,00,00,FF,FF,65

2.3 RS232 Routing Salvo Command.
Used to set RS232 routing for all outputs.

CMD = 0x3D
Databytes = <Byte0>< Byte1>< Byte2>………..< Byte15>

Where: The position of ByteN in the string of Databytes indicates the switch output
                 and the value of ByteN denotes the state of RS232 comms port.

A value of:
                 0x00 = Specified output comms port is OFF
                 0xFF = Specified output comms port is ON

Note: Communication return path is disabled when sending Salvo commands.

Examples:

    i)   To turn RS232 comms off on all ports send the following packet;

              BE,EF,00,00,3D,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,6C,

    ii)   To turn on RS232 comms to all ports send the following packet.

              BE,EF,00,00,3D,ff,ff,ff,ff,ff,ff,ff,ff,ff,ff,ff,ff,ff,ff,ff,ff,6C,

3.1 Matrix Status

CMD = 0x08
Databytes = <FF>

To receive status information send the packet

BE,EF,00,00,08,FF,A6

The received information is sent in the format

<BE><EF><00><00><08><v1><a1><v2><a2><v3><a3>……..<v16><a16><BCC>

The fist 2 bytes represents output 1, <v1> indicates the video input set to output 1 and <a1> indicates the audio input set to output 1. The next 2 bytes represent output 2, the data is displayed in the same format.

Example:

Sent:
BE,EF,00,00,08,FF,A6

Received:
BE,EF,00,00,08,03,03,0A,0A,02,05,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00
,00,00,00,00,00,00,5E

Output 1 – video set to input 4, audio set to input 4
Output 2 – video set to input 11, audio set to input 11
Output 3 – video set to input 3, audio set to input 6
All remaining outputs have both video and audio inputs set to 1

3.2 Get Software Version

CMD = 0x04

Transmit: BE,EF,00,00,04,55,
Reply:
<BE><EF><00><00><04><MAJOR><MINOR><REVISION><DAY><MONTH><YEAR><BCC>

Where:

MAJOR	= Major release.
MINOR	= Minor release.
REVISION	= Revision.
DAY	= Release Day.
MONTH	= Release Month.
YEAR	= Release Year.

Example:

Sent:
BE,EF,00,00,04,55,

Received:
BE,EF,00,00,04,09,00,00,02,09,09,5E,

Therefore Version = V9.0.0, 02/09/09

3.3 Get Serial Number

Returns the SNX Serial Number.

The Serial Number is a 16 bit value.   Valid range = 1042 – 65535.

CMD = 0x42

Transmit: BE,EF,00,00,42,13,
Reply: BE,EF,00,00,42,HIGH_BYTE,LOW_BYTE,BCC

Where:
                Serial number = (HIGH_BYTE * 256) + LOW_BYTE

Example:

Sent:
BE,EF,00,00,42,13,

Received:
BE,EF,00,00,42,05,12,04,

Serial Number = (0x05 * 0x100) + 0x12 = 1298

3.4 Get Matrix Size

Returns the number of SNX Inputs and Outputs.

CMD = 0x03

Transmit: BE,EF,00,00,03,52,
Reply: BE,EF,00,00,03,INPUTS,OUTPUTS,BCC

Where:
                INPUTS   = number of SNX inputs. (1-64)
                OUTPUTS   = number of SNX outputs. (1-16)

Example for an SNX 16x16:

Sent:
BE,EF,00,00,03,52,

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Received:
BE,EF,00,00,03,10,10,52,

3.5 Get IR Address

Returns IR decoder RC5 addresses.

CMD = 0x02

Transmit: BE,EF,00,00,02,53,
Reply: <BE><EF><00><00><02><IR_ADDRESS_BYTES><BCC>

Where:

               IR_ADDRESS_BYTES   = Infrared decoder RC5 Address bytes.

Note: *One byte per physical switch output. (16 for SNX16x16, 8 for SNX8x8)*

Example:

Sent:
BE,EF,00,00,02,53,

Received:
BE,EF,00,00,02,0A,0A,0A,0A,0A,0A,0A,0A,0A,0A,0A,0A,0A,0A,0A,53,

3.6 Matrix Status Dumping

Is used to enable/disable unsolicited status change messages.

CMD = 0x45
Databytes =
<00> Disable
<01> Single Mode
<02> Salvo Mode

Mode Off

Disables the sending of unsolicited status messages. This mode ensures backwards compatibility with existing Smart-e matrices.

Transmit: BE,EF,00,00,45,00,14,
Response: <ACK>

Example:

Sent:
BE,EF,00,00,45,00,14,

Received:
06,

Mode Single

Turns on unsolicited status change messages for individual updates.

For each crosspoint change made within the matrices a status message is sent.

Transmit: BE,EF,00,00,45,01,15,
Response: <ACK>

Status Message Example:

In the example below Output 5 changes to Video Input 3 and Audio Input 3.

Received:
BE,EF,00,00,08,04,02,02,5D,

Note: If status is changed using a salvo command the reply will be as for a Mode Salvo change (See below)

Mode Salvo

Transmit: BE,EF,00,00,45,02,16,
Response: <ACK>

Status Message Example:

In the example below Output 10 is set to Video Input 3 and Audio Input 6. All others are set to Video input 1 and Audio input 1.

Received:
BE,EF,00,00,08,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,
00,00,02,05,00,00,00,00,00,00,00,00,00,00,00,00,00,5E,