DS

Electronics
Software

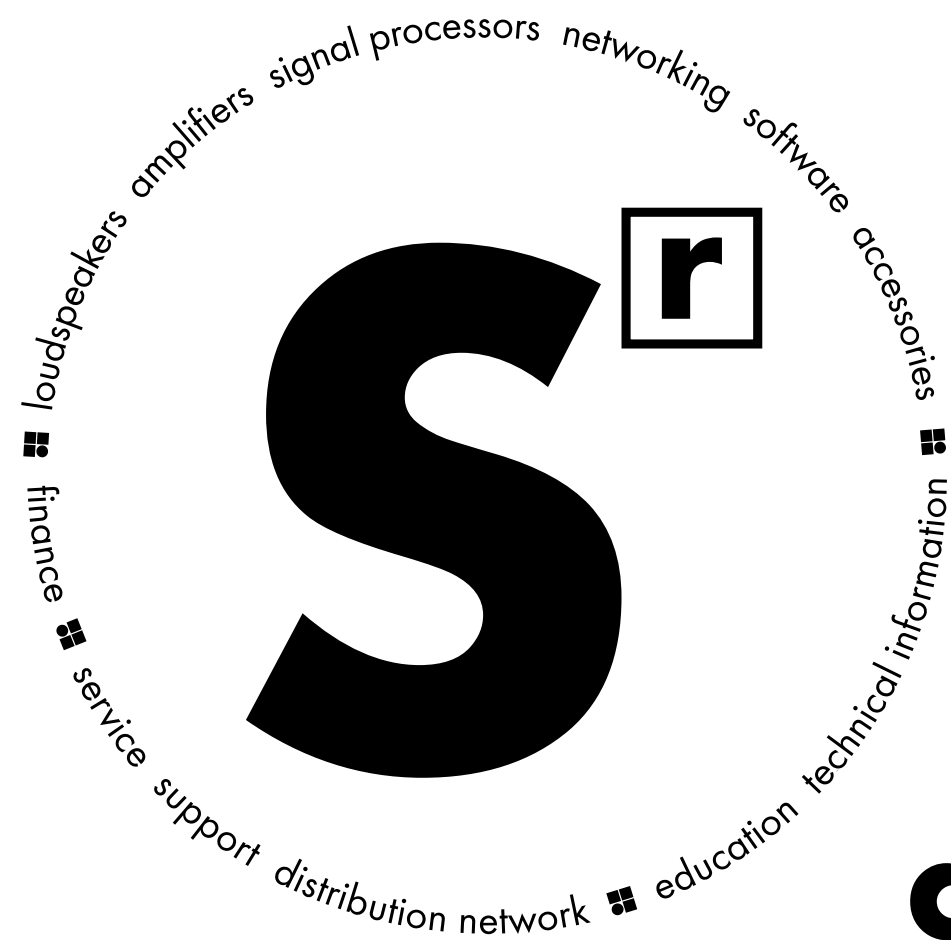**d&b audiotechnik**

Contents

loudspeakers amplifiers signal processors networking software accessories

S^r

finance

service support distribution network education technical information

d&b System reality

As the name implies a d&b audiotechnik system is not just a loudspeaker. Nor is it merely a sum of the components: loudspeakers, amplifiers, signal processors, networking, software and accessories. Right from the outset the d&b audiotechnik approach was to build integrated sound reinforcement systems that actually are more than the combination of parts: an entirety where each fits all. Every element is tightly specified, precisely aligned and carefully matched to achieve maximum efficiency. For ease of use, all the user-definable parameters are incorporated, allowing the possibility of adjustment, either directly, via remote control surfaces, or integrated within wider networks. Neutral sound characteristics leave the user all the freedom needed to realize whatever the brief. At the same time d&b offers finance, service and support, a knowledgeable distribution network, education and training as well as technical information, so the same optimal acoustic result is achieved consistently by every system anywhere, at any time. In reality: the d&b System reality.
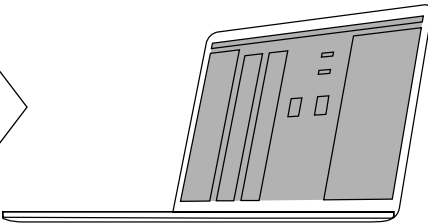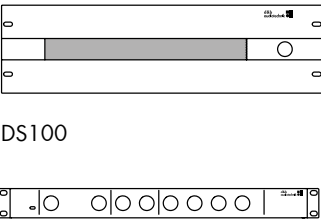
The d&b Workflow

Planning and simulation
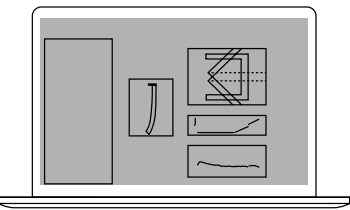
d&b ArrayCalc simulation software

Control and operation

d&b R1 Remote control software

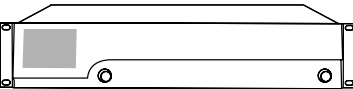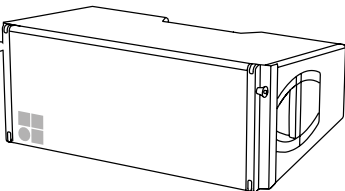## Processing and distribution

DS100

DS10 and DS20

d&b audio network devices

Management and amplification

d&b amplifiers

Reproduction

d&b loudspeakers

The integrated **d&b Workflow** improves efficiency all the way from the start of a project through planning and simulation to control of the final result. In the first stage of the d&b Workflow, a 3D model of a venue is created using d&b ArrayCalc, where loudspeakers can be virtually placed, positioned, and

configured. When this is completed the system performance can be simulated. Once the mechanical settings of a line array have been finalized the optional ArrayProcessing function within ArrayCalc can be applied. ArrayProcessing uses powerful filter algorithms to optimize the level and tonal balance of a line array

across the entire audience area. Once the desired performance has been achieved, the amplifiers can be configured and signal routing defined. ArrayCalc then generates rigging plans, parts lists, and graphics for use in the final proposal. In the next stage of the d&b Workflow, the file built by ArrayCalc can be opened

by the R1 Remote control software where a graphical user interface for the complete system is automatically generated. It is now that all of the settings defined in ArrayCalc can be sent to the amplifiers, and signal distribution configuration can be sent to Signal Engines or Audio Network Bridges.

The d&b ArrayCalc simulation software

The d&b ArrayCalc simulation software is the prediction tool for d&b systems. This is a comprehensive toolbox for all tasks associated with acoustic design, performance prediction, alignment, rigging and safety parameters. For safety reasons d&b line arrays must be designed using the d&b ArrayCalc simulation software. d&b ArrayCalc is available as a native stand-alone application for both Microsoft Windows[1] (Win7 64-bit or later) and Mac OS X[2] (10.12 or later) operating systems and is available at www.dbaudio.com, along with further information and video tutorials.

Simulation

Listening planes can be defined in the venue tab, creating a three dimensional representation of any audience area in a given venue. Special functions assist in obtaining accurate dimensions with laser distance finders and inclinometers. Flown arrays or subwoofer columns can be defined in a project file as single hangs or in pairs. Point source loudspeakers can also be fully integrated as well as a ground stacked SUB arrays. Level over distance is calculated for each source with high resolution in real time, for either band limited or broadband input signals. The comprehensive simulation precisely models the actual performance of the system, taking into account input level, all system configuration options (such as CUT, CPL, HFC or INFRA), limiter headroom and air absorption. Acoustic obstacles, such as video screens, can be added to a model. Acoustic shadowing, whether by these obstacles, or a balcony overhang, is taken into consideration. The load status of all array rigging components is calculated accurately and displayed to determine whether a given array is within the load tolerance. subwoofer array design is assisted by coverage and polar plot prediction. A specialized algorithm allows the user to specify subwoofer positions and a coverage angle, which is then converted into appropriate delay settings that result in the desired dispersion. The alignment tab enables different sources to be time aligned to one another, as well as showing arrival times and Sound Pressure Levels at a definable reference point on one of the audience areas. For alignment of the flown system with the ground stacked SUB array, the phase response of both the SUB array and a flown source is calculated at a definable reference point. The level distribution resulting from the interaction of all active sources can be mapped onto the audience areas in a three-dimensional view. EASE and DXF data export capabilities are also available.
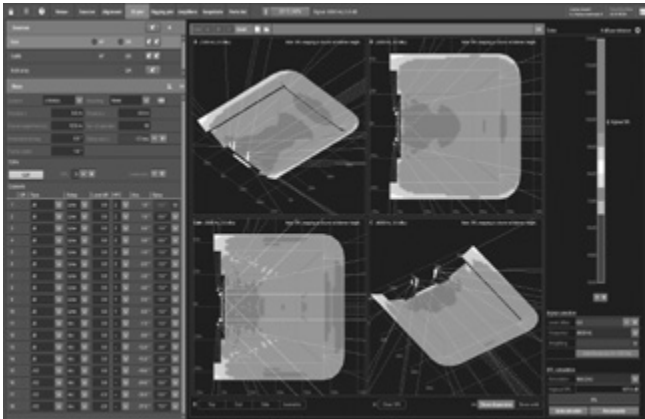
System setup

A rigging plot with all necessary coordinates, dimensions and weights of arrays is generated for export and printing and a parts list, detailing all components required. The d&b ArrayCalc Viewer app presents this key information for positioning and
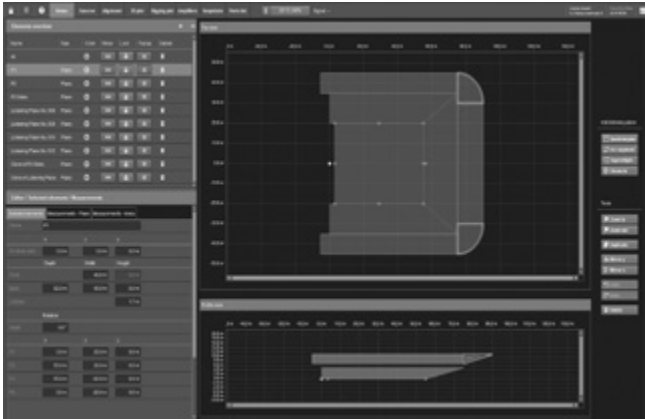

Venue
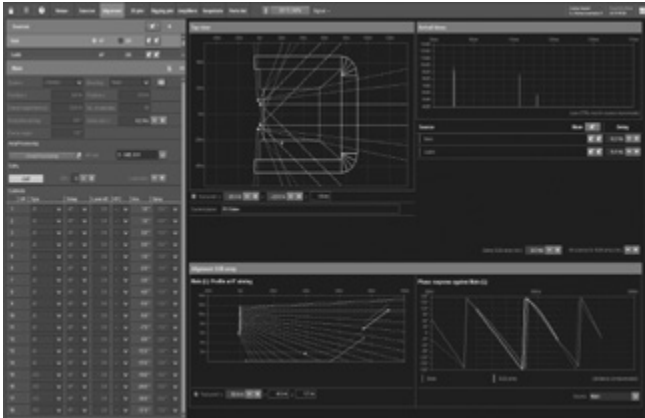
Alignment

3D Plot quad

flying a d&b audiotechnik loudspeaker system on a mobile device. Once the system has been designed, calculated and optimized, the project files can be shared via email, AirDrop, or downloaded onto any iOS or Android device.
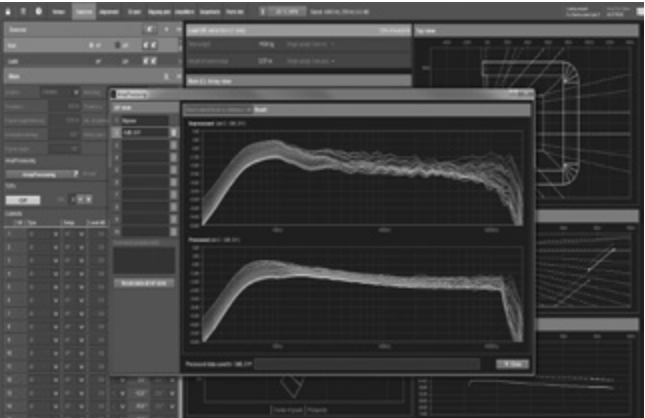
ArrayProcessing

The optional ArrayProcessing function applies powerful filter algorithms to optimize the tonal (spectral) and level (spatial) performance of a line array column over the audience area defined by its mechanical vertical coverage angle. Within the d&b ArrayCalc simulation software, spectral and level performance targets over the listening areas can be defined while specific level drops or offsets can be applied to certain areas, to assign reduced level zones. ArrayProcessing applies a combination of FIR and IIR filters to each individual cabinet in an array to achieve the targeted performance, with an additional latency of only 5.9 ms. This significantly improves the linearity of the response over distance as well as seamlessly correcting for air absorption. In addition, ArrayProcessing employs the same frequency response targets for all d&b line arrays, to ensure all systems share a common tonality. This provides consistent sonic results regardless of array length or splay settings. The resulting coverage is enhanced with spectral consistency and defined leve distribution, achieving more linear dispersion and total system directivity to cover longer distances or steep listening areas effectively.

d&b Soundscape

The d&b ArrayCalc simulation software is also used for planning and simulation of the d&b Soundscape. An Early reflections area can be defined in the Venue view, for which the En-Space software will calculate additional convolutions to better represent the early reflections of the original venue. Additionally Positioning areas can also be defined for use in combination with the En-Scene software, which are used as a reference plane for positioning Sound objects either from R1 or via external controllers. The d&b Soundscape loudspeaker system is also planned, configured and simulated in ArrayCalc, with loudspeakers assigned to Function groups, for which the Soundscape algorithms calculate individual transfer functions according to their function within the system. DS100 Signal Engine devices can be added to a project, together with the necessary DS10 Audio network bridges. Signal routing can be defined for the whole signal path, from DS100 to loudspeaker, through the DS10 and amplifier devices. A Dante Controller preset file can be automatically generated in ArrayCalc, including the complete Dante routing for the whole system. This preset file can be later loaded in Dante Controller, so that no manual Dante patching is required.
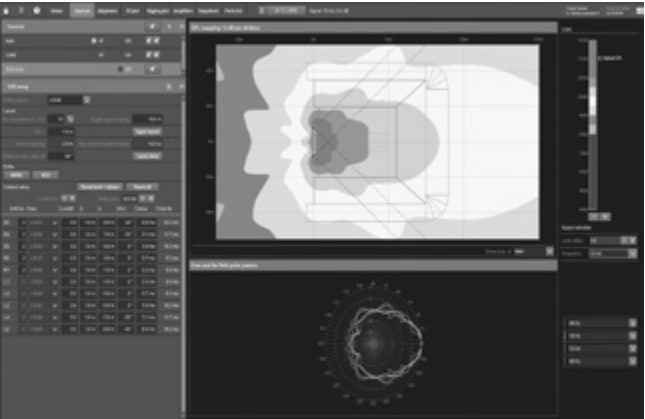
Sources, SUB array

ArrayProcessing

Devices

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[1] Microsoft Windows is a registered trademark or trademark of Microsoft Corporation in the United States and/or other countries

[2] Mac OS X is a trademark of Apple Inc., registered in the U.S. and other countries

The d&b Remote network

The remote control capability of the d&b Remote network enables central control and monitoring of a complete d&b loudspeaker system from anywhere in the network, be it from a laptop in the control room, at the mix position, or on a wireless tablet computer in the auditorium. In the typical user workflow, the d&b Remote network takes settings optimized in the ArrayCalc simulation software and applies these to all the d&b devices within the network. In mobile situations R1 Remote control software provides extensive functionalities for storing and recalling system settings, enabling setups to be repeated as and when required. Project files can be adjusted for use with different equipment at another location. d&b System check verifies that the system performs within a predefined condition, while the Array verification function automatically identifies the physical position of a loudspeaker in an array to check that the system is cabled correctly. For permanent installations, system integrators can configure the d&b Remote network to allow access to different levels of control, according to the operational needs of the venue, with password protection available to restrict access to advanced functions if necessary. R1 enables d&b devices to be remotely controlled, using both Ethernet (AES70/OCA) and CAN-Bus in parallel. The software runs on both Microsoft Windows[1] (Win7 64-bit or later) and Mac OS X[2] (10.12 or later) operating systems and is available at www.dbaudio.com, along with further information and video tutorials.

R1 Remote control software

The R1 Remote control software uses the same project file created in ArrayCalc to automatically generate an intuitive graphical user interface including complete details of the simulated system. This user interface can be customized by the user, in order to fit particular user needs. Changes to the project file can be performed at any time in both ArrayCalc and R1. This workflow removes the need to manually transfer data from one software program to the other.

All features, functions and controls from d&b devices can be remotely controlled and/or monitored using R1 Remote control software. It allows each channel of the amplifiers or the DS100 Signal Engine matrix to be controlled and enables the creation of groups of channels. When grouped together, a button or fader can control the overall system level, zone level, equalization and delay, system power ON/OFF, MUTE as well as loudspeaker specific function switches, such as CUT/HFA/HFC, CPL and ArrayProcessing. An offline mode is provided for preparation in advance of an event, without the need for physical devices being present or connected. The Home view provides an overview of all views in R1 and access to all user defined remote views. Each user definable Remote view can be populated with control functions of the system and can be optimized for different screen resolutions, either for large monitors or for smaller tablet devices.

R1 home screen

R1 in configuration mode
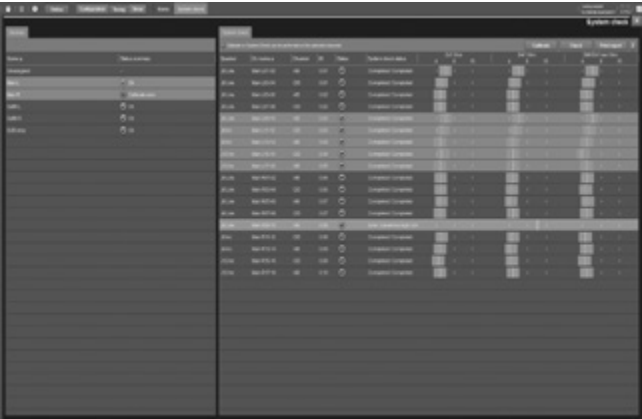
System check in R1

R90 Touchscreen remote control

In installation projects the R90 Touchscreen remote control can be used for quick and reliable operation of day-to-day functions of a pre-configured d&b system without needing expert level knowledge of audio. The built-in 7" panel PC provides users with one-touch control over power, mute, level, grouping and recall of up to nine AmpPresets, entirely independent of R1.

DS10 and DS20 Meta data

The d&b Audio network bridges interface between audio transport networks and AES3 digital audio signals while also providing distribution of Ethernet control data. The DS10 supports Dante networks, while the DS20 is used for the open standards-based Milan protocol.

d&b Soundscape

After system planning and simulation in ArrayCalc, the d&b Soundscape is completely configured, monitored and controlled in R1. The DS100 Signal Engine matrix can be operated manually by the controls on the Device view tabs or, alternatively, by controls in a Remote view. The Matrix crosspoint control provides an array of level and delay controls for a user defined range of matrix crosspoints. Input and Output processing is also available, with a combination of Polarity, Level and Delay available on all inputs and outputs. Additionally, an 8-band parametric EQ is provided on all inputs, and a 16-band parametric EQ on all outputs. Special Positioning remote views can be created for En-Scene systems, in which Sound objects can be individually placed within the venue. En-Space sampled spaces can be selected within R1 from the available library provided with the En-Space software license. En-Space levels for inputs and outputs can also be controlled within the Device or Remote views, and additional EQ for each of the four zones of the space is provided.

Service functions

R1 enables the simultaneous firmware update of multiple devices from a central location. The software will automatically search the d&b website and on demand, downloads the latest available firmware versions and R1 Remote control software updates. Defined settings can be created, saved on a computer and loaded into the devices, for example to ensure that configuration switches are set to a known status, or the user definable equalization is set flat. Settings can be copied to additional or spare devices. For service purposes, information may be read from a device, concerning its condition during operation and errors reported. When additional support is required, the error report can be saved and sent to the d&b service departments for further assessment and diagnosis.

D20/D80 16-band equalizer in R1
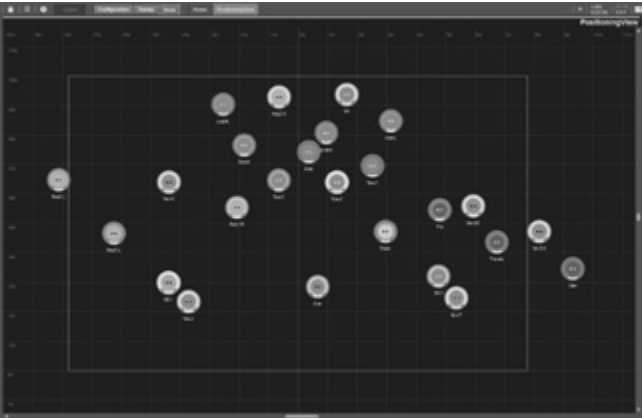
Positioning view in Soundscape
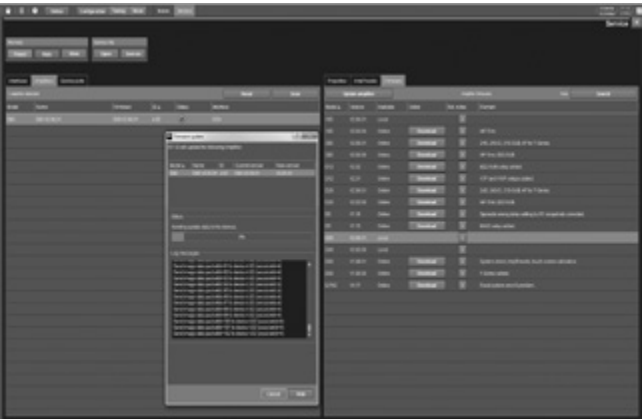
Service, Firmware update in R1

The DS10 and DS20 Audio network bridges

DS10 Audio network bridge

The DS10 Audio network bridge interfaces between Dante networks and AES3 digital audio signals, while also providing distribution of Ethernet control data. Positioned within the signal chain in front of the amplifiers, this 1 RU device expands the d&b system approach in both mobile and installation environments. Each unit can deliver up to sixteen Dante network channels via AES3 digital signal outputs. The AES3 channel streams from the DS10 carry meta data with Dante channel labels and cabling information to the four channel d&b amplifiers. Additionally, four AES3 input channels provide access to the Dante audio network for applications such as a break-in from a Front of House console.

The DS10 incorporates an integrated 5-port switch, offering a primary and redundant network for the Dante protocol, as well as advanced functions such as Multicast Filtering and VLAN modes. This extensive switch flexibility provides extended connectivity for a laptop to control the d&b amplifiers using the R1 Remote control software via the OCA (Open Control Architecture) protocol. Using the DS10 Audio network bridge, audio signals and remote control data can be combined using a single Ethernet cable.

DS20 Audio network bridge

The DS20 Audio network bridge supports the open standards-based Milan protocol rather than Dante. Milan (Media integrated local area networking) is a high level interoperability solution based on Audio Video Bridging (AVB) technology. The main advantages are deterministic behaviour (zero network congestion); improved reliability; optimum synchronization and hassle free network setup, as no special settings, such as QoS, need to be set within the switches to ensure delivery.

The front panel of the DS Audio network bridges is designed to match the I/O panel of d&b Touring rack assemblies. This ensures a simple integration within existing system configurations. The DS Audio network bridges feature a power supply suitable for mains voltages 100 V – 240 V, 50 – 60 Hz, with Overvoltage protection of up to 400 V.

Control and indicators

BYPASS/NETWORK...
DS10 .... Toggle switch
DS20 ....Remote/Push button
Switch port modes/Audio loss................................... LED indicators
SYNC ERROR ....Red LED indicator
SUBSCRIBED (RX Subscription) .... Green LED indicator

Digital inputs

DIGITAL IN... 4 channels (2 x AES3)
....3 pin XLR female
Sampling ....32 - 192 kHz
Synchronization ....Sample Rate Converter (SRC)

Digital outputs

DIGITAL OUT..16 channels (8 x AES3)
....3 pin XLR male
Sampling .... 48/96 kHz
Synchronization ....
DS10 ....Dante network
DS20 ....Milan network

Network

Connectors...etherCON[1]
.... built-in 5-port Ethernet switch
.... 100/1000 Mbit

Power supply

Mains connector...powerCON[1]
Rated mains voltage .... 100 - 240 V, 50 - 60 Hz

Dimensions, weight

Height x width x depth.................................1 RU x 19" x 232 mm
Weight... 3.75 kg (8.26 lb)

The DS10 Audio network bridge front view
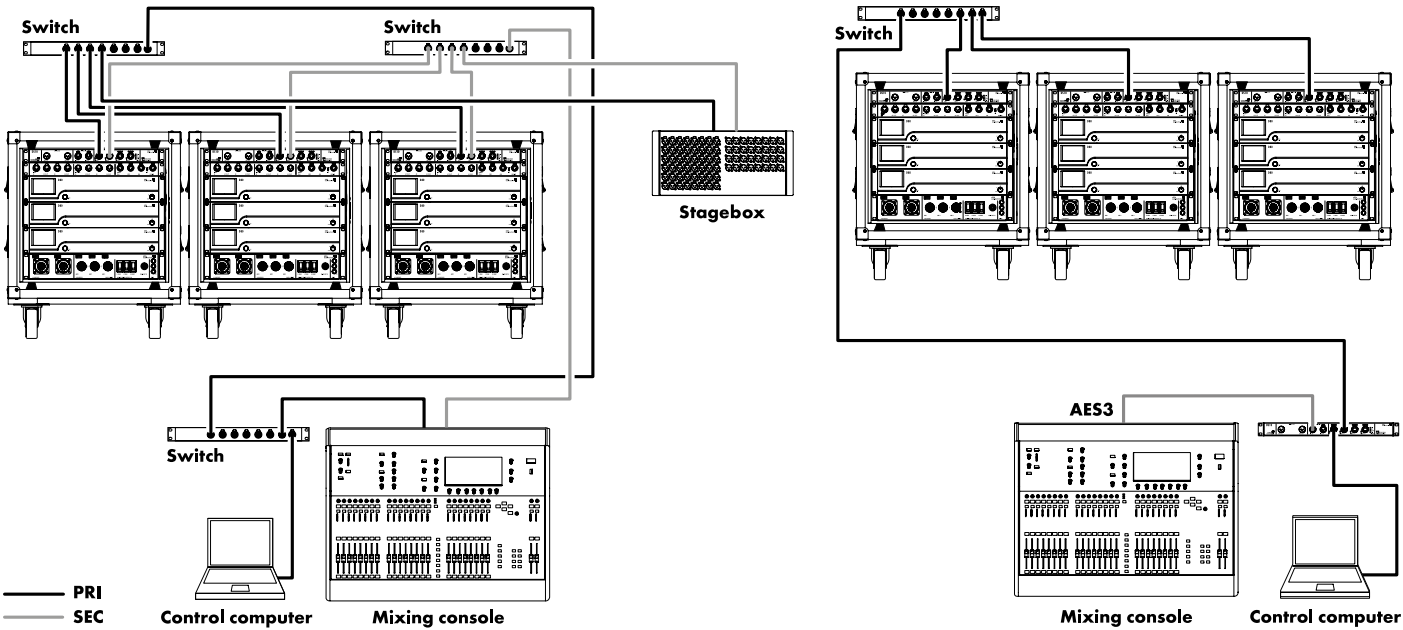

The DS10 Audio network bridge rear view

The DS20 Audio network bridge front view

The DS20 Audio network bridge rear view

PRI
SEC   Control computer   Mixing console

Redundant networking with d&b audio network bridge

AES3

Mixing console   Control computer

d&b Audio network bridge as break-in box

The d&b Soundscape
The DS100 Signal Engine

The d&b Soundscape

The d&b Soundscape is the acoustic environment in context, as perceived, experienced and understood. It defines acoustic environments in which people feel performances, speeches and presentations, real or abstract. It introduces another dimension to the d&b system approach, aligning the aural and visual perception, either realistically, or imaginatively. The d&b Soundscape also includes functionality which can modify the acoustic environment by imposing a different reverberation signature in the audience area, whether inside or outside.

DS100 Signal Engine

The DS100 Signal Engine is the platform underneath the Soundscape, based on a specialized rack mount 3 RU audio processor with Audinate Dante networking. It provides a 64 x 64 audio matrix with level and delay adjustments at all cross points.

The DS100 is a versatile tool for use within complex audio systems to route and distribute multiple audio channels to numerous amplifiers driving loudspeaker positions and zones, show relay and break out rooms. The networking capabilities with a Dante enabled processor are significant, particularly for busy, multi-room complexes.

The DS100 completely integrates with the overall d&b system approach, including loudspeakers, amplifiers, rigging, transport and networking accessories and the DS10 Audio network bridge, which interfaces between Dante audio networking and the AES3 inputs of the d&b amplifiers. The DS100 and DS10 both operate on standard networking technologies, making them flexible and efficient. The complete system is designed and optimized in the d&b ArrayCalc simulation software, and controlled via the d&b R1 Remote control software.

The comprehensive input processing provides gain, EQ, delay and polarity switches, enabling the user to combine all types of input signals to create a mix from a wide variety of sources. Extended processing capabilities are also provided on every output.

I/O

Audio Interface .... Dante™, AES67
Connectors .... 2 x RJ45 for Dante Primary/Secondary
Sample rate for I/O .... 48 kHz
Inputs 64
Outputs 64

Latency

Dante In to Out .... < 1.5 ms at 48 kHz
.... plus Dante network latency

Input processing

Gain .... - 120 to + 24 dB
Polarity .... 0°/180°
EQ .... 8-band PEQ with high/low
shelfDelay .... up to 500 ms
Mute .... On/Off

Matrix Processing

Crosspoint Mute .... On/Off
Crosspoint Level ....- 120 to + 10 dB
Crosspoint delay .... On/Off
.... up to 500 ms

Output processing

Gain .... - 120 to + 10 dB
Polarity .... 0°/180°
EQ .... 16-band PEQ with high/low
shelfDelay .... up to 500 ms
Mute .... On/Off

En-Scene

Input sources .... Up to 64
Positioning .... Static or dynamic (moving)
Control .... Manual or external
External control .... OSC, OCA/AES70

En-Space

Convolvers .... Up to 144
Impulse response length .... up to 10 seconds

Remote control
Interface .... OCA/AES70, OSC via Ethernet (RJ45), MIDI
Ethernet Speed .... 100/1000 Mbps

Power supply

Type .... Universal range switched mode power supply
Rated mains voltage .... 100 - 240 V, 50 - 60 Hz

Dimensions, weight

Dimensions (H x W x D) .... 3 RU x 19" x 481 mm
Weight .... 11.2 kg (24.7 lb)
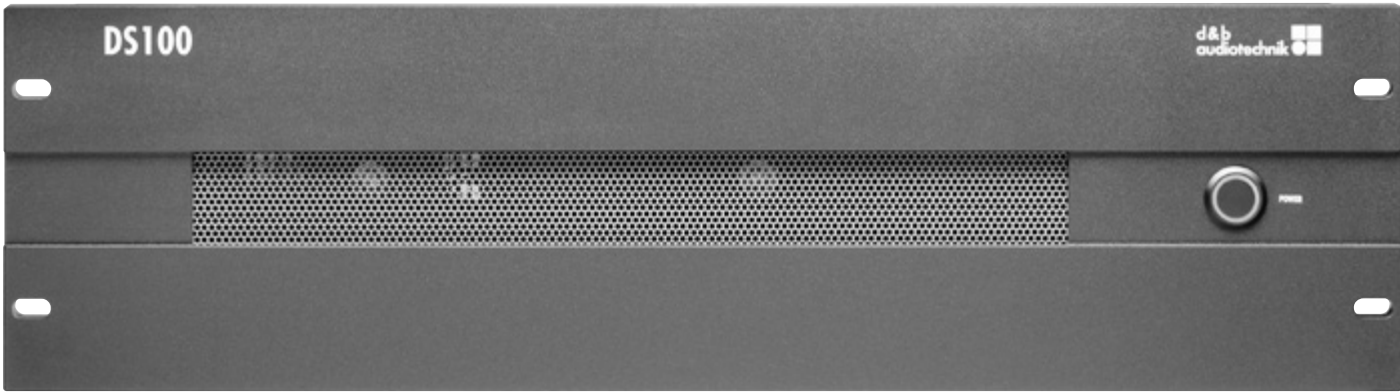
The DS100 Signal Engine front view
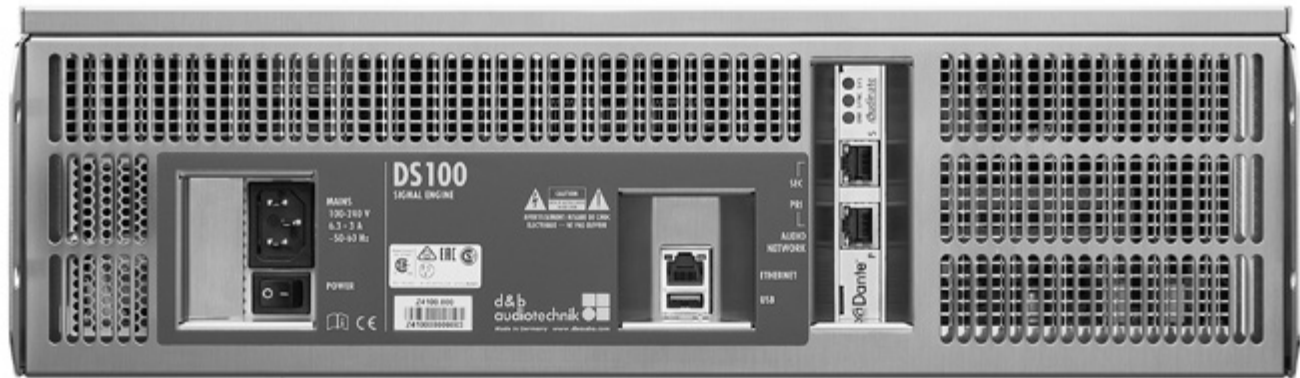
The DS100 Signal Engine rear view
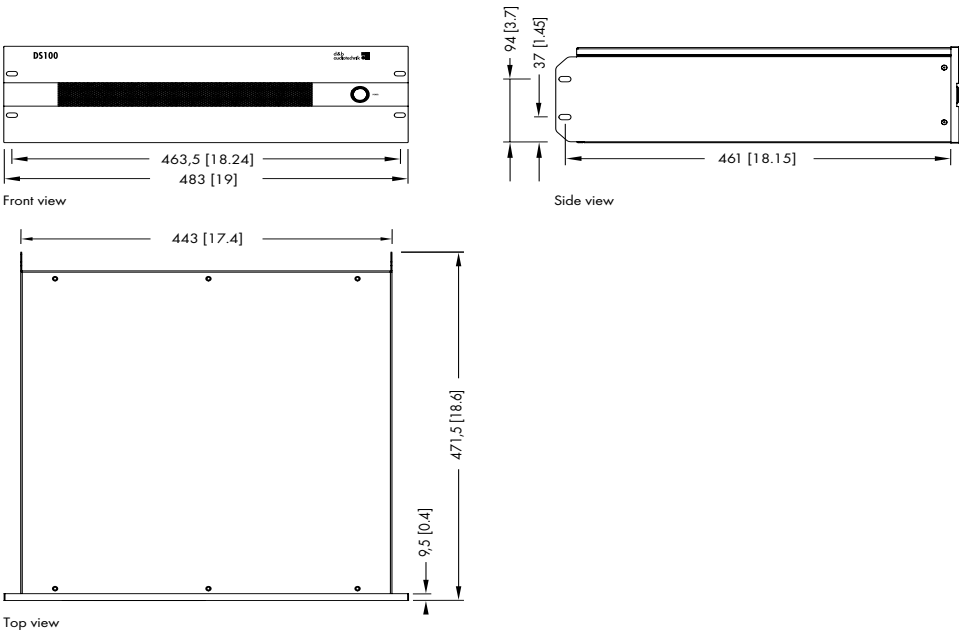
DS100 dimension in mm [inch]

The d&b Soundscape Software

d&b En-Scene

The d&b En-Scene software allows sources to be audibly positioned or repositioned, onstage, or within the acoustic space. This improved source orientation means the audio image is focussed on the physical location of the instrument, or voice, on a stage, whether static or moving. This makes the amplification of a performance transparent and realistic for the listeners throughout the whole audience area. A voice, instrument, or sound object, may also be placed creatively, depending on the desired artistic effect. A major advantage of the d&b audiotechnik approach is an extended freedom of artistic creativity.

In the first instance, it is possible to reproduce precisely what is happening on stage. On top of this, using the processing over the distributed loudspeakers, the listener experience can be moved to another level, whilst still maintaining the imaging on stage. Therefore, the En-Scene software makes it possible to produce compelling soundscapes that can only be experienced when physically present at the event. The object positioning element of the software allows an instrument or voice to be positioned on a graphic representation. In a theatre environment this area would primarily be the stage, although positioning sources around the audience space is also possible.

d&b En-Scene is a form of vector based panning between all the available loudspeakers. Vector based panning could best be described by a source or signal from the stage that is distributed to all relevant loudspeakers with a unique set of levels, times and, if required, filters. The approach makes a loudspeaker system into an acoustic environment in which sound objects can be placed.

An all-inclusive environment, not just with one perfect seat in the centre of the auditorium, every seat is the sweet spot.

d&b En-Space

In the modern venue model, a single room becomes a multipurpose space, because event programming often requires a venue to be versatile. The acoustic environment of a venue can have a significant impact on the performances staged within it. A concert venue without well defined acoustics can have a negative impact on the listener experience. Many multi-purpose venues are acoustically inadequate when used for orchestral music events, too short a reverberation time with poorly defined early reflections, being among the frequent shortcomings of this type of venue.

With the En-Space software, a d&b Soundscape efficiently delivers a convincing acoustic environment to the entire audience to mimic a different acoustic space. The system can be setup and operated quickly and easily, day by day, in different rooms, from multipurpose halls to outdoor venues, and is suitable for creating soundscapes in mobile or installation situations. Fitting acoustic conditions can be applied exactly as the performance requires. This neutral and transparent effect changes the acoustic environment, creating an ideal platform for the artists and optimal listening conditions for the audience.

d&b En-Space is an in-line technology, meaning to generate or expand the acoustic environment it does not use microphone feedback loops to create a regenerative component. The proprietary d&b process is based on capturing a large number of impulse responses in an acoustically well designed room, then using these to recreate this acoustic environment with a loudspeaker system in a different place. This is achieved using a specially designed algorithm with up to 144 convolvers recreating the response of the original room. The resulting ambience is very natural, supporting the program material being performed in a way that enhances rather than disturbs the listening experience.

Console

DS100

R1

PC/Mac

DS10 Audio network bridges

Amplifiers
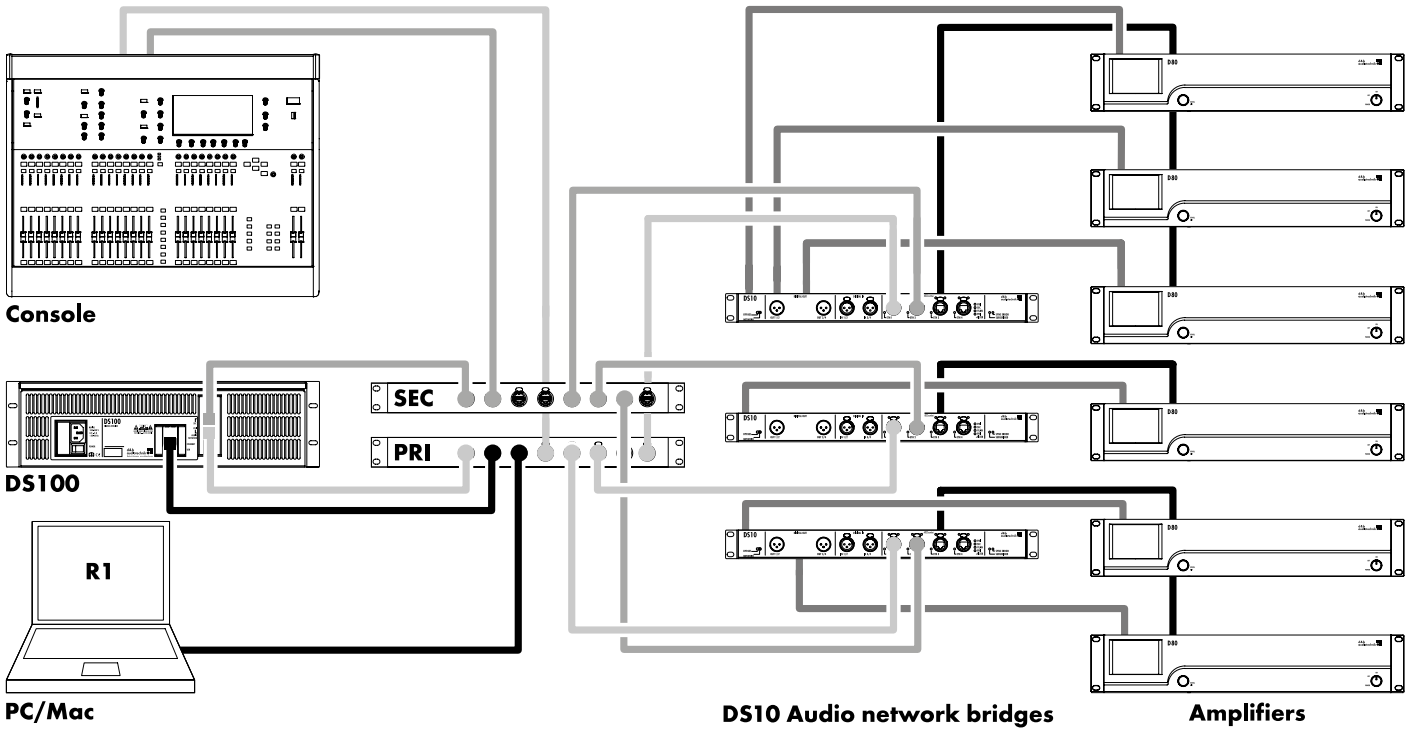
ETHERNET (OCA/AES70)
Primary
Secondary
AES3

Redundant network topology

The DS100 configuration examples

T10
T10
T10
T10
T10
T10

DS10
D20
D20
D20

V-SUB
V-SUB
V-SUB
V-SUB
V-SUB
V-SUB
V-SUB

T10
T10
T10
T10
T10
T10
T10

DS10
D20
D20
D20

Dante network
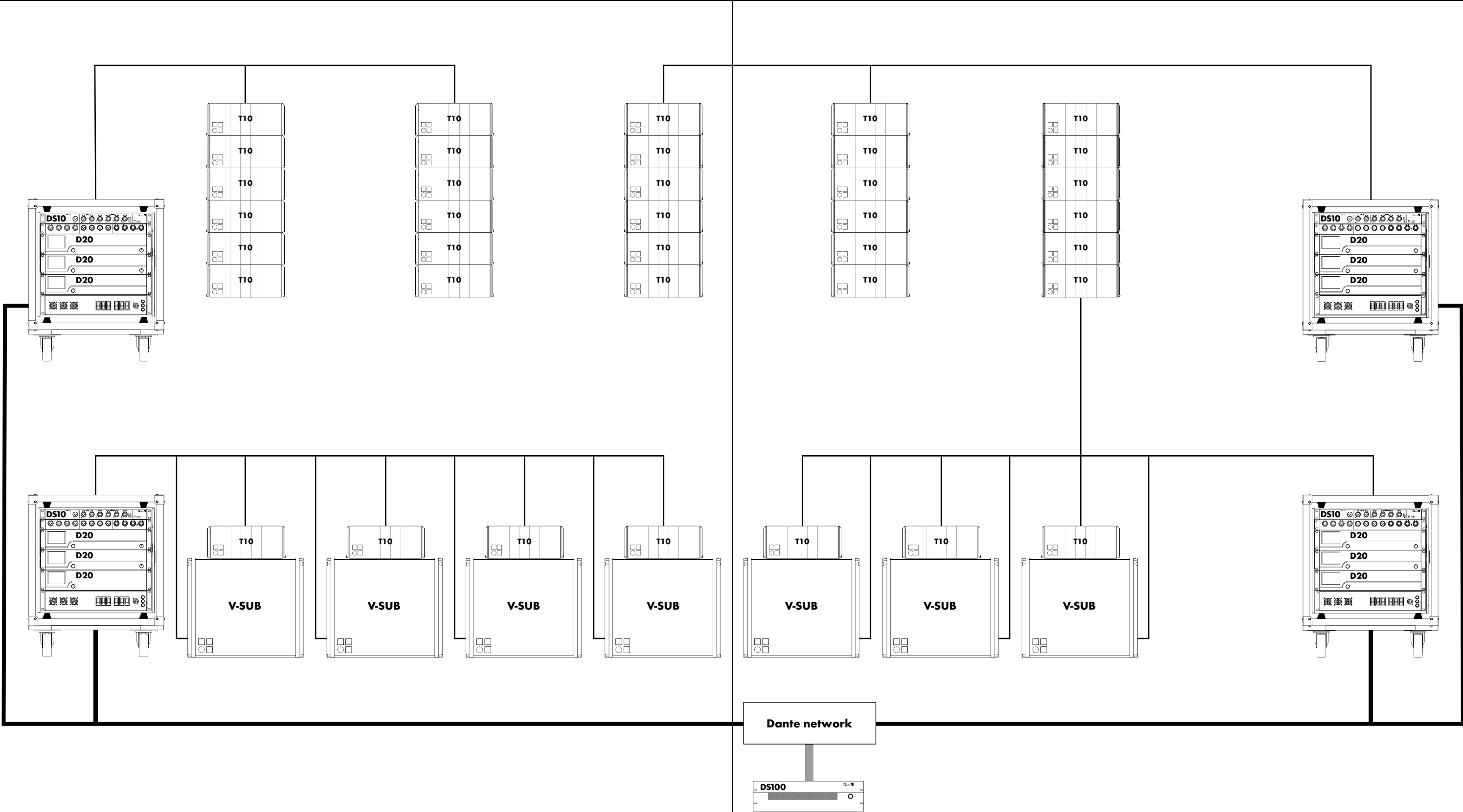
DS100

d&b Soundscape front system

The DS100 configuration examples

KEY:

24S-D

21S-SUB

8S

DS10
30D
30D
30D

DS10
30D
30D
30D

DS10
30D
30D
30D

Dante network

DS100

d&b Soundscape 360° system
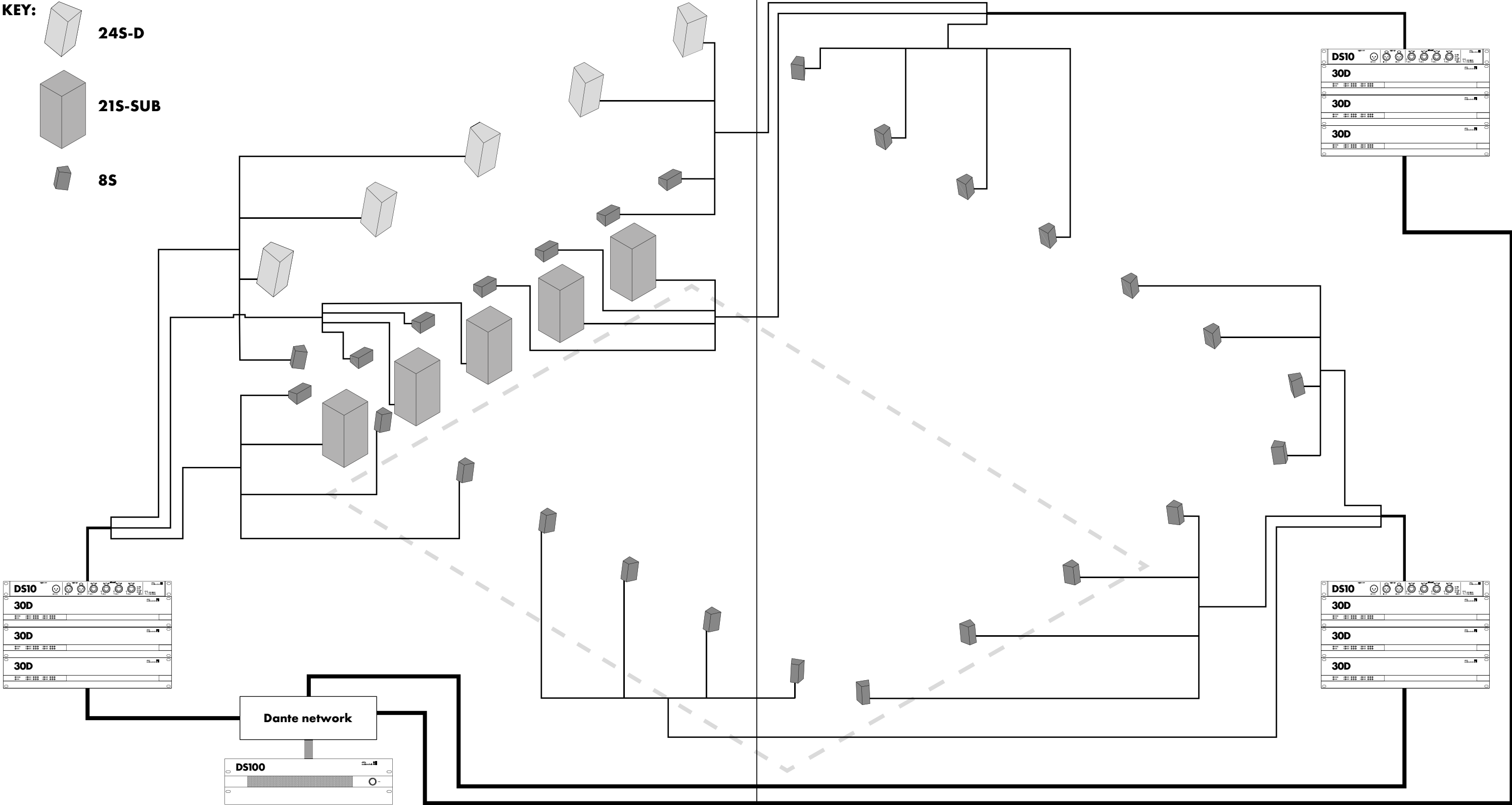
The DS product overview

Audio networking	Z4010.000	**DS10 Audio network bridge**
	Z4011.000	**DS20 Audio network bridge**
Remote network	Z6126.000	**R90 Touchscreen remote control**
d&b Soundscape matrix	Z4100.000	**DS100 Signal Engine**
d&b Soundscape software	Z4110.000	**En-Scene software**
	Z4111.000	**En-Space software**
Racks and accessories	E7483.000	**19" Touring rack 3RU DS100**
	Z5563.000	**DS10 rack upgrade kit**
	Z5339.000	**Multichannel extension cable**

d&b
audiotechnik