SL-D32P

Ported RS-422 Data Router

User manual

Rev. 7

Nevion Support

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Revision history

Current revision of this document is the uppermost in the table below.

Rev.	Repl.	Date	Sign	Change description
7	6	2009-06-18	NBS	Corrected port information in Chapter 3.2.6.2, and added EC Declaration of Conformity.
6	5	2009-03-03	NBS	Corrected reference to SMPTE 207M standard.
5	4	2008-11-24	NBS	Removed GPI information.
4	3	2008-11-05	NBS	General update, among others. Added/corrected GPI wiring information. Added protocol configuration information. Added description of power pinout. Changed order of some chapters.
3	2	2007-11-12	GMW	Added router orientation (DIP 9).
2	1	2007-03-29	NBS	Added Materials declaration and Recycling information.
1	0	2007-02-05	TØ	Moved the Connections section after the Configuration section. Added connection table for RS-422 connectors in Chapter 5.5. Applied new template to document.
0	-	2006-10-26	NBS	First release.

Contents

1 Product overview

Professional broadcast installations often include a number of tape recorders and other devices that require RS-422 machine control for remote operation. To meet these requirements, Nevion introduce the Sublime SL-D32P Ported Data Router.

Complex installations, cable cost and system design is kept at a minimum.

Where user friendliness and operational flexibility is appreciated, the SL-D32P will fit in perfectly.

The Ported Data Routers are bi-directional “ports” rather than “XY”. A traditional 32x32 router will have a total of 64 connectors (32 in/32 out). A ported 32 Router will have a maximum of 32 connectors, all configurable to be operated either as Controller or Device.

In the SL-D32P Ported Data Router the terms Controller and Device are used instead of In/Out, Source/Destination. I.e. a Ported Data Router Controller can be both signal Source or Destination.

All ports are coupled according to SMPTE 207M machine control standard.

2 Specifications

2.1 Router specifications

Signal type:	RS-422 Data.
Data rate:	115200 kbps.
Connector:	D9pin female, according to SMPTE 207M.
AC Power:	External power supplies 100 - 260 VAC.
Max power consumption:	+15V / 675mA ; -15V / 0V; Total: 10.2W.

2.2 Mechanics

Dimensions:	483 x 88 x 45 mm (19”, 2RU).
Weight, router + PSU:	1.6 kg.
Weight, SL-D32P:	1.25 kg
Weight, SL-PWR-40:	350 g
Safety/Emission standards:	Compliant with CE EN55103-1 and 2, FCC part 15.

2.3 Power Supply

SL-PWR-40	40W Power Supply Unit for VikinX Sublime router series.
AC Supply voltage range:	100-240VAC, 50-60Hz, Max 1.6A.
AC Mains connector:	IEC 320.
DC output:	+15V, max. 2.2A / -15V, max 1.35A. Maximum 43W.
DC connector:	DB9, female.
Status monitoring:	Via LED in front of the router/CP.

2.4 Control

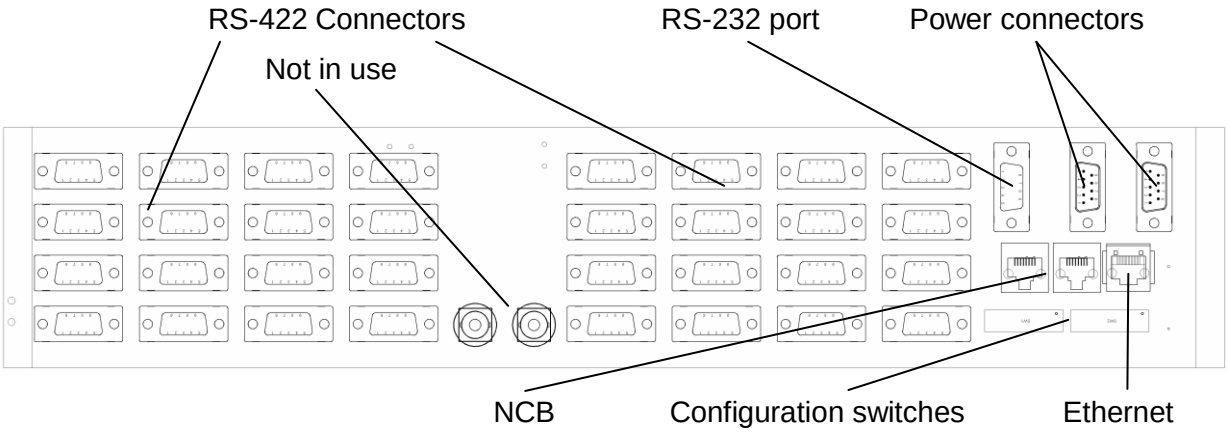
Standard features:

Serial port:	RS-232 for protocol conversion; to VikinX Compact protocol, or to third party protocols.
Connector:	DB9, female.
NCB ports:	(1 In / 1 Out).
Connectors (2):	RJ45.
Ethernet port:	10/100BaseT Ethernet bus for external router control.
Connector:	RJ45.

Hardware control:

Control Panel:	External control panels available.

2.5 Connection details



The following connectors and switches can be found on the rear of the SL-D32P:

RS-422: 32 device connectors.
RS-232 Port: RS-232 for external control.
Power A: ±15VDC Power Input.
Power B: ±15VDC Power Input, redundant supply.
NCB IN: Network Control Bus Input.
NCB OUT: Network Control Bus Ouput.
Configuration: Dip switches for configuration settings.
Ethernet: 10/100 Base-T Ethernet bus for external router control.

2.5.1 Power Supply pinout

The DB9 power pinout for Sublime routers and Control Panels are as follows;

Pin #	Description
1	GND
2	Not connected
3	Not connected
4	+15VDC
5	Not connected
6	Not connected
7	Not connected
8	-15VDC
9	Not connected

3 Configuration

It is possible to use the router out-of-the-box. Changes to the factory settings can be set with the dip-switches found in the back of the router.

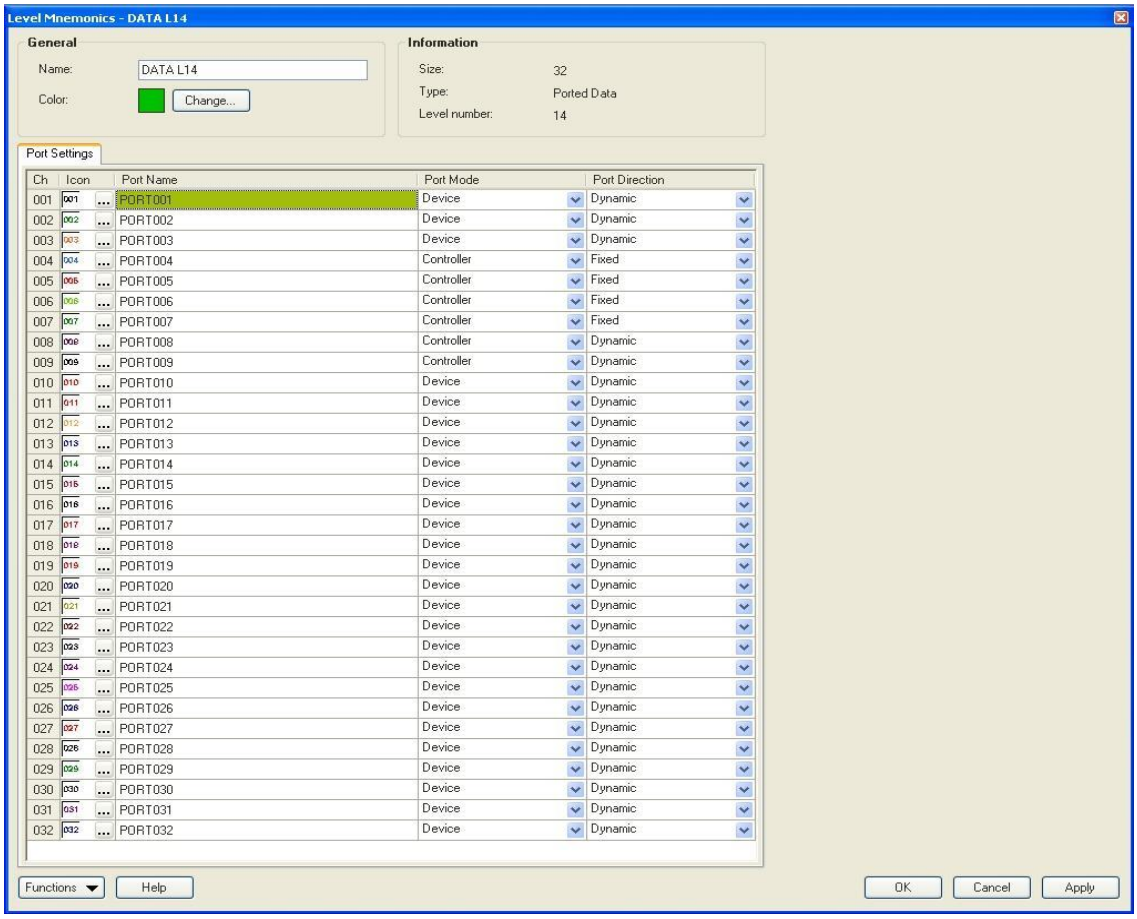
As factory setting, the SL-D32P is shipped with Dynamic ports. This means every port can be controller or device depending on the connected equipment.

Full access to the Sublime SL-D32P Ported Data Router configuration is achieved with the System Configurator in combination with the dip-switches.

3.1 System Configurator

The System Configurator is a unified configuration tool for routers interconnected over Ethernet. The System Configurator makes system set-up easy and includes a wizard to guide you through the set-up procedures. When scanning the network, the System Configurator auto detects all connected hardware. It also provides interactive help, giving Auto Feedback on non-logical settings.

For more information about the System Configurator and its advanced configuration possibilities, please use the interactive help menus included in the software.



Dynamic: The Controller/Device is according to the connected units itself.

Fixed: The Port can be set to either be Controller (Master) or Device (Slave).

3.2 Configuration switches

You will find 2 x 10 Dip-switches on the backplane of the router. These are for configuration purposes.

3.2.1 Router level

Switches 1 - 4 set the router level and the Physical Address for this unit. By setting routers and Control Panels on same level, routers can be controlled as “one”, i.e. Audio-follow-Video.

For more information on Physical Addresses, see the section for re-Mapping in the System Configurator or the Modular Protocol documentation found on the www.nevion.com.

THOR and panels in a NCB loop must be configured to the same level as the router(s).

The levels/Physical Addresses can be set according to the following pattern:

SW 1	SW 2	SW 3	SW 4	Level	Physical Address
OFF	**OFF**	**OFF**	**OFF**	1	0
OFF	**OFF**	**OFF**	ON	2	1
OFF	**OFF**	ON	**OFF**	3	2
OFF	**OFF**	ON	ON	4	3
OFF	ON	**OFF**	**OFF**	5	4
OFF	ON	**OFF**	ON	6	5
OFF	ON	ON	**OFF**	7	6
OFF	ON	ON	ON	8	7
ON	**OFF**	**OFF**	**OFF**	9	8
ON	**OFF**	**OFF**	ON	10	9
ON	**OFF**	ON	**OFF**	11	10
ON	**OFF**	ON	ON	12	11
ON	ON	**OFF**	**OFF**	13	12
ON	ON	**OFF**	ON	14	13
ON	ON	ON	**OFF**	15	14
ON	ON	ON	ON	16	15

Default level is 1.

3.2.2 Audio/Video Mode

The SL-D32P router can be assigned to either the video level or the audio level of a router system, selectable with switch 5 on the configuration switch. If you’re using the Data Router in an Audio-follow-video setting, the Data Router can be set as Video, giving an Audio-follow-Data function. Breakaway is also possible with this set-up.

SW 5	Router mode
OFF	Controlled as Audio
ON	Controlled as Video

Default mode is OFF.

3.2.3 D1616 Mode

If The SL-D32P Ported Data Router is to be configured as a D1616 router, this DIP must be ON. The SL-D32P will then be configured as 16 inputs (1-16) and 16 outputs (17-32) and will be identical with the existing VikinX D1616 Data Router.

SW 6	D1616 mode
OFF	SL-D32P mode
ON	D1616 mode

Default mode is OFF.

3.2.4 Power alarm

When using redundant power supply, the power alarm should be ON.

The SL-D32P will give alarm, and the front LED will blink red, when one of the power supplies connected fails.

If only one power supply is connected, this DIP must be off.

SW 7	Router orientation
OFF	Disable Power Alarms
ON	Enables Power Alarms

Default mode is OFF.

3.2.5 Power up mode

Switch 8 on the configuration switch defines the power up mode. The SL-D32P router provides two modes for powering up the system.

Mode 1 switches all ports are disconnected.

Mode 2 switches all ports according to the latest setting buffered in the routers processor system.

The power up mode can be switched according to the following pattern:

SW 8	Power Up mode
OFF	Mode 2
ON	Mode 1

Default is OFF.

3.2.6 Router orientation

Crosspoint commands in control protocols are using source and destination when controlling routers. This must be mapped to ports in the router. When controlling RS-422, every port is bi-directional and includes both a source and a destination. The mapping is different in D1616 mode and SL-D32P mode.

3.2.6.1 Router orientation in SL-D32P mode

By default, the router is "destination oriented" (DIP is OFF). A bi-directional connection is made between the two ports. If both ports are configured as dynamic, the port referred as source will be used as a controller and the port referred as destination will be used as a device.

When the router is "source oriented" (DIP is ON) the mapping is different. If both ports are configured as dynamic, the port referred as source will be used as a device and the port referred as destination will be used as a controller. This makes it possible to use a single-bus panel to select one-of-several machines to control from a single location.

3.2.6.2 Router orientation in D1616 mode

In D1616 mode all ports are fixed; port 1-16 as controllers and port 17-32 as devices. The control system will see the router as a 16x16 matrix.

When the router is "destination oriented" destinations 1-16 are mapped to ports 17-32 while sources 1-16 are mapped to ports 1-16.

When the router is "source oriented" destinations 1-16 are mapped to ports 1-16 while sources 1-16 are mapped to ports 17-32.

As in SL-D32P mode this makes it possible to use a single-bus panel to select one-of-several machines to control from a single location.

Switch 9 on the configuration switch defines the router orientation.

SW 9	Router orientation
OFF	Destination oriented
ON	Source oriented

Default is OFF.

3.2.7 Future Use
Switches 10 -17 are currently not in use.

3.2.8 Ext Address
Switches 18 -20 are currently not in use.

3.3 Configuring protocol options
For various reasons, Nevion has decided to make it possible to turn the extra commands that were added to the NCB protocol when we introduced the Sublime router range either off or on.

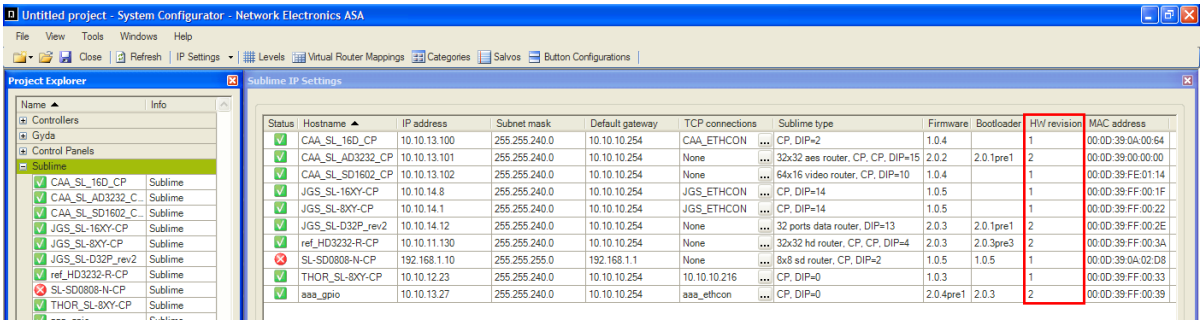
At the same time, the user must select whether he/she shall use the RS-232 port for controlling the router or the Ethernet port. This is done in order to prevent both ports from simultaneously being applied for controlling the router.

There is a new Protocol field in the System Configurator where you may choose from the following options;

- **NCB without Sublime ext. (RS232)**
  This is the “old” Compact NCB protocol, without Sublime extensions. If used on a Sublime, it also disables the Ethernet port of that device.
  This is the default option for the *Sublime Compact* range of products.
- **NCB (RS232)**
  This is the regular Sublime protocol, with the extra commands that were added to the NCB protocol. If used on a Sublime, it also disables the Ethernet port of that device.
  This is the default option for the *Sublime* range of products.
- **MRP (TCP/IP)**
  This option is only applicable to the Sublime range. It selects the Ethernet protocol as the control option, and disables the RS-232 port of that device.

> Note that the above selection is only possible if you have Sublime FW rel. 2.1.1 (or newer) installed on your Sublime device.
>
> Note also that the above selection can only be made via System Configurator rel. 3.3.5 (or newer) installed on your PC.
>
> It is NOT possible to select protocol options on Sublimes with HW rev. 1.

Use your System Configurator to verify the HW revision of your Sublime unit:



Right-click the column headers and select the appropriate column to be shown, if you don't see the appropriate column in your default display.

For further information about FW releases, please go to the Nevion web site to download, or check available FW releases: http://www.nevion.com.

4 LED status

The LED located at the front of the router indicates the status of the router. At start-up, the LED will alternate between red (R) and green (G) every 500ms for about two seconds. After the start-up sequence the LED will indicate the Alarm state of the router.

There are two LEDs located at the Ethernet bus. At start-up the bootloader is searching for update commands on the serial port for about two seconds. During this sequence both Ethernet LEDs will be blinking. After the start-up sequence the LEDs will indicate the Ethernet state.

4.1 Alarm states

The LED can either be red (R), green (G), yellow (Y) or have no light (N).

The LED state is here described with twenty letters, each representing 100ms, which totals to an alarm sequence of two seconds. The X indicates that the LED keeps the colour it has the moment the alarm sequence begins (green, yellow or no light).

Description	LED state	Alarm	Comment
Continuous green light	GGGGG GGGGG GGGGG GGGGG	No alarm. Status is OK.	
Continuous yellow light	YYYYY YYYYY YYYYY YYYYY	Unable to connect to controller over Ethernet.	This alarm will be overwritten by other alarms
Long red blinks	RRRRR NNNNN RRRRR NNNNN	Power is too low.	
One short red blink	RXXXX XXXXX XXXXX XXXXX	Power A failed	Only active if power alarm dip is set.
Two short red blinks	XXXXX XXXXX RXRXX XXXXX	Power B failed	Only active if power alarm dip is set.

4.2 Ethernet states

The LEDs that are located at the Ethernet bus will after the Start-up sequence indicate the Ethernet states:

	On	Off / Blinking
Green	Valid link	No link
Yellow	No data	Data is transmitted or received

5 Router communication

You gain access to router for communication purposes by connecting either the router's serial port to your computer and/or by using an Ethernet connection.

5.1 Serial connection

Connection can by made trough the serial port(s) of the router; see also Chapters 2.4 and 2.5 for connection details.

The communication parameters are configurable. Please refer to the protocol documentation of the appropriate communication/control protocol.

Example: The protocol parameters of the *VikinX Compact routers* are as follows:

- Bit rate 19200 bit/s
- Data bits 8 bits
- Stop bits 1
- Parity: No parity

For further details concerning this protocol, please refer to the following manual:

NCB Protocol.pdf.

The DB9 female connector for the serial port(s) of the router has the following pin-out:

Pin #	RS-232 mode
1	*Not in use*
2	Tx
3	Rx
4	*Not in use*
5	GND
6	GND
7	RTS
8	CTS
9	*Do Not Connect!*

Note that if the standard RS-232 cable specification (DCE) is followed:

A cable with Male+Male or Female+Female connectors at the cable ends is used for Rx/Tx crossed connection, and

A cable with Male+Female connectors at the cable ends is used for a straight through connection.

5.2 Maximum cable length (RS-232)

IEEE has specified the maximum cable length for an RS-232 connection to 15m. Longer distances can be installed depending on the environmental conditions of the installation site.

It is the responsibility of the installer / user to secure a proper installation of the RS-232 connection.

5.3 Ethernet connection

The connections follow the standard set by the IEEE 802.3 100BaseTX specification. The cables that are to be applied should be CAT-5 / CAT-5E standard, or better.

It is the responsibility of the installer / user to secure a proper installation of the Ethernet connection.

All VikinX Modular routers and IP-based Control Panels are connected together through an Ethernet Switch.

A VikinX Sublime device can only have one open Ethernet connection. If redundant control is required, this limitation has to be solved by the control system.

For Ethernet protocol details concerning this router, please refer to the following manual: VikinX_Control_Protocol.pdf.

5.4 NCB connection

Via the Network Control Bus system several routers and control panels can be interconnected.

Up to 16 levels of routers, or combinations of routers, can be controlled. The NCB system and all RS 232 ports interchange the system status. This means that any control system, either from Nevion, or from a third party manufacturer, connected to any RS 232 port in the NCB loop, will have access to all communication data on the bus.

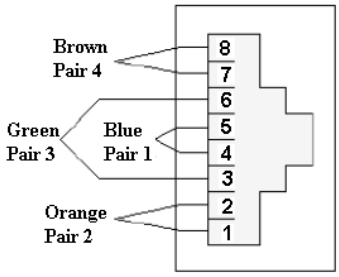
5.4.1 Connecting control panels

To get a control panel working with a specific router, configure the control panel to the same level as the router. Several panels can be configured to control the same router. Panels can also be connected to a router via the RS-232 interface. Please refer to your control panel manual for installation.

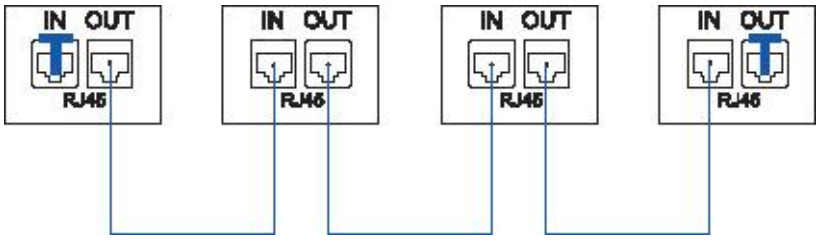
5.4.2 Pin-out and cable type

VikinX Sublime routers and Control Panels use RJ45 connectors for the Network Control Bus ports. The following pin-out is used:

Pin #1	Not Connected
Pin #2	Not Connected
Pin #3	Data (retour)
Pin #4	Data
Pin #5	Data
Pin #6	Data (retour)
Pin #7	Not Connected
Pin #8	Not Connected



The following connection example shows connection of 4 VikinX devices with RJ45 connectors and bus termination:

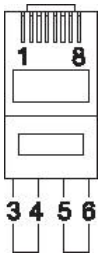


Note that each device at the end of the chain has a termination plug, indicated with the letter "**T**". This termination plug must be inserted in the correct connection port. If not, no NCB communication is possible.

5.4.3 Termination plug

The termination plug that is mentioned in the previous chapter is necessary when you want to avoid closing the loop be a (long) cable.

The termination plug is a standard RJ45 plug with the following internal wiring:



As seen in the figure above, *Pin 3* is connected to *Pin 4*, and *Pin 5* is connected to *Pin 6*.

5.4.4 Control bus structure

The Network Control Bus structure follows the standard MIDI bus definition. The NCB is defined as a closed chain of units. This means that the NCB OUT of the last unit must be connected to the NCB IN of the first unit in the NCB chain. To avoid problems with the control of VikinX units the installer/user has to assure that the bus structure is installed according to this definition.

The total number of VikinX devices in an NCB chain is limited to 50.

5.4.5 Maximum distance between NCB devices

The standard MIDI definition allows a maximum cable length of 200-250 meters between two devices. Longer distances can be made with MIDI repeater units. To avoid grounding problems all NCB ports have opto-coupled inputs.

5.5 Connecting RS-422 signal cables to the SL-D32P

All router ports on the SL-D32P are coupled in accordance to the SMPTE 207M standard. This is the broadcast standard for RS-422 machine control.

Device		**Controller**	
Pin #2	Tx-	Pin #2	Rx-
Pin #3	Rx+	Pin #3	Tx+
Pin #4	GND	Pin #4	GND
Pin #5	Future Use	Pin #5	Future Use
Pin #6	GND	Pin #6	GND
Pin #7	Tx+	Pin #7	Rx+
Pin #8	Rx-	Pin #8	Tx-

The RS-422 connectors on the rear of each unit are arranged as follows:

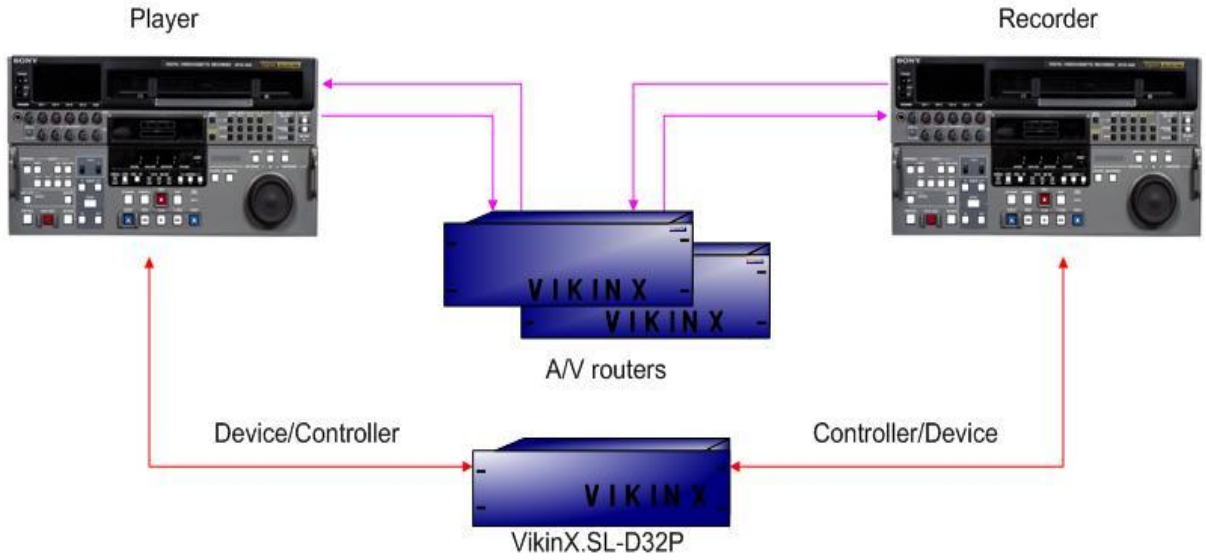
1	5	9	13	17	21	25	29
2	6	10	14	18	22	26	30
3	7	11	15	19	23	27	31
4	8	12	16	20	24	28	32

6 Applications

6.1 Dynamic

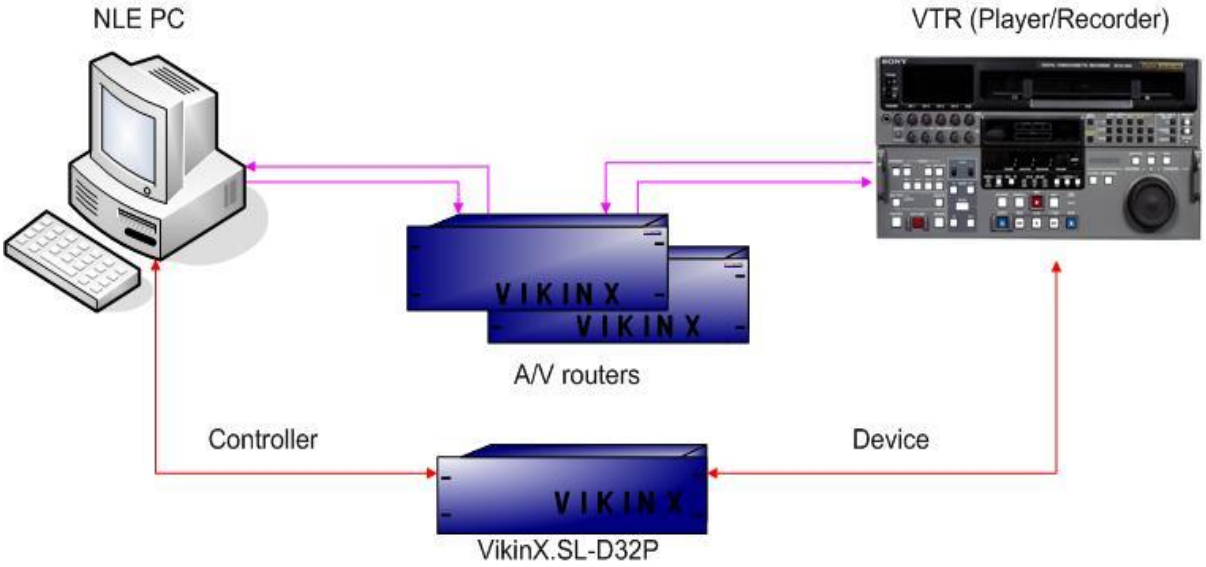
The first example shows how to connect two Video Tape Recorders (VTRs) with traditional AV Routers for signal transport and a SL-D32P Ported Data Router for RS-422 Machine Control.

Both VTRs can be used as Player or Recorder depending on their local/remote setting. When Data Router Ports are set to Dynamic in the System Configurator, machine control will pass either way.



6.2 Fixed

The second example shows a VTR and NLE Computer (i.e. NLE =Non-Linear Editor). The units can both be Player or Recorder for audio & video, while the Computer is Controller (Master) and always controlling the device/VTR (Slave). This leaves RS-422 Machine Control Data to always operate in one mode, Fixed.



General environmental requirements for Nevion equipment

1. The equipment will meet the guaranteed performance specification under the following environmental conditions:
   - Operating room temperature range: 0°C to 45°C
   - Operating relative humidity range: <95% (non-condensing)

2. The equipment will operate without damage under the following environmental conditions:
   - Temperature range: -10°C to 55°C
   - Relative humidity range: <95% (non-condensing)

Product Warranty

The warranty terms and conditions for the product(s) covered by this manual follow the General Sales Conditions by Nevion, which are available on the company web site:

www.nevion.com

Important notes regarding Software in the VikinX Modular router family range

This product utilizes software components that are licensed with open source licenses. The source code for these components and our modifications are available from: http://labs.nevion.com/open-source/

You may also send Nevion Europe a recordable CD and a self-addressed envelope, and we will burn the contents of http://labs.nevion.com/open-source/ to your CD and send it back to you.

This offer is valid for 3 years after purchase of this product.

Open TCP includes software developed by Viola systems (http://www.violasystems.com/).

Appendix A Materials declaration and recycling information

A.1 Materials declaration

For product sold into China after 1st March 2007, we comply with the “Administrative Measure on the Control of Pollution by Electronic Information Products”. In the first stage of this legislation, content of six hazardous materials has to be declared. The table below shows the required information.

組成名稱 Part Name	Toxic or hazardous substances and elements					
	鉛 Lead (Pb)	汞 Mercury (Hg)	镉 Cadmium (Cd)	六价铬 Hexavalent Chromium (Cr(VI))	多溴联苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
SL-D32P	O	O	O	O	O	O
SL-PWR-40	O	O	O	O	O	O
O: Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006. X: Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in SJ/T11363-2006.						

This is indicated by the product marking:

A.2 Recycling information

Nevion provides assistance to customers and recyclers through our web site http://www.nevion.com/. Please contact Nevion’s Customer Support for assistance with recycling if this site does not show the information you require.

Where it is not possible to return the product to Nevion or its agents for recycling, the following general information may be of assistance:

- Before attempting disassembly, ensure the product is completely disconnected from power and signal connections.
- All major parts are marked or labeled to show their material content.
- Depending on the date of manufacture, this product may contain lead in solder.
- Some circuit boards may contain battery-backed memory device.

EC Declaration of Conformity

MANUFACTURER	Nevion Europe AS P.O. Box 1020, 3204 Sandefjord, Norway	
AUTHORIZED REPRESENTATIVE (Established within the EEA)	Not applicable	
MODEL NUMBER(S)	SL-D32P	
DESCRIPTION	Ported RS-422 Data Router	
DIRECTIVES this equipment complies with	LVD 73/23/EEC EMC 2004/108/EEC	
HARMONISED STANDARDS applied in order to verify compliance with Directive(s)	EN 55103-1:1996 EN 55103-2:1996	
TEST REPORTS ISSUED BY	**Notified/Competent Body**	**Report no:**
	Nemko	E08464.00
TECHNICAL CONSTRUCTION FILE NO	Not applicable	
YEAR WHICH THE CE-MARK WAS AFFIXED	2008	
TEST AUTHORIZED SIGNATORY		
MANUFACTURER	**AUTHORIZED REPRESENTATIVE (Established within EEA)**	**Date of Issue**
		2008-02-29
		Place of Issue
	Not applicable	Sandefjord, Norway
Name Thomas Øhrbom		
Position QA Director, Nevion Europe (authorized signature)		