# ControlSpace® Engineered Sound Processors and User Controls

Flexible and easy-to-use solutions for installed audio applications

**ControlSpace®** is a powerful platform of processors, controls, and software that delivers a class-leading combination of flexibility and ease of use.

Loudspeakers and amplifiers alone are not what make an audio system. Premium processing and control are just as important to performance and reliable operation. Bose® ControlSpace family of products are engineered to deliver on that promise and go beyond with two key advantages: **flexibility** and **ease of use**.

Find out how Bose ControlSpace products can make a difference for your business and customers.

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### Flexibility

**Two ControlSpace processor types to better match budget and technical requirements**

Each installation has a unique set of requirements, usually in the dimensions of input/output (I/O) connectivity, end-user control, DSP configuration, and cost. ControlSpace ESP processors provide flexibility in each dimension to handle the broadest range of applications. **Fixed-I/O processors** come in three models and feature 16 channels of analog audio — suitable for a basic-standalone setup to a multi-processor installation. **Card-frame processors** offer the highest level of flexibility through an extensive range of high-quality audio expansion cards that allow system designers to specify exact signal type and channel count.

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**Fixed-I/O Processors**
ControlSpace® ESP-880, 1240 & 4120 engineered sound processors

✓ Powerful open-architecture DSP engines

✓ Fixed-I/O analog audio options 8x8 (ESP-880), 12x4 (ESP-1240), and 4x12 (ESP-4120)

✓ Integrated ESPLink output for distributing digital audio to PowerMatch® amplifiers

✓ All models support an optional 16x16 Dante™ card for a full 56-channel support

**Card-Frame Processor**
ControlSpace® ESP-00 II engineered sound processor

✓ Powerful open-architecture DSP engine

✓ Eight open I/O slots for customized audio solutions

✓ Eight card options available - 2 analog audio, 6 digital audio

✓ High-capacity DSP processing

✓ Standard 8x8 GPIO, expandable to 16x16 GPIO

✓ Dante and CobraNet® audio networking supported

| **Flexibility** | **Expansion card options bring adaptability and cost control to your installations**<br><br>Each ControlSpace processor offers expansion card options. These options help keep initial costs down while providing a path for future enhancements. ControlSpace processors are upgradable so that as needs change or further capabilities are required, expansion cards can be added instead of swapping out entire products. |
|---|---|

**ControlSpace® ESP-880, ESP-1240, ESP-4120** engineered sound processors (ESP-880 shown)

Each of the three fixed-I/O ControlSpace processors offers a standard front-panel network port for programming and an open slot on the rear panel for additional Ethernet network control or 16x16 digital audio expansion using the Dante™ audio networking solution from Audinate®.

**Analog Options: 8x8 (ESP-880), 12x4 (ESP-1240), or 4x12 (ESP-4120)**

Network Control

Dante™

**ControlSpace® ESP-00 II** engineered sound processor

The card-frame ControlSpace ESP-00 II processor offers the most flexible expansion options with eight open card slots and a powerful DSP engine. Supporting up to 64 channels of audio, the ESP-00 II processor accommodates eight different audio cards: 2 high-quality analog and 6 digital cards with CobraNet® and Dante networking options.

| Mic/Line Input II | Line Output II | Surround Decoder | Dante™ | CobraNet® | ESPLink Output | AES3 Input | AES3 Output | GPIO II |
|---|---|---|---|---|---|---|---|---|

*Each ESP-00 II processor supports the use of one audio network format.

**ControlSpace® digital transport options maximize fidelity while simplifying the installation**

Bose® ControlSpace processors offer digital audio transport solutions that include Dante™ and CobraNet® networking technologies, the AES3 protocol, and the cost-effective Bose® ESPLink for distributing audio to PowerMatch® amplifiers . These options make it easy to expand and seamless to integrate with other systems and sources.

## Dante™

Bose® offers one of the broadest lines of Dante-enabled products, supported across ControlSpace processors and PowerMatch amplifier lines via expansion cards which can be used at the initial installation or added later to meet customer's growth needs.

ControlSpace Designer™ software version 4.1 features Dante tools such as automatic device discovery, channel routing, and configuration – greatly simplifying the implementation and monitoring of systems using Dante. Designer 4.1 also allows assignment of Dante audio routing to end-user controls. Pre-programmed routing can be recalled from any of the Bose user controls – or via a third-party control system – allowing everything from basic source selection to the remapping of entire systems to be activated by end-users.
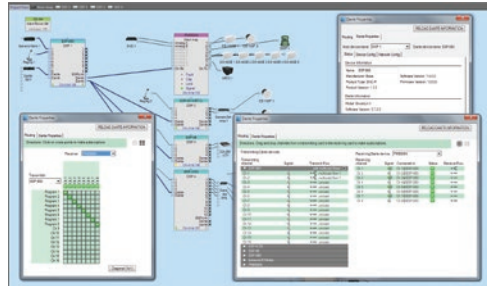


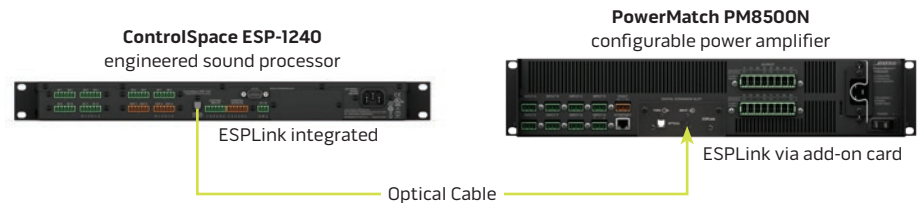**Dante routing using ControlSpace Designer software version 4.1**

## CobraNet®

CobraNet is supported via expansion cards for the ESP-00 II processor and all models of PowerMatch amplifiers. ControlSpace Designer provides basic support for installations where CobraNet is used solely with Bose products.

## AES3

Discrete AES3 input and output cards are available for the ESP-00 II processor. AES3 input cards are available for PowerMatch® amplifiers and feature THRU connections for daisy-chaining multiple amplifiers.

## ESPLink

Proprietary Bose ESPLink is offered across all 4 ControlSpace processor models. ESPLink comes integrated into the fixed-I/O models while available as an expansion card on ESP-00 II processors and PowerMatch amplifiers. ESPLink sends up to 8 channels of digital audio to ESPLink-equipped Bose PowerMatch amplifiers.

**ControlSpace ESP-1240**
engineered sound processor

**PowerMatch PM8500N**
configurable power amplifier



ESPLink integrated

ESPLink via add-on card

Optical Cable

**PowerMatch® configurable professional power amplifiers**



✓ Designed for use in audio systems together with Bose ControlSpace processors and user controls

✓ Proprietary DFL™ (dual-feedback loop) system helps deliver class-leading audio quality, configurability, efficiency and reliability

✓ Four models with Class-D amplification up to 4000 watts rated power

✓ QuadBridge™ channel pairing technology allows 2 or 4 channels to be combined for multiple power levels

✓ Configure from front-panel interface or ControlSpace® Designer™ software using USB or Ethernet port (network models only)

✓ Onboard DSP provides loudspeaker processing with presets for all Bose professional loudspeakers

✓ Optional AES3, CobraNet, Dante or ESPLink digital audio input cards

| Ease of Use | **ControlSpace® Designer™ software simplifies configuration and tuning** |
|---|---|
| | Bose® ControlSpace Designer software is a graphical PC application used for the design, configuration, real-time operation and monitoring of Bose ControlSpace engineered sound processors, end-user controls and PowerMatch® amplifiers. Designer software is specifically built with sound system designers in mind. Each step in the design process, from adding devices to your design to programming scenes and end-user controls, ControlSpace Designer software offers an intuitive workflow and toolset to help you design a sound system more easily. |
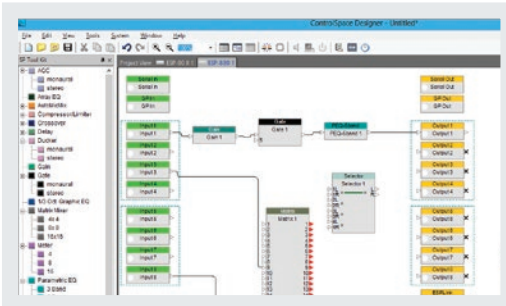
### Open Architecture System Design

All ControlSpace ESP processors support an open architecture DSP platform where custom combinations of signal processing blocks can be arranged in a sound system design, then uploaded to the processor. Once the processor has received the design, users can go on-line with the entire sound system — including multiple processors and amplifiers — and make real-time adjustments to accurately tune the sound system to the needs of the installation.
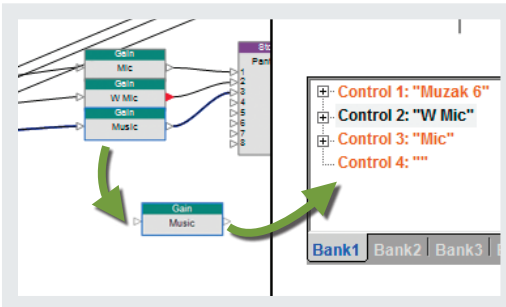
### Drag-and-Drop Control Programming

Bridging external controls to any DSP hardware can be the most time-intensive component of setting up sound systems, especially when using software packages that rely on text-based programming. An intuitive drag-and-drop control programming method in ControlSpace Designer software makes normally complex programming tasks much easier. Whether you are setting up a simple volume control or communicating with control systems using Serial-over-IP, Designer software will help save time and allow you to make client-requested changes quickly.
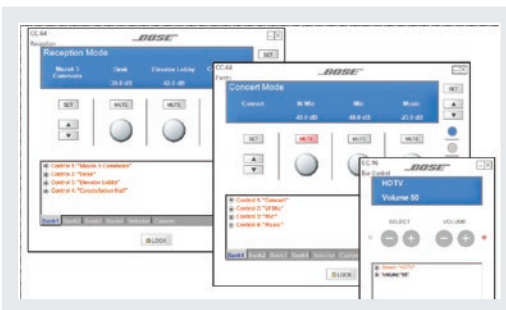
### Smart Simulation

Whether design work is happening at the shop or on-site, the Smart Simulation feature simplifies system control programming, eliminating the need to connect to the actual system to configure and test system control programming. Virtual versions of the popular ControlSpace CC-64 and CC-4 controls can be accessed on-screen where system designers can test and modify system control. When connected on-line with an active system, simulators will mirror physical control panels and allow direct access from within Designer software — facilitating final system commissioning.

**Available
Signal Processing**

Standard Mixers
Matrix Mixers
Graphic EQ
Parametric EQ
Tone Control EQ
Bose Speaker EQ
Array EQ
Crossovers
Automatic Mic Mixing
Delays
Routers
Gains
Signal Generators
Meters
Compressors
Limiters
Duckers
Automatic Gain Controls
Noise Gates
Source Selectors

**Ease of Use**

## Bose® ControlSpace® user controls convert complexity into simplicity

Since few venues employ full-time sound engineers, end-user interfaces need to enable easy operation by non-technical staff. Made worse, multi-function venues introduce added complexity when multiple arrangements of zones make system settings complicated. ControlSpace user controls help present any audio system in simple terms to end-users with easy-to-read LCD displays and inviting tactile controls. In fact, systems integrators have repeatedly praised Bose user interfaces as the most user-friendly controls in the industry.

### ControlSpace CC-64 control center

The ControlSpace CC-64 control center is an elegant, programmable, networked controller that provides end-users with a simple and logical interface to their sound systems when using ControlSpace ESP processors and/or network version PowerMatch® amplifiers. Because the controller is completely programmable, installers can select the key parameters to be made available, simplifying user interaction with the system and reducing support calls. The CC-64 features rotary encoders for volume, source selection, and control over preprogrammed system configurations. A large, 2x40-character backlit LCD provides users with the names of the system elements they are controlling.

### ControlSpace CC-16 zone controller

The ControlSpace CC-16 is an elegant wall-mounted zone controller designed to provide end-user operation of ControlSpace systems. Custom programming allows the CC-16 to control a variety of system elements, from switching remote audio sources to selecting system configurations. The CC-16 features a bitmap LCD and four buttons for displaying and controlling the system settings.

### Additional Bose user interfaces

Three additional user interfaces are available where control of sound in a single zone or room is required. The ControlSpace CC-4 room controller provides a volume control and a 4-way source selector while two Bose Volume Control user interfaces provide additional options. These interfaces are designed to be wired directly to any ControlSpace ESP processor via the GPI port.
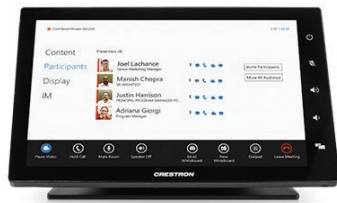
### Third-party control systems and interfaces

ControlSpace ESP processors, and PowerMatch amplifiers support the use of serial commands to receive and transmit information to popular industry-standard control systems such as those by Crestron® and AMX®. Serial-over-Ethernet and RS-232 are available control communication options on ESP processors.
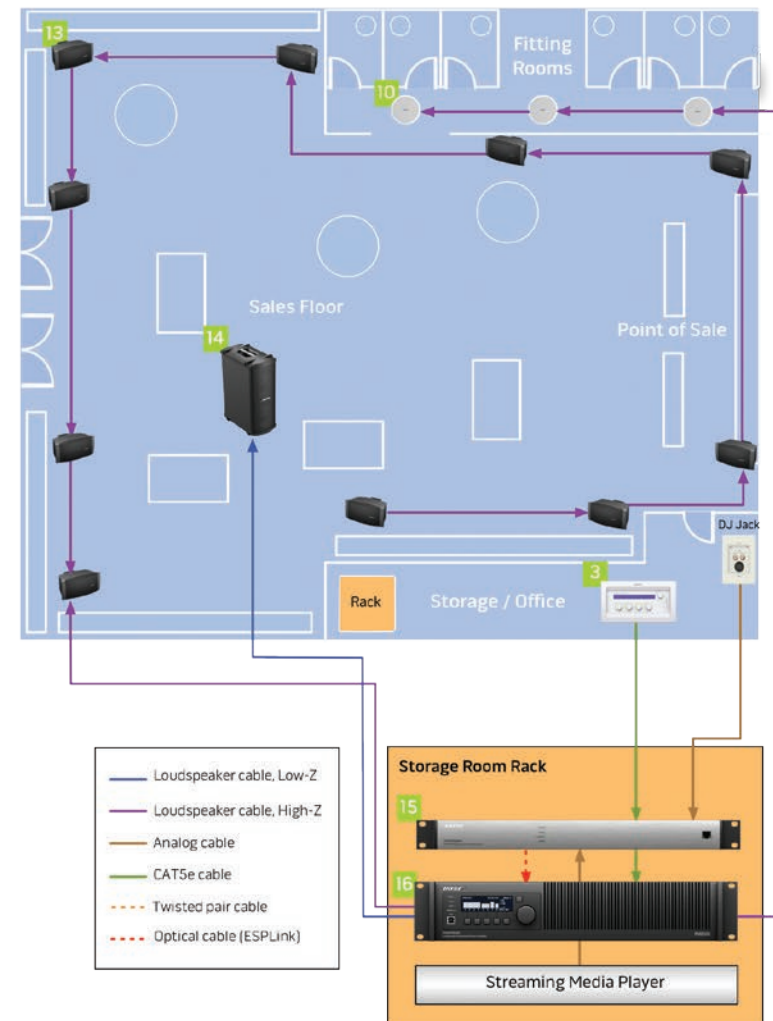
## System Examples

### 1 Restaurant / Bar

This restaurant with bar example showcases how Bose® ControlSpace processors and PowerMatch® amplifiers can provide a combined multi-zone foreground and background music experience. Four wall-mounted end-user controls enable complete control of a system comprised of one ESP-880 processor, and two PowerMatch® amplifiers driving 22 loudspeakers.
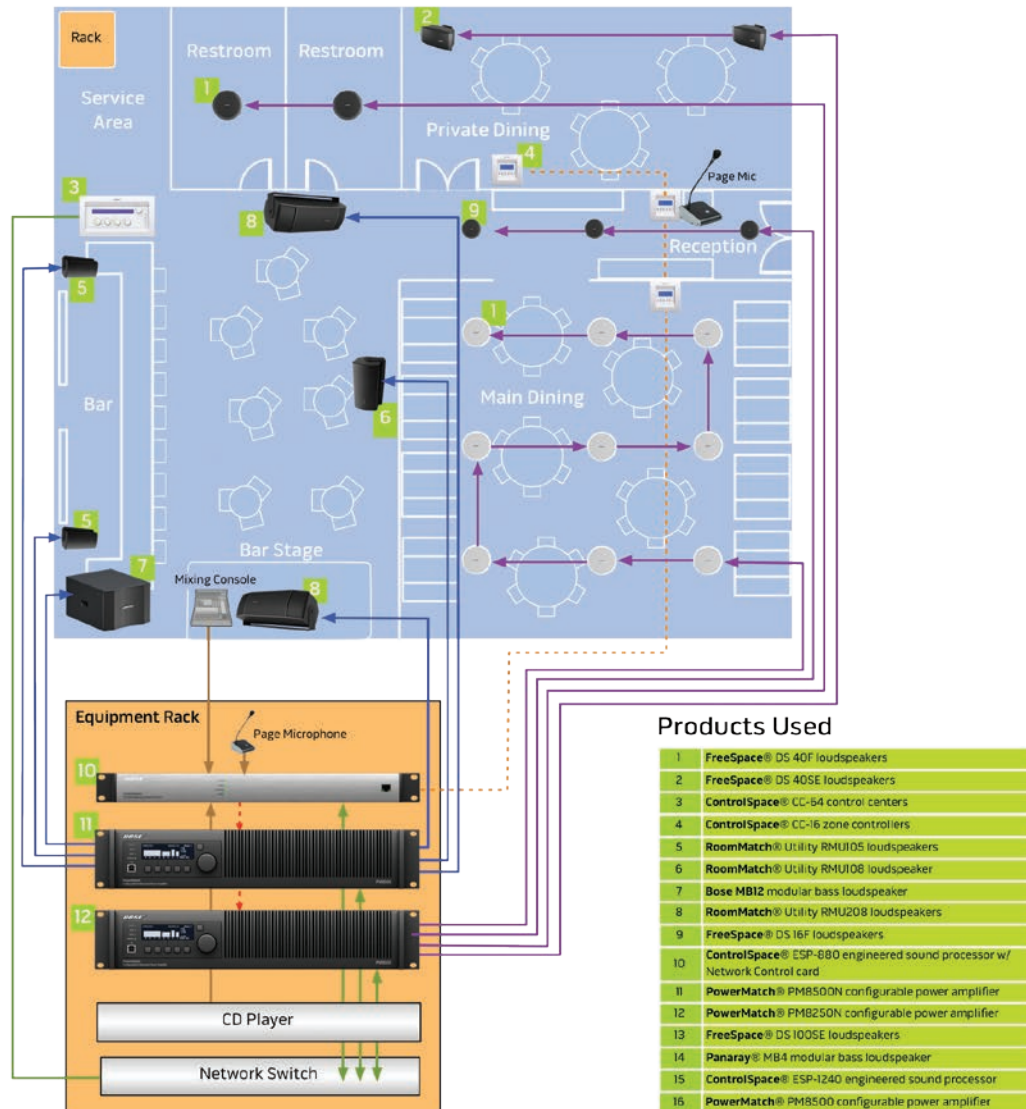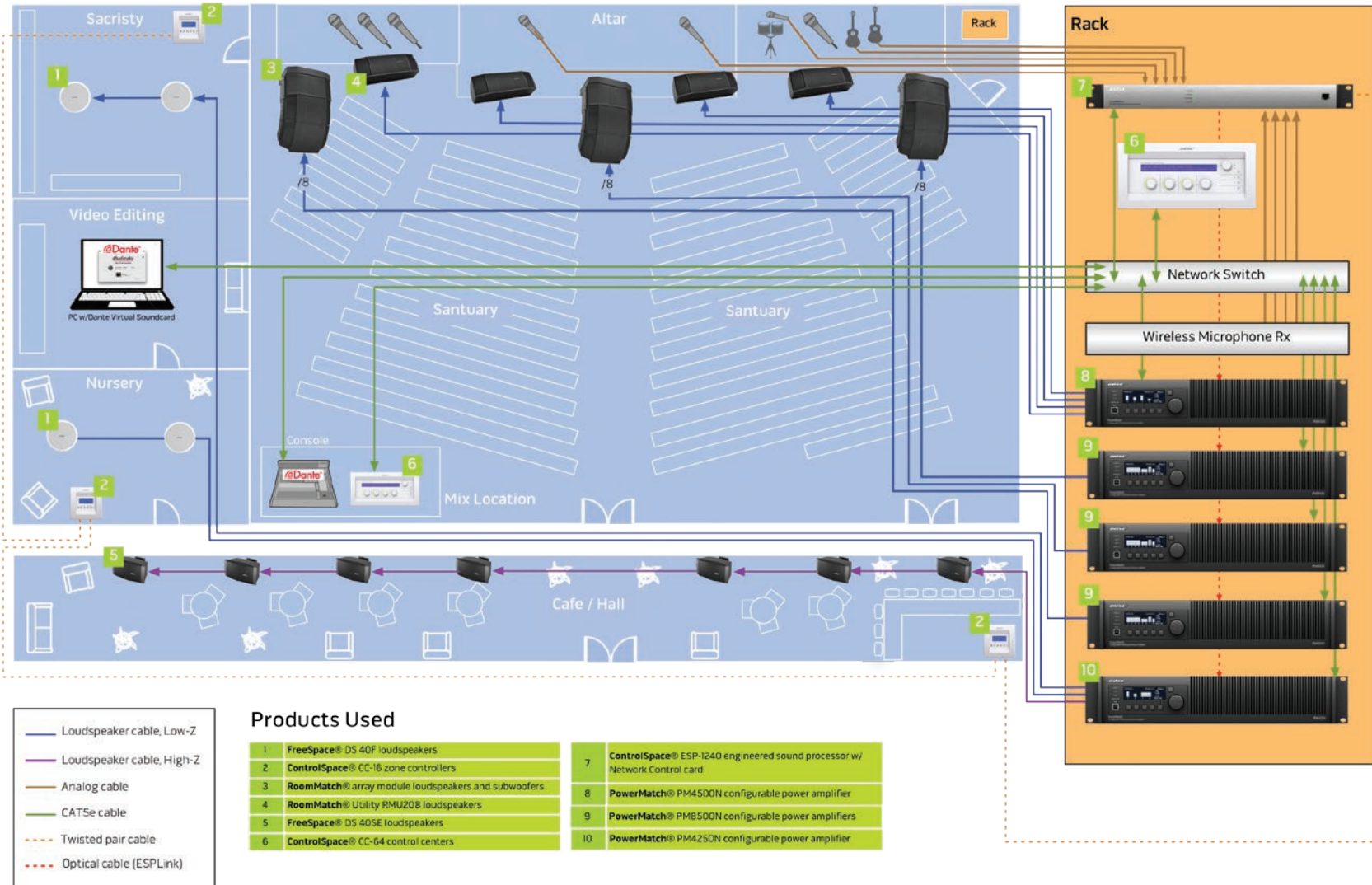
### 2 Retail Store

This retail store requires premium sound and aesthetics to help deliver a better buying experience. In this example, 10 FreeSpace® DS 100SE surface-mount loudspeakers flank the sales floor with a Panaray® MB4 loudspeaker for bass extension. A separate zone of three speakers cover the fitting rooms, all controlled via a CC-64 control center.

### Products Used

| | |
|---|---|
| 1 | FreeSpace® DS 40F loudspeakers |
| 2 | FreeSpace® DS 40SE loudspeakers |
| 3 | ControlSpace® CC-64 control centers |
| 4 | ControlSpace® CC-16 zone controllers |
| 5 | RoomMatch® Utility RMU105 loudspeakers |
| 6 | RoomMatch® Utility RMU108 loudspeaker |
| 7 | Bose MB12 modular bass loudspeaker |
| 8 | RoomMatch® Utility RMU208 loudspeakers |
| 9 | FreeSpace® DS 16F loudspeakers |
| 10 | ControlSpace® ESP-880 engineered sound processor w/ Network Control card |
| 11 | PowerMatch® PM8500N configurable power amplifier |
| 12 | PowerMatch® PM8250N configurable power amplifier |
| 13 | FreeSpace® DS 100SE loudspeakers |
| 14 | Panaray® MB4 modular bass loudspeaker |
| 15 | ControlSpace® ESP-1240 engineered sound processor |
| 16 | PowerMatch® PM8500 configurable power amplifier |

| | |
|---|---|
| —— | Loudspeaker cable, Low-Z |
| —— | Loudspeaker cable, High-Z |
| —— | Analog cable |
| —— | CAT5e cable |
| - - - | Twisted pair cable |
| - - - | Optical cable (ESPLink) |

7

## System Examples

**3** **House of Worship**

Dante™ audio networking technology is used in this example to provide a means for distributing digital audio around the various areas of a worship center. Starting at the altar area, musical instruments and microphones are fed to the ESP-1240 processor in a nearby rack. This same rack houses PowerMatch® amplifiers which together receive audio from the ESP-1240 processor via ESPLink. These amplifiers drive L/C/R clusters and floor monitors in the main sanctuary, and three other zones in the building. Dante audio is routed from the main rack to the mix location where a Dante-enabled mixing console sends back mix channels to the main rack. An additional Dante endpoint, a PC running Dante Virtual Soundcard, is located in the video editing suite for recording live audio from the mixing console.
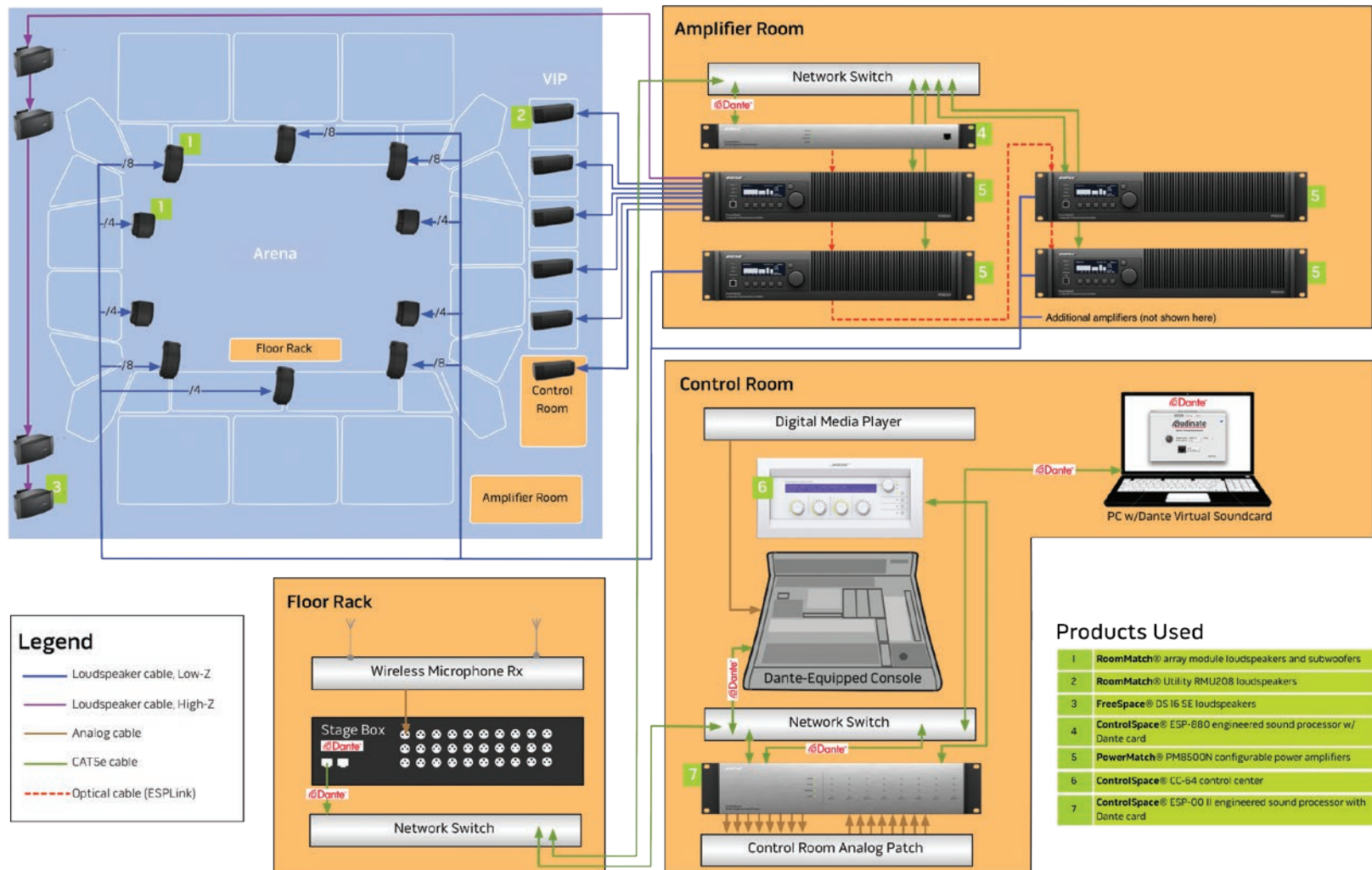


### Products Used

| | | | |
|---|---|---|---|
| 1 | FreeSpace® DS 40F loudspeakers | 7 | ControlSpace® ESP-1240 engineered sound processor w/ Network Control card |
| 2 | ControlSpace® CC-16 zone controllers | 8 | PowerMatch® PM4500N configurable power amplifier |
| 3 | RoomMatch® array module loudspeakers and subwoofers | 9 | PowerMatch® PM8500N configurable power amplifiers |
| 4 | RoomMatch® Utility RMU208 loudspeakers | 10 | PowerMatch® PM4250N configurable power amplifier |
| 5 | FreeSpace® DS 40SE loudspeakers | | |
| 6 | ControlSpace® CC-64 control centers | | |

**Legend:**
- Loudspeaker cable, Low-Z
- Loudspeaker cable, High-Z
- Analog cable
- CAT5e cable
- Twisted pair cable
- Optical cable (ESPLink)

## System Examples

**4** **Sports Arena**

Bose® loudspeakers cover three sections of this sports arena: the main seating area, gates/main concourse, and luxury boxes. During live events, audio sources come from multiple locations in the arena space. A small rack on the arena floor houses a Dante™-enabled stage box where audio is sent up to the control room. There, a Dante-equipped mixing console blends both local and remote sources. The mixing console sends program mix audio out via Dante to a nearby ESP-00 II processor which manages venue routing and distribution. Preprogrammed venue configurations can be selected by the staff using the CC-64 control center to accommodate different seating arrangements,. Dante audio is sent from the ESP-00 II processor to the ESP-880 processor, co-located with multiple PowerMatch® amplifiers in the upper-level equipment room. The ESP-880 processor receives the main mix Dante stream and distributes it to multiple PowerMatch amplifiers via a daisy-chained ESPLink connection.



**Legend**
- Loudspeaker cable, Low-Z
- Loudspeaker cable, High-Z
- Analog cable
- CAT5e cable
- Optical cable (ESPLink)

**Products Used**

| | |
|---|---|
| 1 | **RoomMatch**® array module loudspeakers and subwoofers |
| 2 | **RoomMatch**® Utility RMU208 loudspeakers |
| 3 | **FreeSpace**® DS 16 SE loudspeakers |
| 4 | **ControlSpace**® ESP-880 engineered sound processor w/ Dante card |
| 5 | **PowerMatch**® PM8500N configurable power amplifiers |
| 6 | **ControlSpace**® CC-64 control center |
| 7 | **ControlSpace**® ESP-00 II engineered sound processor with Dante card |

## ControlSpace® engineered sound processors specification summary

| | ControlSpace® ESP-00 Series II<br>engineered sound processor | ControlSpace® ESP-880<br>engineered sound processor | ControlSpace® ESP-1240<br>engineered sound processor | ControlSpace® ESP-4120<br>engineered sound processor |
|---|---|---|---|---|
| Back Panel View | | | | |
| Audio Channel Capacity | 64 (bi-directional, mixed digital and/or analog) | 56 (16 analog, 8 ESPLink, 16x16 digital with expansion card) | 56 (16 analog, 8 ESPLink, 16x16 digital with expansion card) | 56 (16 analog, 8 ESPLink, 16x16 digital with expansion card) |
| Signal Processor | Quad 32-bit floating-point DSPs, 200 MHz | 32-bit fixed/floating-point DSP + ARM, 456 MHz | 32-bit fixed/floating-point DSP + ARM, 456 MHz | 32-bit fixed/floating-point DSP + ARM, 456 MHz |
| Maximum Calculation | 6.4 GIPS / 4.8 GFLOPS | 3.6 GIPS / 2.7 GFLOPS | 3.6 GIPS / 2.7 GFLOPS | 3.6 GIPS / 2.7 GFLOPS |
| Analog I/O | Up to 32 channels using analog expansion cards | 8 mic/line input channels, 8 line output | 12 mic/line input channels, 4 line output | 4 mic/line input channels, 12 line output |
| ESPLink Output | Option cards | Built-in | Built-in | Built-in |
| Dynamic Range | 115 dB ( A-weighted, 20 −20 kHz)** | 115 dB ( A-weighted, 20 − 20 kHz) | 115 dB ( A-weighted, 20 − 20 kHz) | 115 dB ( A-weighted, 20 − 20 kHz) |
| Max. Input/Output Level | +24 dBu | +24 dBu | +24 dBu | +24 dBu |
| THD (+N) | 0.002 % (A-weighted, 20 Hz − 20 kHz, +4 dBu @ 1 kHz input signal)** | 0.002 % (A-weighted, 20 Hz − 20 kHz, +4 dBu @ 1 kHz input signal) | 0.002 % (A-weighted, 20 Hz − 20 kHz, +4 dBu @ 1 kHz input signal) | 0.002 % (A-weighted, 20 Hz − 20 kHz, +4 dBu @ 1 kHz input signal) |
| Delay Memory | 288 seconds | 43 seconds | 43 seconds | 43 seconds |
| Audio Latency | 860 μs (analog in to analog out) | 860 μs (analog in to analog out) | 860 μs (analog in to analog out) | 860 μs (analog in to analog out) |
| PC Configuration Software | ControlSpace® Designer™ software | ControlSpace® Designer™ software | ControlSpace® Designer™ software | ControlSpace® Designer™ software |
| Control Inputs/Outputs | 8 input / 8 output, expandable to 16/16 | 5 input / 5 output | 5 input / 5 output | 5 input / 5 output |
| Network Control | 10 Mb Ethernet (RJ-45) | Front panel 100 Mb Ethernet (RJ-45) or rear option cards | Front panel 100 Mb Ethernet (RJ-45) or rear option cards | Front panel 100 Mb Ethernet (RJ-45) or rear option cards |
| Communication Ports | RS-232 (DB9M, DTE)<br>Bose CC-16 (5.08 mm Euroblock 3-pin) | RS-232 (DB9M, DTE)<br>Bose CC-16 (3.81 mm Euroblock 3-pin) 1 control/audio network (optional) | RS-232 (DB9M, DTE)<br>Bose CC-16 (3.81 mm Euroblock 3-pin) | RS-232 (DB9M, DTE)<br>Bose CC-16 (3.81 mm Euroblock 3-pin) |
| Expansion Slots | 8 analog/digital audio, 2 GPIO (1 occupied) | 1 control/audio network (optional) | 1 control/audio network (optional) | 1 control/audio network (optional) |
| Dimensions | 3.5" H x 19.0" W x 13.0" D<br>(88 mm x 483 mm x 331 mm) | 1.7" H x 19" W x 8.5" D<br>(44 mm x 483 mm x 215 mm) | 1.7" H x 19" W x 8.5" D<br>(44 mm x 483 mm x 215 mm) | 1.7" H x 19" W x 8.5" D<br>(44 mm x 483 mm x 215 mm) |
| Net Weight | 10.8 lb (4.9 kg) | 5.75 lb (2.6 kg) | 5.75 lb (2.6 kg) | 5.75 lb (2.6 kg) |
| Primary Applications | Auditoriums, Houses of Worship, Resorts and Hospitality Venues, Retail Stores, Schools and Universities, Multi-Purpose Spaces | Auditoriums, Houses of Worship, Resorts and Hospitality Venues, Retail Stores, Schools and Universities, Multi-Purpose Spaces | Auditoriums, Houses of Worship, Resorts and Hospitality Venues, Retail Stores, Schools and Universities, Multi-Purpose Spaces | Auditoriums, Houses of Worship, Resorts and Hospitality Venues, Retail Stores, Schools and Universities, Multi-Purpose Spaces |
| Expansion Cards | 4-ch mic/line input, 4-ch line output, Dante™, CobraNet®, ESPLink, AES3 in, AES3 out, Surround decoder, GPIO | Dante™, ControlSpace® Network Control | Dante™, ControlSpace® Network Control | Dante™, ControlSpace® Network Control |
| User Controls | CC-64 control center, CC-16 zone controller, CC-4 room controller, Volume with A/B control, Volume control | CC-64 control center, CC-16 zone controller, CC-4 room controller, Volume with A/B control, Volume control | CC-64 control center, CC-16 zone controller, CC-4 room controller, Volume with A/B control, Volume control | CC-64 control center, CC-16 zone controller, CC-4 room controller, Volume with A/B control, Volume control |

*Images not to scale. **Data based on measurements of 4-channel analog input and output cards. All information is subject to change without notice. ©2014 Bose Corporation

## About Bose Professional

Professional sound systems demand an uncommon expertise and specialized products. Bose Professional Systems Division is a dedicated group of engineers, product managers, technical support specialists and customer service teams that are focused on the professional audio markets. For more than three decades, the Professional Division has developed innovative loudspeakers, electronics and software to meet the needs of demanding professional applications.

Bose Professional products are sold only through authorized pro-audio dealers, AV-system integrators and distributors. We provide substantial support for our distribution network, including product technical information, system design support and after-sale support. Bose® sound is found throughout the world in performing arts centers, theaters, houses of worship, stadiums, restaurants, retail stores, corporate buildings and hospitality establishments.

## About Bose Corporation

Bose Corporation was founded in 1964 by Dr. Amar G. Bose, professor at the Massachusetts Institute of Technology. Today, the company is primarily known for its research in acoustics, which has produced inventions that have improved the performance of:

- Loudspeakers
- Home entertainment systems
- Automotive music systems designed for the interior acoustics of each car model (first introduced by Bose)
- Noise reducing headsets for pilots and the public (first introduced by Bose)
- Sound in public spaces
- The production of sound for musicians requiring electronic amplification of their instruments
- Materials testing and durability simulation instruments for biomedical applications
- Driver suspension systems for heavy-duty trucks

**BOSE**®

*Better sound through research*®