

DICENTIS Conference System



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1 About this document

This document describes all components of the DICENTIS Conference system, as well as the requirements to create a system customized to every need by helping the user select the most suitable devices and the appropriate software licenses.

This manual is available as a digital document in the Adobe Portable Document Format (PDF). Refer to the product related information at: www.boschsecurity.com.

1.1 Target audience

This manual is intended for contractors, consultants, and other professionals that need to design a DICENTIS Conference system.

1.2 Copyright

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The content and illustrations are subject to change without prior notice.

1.3 Document history

Release date	Document version	Note
2018.11	V0.1	First draft
2019.05	V0.2	Second draft
2020.03	V0.3	Third draft: general improvements and corrections
2020.05	V0.4	Fourth draft: comments and improvements implemented
2020.06	V0.5	New structure proposed
2020.10	V0.6	Graphics and content updated

2 System overview

The DICENTIS Conference System is designed to maximize meeting efficiency, and to meet the unique requirements of different organizations and venue owners. These venues may include city councils, regional councils and boardrooms. A wide variety of conference devices and licenses with specific functions are available, each designed for optimal user experience. The system conforms to all relevant ISO and IEC standards.

2.1 Multimedia and discussion devices

The DICENTIS Multimedia and Discussion devices are an integral part of the Conference System. A participant can benefit from each device's different functionalities to have uncomplicated meetings.

2.1.1

DCNM-D

Product number: F.01U.313.726



The DICENTIS Discussion device can be easily configured as a single-use or chairperson device via the PC configuration software application. To provide a cost-efficient and flexible solution, a software license can be activated to enable dual-use.

2.1.2

DCNM-DVT

Product number: F.01U.313.727



The DICENTIS Discussion device with voting incorporates standard parliamentary-style voting with the agility characterized by the Conference System. To enable the participant to fully concentrate on the discussion, the voting touch-buttons only light up when voting is available.

2.1.3

DCNM-DSL

Product number: F.01U.313.728



With the DICENTIS Discussion device with language selector, delegates can conveniently listen to the speaker in their preferred language. Language selection is straightforward and available languages are displayed in native characters to enhance readability.

2.1.4

DCNM-DE

Product number: F.01U.313.729



This DICENTIS Discussion device with touchscreen has a 4.3 inch touchscreen that informs participants of the proceedings and increases meeting efficiency by displaying the current speaker and delegates in the request list. The device includes features like independent dual-use for language selection and voting.

2.1.5

DCNM-MMD / DCNM-MMD2

Product number: F.01U.269.131 / F.01U.322.488



The DICENTIS Multimedia devices are essential for local and regional councils and ideal when multimedia content is required. The DICENTIS Multimedia devices can be remotely configured as chairperson or participant seat and have perfect audio quality and a pluggable microphone.

To combine security and ease of use, the DCNM-MMD2 supports Identification by use of a Near Field Communication (NFC) reader.

2.2 Interpreter desks

The DICENTIS Interpreter desks are specifically created to enhance the meeting management for all multilingual meetings where simultaneous interpretation is required. They are an ideal choice for parliaments and international conventions and events.

2.2.1

DCNM-IDESK / DCNM-IDESKVID

Product number: F.01U.314.659 / F.01U.326.553



The single-user DICENTIS Interpreter desks have a simplified, intuitive and ergonomic design, providing only relevant information. Clear positioning of the controls allows intuitive operation without mistakes.

The DICENTIS Interpreter desk with video output has an HDMI video output to connect a third party video screen, which can show the participant speaking, their presentation or even videos.

2.2.2

DCNM-FSL

Product number: F.01U.364.203



The DICENTIS Flush language selector allows delegates to conveniently listen to the speaker in their preferred language. Language selection is straightforward and takes place automatically when a preferred language for the participant is defined in the system.

2.3 System licenses

The DICENTIS Conference system can use licenses to interface with external systems and devices, such as cameras and 3rd party interpreting systems, to meet to needs of every type of meeting

2.3.1 DCNM-LSYS

Product number: F.01U.287.751

The DICENTIS System server software license is a software platform used to control the entire DICENTIS system. Additional software modules can be added to extend functionalities as required.

2.3.2 DCNM-LCC

Product number: F.01U.287.755

The DICENTIS Camera control license makes it possible to interface the DICENTIS Conference System with IP cameras. This license selects the activation of fixed or pre positioned cameras, so that the current active speaker can be displayed during a meeting.

2.3.3 DCNM-LMS

Product number: F.01U.287.756

The DICENTIS Presenter license makes it possible to share the display of a remote presentation computer to all displays of the DICENTIS Multimedia devices. The chairperson or meeting manager can activate the presentation mode using the Meeting application or the DICENTIS Multimedia devices.

2.3.4 DCNM-LIPM

Product number: F.01U.345.402

The DICENTIS Interpreting prepare and manage license enables the configuration and management of the DICENTIS Interpreter desks via the Meeting application or the API. Without this software license, the Interpreter desks can only be configured on the desks themselves.

2.3.5 DCNM-LDANTE

Product number: F.01U.354.449

The DICENTIS License for 1 Dante stream enables the sending or receiving of Dante audio streams, allowing the interfacing of the DICENTIS Conference System with other systems based on Dante. As such, it provides the ability to record the interpreted languages or to interface with a 3rd party discussion or interpreting system.

2.3.6 DCNM-LIMS

The DICENTIS Interpreting multiple sources license enables the possibility to provide a language from multiple sources: by the local interpreter desk, as well as a remote interpreter. Up to 100 languages can be configured. This allows for interfacing with remote interpreting systems and creates solutions where interpreter desks are located in multiple rooms.

2.4 Device licenses

The functionalities of the DICENTIS devices can be extended by the use of optional licenses. Any conference device can be configured by software as either a participant or chairperson device, which minimizes the amount of necessary hardware and maximizes cost-efficiency.

2.4.1 DCNM-LSSL

Product number: F.01U.300.534

The DICENTIS License for language selector at 1 seat enables the language selection feature of DICENTIS devices. An individual license is required for each seat that requires language selection.

2.4.2 DCNM-LSVT

Product number: F.01U.300.532

The DICENTIS License for voting at 1 seat enables the voting functionality of a DICENTIS Discussion device. The number of licenses has to correspond with the number of seats that require voting.

2.4.3 DCNM-LSID

Product number: F.01U.300.533

The DICENTIS License for identification at 1 seat enables participant identification in DICENTIS devices. A license is required for each seat that requires identification.

2.4.4 DCNM-LSDU

Product number: F.01U.310.246

The DICENTIS Dual use at seat license allows two participants to use the same device and still have their names correctly displayed in the speakers list or with the camera image. It also makes possible for one participant to speak while the other is in the waiting-to-speak list.

2.5 Meeting licenses

Each DICENTIS meeting license focuses on an important part of a meeting, like preparation, participants and voting, to facilitate their management, allowing for a more straightforward way of handling them.

2.5.1 DCNM-LMPM

Product number: F.01U.287.752

The DICENTIS Meeting preparation and management software module enables the prepare and manage meetings functions in the Meeting application.

2.5.2 DCNM-LPD

Product number: F.01U.287.754

The DICENTIS Participant Database license enables you to compile a comprehensive database of information related to the participants in the Meeting application. Persons participating in multiple meetings only need to be entered once.

2.5.3

DCNM-LVPM

Product number: F.01U.308.595

The DICENTIS Voting preparation and manage license facilitates the preparation and management of one or more voting rounds. This allows for an advanced and efficient setup and management of voting sessions as demanded by councils and parliaments.

2.6 Central equipment

The DICIENTIS Central equipment includes the main devices that power, connect and manage all the DICIENTIS Conference system.

2.6.1 DCNM-SERVER

Product number: F.01U.364.222



The DICIENTIS System server, a high-performance management workstation for the DICIENTIS Conference system, delivers high performance and stability for conference applications. It is perfect for any environment due to its versatile design. Its super-fast CPU and Solid State Disk give it unparalleled power to optimize performance.

2.6.2 DCNM-APS2

Product number: F.01U.308.936



The DICIENTIS Audio processor and powering switch is responsible for routing, controlling and processing the audio, and supplies power to the Multimedia devices. Without any user controls, it can be fully controlled remotely, and the built-in Ethernet switch connects all devices in the system together in a network.

2.6.3 DCNM-PS2

Product number: F.01U.308.937



The DICIENTIS Powering switch is used in combination with an Audio processor and powering switch to supply extra power to the DICIENTIS network.

2.6.4 OMN-ARNIS / OMN-ARNIE

Product number: F.01U.311.135 / F.01U.311.136



The Audio Routed Network Interface component of the OMNEO system enhances the scalability of the system, supporting up to 450 OMNEO nodes in a single subnet standalone environment.

When used in parallel with a Network synchronizer single, the Network synchronizer enterprise can support up to 10,000 devices across 40 subnets.

2.6.5 OMN-DANTEGTW

Product number: F.01U.360.285



The Dante gateway, the interface between an OMNEO and a Dante™ network, makes it easier for system designers to take advantage of unique OMNEO features and manage their network configurations with additional multicast management and RSTP network topologies.

2.6.6 OMN-DOCENT

Product number: F.01U.350.662

The Network Docent software scans and visually maps out the network environment, giving insight into all devices and cable-connections of a network-based AV system. Network Docent is able to identify and provide guidance on solving common and simple network errors that cause disruption or improper operation of an AV system.

2.6.7

OMN-CONTR

Product number: F.01U.350.663

The OMNEO Control is an easy-to-use application for configuring and managing audio connections in a network. The application runs on a standard Windows PC, without the need for a dedicated controller device.

2.6.8

PRS-4OMI4

Product number: F.01U.303.397



In combination with the DICENTIS Conference System, the OMNEO interface for real-time uncompressed digital audio distribution over industry standard IP networks can be used to supply interpretations from DCN NG.

2.7 Accessories

The DICENTIS Conference system accessories include microphones, cables, and transport cases, all available to increase the comfort of the meeting participants and simplify the installation of the system.

2.7.1 DCNM-HDMIC

Product number: F.01U.269.132



The innovative, stylish and ergonomically designed DICENTIS High directive microphone gives the user the possibility to view the meeting room without obstructions.

2.7.2 DCNM-MICS / DCNM-MICL

Product numbers: F.01U.288.448 / F.01U.288.447



These DICENTIS Microphones with adjustable stems have a uni-directional response for optimum performance, even in noisy conditions or acoustical challenging rooms.

2.7.3 DCNM-CB02-I / DCNM-CB05-I / DCNM-CB10-I / DCNM-CB25-I

Product number: F.01U.332.138 / F.01U.332.019 / F.01U.332.020 / F.01U.332.021



These System network cables connect all DICENTIS devices and come in four different sizes to best suit the user's needs.

2.7.4 DCNM-CB250-I

Product number: F.01U.332.022



The DICENTIS System installation cable can be used to make custom cables with a maximum length of 100 m (328.084 ft).

2.7.5 DCNM-CBCON

Product number: F.01U.300.133



The DICENTIS Connector for solid core cable can be used to create customized cables out of the DICENTIS solid core cables.

2.7.6 DCNM-CBTK

Product number: F.01U.274.860



The DICENTIS System cable toolkit contains two unique tools for attaching the DICENTIS system connector to a custom made length of cable. The tools are delivered in a robust case, which ensures their adequate protection during transportation and storage.

2.7.7



DCNM-CBCPLR

Product number: F.01U.335.531

The DICENTIS Cable coupler enables technicians to connect DICENTIS Cable assemblies (with one another or with standard CAT-E cable) without the need for special tools.

2.7.8



DCNM-NCH

Product number: F.01U.274.859

Easily positioned and removed, the DICENTIS Name card holder is attached to the rear side of the DICENTIS Multimedia device. A custom made paper card can be easily slid into it.

2.7.9



DCNM-MMDSP

Product number: F.01U.283.299

The DICENTIS Anti reflection foil is a self-absorbing glass screen protector, which protects the LCD screen of the DICENTIS Multimedia device and prevents reflection from ceiling lights.

2.7.10



DCNM-FCMMD

Product number: F.01U.291.793

This Transport case for 6x DCNM-MMD is used for storing and transporting DICENTIS equipment, namely Multimedia devices, microphones and cables.

2.7.11



DCNM-TCID

Product number: F.01U.335.596

This Transport case for 10x DCNM-xD is used for storing and transporting DICENTIS equipment, namely Discussion devices, microphones and cables.

2.7.12



DCNM-TCIDESK

Project number: F.01U.328.089

This Transport case for 2x DCNM-IDESK is used for storing and transporting DICENTIS equipment, namely Interpreter desks with attached microphones and accessories.

2.8 Typical system setup

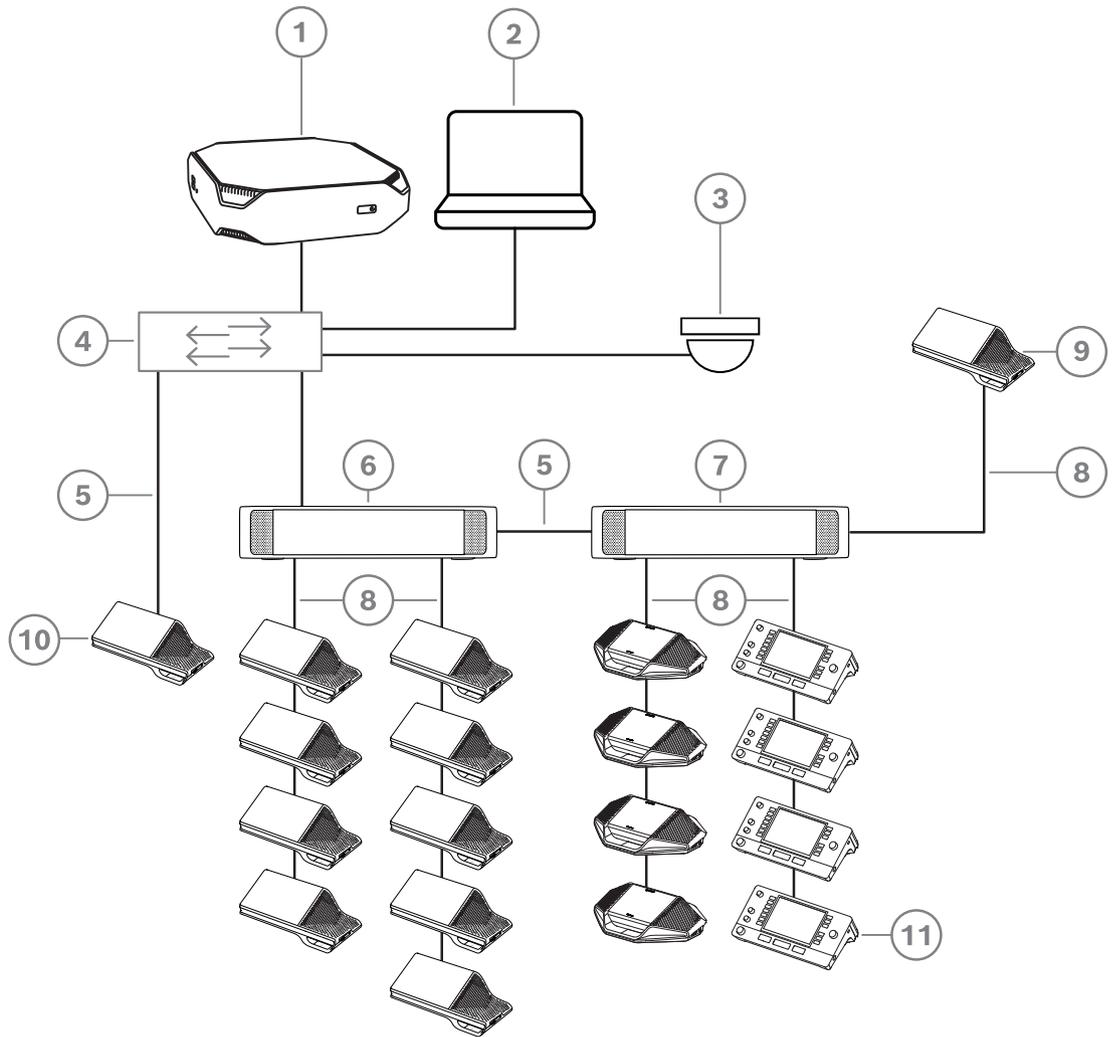


Figure 2.1: Typical DICENTIS Conference System setup

1	DCNM-SERVER	2	Client PC
3	Onvif Profile-S compatible cameras Sony IP cameras via CGI commands, or Panasonic HD Integrated IP	4	Ethernet switch
5	CAT-5e Ethernet cable	6	DCNM-PS2
7	DCNM-APS2	8	DCNM-CB
9	DCNM-MMD/2 (via powered socket)	10	DCNM-MMD/2 (via PoE)
11	DCNM-IDESK / IDESKVID		

3 Functionalities of the conference system

The DICENTIS Conference system offers multiple functionalities to best suit the needs of its users. The combination of devices and licenses allows for multiple customization possibilities. While the DCNM-LSYS is always necessary, all other licenses can be chosen depending on the meeting requirements.

3.1 Discussion

The Discussion functionality in the DICENTIS Conference system offers the possibility to organize and control the discussion to have efficient and effective meetings.

This functionality has the following features:

- Discussion modes:
 - **Open (automatic):** When selected, queues in the waiting list are automatically shifted to the speaker list if it is not full yet. If the speakers list is full, a microphone request is queued in the waiting list.
 - **Open (manual):** When selected, participants can issue a request to speak and enter the queue. A user using the Meeting Application or a participant with “manage meeting” rights using an MMD or the Synoptic application can grant the participant the floor.
 - **First in first out:** When selected, participants can control their own microphone. If the speakers list is full, a microphone request overrides the longest speaking participant.
 - **Voice activated:** When selected:
 - the microphone buttons on the discussion devices are colored red.
 - the microphone is activated when a participant speaks.
 - participants do not need to press the microphone button to get the floor.
 - the microphone button can be held in to temporarily mute the microphone.
 - the discussion list is cleared and is not updated while voice mode is active.
 - the chairperson can still use the priority button to override all participants.
 - camera control is not available.

This mode can be used for systems with up to 50 devices. It can be configured in the profile and agendas during a discussion.

If a microphone has VIP rights, it will not be automatically activated when the participant speaks. Instead a participant with VIP rights has to press the microphone button to speak, which will mute all other participant microphones.

- **Response:** When selected, participants can issue a request to speak and enter the queue (green icon).

Participants can also issue a request to respond to enter the queue and respond to the active speaker (yellow icon).

A user using the Meeting Application or a participant with “manage meeting” rights using an MMD or the Synoptic application can grant the participant the floor. When the next participant in the speakers queue (green icon) is granted the floor, the response queue (yellow icon) will be cleared, since the speaker to which they want to respond no longer has the floor.

Only 1 active speaker and 1 active responder can have the floor. They can temporary mute their microphone during the discussion and activate it again using the microphone button. While muted, the microphone LED is off, but the microphone button LED is on.

A request to respond can only be issued on a Multimedia device and Discussion device with touchscreen, using the yellow button on the touchscreen.

- Queue
- Speech timer
- Control of the discussion (with manage meeting rights):
 - Multimedia device
 - Synoptic control
 - Meeting application
 - External application using the API or conference protocol.

3.2 Identification, authorization and attendance

The identification and authorization functionality in the DICENTIS Conference system allows the chairperson to:

- See who is present or absent during a meeting and store this attendance information in the meeting notes
- Grant rights to participants, like issuing a request to speak or cast a vote
- Show the speaker’s name

Different identification and verification methods are available:

Identification	DCNM-D	DCNM-DVT	DCNM-DSL	DCNM-DE	DCNM-MMD	DCNM-MMD2
Welcome screen	x	x	x	✓	✓	✓
Swipe NFC card	x	✓	✓	✓	x	✓
Keep NFC card at device	x	✓	✓	✓	x	✓
Username	x	x	x	x	✓	✓
Select from list	x	x	x	x	✓	✓
External system	✓	✓	✓	✓	✓	✓
Verification	DCNM-D	DCNM-DVT	DCNM-DSL	DCNM-DE	DCNM-MMD	DCNM-MMD2
Pin	x	x	x	✓	✓	✓
Password	x	x	x	x	✓	✓
External system	✓	✓	✓	✓	✓	✓

The identification, authorization and verification functionalities are made available through the following licenses:

- The DCNM-LSID is required to extend the participant devices with identification functionality



Notice!

Since the DCNM-D does not have an NFC-reader nor a touch screen, it cannot participate in any identification mode. However, if an external system is used for identification, then a DCNM-D device can also participate in the identification mode when it receives a DCNM-LSID license.

- The DCNM-LPD is required to manage participation
- The DCNM-LMPM is required to assign participants to meetings

3.3

Voting

The electronic voting functionality in the DICENTIS Conference system saves time since the headcount is automatic. Configure different voting functionalities using a combination of the devices and licenses:

	DCNM-MMD	DCNM-DE	DCNM-DVT	Meeting application	.NET API	Synoptic control	Conference protocol
Cast vote: DCNM-LSVT	✓	✓	●	✓	✓	x	x
Dual use: DCNM-LSDU	x	✓	x	x	x	x	x
Show total voting results: DCNM-LVPM	✓	✓	x	✓	✓	x	✓
Show individual voting results: DCNM-LPD	x	x	x	x	✓	✓	✓
Show description of the voting round: DCNM-LVPM	✓	✓	x	✓	✓	x	✓
Control voting round: DCNM-LVPM	✓	x	x	✓	✓	x	x
Prepare voting round prior to the meeting: DCNM-LMPM	x	x	x	✓	✓	x	x

Prepare voting round during the meeting: DCNM-LMPM	x	x	x	✓	✓	x	x
---	---	---	---	---	---	---	---

- ✓ Device and license work together to provide functionality
- Device includes functionality without the need for a license
- x License does not provide functionality to device

Please refer to the DICENTIS System configuration manual for all the possible different options about the voting functionality.

3.4 Interpretation and languages

The interpretation functionality allows meeting participants to listen to an interpretation in their preferred language. The DCNM-LSSL license might be necessary to add the interpretation feature to some participant devices:

	DCNM-MDD/2	DCNM-DE	DCNM-DSL	DCNM-FSL
Language selection	DCNM-LSSL	DCNM-LSSL ¹	●	●

- Device includes functionality without the need for a license

¹When extended with DCNM-LSDU and two DCNM-LSSL, the DCNM-DE can be used by two participants and both can select a different headphone language.

3.4.1 Languages from DICENTIS

The DICENTIS Conference System supports up to 100 languages with the DICENTIS interpreter desks so that every participant can listen to their preferred language. The headphone and user interface languages of all participants will be automatically selected when they login to their seat.

	DCNM-IDESK	DCNM-IDESKVID
Language selection	●	●
Display active speaker: DCNM-LCC	x	✓
Display presentation: DCNM-LMS	x	✓
Language configuration	●	●
Control functionality: DCNM-LIPM ¹	✓	✓

- ✓ Device and license work together to provide functionality
- Device includes functionality without the need for a license
- x License does not provide functionality to device

¹ If you extend the system with DCNM-LIPM you can also configure the system using the Meeting Application or .Net API and you gain control functionality. DCNM-LIPM offers more configuration functionalities than the configuration on the DCNM-IDESK.

3.4.2 Interfacing with DCN Next Generation

The DICENTIS system can receive and send interpretations from DCN Next Generation using the OMNEO Media Interface (PRS-4OMI4).

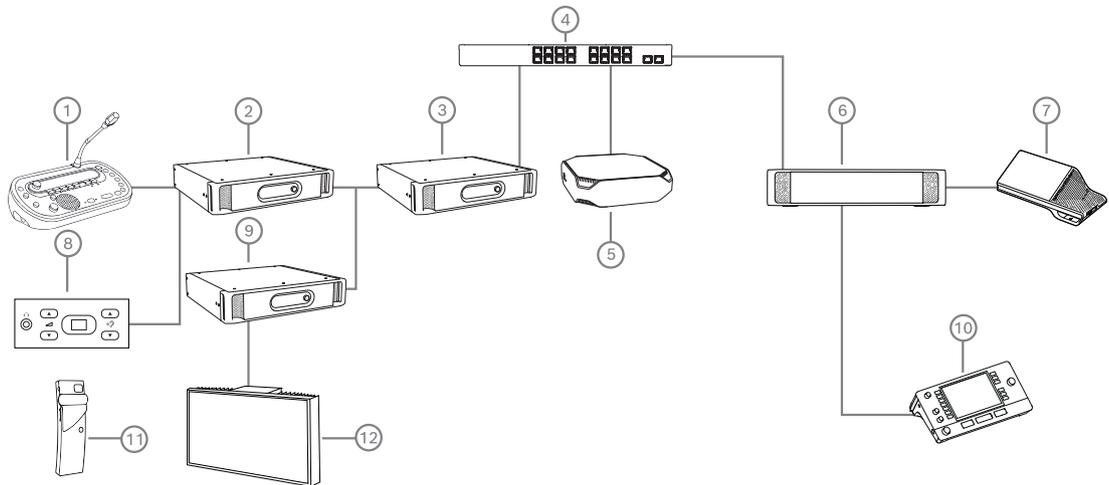


Figure 3.1: Interfacing DICENTIS with DCN NG

1	DCN-IDEK	2	DCN-CCU2
3	PRS-4OMI4	4	Network switch
5	DCNM-SERVER	6	DCNM-APS2
7	DCNM-MMD/2 DCNM-DE DCNM-DSL	8	DCN-FCS
9	INT-TX	10	DCNM-IDEK/IDEKVID
11	LBB4540 Integrus Pocket receiver	12	LBB451x/00 Integrus radiator

Please refer to the DCN Next Generation User manual for additional information on this conference system.

3.4.3 Interfacing with Dante™ devices via OMN-DANTEGTW

The DICENTIS Conference system can send and receive interpretations as Dante™ unicast streams using the Dante gateway (OMN-DANTEGTW). Using the Dante gateway, the languages come from a single source (the Dante gateway) instead of different sources (the DICENTIS Interpreter desks).

Connecting two DICENTIS systems

It is possible to connect two or more rooms together using the Dante gateway: one room for the participants in the discussion and the interpretation; and the other rooms for the audience and additional interpretations.

Note that:

- The configuration for each room is done separately
- The Dante™ network is used for routing and recording the audio
- The Dante™ network is configured using Audinate's Dante Controller or Dante Domain Manager
- Using mix-minus you can have participants speaking in two rooms
- Mix-minus does not work in more than two rooms

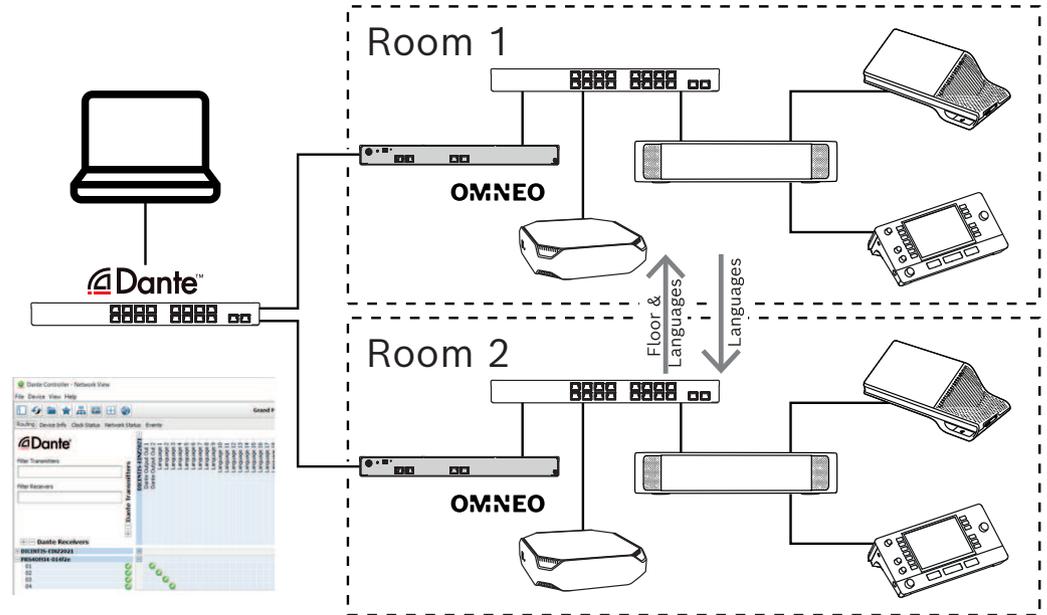


Figure 3.2: Dante gateway configuration

3.4.4 Interfacing with Dante™ devices via DCNM-LDANTE

Besides using the OMN-DANTEGW as an OMNEO to the Dante™ interface, the DICENTIS System can also send and receive Dante multicast streams.

By default, the Dante™ Inputs 1 and 2 and Outputs 1 and 2 are available and muted. The system can send and receive up to 100 languages as Dante™ multicast streams. One DCNM-LDANTE license is required for each incoming and each outgoing stream.

When the source of a language is configured as Dante™, the Dante™ input that has the same number as the language will automatically be routed to the participants.

When the system is extended with at least one DCNM-LDANTE license, then the DICENTIS System will appear in the Dante™ Controller with 100 inputs and 100 outputs for languages. However only the languages configured to receive or send to a Dante stream in combination with the available DCNM-LDANTE licenses define which inputs and outputs are active.

3.5 Camera control

The DICENTIS Conference system can interface with IP cameras with the DICENTIS Camera control software module. It enables the activation of fixed or prepositioned cameras, so that the current active speaker can be displayed during a meeting.

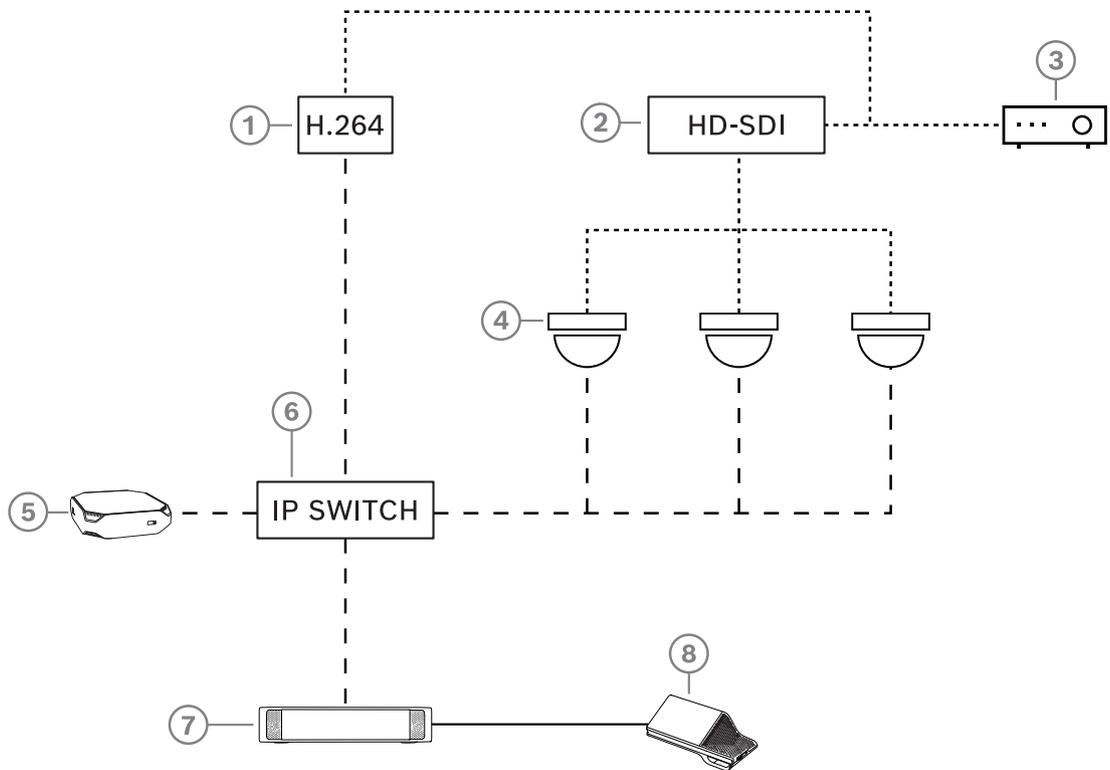


Figure 3.3: Typical camera setup

1	H.264 encoder to encode the HD SDI video to H.264 if the video camera is not able to supply the supported H.264 stream	2	HD-SDI switcher to switch the HD-SDI streams of the cameras
3	Projector to show the active speaker on the large screen	4	Video camera (Onvif Profile-S compatible camera, Sony, Panasonic)
5	DCNM-SERVER	6	L3 Ethernet switch
7	DCNM-APS2	8	DCNM-MMD2, displaying the active speaker on the device
.....	HD-SDI (coax cable)	-----	Ethernet TCP/IP
_____	DCNM-Cables		

3.6 Interfacing for preparation, management and control

You can carry out most of the preparation, management, and control actions relating to the DICENTIS Conference system through the Multimedia devices, the Meeting Application, and third party systems using the DICENTIS API or the Conference protocol.

Please refer to the DICENTIS Conference configuration manual, .NET API manual, and Conference protocol manual for detailed information.

4 System installation design and planning

Before you start to install system devices and connect system cabling, you should make a system design and planning:

- Familiarize yourself with the product and system capabilities.
- Make a cable (connection) plan:
 - Calculate the system network cable length.
 - Calculate the system power consumption.
 - Calculate the required power capacity of the system.

**Notice!**

The DICENTIS Conference System uses the RSTP protocol when redundant cabling mode is enabled. If the DICENTIS Conference System needs to be connected with the locally present network, please consult the local IT department before continuing with the installation design.

**Notice!**

Make sure that the cable lengths and power consumptions do not exceed the specifications. Not doing so will result in malfunctioning at any moment of the DICENTIS Conference System and products.

4.1 General requirements

The capability of the DICENTIS Conference System and DICENTIS products depends on:

- The lengths of the system network cables.
- The number of connected devices.
- The system power supply capacity.

Cable length

System network cables (DCNM-CBxx-I) lengths (2, 5, 10 or 25 m) have a direct effect on the available power supply capacity. The longer the system network cable, the less power supply capacity is available to drive the connected devices. Therefore, choose the lengths of the system network cables carefully.

**Notice!**

Custom network cables must never exceed the maximum Ethernet specification of 100m (IEEE 802.3ab).

Keep your network hierarchy as flat as possible. This means having as few levels as possible. It is recommended not to exceed 7 levels. See the following example: 1: 1st level = Root switch, 2: 2nd level = switch, 3: 3rd level = switch.

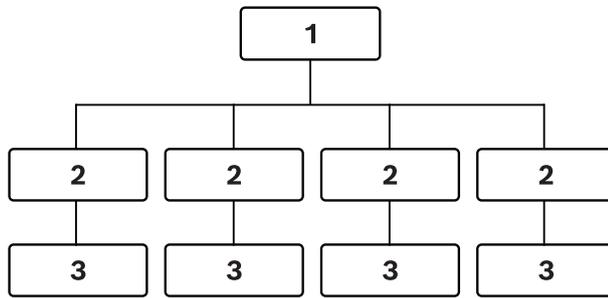


Figure 4.1: Example: Switch-levels

Power supply capacity

The total system network cable length and connected devices determine the required power supply capacity. The power within the DICENTIS Conference System is supplied by:

- The Audio processor and powering switch and the Powering switch, or
- Off-the-shelf PoE Ethernet switches.

Refer to the *Power supply capacity calculation plan, page 28* for more information.

Calculation tool

The calculation tool can be used to calculate the total power capacity of the system. This makes the design and planning of the DICENTIS Conference System easier. The calculation tool uses the power consumption of the devices and the system network cable lengths to calculate the needed system power supply capacity.

The calculation tool is on the DVD supplied with the Audio processor and powering switch and is part of the DICENTIS software DCNM.iso file. The DCNM.iso file can be downloaded from the Bosch website at: <https://licensing.boschsecurity.com/software>

Refer to the *Power supply capacity calculation plan, page 28* for more information.

4.2 Hardware requirements

This section lists the minimal requirements for each part of the system. For an overview of which parts are required or optional, see the DICENTIS manual System Overview sections.

PC

PC requirements for the computer running the services in a DICENTIS system can be categorized as follows:

- Up to 100 devices without identification or participants images
- Up to 100 devices with identification or participants images
- Up to 750 devices without identification or participants images
- Up to 750 devices with identification or participants images

For each use the minimal requirements are.

	PC running server software (meeting application, optional):
Less than 100 devices & without identification or participant images	<ul style="list-style-type: none"> - Windows Server 2016 (including .NET Framework 3.5 feature), or: - Windows Server 2019 (including .NET Framework 3.5 feature).
CPU passmark RAM	<ul style="list-style-type: none"> - >= 6000* - 8 GB

Free disk space Ethernet card	<ul style="list-style-type: none"> - 20 GB - 1 GB
Less than 100 devices with identification or participant images	<ul style="list-style-type: none"> - Windows Server 2016 (including .NET Framework 3.5 feature), or: - Windows Server 2019 (including .NET Framework 3.5 feature).
CPU passmark: RAM: Free disk space: Ethernet card:	<ul style="list-style-type: none"> - >= 7000* - 16 GB - 50 GB - 1 GB
Up to 750 devices & without identification or participant images	<ul style="list-style-type: none"> - Windows Server 2016 (including .NET Framework 3.5 feature), or: - Windows Server 2019 (including .NET Framework 3.5 feature).
CPU passmark RAM Free disk space Ethernet card	<ul style="list-style-type: none"> - >= 9000* - 16 GB - 50 GB - 1 GB
Up to 750 devices with identification or participant images	<ul style="list-style-type: none"> - Windows Server 2016 (including .NET Framework 3.5 feature), or: - Windows Server 2019 (including .NET Framework 3.5 feature).
CPU passmark RAM Free disk space Ethernet card	<ul style="list-style-type: none"> - >= 10000* - 16 GB - 50 GB - 1 GB
	PC running the meeting application only:
Less than 100 devices & without identification or participant images	<ul style="list-style-type: none"> - Windows 8.1 Pro/Windows 10 Pro 64 bits (including .NET Framework 3.5 feature). - Note: Windows 10 is only suitable for use with the client PC.
CPU passmark RAM Free disk space Ethernet card	<ul style="list-style-type: none"> - >= 6000* - 8 GB - 20 GB - 1 GB

Note: The power of the processor is measured by a CPU passmark score, because this gives a more reliable benchmark score than just the processor family:

- many different processor brands and families are available
- a processor intended for a laptop is not as powerful as the processor intended for a desktop, although both can be for example, an i7
- newer versions of the same processor are faster than older versions

To check the passmark score of a processor.

1. Go to: https://www.cpubenchmark.net/CPU_mega_page.html

2. Enter the processor (for example, i3-8100) in the CPU Name text box
3. Check the CPU Mark column for the CPU passmark score (for example, i3-8100 scores 8079)

Alternatively, you can clear the textbox CPU Name and sort the CPU Mark column and see which processor scores above for example, 7000.

Switches

The following minimum requirements and recommendations apply to switches used in a DICENTIS:

Requirement	Standard	Settings
Gbit Ethernet	IEEE802.3	Switch latency is maximally 10µSec with Gbit. Valid for both copper and/or fiber ports.
Packet forwarding in HW per port >1.2Mpps	n.a.	If SW is responsible for packet switching, this would result in variable latency which is unacceptable.
Quality of Service With strict priority	DiffServ	To make sure PTP synchronization packets and audio packets get priority over control packets. OMNEO uses QoS on IP level to avoid synchronization and audio problems on busy networks. Although the system does work without problems on relatively quiet networks (< 10% network load) it is important to configure your network switches correctly. The used QoS is Differentiated Services or DiffServ, which is part of the Type of Services field (ToS) in the IP header. For more details on DiffServ & IP header, see Wikipedia.

Warning: IEEE802.1p is also used for QoS, but is limited to layer 2. Since OMNEO uses IP communication, this mechanism is not suitable, so make sure the used equipment uses DiffServ QoS!

The table below gives an overview of the used **DSCP values** which need to be configured in the switch:

Data	DSCP dec	DSCP hex	DSCP Label	TOS byte (hex)	Switch Priority queue
PTP sync, delay req	56	0x38	CS7	0xE0	Highest
PTP follow-up, delay response, audio	46	0x2E	EF	0xB8	High
(reserved)	8	0x08	CS1	0x20	Low
Control	0	0x00	Best effort	0x00	None

Warning: Please check thoroughly if your switch’s highest priority queue is label as #1 or e.g. #8, because this may differ per brand. Unfortunately this is not consistent over the different brands. Setting it wrong is worse than not having priority.

Switches must be configured to support DiffServ (DSCP) quality of service The switch needs to have 4 priority queues for the DiffServ mechanism to work.

Warning: Never use VOIP QoS settings!

Requirement	Standard	Settings
MAC table >1000	n.a.	To avoid the switch starts broadcasting unicast packets because it runs out of space.
Disable EEE	IEEE 802.3az	Most implementations of EEE cause problems because of implementation flaws. A good implementation should work, but does not save energy since the PTP synchronization avoids this. Therefore, EEE (green or low power Ethernet) must always be disabled.
Disable RSTP (when no cable loops are used)		Rapid Spanning Tree Protocol (RSTP) is required when (cable) loops are created for redundancy. When no loops are created, RSTP needs to be disabled for optimal operation. When enabled, it can cause slow connections to the switch.
Possibility to create VLANS	n.a.	VLAN separation is recommended instead of IGMP snooping, because most switches are unable to handle the multicast changes in the system. Filtering multicast data may be necessary for some devices, such as 100 Mb devices (Sony cameras, TVOne, AMX, and others).
IGMPv3 IGMPv2 snooping in hardware		IGMPv3 or IGMPv2 snooping. To optimize bandwidth usage, IGMP snooping can be used. This is useful in systems with >10 multicast streams, although not absolutely required. Sufficient performance for handling a large number of IGMP query responses, depends on the number of (directly or indirectly) connected devices to that switch. Hardware support for IGMP snooping is strongly recommended.
Requirements when Redundant wiring is used	Standard	Settings
RSTP	IEEE802.1D-2004	RSTP is used to allow the creation of loops for redundancy. The switch must support changing the following parameters to the listed values: <ul style="list-style-type: none"> - Hello_Time = 9 seconds - Forwarding_delay = 30 seconds - Max_age = 22 seconds
Diagnostics		

Requirement	Standard	Settings
Link Layer discovery	IEEE 802.1AB	For network diagnoses using Network Docent.
SNMP	SNMP	For network diagnoses using Network Docent.

Routers

The following minimal requirements apply to routers:

- 1 Gbit or higher Ethernet ports.
- Supports PIM-DM or Bidirectional PIM.
- Performs IP routing in hardware (i.e. a 'layer 3 switch') to minimize the routing delay.
- Packet forwarding rate > 1,000,000 packets per second per port (e.g. 8 Mpps for an 8-port router).
- Non-blocking backplane per switching port, i.e. 2 Gbit per port (e.g. 16 Gbps for an 8-port router).
- MAC address table of at least 1000 addresses per directly connected subnet.

4.3

Network requirements

If the DICENTIS Conference System is being used as a standalone system, it uses the so-called dynamic link-local addresses. This means that the TCP/IPv4 setting of the server PC and client PCs need to be set to "Obtain an IP address automatically". Normally, these settings are default and therefore do not require PC network configuration settings.

In case more functionality is required, for example, internet access, the dynamic link-local addresses cannot be used. In this case the DICENTIS devices and PCs need to be connected to a DHCP server and gateway to provide internet access. If the DICENTIS Conference System will become part of a locally present network, contact your local IT department for how to set up the network.

The DHCP server has to comply with RFC 4676 and must be able to handle 500 requests per 30 seconds. A consumer grade DHCP server as is used in most home router/wireless access points is not able to comply with this requirement and will cause unexpected and unrequested behavior.

The DHCP server functionality of Windows server does comply with these requirements.

The DICENTIS Conference System service uses ports 13 and 9710 for communication. Please make sure that these ports are not used by any other applications on the DICENTIS server computer.



Notice!

How to set up an Ethernet network is outside the scope of this manual.

4.4

Power supply capacity calculation plan



Notice!

It is advisable to use the power calculation tool. The calculation tool is on the DVD supplied with the Audio processor and powering switch and is also part of the DICENTIS software DCNM.iso file, which can be downloaded from the Bosch website at: <https://licensing.boschsecurity.com/software>

Decide how to supply power to the DICENTIS devices:

- Using the Audio processor and powering switch and one or more Powering switches.
- Using one or more PoE Ethernet switches.

If you want to use PoE Ethernet switches, continue with chapter *Calculation using PoE switches, page 32*.

4.4.1 Calculation using DCNM-APS2 or DCNM-PS2



Notice!

If you want to use customized cables, or a more accurate power supply capacity calculation plan is needed, you should use the power calculation tool.

To calculate the total power supply capacity:

1. Count all DICENTIS devices.
2. Know the exact location where the devices are installed.
3. Count each system network cable of the same length.

Device type	Power consumption (Watts)
DCNM-D	3.10
DCNM-DSL	3.60
DCNM-DVT	3.70
DCNM-DE	5.00
DCNM-MMD	11.30
DCNM-MMD2	12.00
DCNM-IDEK	15.00
DCNM-IDEKVID	18.00
DCNM-FSL	2.6*
DCNM-CB02-I	1.19
DCNM-CB05-I	2.43
DCNM-CB10-I	4.50
DCNM-CB25-I	10.71

Tab. 4.1: Power consumption (Watts)



Notice!

*The DCNM-FSL is powered by PoE and not via the DCNM-APS or DCNM-PS. Refer to *Calculation using PoE switches, page 32* for more information.

Ordering number	Cable lengths	
	m	ft

Ordering number	Cable lengths	
DCNM-CB02-I	2	6.56
DCNM-CB05-I	5	16.40
DCNM-CB10-I	10	32.81
DCNM-CB25-I	25	82.02

Tab. 4.2: Cable types and lengths

Rear view

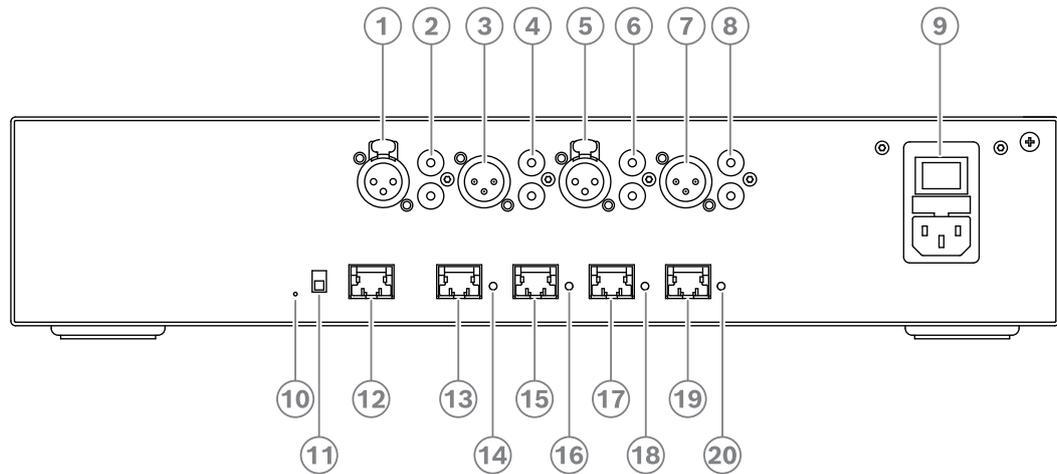


Figure 4.2: Audio processor and powering switch

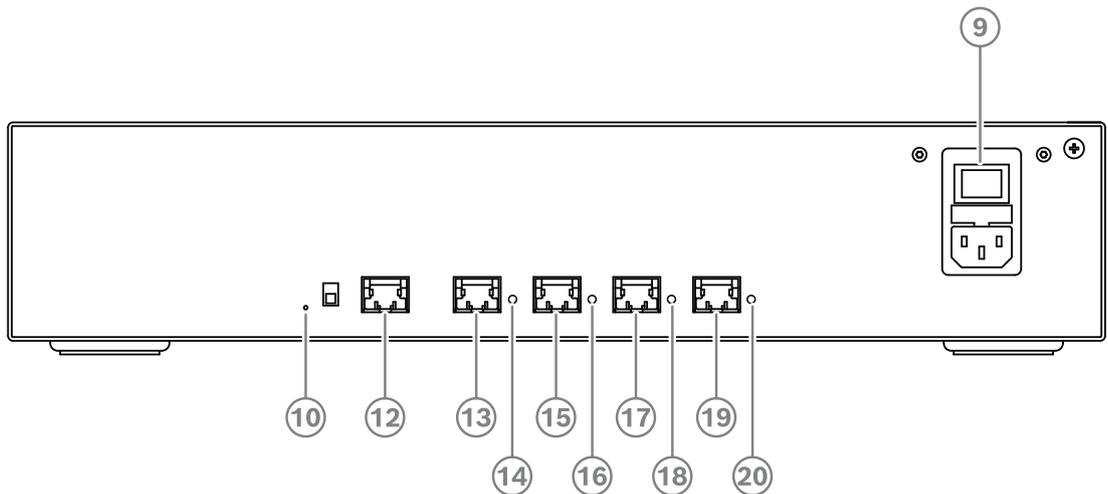


Figure 4.3: Powering switch

Item	Description
1, 5	XLR line outputs 1 and 2.
2, 6	RCA line outputs 1 and 2.
3, 7	XLR line inputs 1 and 2.

Item	Description
4, 8	RCA line inputs 1 and 2.
9	Mains inlet, mains switch and fuse holder.
10	Reset button.
11	Ground switch (grounded or floating).
12	Socket 1 without power.
13	Socket 2 low power.
15, 17, 19	Socket 3, 4, 5 high power.
14, 16, 18, 20	<p>Overload LED for sockets 2-5:</p> <p>Green: Power OK.</p> <p>Red: Overload. Remove cable and wait a few seconds for the system to reset the overload.</p>

Network and Power connector	Max. power output (W)	Max. devices
Socket 1 (12)	No power capacity	---
Socket 2 (13)	15	1
Socket 3 (15)	144	40
Socket 4 (17)	144	40
Socket 5 (19)	144	40

Tab. 4.3: Power supply capacity DCNM-APS2 / DCNM-PS2

Calculation examples

The following example gives you an indication of the maximum load to each socket of an Audio processor and powering switch or Powering switch.

- **Socket 2:** 50 m cable + DCNM-MMD2 = **12 W¹**
- **Socket 3:** 10 m cable + DCNM-MMD2 + 9x (2 m cable + DCNM-MMD2)
= (4.5 + 12) + 9x(1.19 + 12) = **135.21 W²**.
- **Socket 4:** 10 m cable + DCNM-D + 19x (2 m cable +DCNM-D)
= (4.5 + 3.1) + 19x(1.19 + 3.1) = **89.11 W²**.
- **Socket 5:** 10 m cable + DCNM-DE + 19x (2 m cable + DCNM-DE)
= (4.5 + 5) + 19x(1.19 + 5) = **127.11 W²**.

¹ For socket 2, the cable power consumption of the cable does not need to be counted if only one device is connected to this output.

² The shortest redundant cable does not need to be counted.

Refer to

- *Calculation using PoE switches, page 32*

4.4.2 Calculation using PoE switches

Select one or more PoE Ethernet switches to supply power to the DICENTIS devices. Each DICENTIS device must be connected to an individual PoE enabled output of an Ethernet switch.

Each DICENTIS Multimedia, Discussion and Interpreter desk device has one network connector and one network/PoE connector.



Notice!

Some PoE Ethernet switches can only supply power to a limited number of ports. Others can supply power to every port, but the total power the Ethernet switch can supply is limited. Please consult the documentation of the PoE Ethernet switch used.



Notice!

Using PoE, DICENTIS devices cannot be daisy-chained connected. Using PoE does not provide redundant cabling.

4.5 System extension

The DICENTIS Conference System has two sizes, small to medium and large. This section describes both, and what are the requirements for each of them.

A small to medium DICENTIS Conference System (see *Typical system setup, page 15*) consists of:

- up to 450 DICENTIS nodes.
Refer to table **Node and device count of DICENTIS equipment** below about the node and device count of DICENTIS equipment.
- all DICENTIS devices in 1 subnet.
- 1 DICENTIS Audio processor and powering switch for the audio processing.
- 1 Server PC which hosts the DICENTIS services.

A large DICENTIS Conference System consists of:

- up to 750 DICENTIS devices.
- multiple subnets connected by use of a router/L3 switch.
 - Each subnet can have up to 450 DICENTIS nodes.
Refer to the following table for the node count of DICENTIS equipment.
 - The first subnet has:
 - 1 DICENTIS Audio processor and powering switch for the audio processing.
 - 1 Server PC which hosts the DICENTIS services.
 - 1 ARNI-Enterprise to increase the size of the system.
 - All other subnets have 1 ARNI-Standard to increase the size of the system.

Note: There is no DICENTIS Audio processor and powering switch in the other subnets.

Device	Node count	Device count
DICENTIS server	0	0

Device	Node count	Device count
DICENTIS meeting application	0	0
DICENTIS Audio processor and powering switch	1	1
DICENTIS Powering switch	1	1
DICENTIS multimedia device	2	1
DICENTIS discussion device	1	1
DICENTIS discussion device select language	1	1
DICENTIS discussion device voting	1	1
DICENTIS discussion device extended	1	1
DCNM-IDESK Interpreter desk	1	1
DCNM-IDESKVID Interpreter desk with video	1	1
DCNM-FSL Flush language selector	1	1
OMN-DANTEGTW Dante gateway	1	0
PRS-4OMI4 OMNEO media interface	1	0
OMN-ARNIE ARNI-E OMNEO interface	0	1
OMN-ARNIS ARNI-S OMNEO interface	0	1

Tab. 4.4: Node and device count of DICENTIS equipment

An ARNI (Audio Routed Network Interface) is used to connect multiple DICENTIS system subnets. If more than one subnet is required, two types of an ARNI must be used.

- OMN-ARNIS (ARNI-S OMNEO interface): The ARNI-S is required for increasing the system size above 450 DICENTIS nodes. It supports up to 450 DICENTIS nodes in its subnet. It also acts as a DHCP server in its subnet.
- OMN-ARNIE (ARNI-E OMNEO interface): The ARNI-E is required for increasing the system size above 450 DICENTIS nodes. It supports up to 450 DICENTIS nodes in its subnet. It also acts as a DHCP server in its subnet. It can connect up to 40 subnets, each with an ARNI-S.

Defining subnets and subnet masks

A subnet is a logical, visible subdivision of an IP network. The number of DICENTIS devices that can be in the same subnet depends on the subnet mask.

A standard class C subnet (255.255.255 or /24) can contain 254 IP addresses. Some DICENTIS devices have 2 IP addresses. For this reason, Bosch advises to use 255.255.252.0 (or /22) as a subnet mask. This allows you to have 1018 IP addresses. The following table lists the number of IP address per DICENTIS device in a DICENTIS Conference System.

Device	IP addresses
DICENTIS server (optional Meeting Application)	1
Client PC running DICENTIS meeting application	1

Device	IP addresses
DICENTIS Audio processor and powering switch	1
DICENTIS Powering switch	1
DICENTIS multimedia device	2
DICENTIS discussion device	1
DICENTIS discussion device select language	1
DICENTIS discussion device voting	1
DICENTIS discussion device extended	2
DCNM-IDESK Interpreter desk	2
DCNM-IDESKVID Interpreter desk with video	3
DCNM-FSL Flush language selector	1
ARNI-Enterprise	1
ARNI-Standard	1
IP camera	1
SDI video switcher	1

Tab. 4.5: Nodes count of DICENTIS equipment

Multi subnet DICENTIS Conference System

The following figure illustrates a typical multi subnet DICENTIS Conference System with a total of 750 DICENTIS devices.

- The system is divided over four (4) subnets, where two (2) subnets having a maximum of 450 DICENTIS nodes and an OMN-ARNIS are connected.
- The system has one OMN-ARNIE installed in the first subnet with a maximum of 450 DICENTIS nodes connected (Note that only one OMN-ARNIE is allowed within a multiple subnet DICENTIS Conference System).
- Subnet four (4): When using multiple subnets, make sure that all cameras needed to capture video of the seats are all connected to the same subnet.

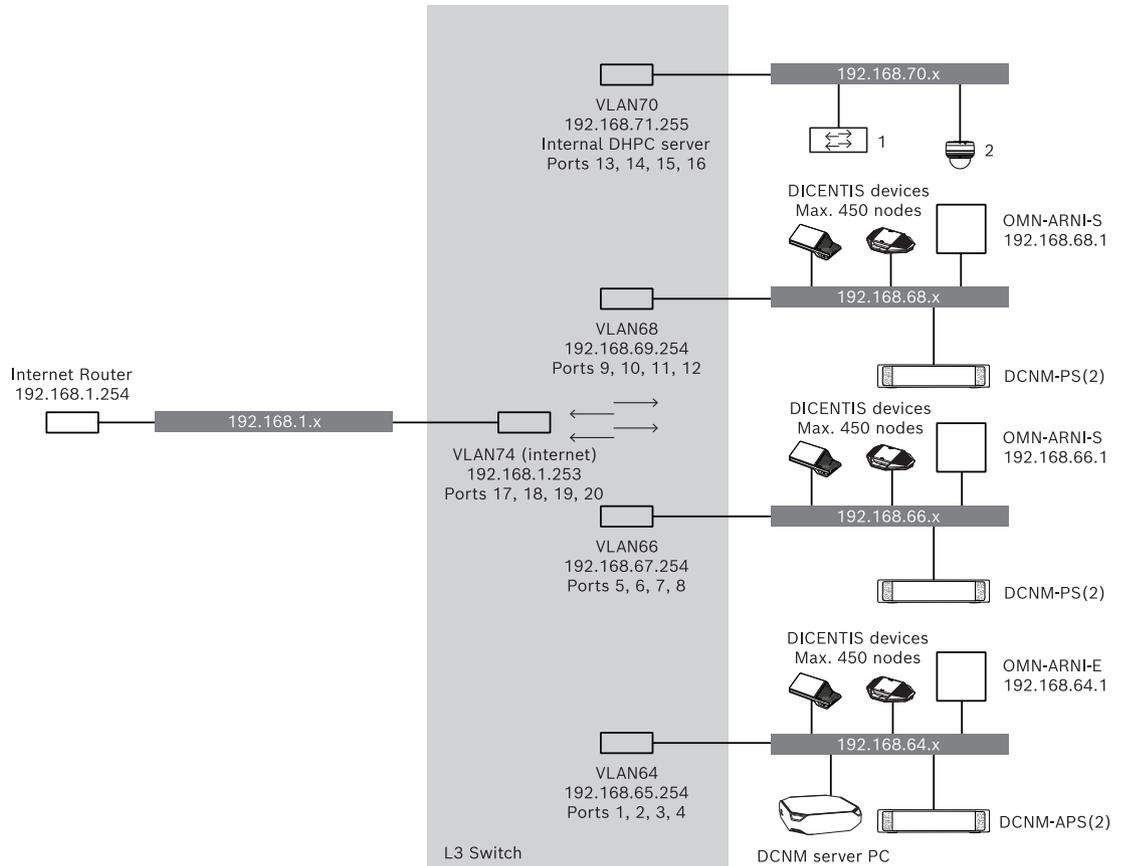


Figure 4.4: Typical DICENTIS Conference System with multiple subnets

- **1:** External video switcher.
- **2:** Dome camera.

Refer to

- *Typical system setup, page 15*

4.6 Redundancy options

DICENTIS Conference Systems can be created with network redundancy. This ensures that the system will continue to work if:

- a network cable is defective or accidentally disconnected.
- one of the components fails.

Different levels of redundancy can be created in the system depending on:

- the number of redundant components used in the system.
- the amount of redundant network cabling.

The following sections explain the redundancy options that can be used when designing your DICENTIS Conference System. Each option can be combined in the DICENTIS Conference System, providing you observe the redundant cabling limitations. Refer to:

- *Redundant cabling for DCNM-APS2/DCNM-PS2 units, page 36.*
- *Redundant server PC, page 37.*



Notice!

Rapid Spanning Tree Protocol (RSTP) must be enabled in the DICENTIS Conference System for these redundancy options to work correctly.

Refer to

- *Redundant cabling for DCNM-APS2/DCNM-PS2 units, page 36*
- *Redundant server PC, page 37*

4.6.1

Redundant cabling for DCNM-APS2/DCNM-PS2 units

This section describes how to create redundant cabling for DCNM-APS2 / DCNM-PS2 type units. The maximum number of Ethernet devices in the largest possible loop (including the root switch) is 22. In a system with no Ethernet switch(es), the APS is the root switch.

The total number of devices allowed in a loop depends on:

- The type of device connected in the loop (for example, DCNM-MMD2 devices consume more power than DCNM-DE devices).
- The length of the loop (cable also consumes power).

The figure shows how to calculate the number of devices in the loop. The grey line shows the largest loop. The # sign shows the way the devices are counted.

In the example below up to 19 ($22 - 3 = 19$) discussion devices can be connected.

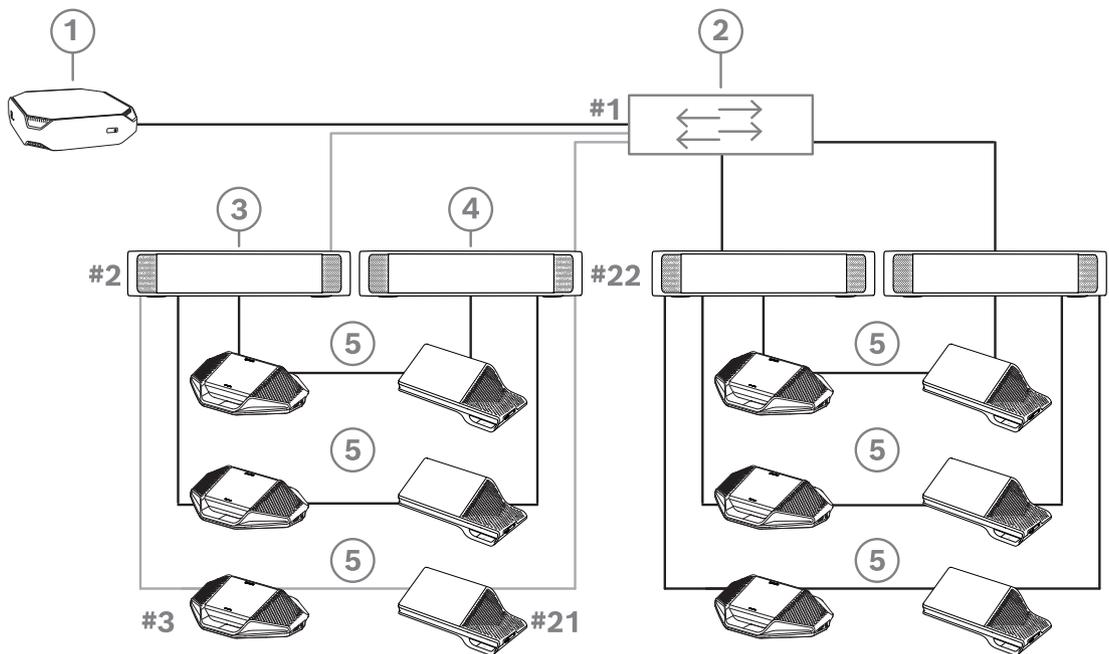


Figure 4.5: DICENTIS discussion devices connected with redundant cabling between DCNM-PS2 / DCNM-APS2 type units

1	DICENTIS system	2	Network switch (with optional redundant power supply)
3	DCNM-APS2	4	DCNM-PS2
5	DICENTIS cabling (redundant loop)		

Cabling possibilities (DCNM-APS2/DCNM-PS2)	Limitations/requirements
<p>Create a redundant loop by connecting the DICENTIS devices in a daisy chain configuration from a high power socket on a DCNM-PS2 / DCNM-APS2 to a high power socket on another DCNM-PS2.</p> <p>The redundant loop between two DCNM-PS2 units is for power and signal. If one of the DCNM-PS2 units fails, the other DCNM-PS2 unit will supply power and signal to the DICENTIS devices in the daisy chain.</p>	<p>The redundancy is for power and control. If the DCNM-APS2 fails, the devices remain connected, but audio is lost.</p> <p>To enable redundancy:</p> <ul style="list-style-type: none"> - Rapid Spanning Tree Protocol (RSTP) must be enabled in the DICENTIS Conference System. - a network switch with redundant power supply, should be connected to the DCNM-PS2 / DCNM-APS2 units, as shown in the previous figure.
<p>You can use any of the high power sockets (3, 4, or 5) on either of the DCNM-PS2 units to create the daisy chain/redundant loop. For example, high power socket 3 on one unit can be connected to high power socket 4 on another unit.</p>	<p>Note: The redundant loop must be connected to another DCNM-PS2 type unit. You cannot use DCNM-PS / DCNM-APS type units to create redundant loops for power.</p>
<p>You can create a redundant loop for signal only, by connecting the DICENTIS devices in a daisy chain configuration to the same DCNM-PS2 or DCNM-APS2, although this is not recommended.</p> <p>The DCNM-PS2 unit is designed to reduce cost of ownership, for example, by allowing a maximum of three redundant loops to be connected between two DCNM-PS2 units.</p>	<p>The redundant loop will protect against cable outages, but not against failure of a DCNM-PS2.</p>



Notice!

Rapid Spanning Tree Protocol (RSTP) must be enabled in the DICENTIS Conference System for these redundancy options to work correctly.

4.6.2

Redundant server PC

System availability can be improved by connecting a redundant DICENTIS server PC and the associated components and cables to the DICENTIS Conference System. The maximum number of Ethernet devices in the largest possible loop (including the root switch) is 22.

The total number of devices allowed in a loop depends on:

- The type of device connected in the loop (for example, DCNM-MMD2 devices consume more power than DCNM-DE devices).
- The length of the loop (cable also consumes power).

The figure shows how to calculate the number of devices in the loop. The grey line shows the largest loop. The # sign shows the way the devices are counted.

In the example below up to 17 ($22 - 5 = 17$) devices can be connected.

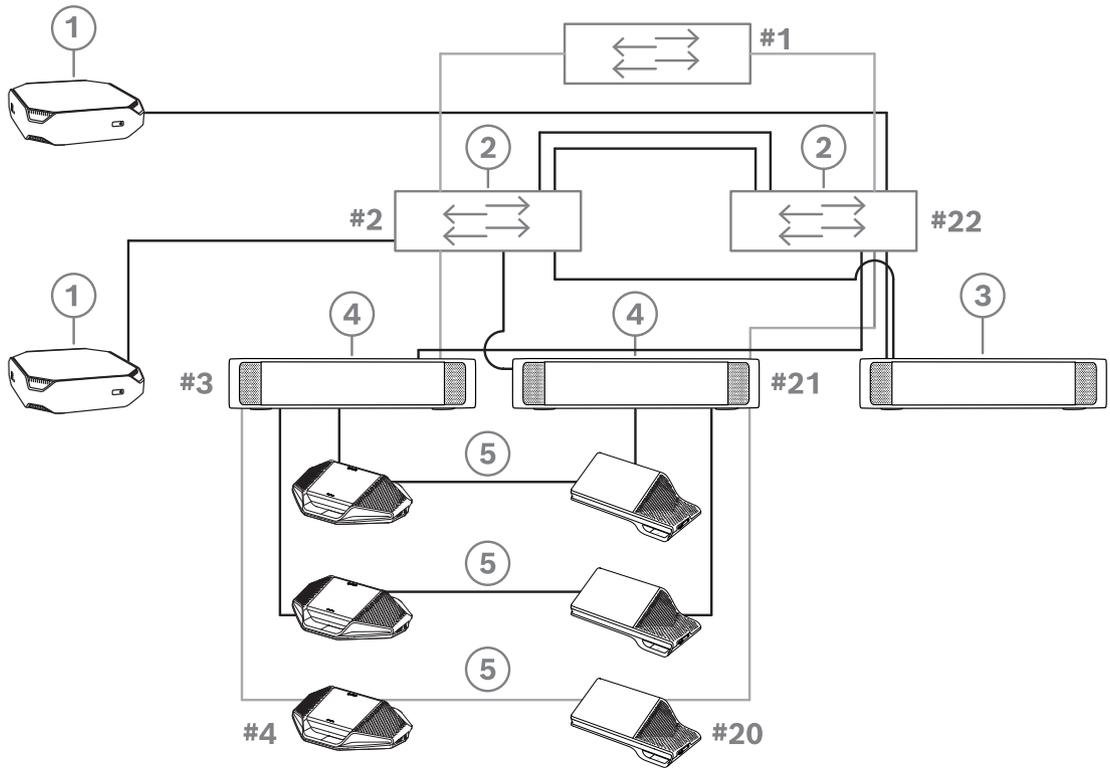


Figure 4.6: Redundant DICENTIS server PC with redundant components and cables

1	DICENTIS system	2	Network switch (with optional redundant power supply)
3	DCNM-APS2	4	DCNM-PS2
5	DICENTIS cabling (redundant loop)		

For this option to work the DICENTIS Conference System has to be run in combination with EverRun Enterprise software from Stratus Technologies. For more information, refer to the Stratus Technologies website.

Other options that can be used for guaranteeing the reliability of the DICENTIS Conference System include:

- Remote SQL servers.



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