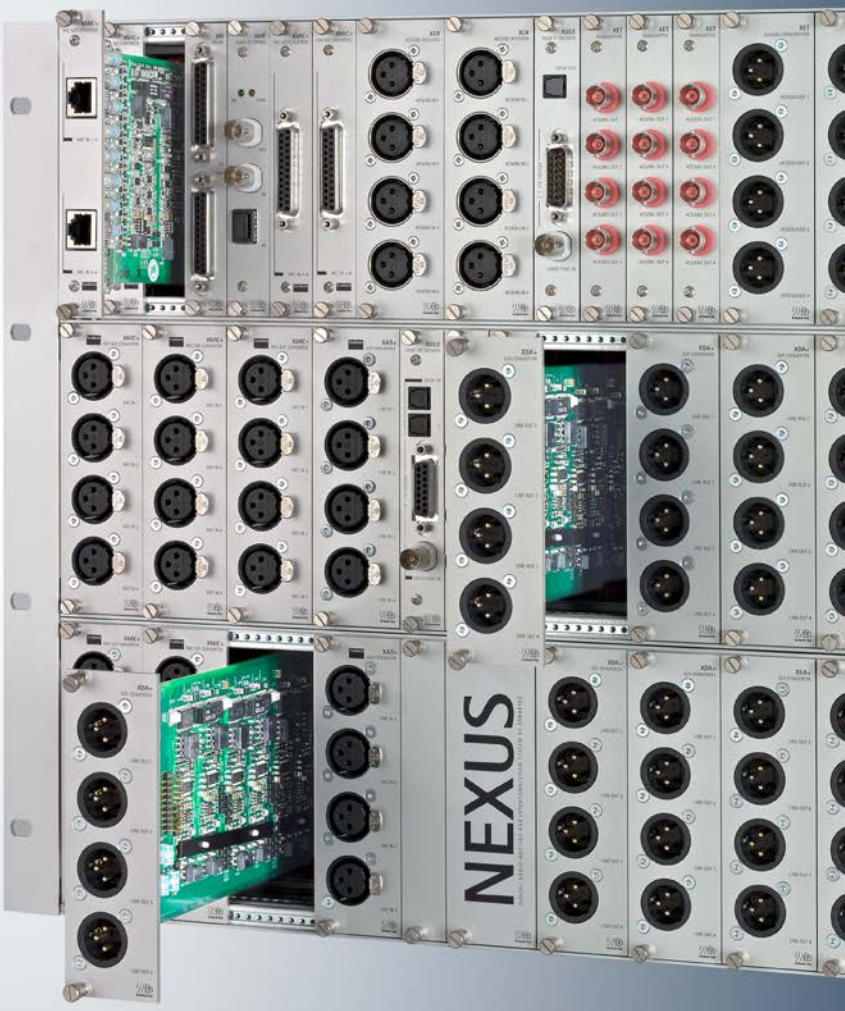


Englisch

NEXUS/NEXUS STAR

Technical Specifications

STAGETEC

AUDIO EXCELLENCE

In numerous installations worldwide, a NEXUS system is the core component for networking, routing, and processing audio, control, and ancillary data. Countless installations ranging from studio crossbars to switching-room routers to complete broadcasting-centre networks prove the system's flexibility. The NEXUS also excels by its ultra-low latency, its reliability, and its versatility at the centres of small-scale set-ups including portable transmission systems featuring quality stage boxes as well as in medium-size installations in OB vehicles or public-address systems.

Unparalleled Performance for Any Application

As a proprietary system interfacing to all established formats and standards, the NEXUS offers unparalleled performance. It supports analogue formats such as like MIC or line I/O as well as digital formats including AES, MADI, and AoIP through Dante. In addition, the NEXUS routes non-audio formats such as GPI/O, MIDI, TC, and serial data on the entire network.
It excels not only by its audio quality but is also amazingly reliable, integrable, and scalable.

Customisable

Each Base Device has a custom configuration with all interfaces and modules required onsite. The Base Device network allows for routing any sources to any sinks regardless of I/O formats and their physical positions on the network. This effectively eliminates the need for complex and costly format conversions.

The Key Features

- Audio routing – 64,000 inputs to 64,000 outputs
- Large selection of analogue and digital audio interfaces available
- Audio, control, and sync-data transmission through a single cable
- Full isolation between devices
- Minimum latency: 6 samples per Base Device
- Rigid synchronisation of all devices even in large networks
- Large variety of control options
- Audio-over-IP interfacing
- Flexible clocking options

The Idea

A NEXUS network consists of separate Base Devices placed wherever you need to route audio, control, and other signals to and from the network. All Base Devices are interconnected through digital links implemented as floating fibre-optic cables.
Each Base Device acts as an autonomous local router. This way, a NEXUS network offers distributed intelligence including decentralised control and crosspoint information.

TDM and IP

Internally, Time-Division Multiplexing (TDM) with dynamic time-slot allocation ensures ultrafast signal transmission within just a few samples.
Typically, you operate the NEXUS using a graphical interface that runs on a configuration PC. The computer can be connected to any Base Device on the network through Ethernet, USB, or serial links. You can store all settings and operate the entire audio network from wherever a control interface is installed.

Redundant

Safe operation is a core feature of the NEXUS: Each Base Device incorporates a dedicated CPU – a setup that reliably prevents an overall-system breakdown in case of failure. In addition, you can optionally implement redundant power supplies and optical links to ensure safe operation.

The NEXUS STAR is a star router designed for large networks and therefore offers a redundant processor and routing card. In addition, the STAR can also be configured with redundant MADI ports.

At power-supply, optical-link or MADI failure, the system smoothly and inaudibly switches to the required backup component. Ring topologies also allow for re-routing the transmitted signal.

Status Indication

At failure, the system's internal watchdog triggers an alert. All issues will be reported on the graphical user interface. Interface cards are hot-swap-enabled, i.e. you can replace them in system operation without affecting other components.

Operation and Monitoring

Many third-party controllers support the NEXUS control protocol. This way, NEXUS networks seamlessly integrate with global crossbar or studio controllers in almost any configuration and also support SNMP management.

In general, you can control the NEXUS through IP, GPIO, USB, or serial interfaces.

So Much More Than an Audio Router

The NEXUS functionality goes far beyond of what a simple audio router offers. In addition, the system provides the following:

- Various digital audio interfaces
- A/D and D/A conversion
- Audio conversion
- Audio processing
- Video embedding and de-embedding
- Custom DSP configuration
- Multichannel metering
- EBU R128-compliant loudness metering
- Flexible intercom applications
- Tunnelling of serial non-audio data
- Control of third-party systems
- User-programmable internal logic and control functions

IP Support

NEXUS supports various IP-based technologies ranging from multichannel audio transmission to Dante or AES67 to numerous control methods. For internal real-time routing, however, the system uses a separate ultrafast high-performance TDM bus.

The XACI general-purpose control interface with Ethernet ports, OCA support, and a built-in switch handles complex tasks that otherwise would require the use of external server hardware. IP is also used for integrating the NEXUS SNMP agent into the global SNMP scheme for system monitoring. Other features including transparent IP tunnelling through NEXUS and an audio-over-IP interface for the NEXUS STAR are currently under development.

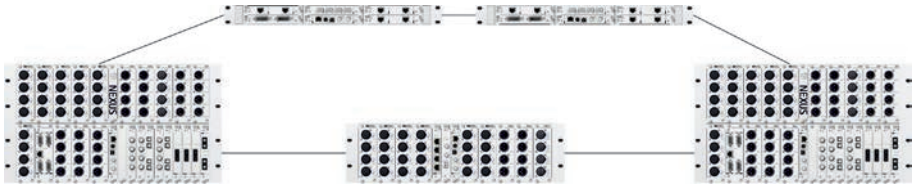
Tailored Switching

Using the built-in native programming environment, you can define logical switching operations ranging from simple tally-signal forwarding to full reconfiguration of studio and control-room complexes (including emergency switchover). The integrated documentation makes all logic flows on the system fully transparent.

Network Topologies: Stand Alone to Massive - All in Sync

NEXUS in standalone use
- Reference converter
- Recording interface
- Format converter, splitter

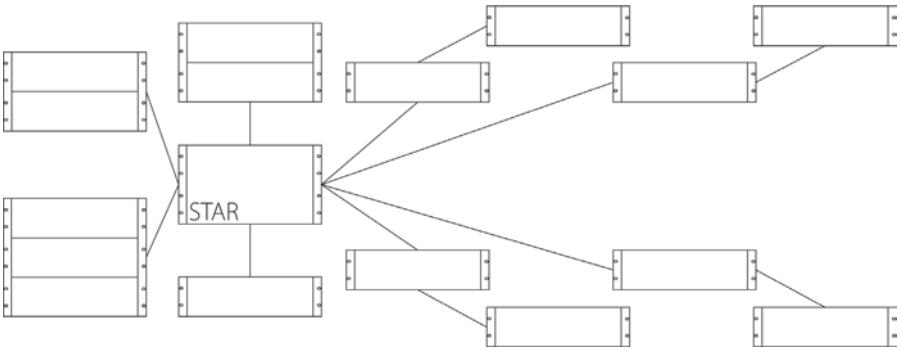
NEXUS in a campus environment
- Decentralised distribution
- Individual topologies possible
- Campus networking



Basic Components

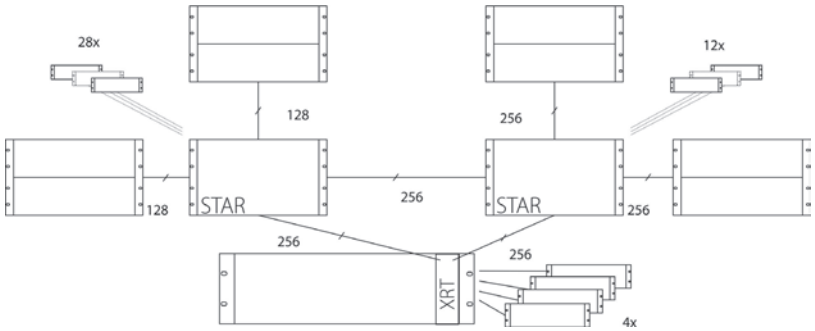
NEXUS Base Devices come in various sizes. They all feature a 19" mainframe with a processor card, a backplane and optical-interface cards. All Base Devices are separately configured with audio interfaces, DSPs, and other interface cards as per customer specifications.

19" Mainframes			TDM: 256 timeslots (48 KHz), 128 timeslots (96 KHz)
X19-3RU	NEXUS Base Device, 1 active row	3U, 420mm in depth	20 free slots receiving audio, controller, sync, and optical interface cards Routing technology: TDM bus
X19-6RU-01	with passive top row (optional)	6U in total	Optional: additional passive row for detached XLR panels
X19-6RU-10	with passive bottom row (optional)	6U in total	
X19-6RU-11	NEXUS Base Device, 2 active rows	6U, 420mm in depth	40 free slots receiving audio, controller, sync, and optical interface cards
X19-9RU-011	with passive top row (optional)	12U in total	Routing technology: TDM bus
X19-9RU-110	with passive bottom row (optional)	12U in total	Optional: additional passive row for detached XLR panels
X19-9RU-0110	with passive top and bottom rows (optional)	15U in total	
X19-6RU-111	NEXUS Base Device, 3 active rows	9U, 420mm in depth	60 free slots receiving audio, controller, sync, and optical interface cards
X19-9RU-0111	with passive top row (optional)	12U in total	Optional: additional passive row for detached XLR panels
X19-9RU-1110	with passive bottom row (optional)	12U in total	Routing technology: TDM bus
X19-9RU-01110	with passive top and bottom rows (optional)	15U in total	
X19-1RU	NEXUS Base Device (compact)	1U, 420mm in depth	5 free slots receiving audio, controller, sync, and optical interface cards Routing technology: TDM bus
R19-6RU	NEXUS STAR Router Base Device	6U, 410mm in depth	16 (8L, 8R) free slots for audio and optical interface cards, 2 free slots for the RCX controller card (optional, redundant), 1 free slot for the RSYNC sync card Routing technology: 4096 : 4096 matrix



NEXUS as a centralized component
- Production studios
- OB trucks
- Mixing console integration
- Capacity-optimized
- Fleet concept

NEXUS in a massive environment
- Topology blocks like star cluster, ring cluster, XRT cluster, daisy chain
- Networks up to 63 Base Devices



System Cards for X19 Base Devices		
XCPU	Base-Device CPU	Base-Device and bus management, system-control interfaces (IP, USB, RS232), clock generation and conditioning, external word-clock-sync input, network-synced wordclock output
XFOC	Optical interface for the NEXUS	4 SFP ports (interface modules for various fibre types), NEXUS in-sync networking (audio, clock, and control data), up to 256 bi-directional audio channels (@48 KHz); built-in matrix (separate from the TDM bus – requires Rev. 8 or later)
XRT	High-performance optical inter-face with built-in routing matrix	High-performance optical-interface card with built-in 8448:8448 router (@48 KHz), 12 optical ports handling 512 or 2048 audio channels each High-speed network bypassing the TDM bus
XSYNC	Video-sync card	Supports external sync formats including TriLevel and Blackburst

System Cards for R19 STAR Routers		
RCX	Base-Device CPU for STAR routers	Base-Device and bus management, system-control interfaces (IP, USB, RS232), clock generation and conditioning, external word-clock-sync input, network-synced wordclock output, 4000:4000 routing matrix (@48 KHz)
RFOC	Optical interface for the NEXUS	4 SFP ports (interface modules for various fibre types), NEXUS in-sync networking (audio, clock, and control data), up to 256 bi-directional audio channels (@48 KHz)
RSYNC	Video-sync card	Supports external sync formats including TriLevel and Blackburst

Operation and Monitoring			
XCI	 -4 HP -8 HP	NEXUS Control Interface 2 serial ports 4 serial ports	Multifunctional control interface, configurable ports (MIDI, Yamaha AD8HR, machine control); internal miniSD card supporting the NEXUS status-load feature, IP-control interface (configured using the GUI), SNMP
XACI		NEXUS Advanced Control Interface	Control interface incorporating an embedded PC module and an audio-bus interface, 2 USB ports, 3 Ethernet ports; use cases: EmBER+; FLEX-console proxy hosting (more use cases planned)
XRI	Rev 05	NEXUS Relay Interface	24 optocoupler inputs, 24 semiconductor-relay outputs (AC/DC), internal/external supply, common pin or isolated pairs, programmable functions using NEXUS Logic Control

Fibre Specifications		Examples – other SFP module types (e.g. CWDM / DWDM) available on request	
SFPM- …	FO-01	SFP module for XFOC/RFOC	LC duplex, 1310nm, SM: 10km, MM: 500m (default)
	FO-04	SFP module for XFOC/RFOC	LC duplex, 1310nm, SM: 20km
	FO-08 A/B	SFP module for XFOC/RFOC	LC simplex, 1310nm / 1550nm WDM , SM: up to 10km
	MF-01	SFP module for XMF/RMF (MADI)	LC duplex, 1310nm, MM: 2km (default)
	MF-02	SFP module for XMF/RMF (MADI)	LC duplex, 1310nm, SM: 10km
	HD-02	SFP module for XHDI (HD-SDI)	LC duplex, 1310nm, SM: 30km (SD), 20km (HD)
Optical Multiplexer for Duplex Links			Transparent transmission, cascadable units
OMUX	-LC -LCT (1) … (4)	1:4 optical multiplexer, re-clocking (optional), 1–4 units inside a 19" 1U mainframe	Stand-alone unit, internal plus redundant power supplies, auto (priority-controlled) or GPI-controlled operation; can be reconfigured as unidirectional in-parallel router (for example, for MADI)
XMUX	-LC -LCT	1:4 optical multiplexer, re-clocking (optional), 1 plug-in card	Plug-in card for NEXUS X19 Base Devices, auto (priority-controlled) operation; can be reconfigured as unidirectional in-parallel router (for example, for MADI)

Built-in Processing			
XDSP	Rev. 06	DSP card for NEXUS X19 Base Device 2 Sharc 21469 processors	Custom configuration using freely routable processor modules (faders, EQs, filters, dynamics, delays, summers, IFBs, downmix, mix-minus matrix, crossover, M/S decoder, de-esser, and many more); capacity (@48kHz): 2 × 1000 summing points, 20 min. audio delay
		DSP configuration per customer specifications	Custom solutions such as single-destination auto-crossfade, etc. available on request
ISOSTEM	-L	ISOSTEM Upmix 5.1 (dongle)	Plug-in for use with ***one*** processor of a XDSP Rev06 card
XFAD		8-way crossfader for the NEXUS	Configurable summing layout on the output side, logic triggers
XDEE		NEXUS Dolby-E® encoder card	Dolby-E® stream encoder (1 OEM module)
XDED	-S -D	NEXUS Dolby-E® decoder card	Dolby-E® stream decoder (1 OEM module) Dolby-E® stream decoder (2 OEM modules)

Transparent Tunnelling			
XTI	 -4 HP -8 HP	Serial-data transport interface 2 serial ports 4 serial ports	Supports transparent transmission of serial data (MIDI, RS 232, RS 422, RS 485, DMX, LTC, Dolby metadata) through the NEXUS network, 2 or 4 duplex ports, separately routed transmission in each direction, allows both parallel routing and point-to-point links

Legacy Formats			
XAF		ADAT interface	8 inputs, 8 outputs in ADAT format, optical (POF) port, SRCs (optional)
XTF		TDIF interface	8 inputs, 8 outputs in TDIF format, D-sub 25 port, SRCs (optional)

High-Quality Analogue Range			Fullscale [0..24 dBu]
XMIC+	-X, -D, -R	8-channel microphone converter	32-bit TrueMatch A/D converter, 158dB(A) dynamics at 24dBu, no analogue preamplification required, ultralow latency, exceptional pulse fidelity, phantom power, auto-mute when connecting/disconnecting powered microphones, DI-box functionality, galvanically transformer-isolated channels Software option: active 1:4 splitter per input converter, with gain, subsonic filter, and limiter for each splitter output
XAD+	-X, -D, -R	8-channel analogue line-input converter	24-bit TrueMatch A/D converter, 133dB(A) dynamics at 24dBu, galvanically transformer-isolated channels
XDA+	-X, -D, -R	8-channel analogue line-output converter	24-bit TrueMatch D/A converter, 131dB(A) dynamics at 24dBu, galvanically transformer-isolated outputs

AES Standard Range			
XER	-X, -D, -R -O, -B	4 AES/EBU input ports	4 AES digital 2-channel inputs with SRC
XET	-X, -D, -R -O, -B	4 AES/EBU output ports	4 AES digital 2-channel outputs with SRC
XER-M	-X	Input card for 4 digital microphones	Input card for 4 digital microphones, AES-42, mode 1 compliant, phantom power, microphone-parameter adjustable through GUI
XETR	-X, -B	4 AES/EBU input ports and 4 AES/EBU output ports	Combo unit featuring 4 AES digital 2-channel inputs and 4 AES digital 2-channel outputs, with I/O SRCs

Compact Range		High component density, maximum cost efficiency, minimum power consumption
HXAD	-D, -R	8 line inputs (2-channel)	24-bit TrueMatch A/D converter, 112 dB(A) dynamics at 15dBu, galvanically isolated channel pairs
HXDA	-D, -R	8 line outputs (2-channel)	24-bit TrueMatch D/A converter, 120 dB(A) dynamics at 15dBu, galvanically isolated channel pairs
HXETR	-D, -R	8 AES/EBU input ports and 8 AES/EBU output ports	Combo unit featuring 8 AES digital 2-channel inputs with SRCs and 8 AES digital 2-channel outputs without SRCs

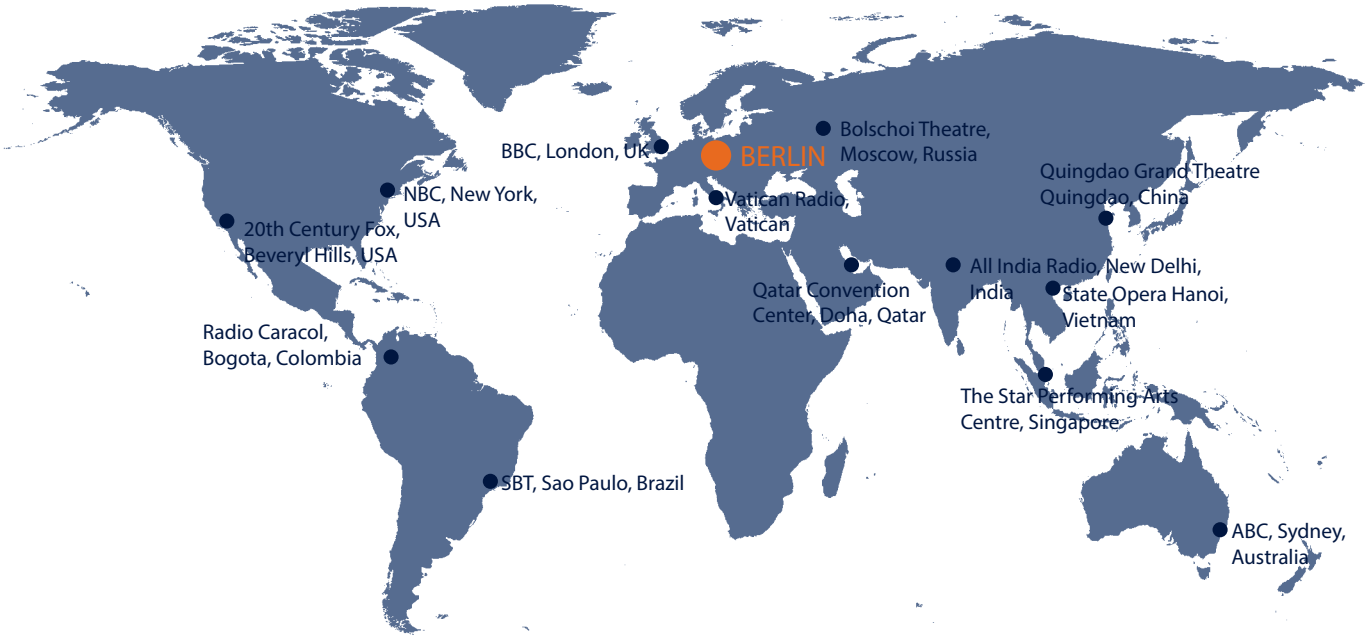
Multichannel Formats			
XDIP		Dante AoIP-Interface	Audio-over-IP duplex interface, 64 inputs and 64 outputs (@48kHz); SRCs; 1 Audinate DANTE Brooklyn II; AES67; stabilised clock regeneration, 4x switch supporting primary/secondary cabling
XMF	-BLC SRC	Single MADI port for NEXUS X19 Base Devices	64 inputs, 64 outputs (@48kHz) per port, BNC port, SFP slot, SFP module (optional). SRC option: 2 × 32 channels (64 in or 64 out or 32 in/32 out)
RMF	-BLC	4 MADI ports for NEXUS R19 STAR Routers	64 inputs, 64 outputs (@48kHz) per port, BNC port, SFP slot, SFP module (optional)

Embedded Audio			
XHDI	-B, -O	Combo unit with 16-channel HD-SDI embedder and 16-channel HD-SDI de-embedder	Processes the embedded audio of a serial video stream compliant with SMPTE 259M (SD), SMPTE 292M (HD), or SMPTE 424M/425M (3G). The de-embedder extracts 16 channels while the embedder embeds 16 channels. Embed mode (Emb, Replace, Clr, Byp) selectable per group SMPTE 2020 compliant metadata embedder/de-embedder. Video delay, I/O SRCs (optional)

Legend

-X	with XLR ports	-R	RJ45 version	-B	BNC version
-D	D-sub port	-O	OptoXLR version	-BLC	BNC + LC version

Stage Tec NEXUS: A global reference!*



*This map shows the locations of selected reference installations. All in all, more than a thousand Stage Tec NEXUS systems have been delivered and installed so far.

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