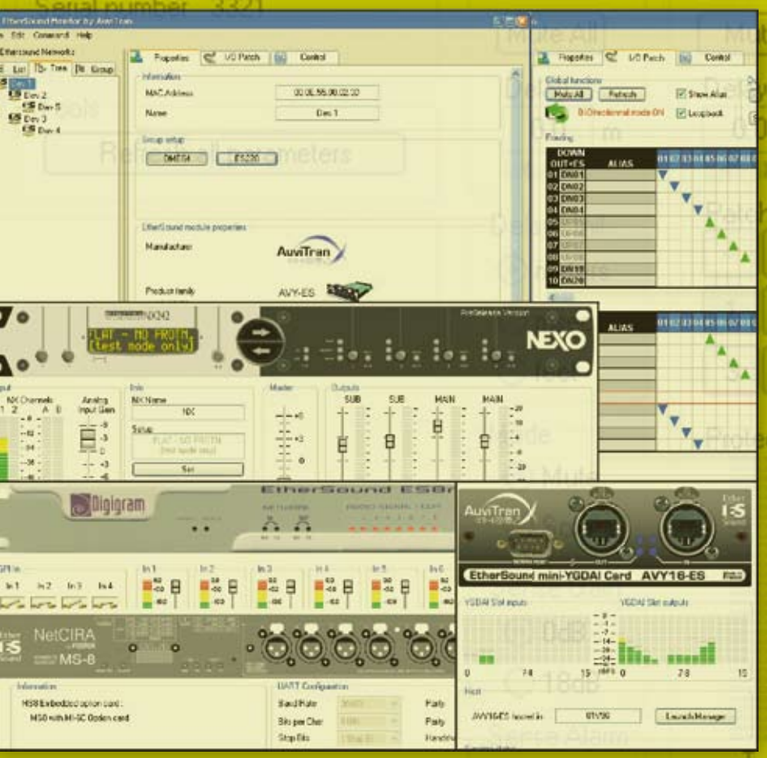

Clustered Screenshot
display of various
EtherSound control panels.

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v 1.1

DIGITAL TD CONTROLLER NX242

NEXO INNOVATE

NX242

CONTENTS

NEXO S.A.

Now in its fourth decade, NEXO's company mission is to provide wide-ranging solutions that enhance the science, art and commerce of sound reinforcement. Founded by Michael Johnson, NEXO's Managing Director, and Chairman/R&D Director Eric Vincenot, NEXO became a publicly traded company in May 2001. NEXO shares are listed on the Marche Libre of the Paris Bourse (SICOVAM 4441). The added access to capital markets gained by this public offering strengthened NEXO's ability to pursue aggressively genuine audio innovations. The first of these advanced audio design options is the widely heralded GEO Tangent technology, which incorporates several fundamental wave-source patents. NEXO's sound reinforcement systems also include the compact, versatile PS Series plus the high performance Alpha System and Alphae Series. In short, all NEXO loudspeakers, analogue and digital controllers, power amplification, and advanced rigging systems are designed to deliver: Sonic Innovation That Works. NEXO is a world leader in the design and manufacture of loudspeaker systems for sound reinforcement.

NEXO

INNOVATE

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TAKE CONTROL...

NEXO's new NX242 TDcontroller is an advanced, proprietary digital processor that maintains exceptional performance and reliability in GEO, Alpha and PS loudspeaker systems and associated Sub-basses. The NX242 provides crossover, sensed-amplifier control and system alignment acoustically matched to each NEXO component.

The NX242's complex software algorithms integrate this calibrated data with sensed-voltage measurements, while analogue I/O functions share rear panel space with digital Audio Distribution and System Control over Standard Ethernet via EtherSound™ connection using the NXtension-ES4 Expander Board.

Neutrik EtherCon® Series connectors are the only EtherSound connector recommended by Nexo.

MUCH MORE THAN EXPECTED

The NX242 offers every conceivable "generic" Digital Loudspeaker Controller function, but its real value is precision interface with NEXO loudspeakers. For example, every NX242 channel offers discrete simulation/protection processing and contains a combination of controlled gain stages (think of analogue VCAs), embedded into adaptive, complex composite signal chains with frequency-selective attenuation, similar to an analogue voltage controlled dynamic equaliser (VCEQ).

Each VCEQ and VCA is controlled, via synthesis of several signals, with multiple detection sections. That synthesis is the envelope of those signals, with optimised release and attack times for each VCEQ and VCA (depending on cabinet and frequency range).

NX242 also employs low and high-pass filters to filter potentially performance-degrading frequencies and maximize overall system response. High-pass filters also help prevent loudspeaker over-excursion at very low frequencies. Crossover function is tuned for every possible cabinet set-up and designed to optimize phase alignment throughout the crossover overlap region.

Each crossover is customized so that each transducer will fit with its neighbour by achieving a perfect phase alignment. Unconventional, crossover-defined filters are applied, ranging from 6dB/octave to near infinite slopes.

EQ, TIMING & SENSE

Time alignment is also unconventionally achieved, by combining crossover filter group delays with all-pass and/or frequency dependent delays. Active attenuation allows lowering of amplifier voltages for a given output SPL to maximum potential SPL. Active equalisation also extends a NEXO loudspeaker's frequency response, especially at LF, where output is cabinet size-limited.

The Sense-Input signal is routed to a shaping filter, producing a signal whose instantaneous amplitude is proportional to voice coil excursion. After rectification, this signal is compared to a preset threshold matching the maximum usable value, as determined from laboratory measurements. Any signal exceeding this threshold is sent to the VCEQ control buffer, while the VCEQ instantaneously acts as an excursion limiter.

To avoid detrimental effects caused by very long release time constants inherent to any temperature detection signal (i.e system output being reduced for an extended period, "pumping" effects, etc.), the detection signal is modulated by another voltage integrated with faster time constants that match subjective "human" sound perception. This allows the NX242 to reduce temperature limiter operating durations to natural levels, while keeping protection thresholds as high as possible.

NETWORKED AUDIO SYSTEMS

Networked audio systems were first suggested when MIDI (Musical Instrument Digital Interface) emerged as an early 1980s control protocol. But MIDI, while effective at sequencing and machine control, held no network promise.

Still the digital audio network idea was in play. And the BIG idea was a fully digital, open-architecture, plug and play bi-directional, portable or fixed audio network. Twenty years later, with the audio network path littered with false starts and outright failures, EtherSound emerged.

Today, EtherSound users enjoy a non-proprietary, ultra low latency audio network for every imaginable application. Where do you want from your next sound system design? Do you need to reconfigure your 8-zone output matrix on the fly? No Problem. Do you imagine an entire school, hotel or hospital elegantly engineered so that rolling cases can move mixer and control hardware from room to room, and immediately connected with CAT5 cable? Its already been done. With EtherSound, the possibilities are endless.

ENTER NXTENSION

Our NXtension EtherSound card, for NX242 TDcontrollers, now connects NEXO's unrivaled integrated system performance with networked system topology. (see pg #7) Among the earliest EtherSound licensees, NEXO is proud to know our integrated loudspeaker systems are included in many sophisticated EtherSound-based system designs. There is no reason to compromise.

DIGITAL TD CONTROLLER NX242

NX242 FEATURES

■ ***Precision circuits engineered for NEXO loudspeakers permit increased sound pressure and operational reliability.***

■ ***Flexible loudspeaker management for all NEXO loudspeaker systems, providing crossover, driver protection and system alignment.***

■ ***User-configurable inter-channel gain, delay and array EQ.***

■ ***Low and High-pass filters optimised to work in conjunction with overall system response.***

■ ***High-quality audio performance, 24bit data with 48bit accumulator; 100MIPS.***

■ ***2x audio inputs, 4x audio outputs and 4x sense inputs enable a single NX242 to easily manage multiple NEXO cabinets across each product range.***

■ ***Comprehensive 16x2 character backlit LCD display, indicators and controls.***

■ ***Optional Remote Control, additional 100MIPS DSP and memory resources and link to the EtherSound Network (4in/4out) via the NXtension-ES4 expander Board.***

■ ***4x NX242's processed (digital) audio outputs to 64x uncompressed channels of 24bit/48kHz of audio transmission over Ethernet.***

■ ***Updateable Flash EPROM (Firmware) Upgrades.***

■ ***Remote Control software is WIN2000/XP OS compliant.***

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PHYSIOLOGIC DYNAMIC CONTROL

The NX242's unique Physiologic Dynamic Control (PDC) avoids unwanted effects from long attack time constants. Through anticipation of the temperature limiter, it prevents quick, high-level transient signals from triggering the temperature limiter. The PDC control voltage independently applies a low compression ratio to the VCA, with its operation threshold slightly (3dB) above the temperature limiter.

An optimised attack time constant allows operation without any subjectively unpleasant transient effects, while the user-adjusted Peak Limiter threshold is set to match the amplifier's clip point, avoiding any audible artifacts and loudspeaker damage caused by intense amplifier distortion, thus protecting against driver overheating and over-excursion.

ETHERSOUND™ INSIDE

EtherSound enhances NX242 functionality with easy-to-implement, high-quality audio networks utilising the NXtension-ES4. The patented EtherSound protocol provides full control with very low-latency (125µs, plus 1.6µs per additional network node) transmission of synchronized audio channels, over standard Ethernet.

EtherSound's cost effective, all digital path, between a nearly infinite numbers of networked audio devices, offers up 2 x 64 channels (bidirectional mode) of 24-bit digital audio at 48KHz, plus bi-directional status and control data. Off-the-shelf Ethernet components, such as 100baseTX switches can expand the number of audio devices and extend the distance between network devices.

NX242 TDCONTROLLER ARCHITECT & ENGINEERING SPECIFICATIONS

The 1RU TDcontroller shall be configurable from a combination of two inputs and four outputs with each output providing facilities for crossover, parametric EQ, mid-filter limiters, and delays for all the current NEXO ranges. The unit shall have electronically balanced analogue inputs and outputs. Each input must have facilities for automatic EQ, user configurable delays, Soft Clip Automatic tracking of amplifier clip point, plus LF or HF shelving filter to compensate ground or stacking effects, ±6dB. Any output may take its feed from any input, including a mono sum of the two inputs. MUTE (or solo) buttons control for each output must be independent and directly accessible through front-panel switches.
Data shall be numerically displayed on 16x2 character backlit LCD Display and controlled from Menu A and Menu B buttons or Wheel and Enter Button. Up to 80x factory pre-sets, within the selected range, shall allow cabinets to be configured for passive or active mode, aux, mono or stereo subs, wedge or FOH function. All crossover, protection parameters, and EQ are factory optimized and can't be modified by the user. Password protected: Read-Only Mode. The controller must model the loudspeakers in real time and this modeling shall include loudspeaker temperature and displacement. Protection algorithms shall be selective, acoustically transparent and not allow the loudspeaker to exceed speaker-dependent thresholds. The controller shall be able to apply DSP to the loudspeaker to achieve cabinet directivity control if needed.
The controller shall have 4x inputs providing feedback from amplifier output to allow real time monitoring of amplifier gain and clipping voltage. The controller shall display an extension slot, allowing factory (or user) insertion a daughter board to increase memory and DSP resources and add remote function control. The controller shall be the NEXO NX242 TDcontroller.

NX242-SPECIFIC FUNCTIONS (when equipped with the NXtension board)

■ ***Controls all NX242 TDcontroller functions***

■ ***Advanced Patching operation***

■ ***Provides Group operation***

■ ***Provides hardware security lock (via NX242)***

■ ***Provides protection monitoring (coming soon)***

GENERAL AUDIO & CONTROL FUNCTIONS

■ ***Ready for bi-directional Audio path***

■ ***Control via MIDI-tunneling any EtherSound device and dedicated MIDI control software***

■ ***Save/Recall all parameters***

NXTENSION ES ARCHITECT & ENGINEERING SPECIFICATIONS

The digital NXtensionES plug-in card shall be engineered specifically for use with the NEXO NX242 TDcontroller. When resident to the NX242 expansion slot, the device shall double all NX242 DSP resources and Setup Memory. The device shall also present Remote Control potentials via WLAN and Internet and be 100% Ethernet and TCP/IP compatible. From the NX242 TDcontroller, the NxtensionES will present full remote control of all user-accessible NX242 functions, including, but not limited to Input/Output meters and protection monitoring. These remote control functions shall be accessed remotely via properly configured PC-based computers using Windows2000/XP-compliant operating systems.
The NXtensionES plug-in card shall also Ethernet-transmit four digital audio Input/Output channels, into the EtherSound protocol of 64x uncompressed channels of 24bit/48kHz digital audio. When fitted with NxtensionES cards, unlimited numbers of NX242 and/or other EtherSound compliant devices shall be able to share and transmit these 64x uncompressed channels of 24bit/48kHz of digital audio, while simultaneously being controlled from the EtherSound Network.

NX242 PRODUCT SPECIFICATIONS

Output Level	+28dBu Max into 600Ω.
Dynamic Range	All Channels = 110dB.
THD+N Output	Typ 0.005% @ 1000Hz @ 27dBu.
Latency Time	2.2ms flat set-up
Output Level	110-220V, 50-60Hz continuous operation (Operating range 90-264V)
Audio Inputs	2x L&R Heavy Duty Audio inputs, 24bit convertors; Electronically balanced and floating, 20kΩ. CMMR=80dB. 2x XLR 3 connectors.
Sense Inputs	4x Amplifier Sense-Inputs, 18bit converters; Floating 150kΩ. 8-Pole Removable Strip Terminal.
Audio Outputs	4x audio outputs, 24bit converters, Electronically balanced, 50Ω. 3x XLR-3M connectors.
Processing	24bit data with 48bit accumulator. 100MIPS.
Front panel	Menu A and Menu B buttons. 16 x 2 character backlit LCD Display. Select Wheel and Enter Button; Four MUTE/SOLO Buttons.
Indicators	4x Speaker Protect YELLOW LEDs. 4x GREEN Amp Sense LEDs. 4x RED Peak LEDs. 4x RED Mute LEDs; 2x RED LEDs; Input CLIP and DSP CLIP.
Rear panel	On/Off Mains switch; mains IEC socket; RS232 serial communications connector; Expansion slot for processor extension card;
Flash/EPROM	Software upgrades and new cabinet set-ups are available from nexo-sa.com.
Dimensions	1RU(19in) Width, 230mm(9in) Depth
Weight	3.8kg(8.8lbs) net

SAMPLE USER CONTROL SPECIFICATIONS

System Selection	Allows control of all NEXO ranges.
System Set-up	Within the selected range, allows the cabinet to be set for passive or active mode, aux, mono or stereo subs, wedge or FOH operations depending on system selected. Up to 80x factory pre-sets.
Protection	Peak Limiter, Displacement and Temperature protection on every channel; Physio control of the Protection limiter & compressors Soft Clip Automatic tracking of amplifier clip point.
Delay	Up to 150m(465ft.) of delay in 10cm(.4in) steps; on Sub channel, Main channels or Sub + Main linked.
Input Sensitivity	Level From 6dB to +12dB in 3dB steps.
Output Level	Global and inter-channel gain 6dB in 0.5dB steps.
Amplifier Gain Reading	Allows amplifier gain checking with program material.
Mute/Solo	Changes front panel buttons from Channel Mute to Solo.
Save/Recall	Set-up Stores up to 10 user set-ups; On- the-fly recall, without mute or glitches for instant comparison.
Array EQ	LF or HF shelving filter to compensate ground or stacking effects, +/-6dB
Security Mode	Password protected in Read-Only Mode.

SHIPPING & ORDERING SPECIFICATIONS

Packaging	NX242s are sold as single items and multiples thereof.
Shipping Weight & Volume	1 x NX242 = 4kg(8.8lbs) 0.02cu m(0.71cu ft)

Complying with the safety objectives of 73/23/EEC & 89/336/EEC directives. (EN 60065-1998, EN55103-1996)
UL Certification: UL60065 Seventh Edition, dated June 30, 2003 category AZSQ, E241312.
CB test certificate DK-8371 based on IEC60065-2001 7nd ed. with all national deviations.

NXTENSION-ES4 EXPANDER BOARD

ETHERSOUND INTERFACE

NEXO's NXtension-ES4 Expander Board improves NX242 processing capacity and adds 4x Digital I/Os via the DIGIGRAM EtherSound™ Network. An additional DSP chip, and Flash Memory on the NXtension Expander Board, doubles NX242 memory.

Native, integrated NXtension-ES4 networked Status Reports enable remote (network) installation survey. In addition to their NXtension card development, Auvitran's AVY16-ES card creates EtherSound compatibility for all digital Yamaha professional audio products via the "mini-YGDAI" interface. (seen at right)

NX CONTROL & ES4 ROUTING SOFTWARE FEATURES

- ***All-parameter Access, including NX242 Protection Monitoring.***
- ***Single page display of all NX242 parameters and I/O meters (see ESMonitor screen above).***
- ***Zoning and control of multiple NX242.***
- ***Remote or Local audio I/Os Assigns via any of 64x EtherSound channels.***

KEY NXTENSION(n) & ESMONITOR(e) FEATURES

- ***n-Full remote control of NX242 TDcontroller including I/O meters and protection monitoring.***
- ***n-4x Digital audio I/Os from 64x uncompressed channels of 24bit/48kHz Ethernet audio transmission.***
- ***n-Remote Control via WLAN and Internet, 100% Ethernet and TCP/IP compatible.***
- ***n-Control of unlimited NX242 and other EtherSound compliant network devices.***
- ***n-Enabled for NEXO-compliant ES-ready amplifiers.***
- ***e-Polling & Display of EtherSound-connected equipment.***
- ***e-Automatic discovery of network architecture (Daisy Chain and/or star).***
- ***e-Real-time connection tracking, with status alarms.***
- ***e-Status alarms saved in logbook for further analysis.***

DIGITAL AUDIO NETWORK CONTROL

A core benefit to any audio network is its ability to be to be computer controlled, i.e. "administered" via protocol, so that network-connected equipment can transmit function-specific (control, monitoring etc.) non-audio command data. EtherSound is just such a network.

EtherSound's bi-directional control and monitoring protocol is embedded into each EtherSound data frame eliminating any need for separate control and monitoring cables. The entire network can be configured, monitored, and controlled from using PC software (Windows 2000 and XP) or a microcontroller. What follows are a few key EtherSound control features.

THE ETHERSOUND MONITOR

EtherSound's unifying utility is the way Auvitran's free, fast *EtherSound Monitor* (ESMonitor) administration G.U.I (graphical interface) program allows operators to simultaneously manage multiple EtherSound devices from a single PC.

For example, ESMonitor simplifies NEXO system integration into larger EtherSound networks when an NX242, fitted with a NEXO ES4 NXtension card, is controlled from the same computer that also controls other EtherSound-enabled devices such as a Yamaha DME (DSP) processor, Digigram A/D converter, Camco Amplifier, Innovason mixing desk, etc. (see Figure #1)

While generally intuitive, audio channel routing, via ESMonitor software requires specific attention to detail. For accurate EtherSound network operation and control IN and OUT channels must be properly assigned and visually confirmed. When equipment is to be master/slave configured, channel routing is displayed and controlled on two matrix tables found on the I/O patch page.

These I/O tables (see Figure #2) are:

- Down Out<ES (or Up ES>Out in the bidirectional case)
- Down In>ES (or Down ES<IN in the bidirectional case)

CONTROL TUNNELING

EtherSound network control is not limited to EtherSound-enabled products and extends to control of MIDI and RS232 connected devices. For example, Auvitran's control software for Yamaha AD8HR preamplifiers employs RS232-transmitted tunneling commands that are theoretically identical to MIDI tunneling, except that RS232 data is passed through the EtherSound frame, rather than MIDI data. While this tunneling technique remains transparent to other EtherSound networked equipment, it is only possible when Auvitran cards are used.

AuviTran

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Figure #1

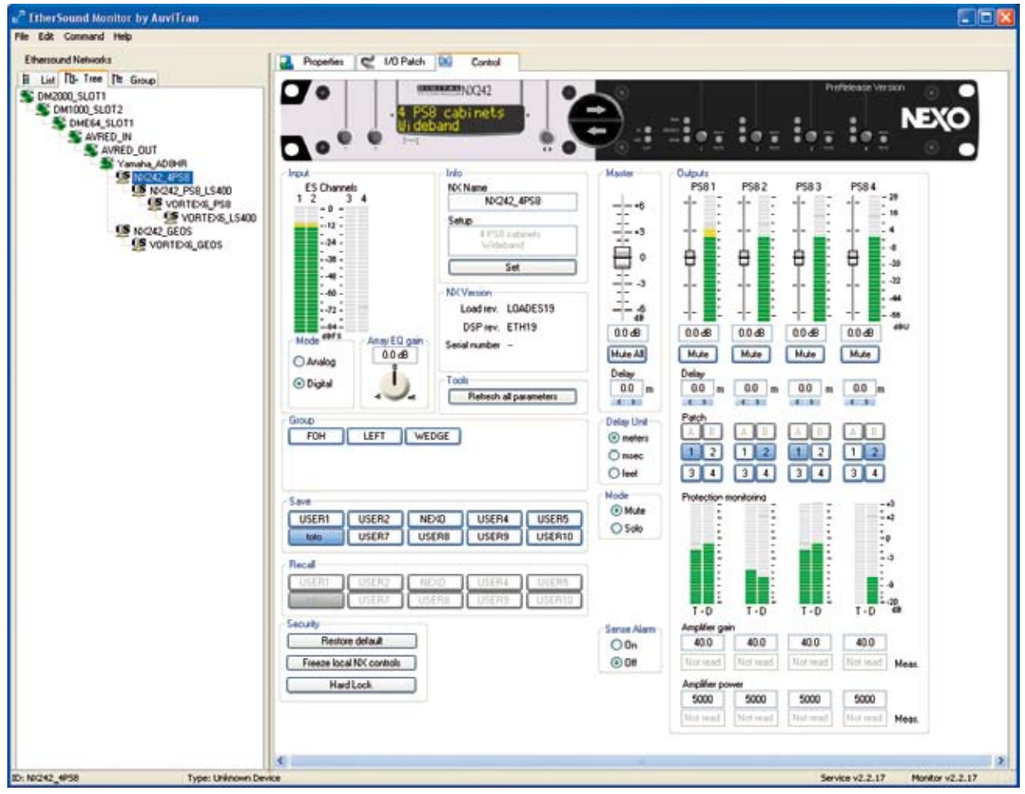
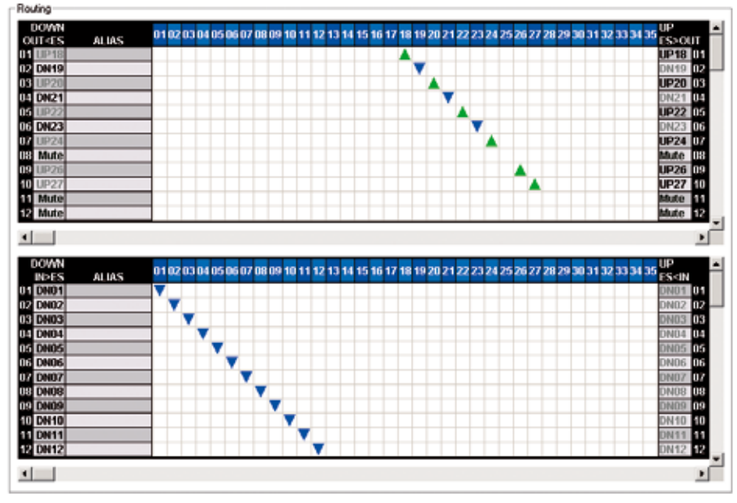
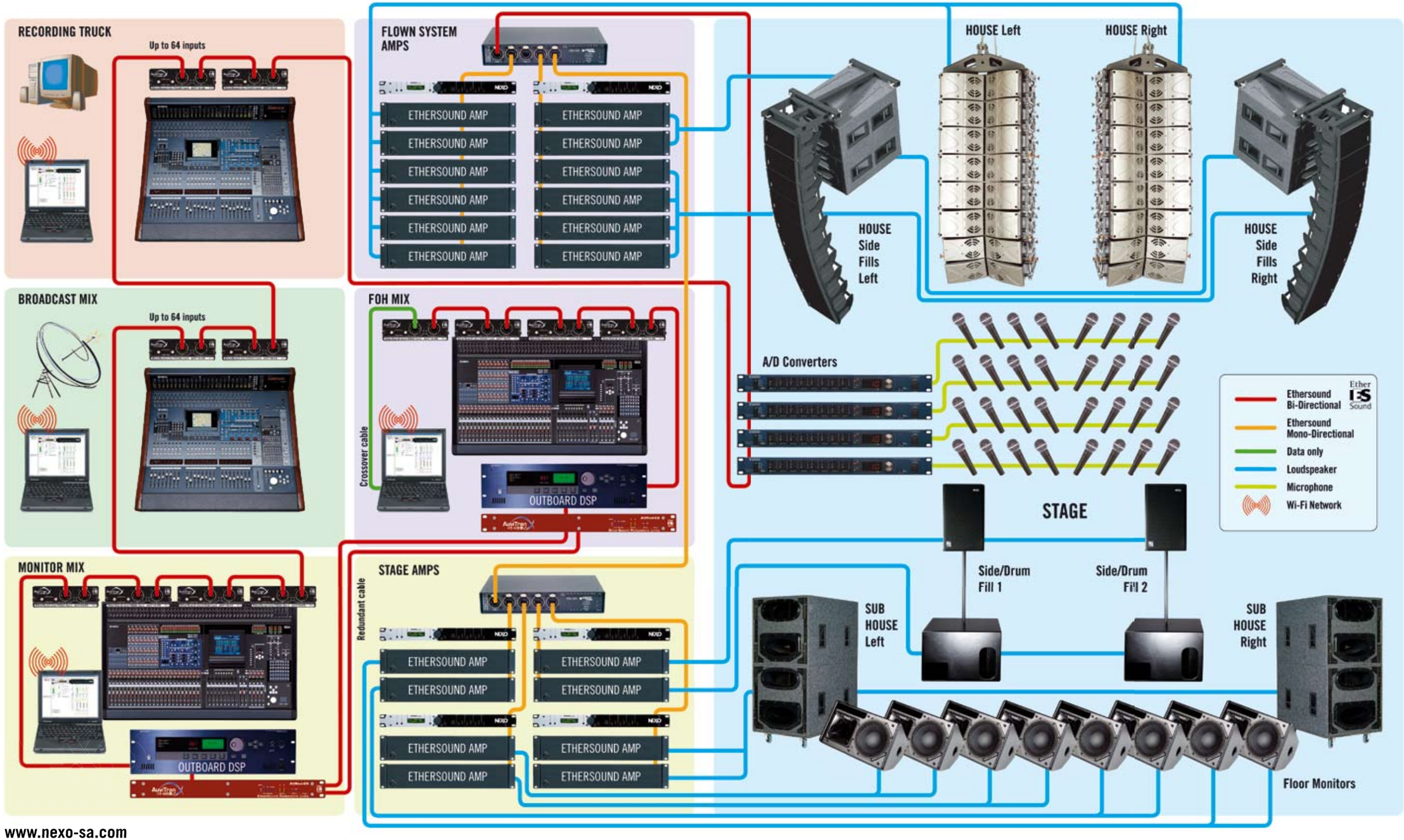


Figure #2



INTEGRATED MULTI-MEDIA CONCERT SYSTEM DIAGRAM



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MULTI-PURPOSE FIXED INSTALLATION
SYSTEM DIAGRAM