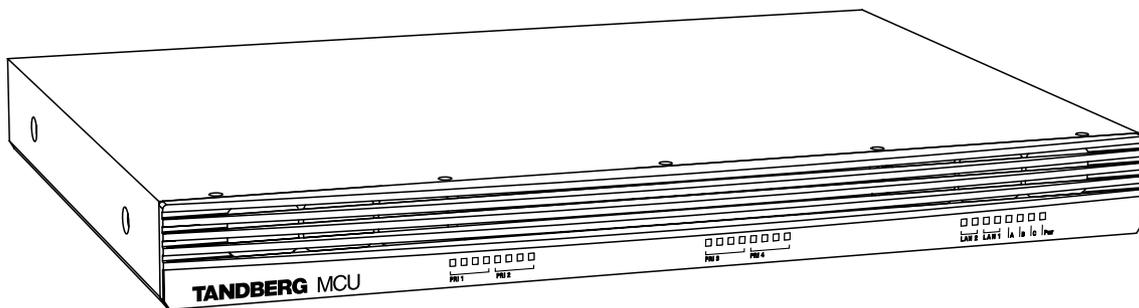


TANDBERG MCU

User Manual



Software version D3

D12911-03

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Environmental Issues

Thank you for buying a product which contributes to a reduction in pollution and thereby helps save the environment.

Our products reduce the need for travel and transport and thereby reduce pollution.

Our products have either no or few consumable parts (chemicals, toner, gas, paper).

Our products are low energy consuming products.

Waste handling:

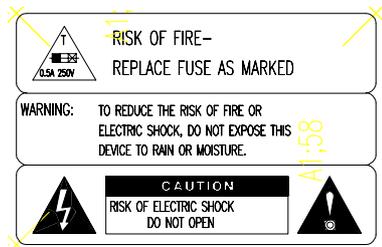
There is need to send material back to TANDBERG. Please contact your local dealer for information on recycling the product by sending the main parts of the product for disassembly at local electronic waste stations.

Production of products:

Our factories employ the most efficient environmental methods for reducing waste and pollution by ensuring that the products are recyclable.

Operator Safety Summary

For your protection, please read these safety instructions completely before operating the equipment and keep this manual for future reference. The information in this summary is intended for operators. Carefully observe all warnings, precautions and instructions both on the apparatus and in the operating instructions.



Equipment Markings

The lightning flash symbol within an equilateral triangle is intended to alert the user to the presence of uninsulated “dangerous voltages” within the product’s enclosure that may be of sufficient magnitude to constitute a risk of electrical shock.

The exclamation mark within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions within literature accompanying the equipment.

Warnings

Water and moisture - Do not operate the equipment under or near water - for example near a bathtub, kitchen sink, or laundry tub, in a wet basement, near a swimming pool or in areas with high humidity.

Cleaning - Unplug the apparatus from the wall outlet before cleaning or polishing. Do not use liquid cleaners or aerosol cleaners. Use a lint-free cloth lightly moistened with water for cleaning the exterior of the apparatus.

Ventilation - Do not block any of the ventilation openings of the apparatus. Install in accordance with the installation instructions. Never cover the slots and openings with a cloth or other material. Never install the apparatus near heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.

Grounding or Polarization - Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician.

Power-Cord Protection - Route the power cord so as to avoid it being walked on or pinched by items placed upon or against it, paying particular attention to the plugs, receptacles, and the point where the cord exits from the apparatus.

Attachments - Only use attachments as recommended by the manufacturer.



S3125A

Accessories - Use only with a cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.

Lightning - Unplug this apparatus during lightning storms or when unused for long periods of time.

ISDN cables - CAUTION - To reduce the risk of fire, use only No. 26 AWG or larger telecommunication line cord.

Servicing - Do not attempt to service the apparatus yourself as opening or removing covers may expose you to dangerous voltages or other hazards, and will void the warranty. Refer all servicing to qualified service personnel.

Damaged Equipment - Unplug the apparatus from the outlet and refer servicing to qualified personnel under the following conditions:

When the power cord or plug is damaged or frayed

If liquid has been spilled or objects have fallen into the apparatus

If the apparatus has been exposed to rain or moisture

If the apparatus has been subjected to excessive shock by being dropped, or the cabinet has been damaged

If the apparatus fails to operate in accordance with the operating instructions

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NOTE IMPORTANT
PLEASE READ THIS
SECTION
CAREFULLY FOR
OPTIMAL SYSTEM
SET-UP.

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Introduction

This User Manual is provided to help you make the best use of your TANDBERG MCU. The MCU enables sites on IP and sites on ISDN to participate in meetings with each other, and at the same time it offers superior quality and ease of use in one fully-featured multipoint control unit (MCU).

Main Features:

- Both ISDN and IP networks are supported at call rates of up to 2 Mbps for each call.
- Multiple simultaneous conferences.
- Up to 8 video sites and 8 telephony calls (optional: 16 video sites and 16 telephony calls) can supported at the same time, each benefiting from the same superb audio and video quality, and full featured TANDBERG functionality. The TANDBERG MCU can also be used purely as an audio-bridge.
- Secure Conference^{TF} - using standard based AES 128 and DES encryption.
- Best Impression^{TF} - Automatic selection of layout and resolution depending on number of meeting participants.
- Continuous Presence 5+1 and Continuous Presence 7+1 modes are supported, in addition to traditional Continuous Presence 4, Continuous Presence 9, Continuous Presence 16 and Voice Switched mode.
- Dual Stream - support for Duo Video^{TF} on both ISDN and IP, and People+Content on ISDN.
- Duo Video^{TF} - automatically distributed to conference participants supporting DuoVideo. Endpoints not supporting DuoVideo will receive main stream only.
- Downspeeding^{TF} - if channels are dropped during a videoconferencing session, the connection is automatically re-established without interruption.
- Audio and video transcoding to the best quality available.
- Secure Access - support XML/SOAP over HTTPS, Web (HTTP) encrypted password and the services Telnet, FTP, HTTP, HTTPS and SNMP can be disabled.
- Web-interface for system management, call management such as conference administrator, diagnostics and software uploads.
- Worldwide compatibility with standards-based videoconferencing systems.

Options:

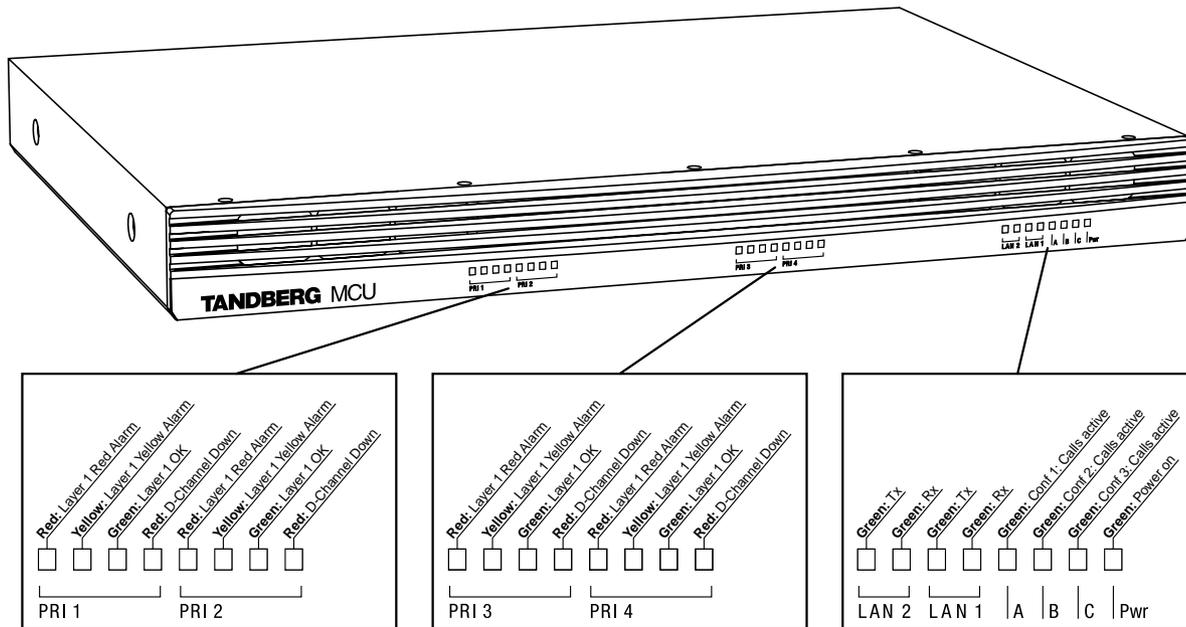
- Management using TANDBERG Management Suite.
- Scheduling using TANDBERG Scheduler. Simplifies scheduling and the use of video meeting resources through highly automated functionality.

TIP HELPFUL TIPS AND NOTES WILL APPEAR LIKE THIS.

The TANDBERG MCU

Front view

The front of the MCU contains 24 Light Emitting Diodes (LEDs) organized in three groups. These diodes provide information about PRI-line status, LAN (Ethernet) connection and power.

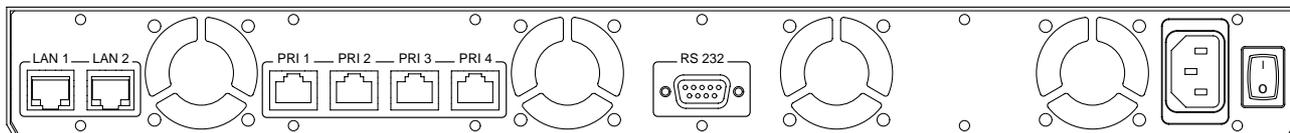


Red Alarm or Loss of signal (LOS) indicates that there is no signal and thus no framing info received. The same effect will be obtained by pulling out the PRI cable. This may also be caused by a broken connector in the receive (RX) part of the cable.

Yellow Alarm or Remote Alarm Indicator (RAI) means that the MCU is receiving framing info, but in this framing info the other side tells the MCU that it is not reading the MCU's transmitted framing info. Typically, this may be a broken connector in the transmit (TX) part of the PRI cable. This could also indicate weak or noisy signal in the transmit (TX) part of the PRI cable.

Rear view

The back panel provides four PRI interfaces, two LAN interfaces and one RS 232 interface located together with the power switch/connector and four cooling fans.



NOTE THE 'LAN 2' CONNECTOR IS NOT USED.

MCU Capacity – typical scenarios (16 video sites and 16 telephony calls option)

Below is an overview of the number of video calls possible to connect on different bandwidths, when 4xE1 (or 4xT1) PRI ISDN lines are connected. In addition to the video calls, telephony calls can also be added.

Bandwidth	Non-encrypted	Encrypted
128 kbps	16+16*	14
256 kbps	16+15	13
384 kbps	16+9	11
512 kbps	15+0	10
768 kbps	10+0	7
1472 kbps (1.5 Mbps)	5+5	N/A
1920 kbps (2 Mbps)	4+0	N/A

* 16+16 indicates 16 video calls and 16 telephone calls.

TIP TO INCREASE THE CAPACITY, THE MCU CAN BE CONNECTED IN A CASCADED CONFIGURATION. SEE 'APPENDIX 3: CAPACITY' FOR MORE DETAILS.

Installation

Precautions

- Never install telephone wiring during a lightning storm.
- Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
- Never touch uninstalled telephone wires or terminals unless the telephone line has been disconnected at the network interface.
- Use caution when installing or modifying telephone lines.
- Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electrical shock from lightning.
- Do not use the telephone to report a gas leak in the vicinity of the leak.
- The socket outlet shall be installed near to the equipment and shall be easily accessible.
- Never install cables without first switching the power OFF.
- This product complies with directives: LVD 73/23/EC, EMC 89/366/EEC, R&TTE 99/5/EEC.
- This product complies with the standards GR-63-CORE and GR-1089-CORE and is NEBS approved by UL .For NEBS compliance, the product should be installed in the following manner:
 - Use the enclosed rack brackets marked "NEBS".
 - There should be a clearance of 9.1cm between the product and any other product mounted in the rack.

Unpacking

To avoid damage to the unit during transportation, the MCU is delivered in a special shipping box which should contain the following components:

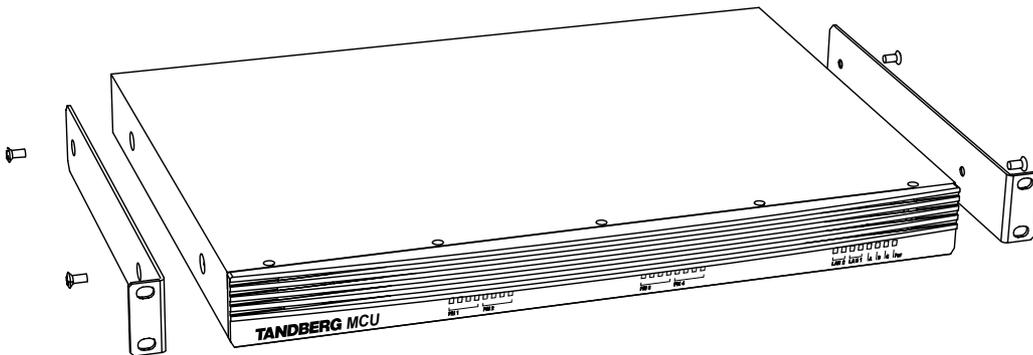
- TANDBERG MCU.
- User Manual and other documentation on CD.
- Rack-ears, screws and screwdriver.
- Cables:
 - Power cable
 - Four ISDN PRI cables
 - Ethernet cable
 - RS232 cable

Installation site preparations

- Make sure that the MCU is accessible and that all cables can be easily connected.
- For ventilation: Leave a space of at least 10cm (4 inches) behind the MCU's rear panel and 10cm (4 inches) in front of the front panel.
- The room in which you install the MCU should have an ambient temperature between 0°C and 35°C (32°F and 95°F) and between 10% and 90% non-condensing relative humidity.
- Do not place heavy objects directly on top of the MCU.
- Do not place hot objects directly on top, or directly beneath the MCU.
- Use a grounded AC power outlet for the MCU.
- You will need a CSU (Channel Service Unit) between the MCU and the PRI line from your network provider.

Rack Mounting (optional)

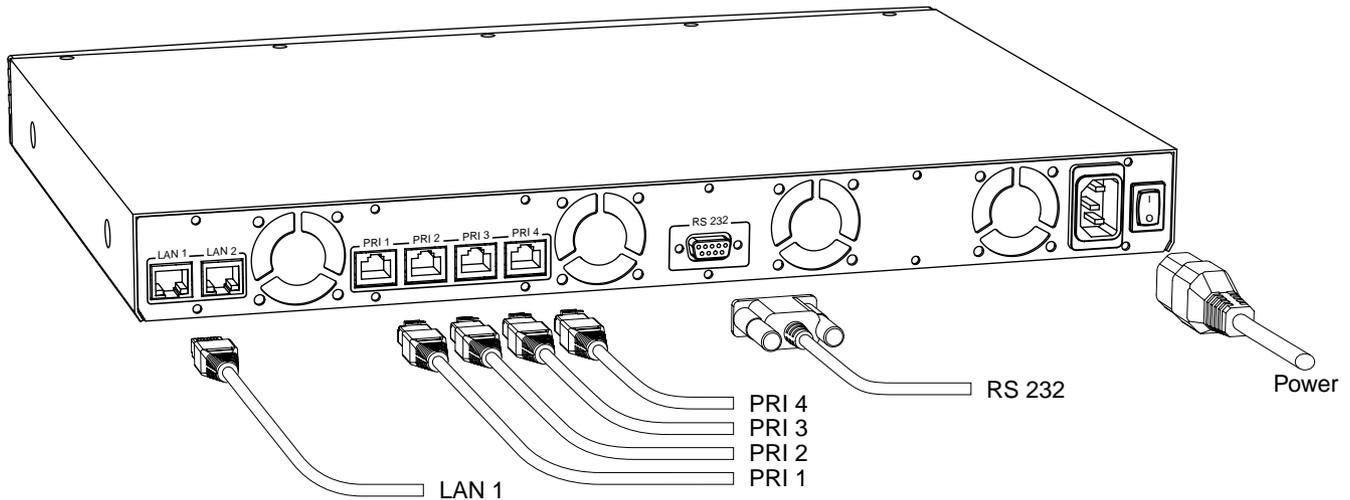
The MCU comes with brackets for mounting in standard 19" racks.



NOTE BEFORE STARTING THE RACK MOUNTING, PLEASE MAKE SURE THE TANDBERG MCU IS PLACED SECURELY ON A HARD, FLAT SURFACE.

1. Disconnect the AC power cable.
2. Make sure that the mounting space is according to the 'Installation site preparations' (see above).
3. Attach the brackets to the MCU on both sides of the unit.
4. Insert the MCU into a 19" rack, and secure with screws in the front (four screws).

Connecting cables



Power cable

Connect the system power cable to an electrical distribution socket.

ISDN PRI cables

For each of the four PRI interfaces, the E1/T1 cable should be connected to a CSU (Channel Service Unit). You will need a CSU between your MCU and the PRI line from your network provider.

LAN cable

To use the MCU on IP, connect a LAN cable from the 'LAN 1' connector on the MCU to your network. The 'LAN 2' connector is not used and should be left open.

RS 232 cable

To control the MCU using the dataport, connect an RS 232 cable between the MCU's RS 232 connector and the COM-port on a PC. For further information, please refer to the 'Dataport Configuration' section under 'Configure the MCU'.

MCU Configuration

The MCU requires some basic configurations before it can be used. It will be necessary to find the IP-address and program the ISDN-PRI Line numbers.

To do this configuration, follow the instructions below:

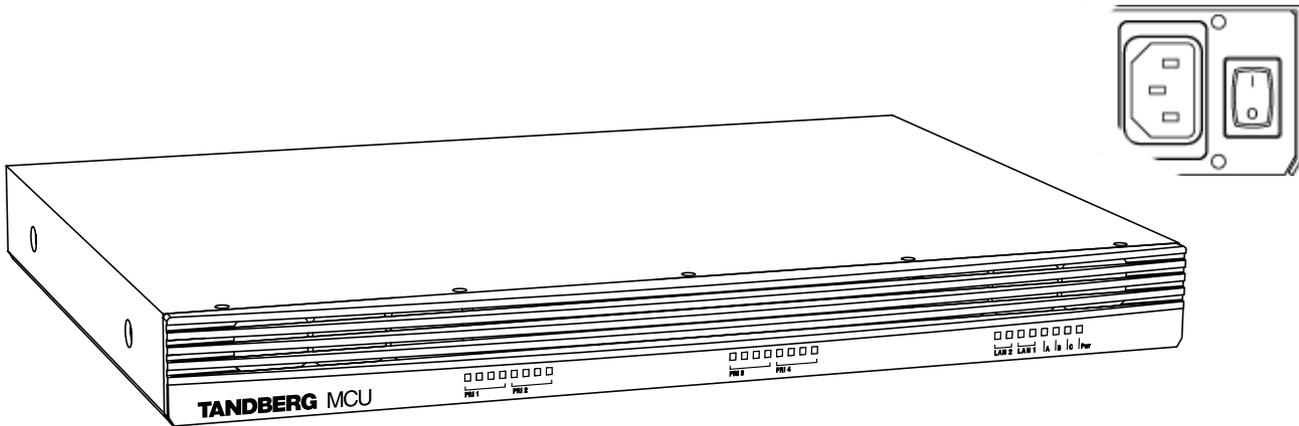
1. Connect the RS232 cable between the MCU and a PC and then switch on the MCU.
2. Start a terminal program on the PC and configure it to: 9600, 8, 1, None.
- 3a. To assign a static IP-address, type 'ipassign static' and 'ipaddress 1 static <IP-address>'.
3b. To assign an IP Subnetmask, type 'ipaddress 1 subnetmask <subnetmask>'.
3c. To assign an IP Gateway address, type 'ipaddress 1 gateway <gateway IP-address>'.
4. Restart the MCU.

TIP DHCP ASSIGNED IP-ADDRESSES ARE SUPPORTED BY THE TANDBERG MCU (FACTORY DEFAULT).

5. Start a WEB browser and enter the IP-address of the MCU. Default password: 'TANDBERG'.
6. To configure the MCU for ISDN dial in, enter the PRI numbers and dial in number(s). For details, see the 'PRI Configuration' section and the 'MCU Dial In Numbers' section under 'Configure the MCU'.
7. To configure the MCU for IP dial in, register the MCU to a gatekeeper and enter the H.323 Numbers. For details, see the 'H.323 Configuration' section and the 'MCU Dial In Numbers' section under 'Configure the MCU'.

MCU start-up

To start the MCU, make sure that the power cable is connected, and press the power switch button to '1'.



On the front panel of the MCU the power indicator LED, marked 'Pwr', will now turn GREEN.

Accessing the MCU

You may access the MCU by entering the IP-address of the MCU in a standard WEB-browser. You will then be asked to enter a password. It is not necessary to enter 'User Name'. The default password for the MCU is 'TANDBERG'. Remember that the password is case sensitive.



TIP IF YOU DO NOT KNOW THE IP-ADDRESS, PLEASE FOLLOW THE PROCEDURE IN THE 'MCU CONFIGURATION' SECTION UNDER 'INSTALLATION'.

TIP THE PASSWORD CAN BE CHANGED IN THE 'SYSTEM CONFIGURATION', 'MISC' TAB. SEE ALSO THE 'MISCELLANEOUS CONFIGURATION' SECTION UNDER 'CONFIGURE THE MCU'.

Using the MCU

Conference Overview

The following Web page, called '**Conference Overview**' will be shown when the correct password has been entered and shows all conferences currently active on the MCU.

Auto-refresh?

Conference	Videos	Telephones	ISDN Ch.	IP Bandwidth	Duration	Allow Incoming Calls	Encryption	Password
1. MCU Conference	6 (max. 16)	1 (max. 16)	13	1536.0	6m. 18s.	yes	—	—
2. MCU Conference	3 (max. 16)	0 (max. 16)	12	384.0	5m. 17s.	yes	(DES) / (AES 128)	
3: [Idle]								

Status

PRI	more...
H.323	more...

Usage

Video Calls	9 of 16
Telephone Calls	1 of 16
ISDN Channels	25 of 120
Total Bandwidth	3456 kbps of 7680 kbps

ISDN Numbers	H.323 Numbers
Conference 1	67828668 9222
Conference 2	67828669 9223
Conference 3	67828673 9224

Conference

Shows each active conference.

MCU Conference

A conference is active. Click on [MCU Conference](#) to see conference status in details. It is possible to change the conference name.

[Idle]

No conference is active. Click on [\[Idle\]](#) to set up a new conference.

Videos

Shows the number of connected video sites and the maximum number of allowed video sites in the conference.

Telephones

Shows the number of connected telephones and the maximum number of allowed telephones in the conference.

ISDN Ch.

Shows the total number of ISDN channels used in the conference.

IP Bandwidth

Shows the total IP bandwidth used in the conference.

Duration

Shows the call duration of the conference.

Allow Incoming Calls

yes Participants can dial in to the conference.

no No incoming calls are allowed. The MCU must dial out to all participants.

Encryption (Secure conference^{TF})

The MCU supports Secure Conference DES and AES.



The single padlock symbol indicates that DES (56 bit) encryption is used.



The double padlock symbol indicates that AES (128 bit) encryption is used.



Indicates that the conference is not encrypted.

NOTE ENABLING ENCRYPTION WILL REDUCE THE CAPACITY OF THE MCU.

Password

For privacy, a conference can be password protected.



The key lock symbol indicates that a valid password is required for all participants dialing in to the conference.



Indicates that the conference is not password protected.

Status

Shows current PRI and IP connection status.

PRI:



Minimum one PRI line is synced and active. Click on [More...](#) for details.



No PRI lines are active. Click on [More...](#) for details.

H.323:



The MCU is registered with a Gatekeeper. Click on [More...](#) for details.



The MCU is not registered with a Gatekeeper. Click on [More...](#) for details.

Usage

Shows the current status of all the available resources (Video, Telephone, ISDN Channels, Total Bandwidth).

Video Calls	4 of 16, indicate that four video calls are connected to the MCU. Maximum is 16.
Telephone Calls	0 of 16, indicate that no telephone calls connected to the MCU. Maximum is 16.
ISDN Channels	12 of 120, indicate that 12 ISDN channels are used on the MCU. Maximum is 120.
Total Bandwidth	1536 kbps of 7680 kbps, indicate that 1536 kbps bandwidth is used on the MCU. Maximum is 7680 kbps.

ISDN Numbers

Shows the ISDN dial-in numbers for Conference 1, Conference 2 and Conference 3.

TIP

FOR MORE INFO ABOUT ISDN NUMBERS, SEE THE 'MCU DIAL IN NUMBERS' SECTION UNDER 'CONFIGURE THE MCU'.

H.323 Numbers

Shows the H.323 dial-in numbers for Conference 1, Conference 2 and Conference 3.

TIP

FOR MORE INFO ABOUT H.323 NUMBERS, PLEASE READ THE 'MCU DIAL IN NUMBERS' SECTION UNDER 'CONFIGURE THE MCU'.

Set up a new conference

To set up a new conference, click on 'Conference 1, 2 or 3' to begin a new conference. Shown below is the set up for 'Conference 3'.

Conference 3: [Idle]

Conference Configuration

Name	MCU Conference
Default Call Type	384 kbps
Restrict (56K)	<input type="checkbox"/>
Allow Incoming Calls	<input checked="" type="checkbox"/>
Cascading Mode	Auto
Max Call Duration	0 minutes
Legacy Mode	<input type="checkbox"/>
Floor to Full Screen	<input checked="" type="checkbox"/>
Billing Code	
Video	
Picture Mode	Auto
Video Format	Auto
Video Custom Formats	<input checked="" type="checkbox"/>
Duo Video & P+C	<input checked="" type="checkbox"/>
Audio	
Audio Levelling (AGC)	<input checked="" type="checkbox"/>
Telephone Noise Suppression	<input checked="" type="checkbox"/>
Allow G.728	<input checked="" type="checkbox"/>
Security	
Password	
Encryption	<input type="checkbox"/>
Encryption Mode	Auto
Participants	
Video Participant Limit	16
Telephone Participant Limit	16
Welcome Picture and Sound	<input checked="" type="checkbox"/>
Entry and Exit Tones	<input checked="" type="checkbox"/>

Add Participants Create Only Cancel

TIP TO MODIFY THE DEFAULT CONFERENCE TEMPLATE, SEE THE 'CONFERENCE TEMPLATE' SECTION UNDER 'CONFIGURE THE MCU'.

Conference Configuration

Name	Name of the conference. The conference name will be shown on the 'Conference Overview' page and on the 'Conference Status' page.
Default Call Type	<p>Specifies the default call rate that the MCU shall use when dialing to a participant. It is also the maximum rate allowed in the conference. If a participant does not support this rate, the MCU will connect at the highest rate possible.</p> <p>The call rate can be set to: Telephone, 64 kbps, 2x64(h221) kbps, 128 kbps, 192 kbps, 256 kbps, 320 kbps, 384 kbps, H0 (384 kbps), 512 kbps, 768 kbps, 1152 kbps, 1472 kbps and 1920 kbps.</p> <p>If 'Telephone' is selected, an audio bridge will be created and no video participants will be able to join.</p>
Restrict (56K)	<p>When unselected, the MCU will set up a non-restricted call and downspeed to 56kbps if necessary. Select 'Restrict (56)' if the MCU should set up restricted calls by default.</p> <p>Non-restricted and restricted calls are supported in the same conference.</p>
Allow Incoming Calls	When selected, incoming calls are automatically answered. If unselected, all incoming calls will be rejected.
Cascading Mode	<p>Used when two or more conferences are joined together.</p> <p>Auto will automatically determine which conference is 'master' and which conference(s) are 'slave'. The 'master' conference will have control over the video layout. When left in 'Auto', the conference dialing in to the other conferences, will become the 'master'.</p> <p>Master should be used when this conference is the one controlling the video layout for the whole conference. It is not recommended to have more than one 'master' in a conference.</p> <p>Slave should be used when another conference manually has been assigned 'master'. The slave will be forced to Voice Switched mode.</p>
Max Call Duration	Determines the maximum duration of the conference and will automatically terminate the conference when the specified 'Max Call Duration' has been reached. 10 minutes, 5 minutes and one minute prior to this, a warning will be displayed to all the video participants in this conference, indicating the remaining time. The conference administrator can extend the time. The timer for the max call duration will not begin until the first participant is connected.

Legacy Mode

When connecting older videoconferencing endpoints to the MCU, problems can occur since older equipment sometimes do not handle modern capabilities. When selected, some capabilities are not being sent from the MCU. Please refer to the software release document for more information.

Floor to Full Screen

This function only applies for the Continuous Presence 5+1 and 7+1 layout.

When selected, the participant requesting the floor, will be shown in full screen to all the other video participants, regardless of current speaker. The same will happen if the conference administrator 'Assign Floor' to a site.

When unselected, the participant requesting the floor, will be shown in the larger quadrant of the 5+1 or 7+1 layout.

Billing Code

When defining a conference, a specific billing code can be assigned to it. All calls in this conference will be associated with this billing code. Management tools, such as the TANDBERG Management Suite, can then use it for billing purposes.

Video**Picture Mode**

Defines the picture layout for the conference.

Auto (Best Impression^{TF}) will automatically select Enhanced CP (see below).

Voice Switched will show the current speaker in full screen to all the other participants, regardless of how many participants in the conference. Current speaker will see the previous speaker.



Enhanced CP will automatically select the most suitable picture layouts depending on the number of video participants in the conference. For up to two video participants, both sites will receive a full screen view of the far end. For three to six video participants, the Continuous Presence 5+1 mode is used. For seven and more participants, the Continuous Presence 7+1 mode is used.



Traditional CP will automatically select between Continuous Presence 4 mode, Continuous Presence 9 mode and Continuous Presence 16 mode. For up to two video participants, both sites will receive a full screen view of the far end. For up to four video participants, the Continuous Presence 4 mode is used. For five and up to nine, the Continuous Presence 9 mode is used. For ten and more participants, the Continuous Presence 16 mode is used.



Continuous Presence 4 will split the screen into four equal quadrants where each participant is shown in one quadrant. If there more than four video participants, the last four speakers will be shown. With less than four video participants, the 'empty' quadrants will be black.



Continuous Presence 5+1 will split the screen into one larger quadrant and five smaller quadrants where each participant is shown in one quadrant. The current speaker will be shown in the larger quadrant to all other participants. Current speaker will see the previous speaker in the larger quadrant. If there are more than six video participants, the last six speakers will be shown. With less than six video participants, the 'empty' quadrants will be black.



Continuous Presence 7+1 will split the screen into one larger quadrant and seven smaller quadrants where each participant is shown in one quadrant. The current speaker will be shown in the larger quadrant to all other participants. Current speaker will see the previous speaker in the larger quadrant. If there are more than eight video participants, the last eight speakers will be shown. With less than eight video participants, the 'empty' quadrants will be black.



Continuous Presence 9 will split the screen into nine equal quadrants where each participant is shown in one quadrant. If there more than nine video participants, the last nine speakers will be shown. With less than nine video participants, the 'empty' quadrants will be black.



Continuous Presence 16 will split the screen into sixteen equal quadrants where each participant is shown in one quadrant. With less than sixteen video participants, the 'empty' quadrants will be black.

Video Format

Defines the video format used in the Continuous Presence mode.

Auto (Best Impression^{TF}) will automatically select the most suitable video format depending on the Picture mode used in the conference. In Voice Switched and Continuous Presence 4 mode, the MCU will select 'Motion (CIF)' displaying up to 30 frames per second (fps). In Continuous Presence 5+1, 7+1, 9 and 16 mode, the MCU will select 'Motion (CIF)' if the call rate is below 256 kbps and 'Sharpness (4CIF)' when the call rate is 256 kbps or higher.

Sharpness (4CIF) will prioritize crisp and clear picture and transmit the highest common format, preferably H.263 4CIF.

Motion (CIF) will prioritize motion and show up to 30 fps in CIF resolution and transmit the highest common format, preferably H.263 CIF.

In Voice Switched mode or Continuous Presence 4 mode, with H.264 enabled and only one conference active, the MCU will prioritize H.264 CIF as the highest common format.

Video Custom Formats

Custom formats such as SIF and VGA resolutions are supported when the 'Video Custom Format' is selected. It allows true resolution to be maintained, rather than being scaled to another format. This is of particular benefit to users of NTSC and VGA resolutions, ensuring that their images are not scaled to fit with the PAL standard.

DuoVideo & P+C

The MCU supports DuoVideo^{TF} on both ISDN and IP, and People+ContentTM on ISDN. When unselected, no DuoVideo^{TF} or People+ContentTM capabilities will be transmitted.

Audio

Audio Levelling (AGC)

Ensures that all participants receive the same audio level from all other participants, regardless of the levels transmitted.

When selected, the MCU maintains the audio signal level at a fixed value by attenuating strong signals and amplifying weak signals. Very weak signals, i.e. noise alone, will not be amplified.

Example: In most conferences, the participants will speak at different levels. As a result, some of the participants are harder to hear than others. The Audio Levelling corrects this problem by automatically increasing the microphone levels when "quiet" or "distant" people speak, and by decreasing the microphone levels when "louder" people speak.

Telephone Noise Suppression Attenuates the noise which normally is introduced when adding mobile phones to a conference. The background noise normally heard when the telephone participant is not speaking will be attenuated.

Allow G.728

The MCU supports high quality audio even on low call rate. On low call rate the MCU will prioritize G.722.1. Video participants not supporting this, will receive low quality audio G.728 instead, when 'Allow G.728' is selected. To ensure high quality audio on low call rate, unselect 'Allow G.728' and video participants not able to support G.722.1, will receive G.722 instead.

Security

Password



Encryption



This setting can be used to ensure that only authorized participants are able to join the conference. The password entered in this field, will be the password a participant must enter to join the conference. This password can only contain digits.

When dialing into a password protected conference, the participant is met with the 'Password Enquiry' screen and sound, asking the participant to enter a password. This can be performed via a menu generated by the videoconferencing system (H.243 Password) or via DTMF (telephone) tones. Until the correct password is entered, the participant will not be able to hear or see any of the other participants. After entering the correct password and confirming (typically by pressing 'OK'), the participant will join the conference. When using DTMF tones, the MCU will automatically accept the password without having to press a confirmation key.

Should the password be incorrect, the participant is met with the 'Password Incorrect' screen and after a few seconds, the 'Password Enquiry' screen and sound appear again. If the participant enters a wrong password three times, the participant will be disconnected.

If no password is entered in this field, participants can join the conference without entering a password.

The MCU supports Secure conference^{TF}. When selected, all participants in the conference must support at least standard DES encryption (available on all TANDBERG endpoints using software version B4.0 or later). Participants not supporting encryption will be shown the 'Encryption Required' screen for 60 seconds before they are disconnected from the conference.

NOTE IN A SECURE CONFERENCE, THERE IS NO SUPPORT FOR TELEPHONE PARTICIPANTS.

TIP IN A SECURE CONFERENCE, THE MAXIMUM NUMBER OF PARTICIPANTS ARE AS FOLLOWS:

14 SITES WHEN USING	128 KBPS PER SITE
13 SITES	256 KBPS
11 SITES	384 KBPS
10 SITES	512 KBPS
7 SITES	768 KBPS

Encryption Mode

This settings only applies if 'Encryption' is selected (see above).

Auto will use the highest level of encryption available on each of the participants connected in the conference. This means that there can be a mix of DES and AES encrypted connections in the same conference.

AES 128 will only allow participants with AES 128* bit encryption capabilities. Participants without this capability will not be able to join the conference.

DES will only allow participants with DES 56 bit encryption capabilities. Participants without this capability will not be able to join the conference.

Participants**Video Participant Limit**

Defines the maximum number of Video Participants allowed in the conference.

Telephone Participant Limit

Defines the maximum number of Telephone Participants allowed in the conference.

Welcome Picture and Sound

When selected, a Welcome screen and audio message will be shown to each new participant of the conference.

TIP

THE WELCOME SCREEN AND SOUND CAN BE CUSTOMIZED IN THE 'FILE MANAGEMENT' SECTION UNDER 'CONFIGURE THE MCU'.

Entry and Exit Tones

When selected, a tone signal will be heard each time a participant is entering or leaving the conference.

Add Participants

Selecting 'Add Participants' will create a conference with the above-specified configuration and at the same time, the MCU will open the 'Add Participants' page. Here the conference administrator can add participants from the phone book or manually dial one.

Create Only

Selecting 'Create Only' will create a conference with the above-specified configuration, without dialing out to any participants.

Cancel

Selecting 'Cancel' will discard all changes made and return to the 'Conference Overview' page.

* Optional feature on all DES encryption capable TANDBERG endpoints

Manage an active conference

To view conference 1 in detail, open 'Conference 1' as shown in the figure below.

Participant	Status	Net	Audio	Video	DuoVideo	In Picture	Actions
1 Meetingroom 1	Connected, 352 kbps	H323					
2 Copenhagen	Connected, 224 kbps	H323					
3 Corner room	Connected, 352 kbps	H323					
4 UK consultant	Connected, 384 kbps	H320					
5 Marketing Dep.	Connected, 384 kbps	H320					
6 Sales Department	Connected, 384 kbps	H320					
7 Consultant	Connected	ISDN					
Showroom 1	Disconnected [16]						

Conference Status

Numbers (ISDN/IP)

Shows the conference ISDN and IP dial in number. Each conference has separate dial in numbers.

Call Duration

Shows the call length of the current conference.

Video Out

Shows the outgoing video rate, video encoding algorithm and resolution that is transmitted from the MCU to the participants.

DuoVideo Out	<p>If one of the participants is transmitting DuoVideo, the outgoing DuoVideo rate, DuoVideo encoding algorithm and resolution is shown here.</p> <p>Participants not capable of receiving DuoVideo, will only receive the main video.</p>
Picture Mode	<p>Shows the selected picture mode layout. Several layouts are available:</p> <p>Auto, Voice Switched, Enhanced CP, Traditional CP, Continuous Presence 4, Continuous Presence 5+1, Continuous Presence 7+1, Continuous Presence 9 and Continuous Presence 16.</p> <hr/> <p>TIP FOR MORE DETAILS ON PICTURE MODE, SEE THE 'CONFERENCE CONFIGURATION' SECTION UNDER 'USING THE MCU'.</p> <hr/>
Encryption	<p>Shows what type of encryption is allowed for the conference.</p> <hr/> <p>NOTE IN AN ENCRYPTED CONFERENCE, CONFERENCE SNAPSHOTS ARE NOT AVAILABLE.</p> <hr/>
Password	<p>Shows the key symbol if a dial in password has been assigned to the conference. If no key symbol is present, the conference is not password protected.</p>
Video/Telephone Participants	<p>Shows the current number of video and telephone participants in the conference. The maximum allowed number of participants are shown in brackets.</p>
Conference Mode	<p>'Stand Alone' indicates that a normal conference is active.</p> <p>'Cascading Master' indicates that this conference has become Master when connecting to another MCU. If the 'Warning: Multiple masters, irregular behavior expected' is seen, more than one conference has been forced to 'master', which is <u>not</u> recommended!</p> <p>'Cascading Slave' indicates that this conference has become Slave when connecting to another MCU.</p>
Conference Snapshot	<p>Shows a snapshot of the video transmitted from the MCU to the participants. Click on the picture to enlarge it in a separate window.</p>
DuoVideo Snapshot	<p>Shows a snapshot of the DuoVideo transmitted from the MCU to the participants. Click on the picture to enlarge it in a separate window.</p>

Add Participants

To add new participants to the conference, press 'Add Participants' and the 'Add Participants' window is shown.

Conference 1: MCU Conference

Add Participants

Phone Book		
Front room	10.47.40.9	Auto
Marketing Dep.	67828608	Auto
Marketing	(Group,4)	
Meetingroom 2	98609	H323
Meetingroom 3	67828605	ISDN
Reception	67117777	ISDN
RoofCam	192.212.161.69	H323
Sales Department	67828606	Auto
Sales meeting	(Group,5)	
Service Center	97790	H323
Showroom 3	67828620	ISDN
Singapore	006567206385	ISDN
Sydney	0061282261400	ISDN
Toyko	0081356523601	ISDN

Copy entry to Manual Dial

Manual Dial

Number:

Call Type:

2nd Number:

Dial Profile:

Sub Address:

Restrict (56K):

Add -->

<- Remove

Participants		
Hong Kong	0085229381800	ISDN
Beijing	00861084981067	ISDN
Meetingroom 1	67828609	Auto
Showroom 1	67828615	Auto
Corner room	67828609	Auto

Call Participants Cancel

Select the participant(s) from the Phone book and press 'Call Participants'. If a participant is not listed, use the 'Manual Dial' area instead. To add several participants at the same time, use the 'Add -->' button. Use 'Copy entry to Manual Dial' to modify an existing participant.

Conference Configuration

To change the conference configuration for this conference, press 'Conference Configuration' and the 'Conference Configuration' window is shown. Some settings cannot be changed when a conference is active.

Disconnect All

To disconnect all participants in the conference, press 'Disconnect All'. A confirmation window will be shown. Press 'OK' to disconnect.

This will not end the conference itself, just disconnect all the participants in it.

End Conference

To end the conference completely, press 'End Conference'. A confirmation window will be shown. Press 'OK' to end the conference.

The conference will lose its configuration and will be set to [idle] in the 'Conference Overview' page.

Basic view

Provides a basic overview of all the participants in the conference.

Participant	Status	Net	Audio	Video	DuoVideo	In Picture	Actions
1 Meetingroom 1	Connected, 352 kbps	H323					
2 Copenhagen	Connected, 224 kbps	H323					
3 Corner room	Connected, 352 kbps	H323					
4 UK consultant	Connected, 384 kbps	H320					
5 Marketing Dep.	Connected, 384 kbps	H320					
6 Sales Department	Connected, 384 kbps	H320					
7 Consultant	Connected	ISDN					
Showroom 1	Disconnected [16]						

Participants

Shows the name of the participants.

Status

Shows the status of the connection.

Establ Out

Shown during call setup between the participant and the MCU.

Alerting

Waiting for the participant to answer the outgoing call.

Connected, 384 kbps

The participant is connected at 384 kbps bandwidth.

Requesting Password

To join the conference. the participant is requested to enter the conference password.

Initiating Encryption

Encryption is being initiated between the MCU and the participant.

Disconnected The participant has either disconnected or been disconnected by the conference administrator.

Clear Out The MCU is currently disconnecting the participant.

Net

Shows the network protocol used for the connection.

H323 The participant is connected on IP using the H.323 protocol.

H320 The participant is connected on ISDN using the H.320 protocol.

ISDN The participant is connected on ISDN as a telephone.

Audio

Shows the audio status for each participant.



The participant is transmitting audio.



The participant has muted the microphone.



The participant is connected as a telephone.



The conference administrator has manually muted the participant.

Video

Shows the video status for each participant.



The participant is transmitting video.



The participant is not transmitting video, for instance when the participant has set the video to 'Off'.

DuoVideo

Shows the DuoVideo status for each participant.



The participant is transmitting DuoVideo.



The participant is receiving DuoVideo.

In Picture

Shows the current Picture Mode and where each participant is displayed in the outgoing video image from the MCU.



The participant is in a Voice Switched conference and currently transmitting video to all the other participants.



The participant is in a conference with Continuous Presence 5+1 layout and is currently transmitting video to all the other participants in the larger quadrant.



The participant is in a conference with Continuous Presence 7+1 layout and is currently transmitting video to all the other participants in the larger quadrant.



The participant is in a conference with Continuous Presence 4 layout and is currently transmitting video to all the other participants in the top left quadrant.



The participant is in a conference with Continuous Presence 9 layout and is currently transmitting video to all the other participants in the top left quadrant.



The participant is in a conference with Continuous Presence 16 layout and is currently transmitting video to all the other participants in the top left quadrant.



The participant has requested the floor or has been assigned the floor by the conference administrator and is transmitting video to all the other participants.

Actions

During the conference, the conference administrator is able to control each participant.



To disconnect a participant, press the 'Disconnect' button. A confirmation window will be shown. Press 'OK' to disconnect.



If a participant has been disconnected from the conference, the 'Redial' button is shown. Press the button to reconnect the participant. The button is only available for outgoing MCU calls.



To assign the floor to a participant, press the 'Assign Floor' button. The participant is then transmitting video to all the other participants. The participants can also perform this function themselves, if they support the Request Floor (H.243 MVC) functionality.



To release the floor again, press the 'Release Floor' button. This button is shown if the floor has been assigned by the conference administrator or if the participant have request the floor themselves.



To mute a participant, press the 'Mute Site' button and the participant will not be heard by the other participants. Note that muted participants will not be able to 'un mute' themselves, since this is done on the MCU. The participants can independently of this function, mute their microphone locally on their system.



To un-mute a participant again, press the 'Un Mute' button. This button is only shown if the audio has been muted by the conference administrator.

Advanced view

Gives detailed information on the audio in, audio out and video in protocols and the bandwidth used by these protocols. For full participant details, click in the participant name and a 'Call Info' page is shown.

Participant	Status	Net	Audio In	Audio Out	Video In	DuoVideo	In Picture	Actions
1 Meetingroom 1	Connected, 352 kbps	H323	G722 @64	G722 @64	H263+ CIF@320	Rx Duo		
2 Copenhagen	Connected, 224 kbps	H323	G722 @64	G722 @64	H263+ CIF@160	Tx XGA@160		
3 Corner room	Connected, 352 kbps	H323	G722 @64	G722 @64	H263+ CIF@320	Rx Duo		
4 UK consultant	Connected, 384 kbps	H320	G722 @56	G722 @56	H263 CIF@326	Rx Duo		
5 Marketing Dep.	Connected, 384 kbps	H320	G722 @56	G722 @56	H263 CIF@326	Rx Duo		
6 Sales Department	Connected, 384 kbps	H320	G722 @56	G722 @56	H263 CIF@326	Rx Duo		
7 Consultant	Connected	ISDN	G711 @64	G711 @64				
Showroom 1	Disconnected [16]							

Terminal List

List the participants in the conference. If the conference is cascaded to another conference, this is also shown here.

Basic	Advanced	Terminal List
Terminal List		
1. MCU Conference (Local) (Master)		
2. Sales Department		
3. Meetingroom 1		
4. V54000		
5. Corner room		
6. Marketing Dep.		
7. AsiaPac MCU (Slave)		
2. China office		
3. Beijing office		
4. Japan office		
5. Sydney		
6. Tokyo office		
8. MCU B - GLCRZEG (Slave)		
2. Accounting		
3. Main Boardroom		
4. Baltimore Office		
5. Marketing		
6. Downtown Office		

Manage the Phone Book

By selecting the **'Phone Book'** tab, you can add new or edit existing Phone Book entries in the MCU.

The Phone Book can be used to dial out to a participant, either through ISDN or IP, and can contain up to 99 single entries and 16 group entries. They are listed alphabetically as can be seen in the figure below.

The screenshot shows the 'Edit Phone Book' window in the Tandberg MCU. The window has a title bar with tabs for 'Conference', 'Phone Book', 'System Status', 'System Configuration', and 'MCU Configuration'. Below the title bar is a sub-header 'Edit Phone Book'. The main content is a table with the following data:

Name	Number	Call Type	Profile
Beijing	00861084981067	192	ISDN
Corner room	67828609	Auto	Auto
Front room	10.47.40.9	Auto	Auto
Hong Kong	0085229381800	192	ISDN
Marketing Dep.	67828608	Auto	Auto
Marketing	(Group, 4)		
Meetingroom 1	67828609	Auto	Auto
Meetingroom 2	98609	Auto	H323
Meetingroom 3	67828605	768	ISDN
Reception	67117777	Auto	ISDN
RoofCam	192.212.161.69	128	H323
Sales Department	67828606	512	Auto
Sales meeting	(Group, 5)		
Service Center	97790	1920	H323
Showroom 1	67828615	Auto	Auto
Showroom 3	67828620	Auto	ISDN
Singapore	006567206385	Auto	ISDN
Sydney	0061282261400	256	ISDN
Toyko	0081356523601	128	ISDN

At the bottom of the window, there are four buttons: 'Add New Entry', 'Add New Group Entry', 'Edit', and 'Delete'. A vertical label 'TANDBERG MCU' is visible on the left side of the window frame.

Delete

By selecting an existing Entry in the Phone Book and then pressing the **'Delete'** button, you will delete the selected entry.

Add new entry

To add a new entry in the Phone Book, press the 'Add New Entry' button and the 'Add New Entry' page will be shown.

The screenshot shows the 'Add New Entry' form in the Tandberg MCU interface. The form is titled 'Add New Entry' and is part of the 'Edit Phone Book' section. It contains several input fields: 'Name' (Marketing Dep.), 'Number' (67828608), 'Call Type' (Auto), '2nd Number', 'Sub Address', 'Dial Profile' (Auto), and 'Restrict (56K)' (unchecked). There are 'Create New' and 'Cancel' buttons at the bottom.

Name	Name of the phone book entry.
Number	Video number or telephone number.
Call Type	Select the call rate to be used. For details, see the 'Set up a new conference' section under 'Using the MCU'.
2nd Number	If two numbers are required, both should be specified (2x64 kbps, 2x56 kbps calls).
Sub Address	Used to address different participants on the same ISDN line or TCS4 dialing.
Dial Profile	Select which network / dial profile to use.
Restrict(56K)	Use 56 kbps per ISDN B-channel.

Press '**Create New**' to save the entry in the phone book.

Create New

To save the new entry, press 'Create New'.

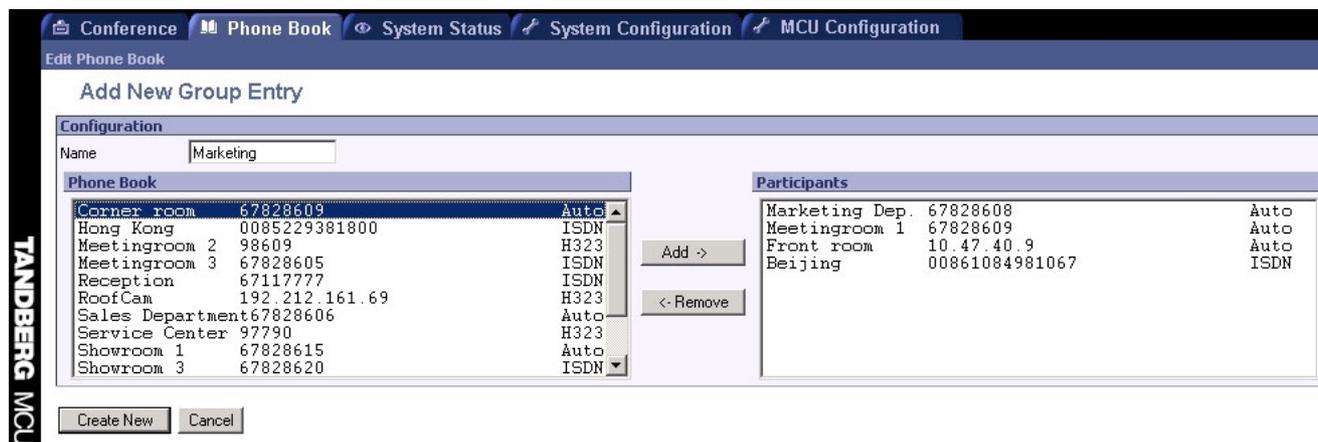
Cancel

Will discard all changes made and return to the 'Edit Phone Book' page.

Add New Group Entry

It is possible to define up to 16 group entries. The Group entries are useful for recurring meetings where the same participants meet each time. By doing this, only the group entry has to be selected in the 'Add Participants' menu and the participants are automatically being called out to.

To add a new group entry in the Phone Book, press the 'Add New Group Entry' button and the 'Add New Group Entry' will open, as shown in figure below.



Each group entry can contain up to 16 video and 16 telephone participants.

- Name** Enter the name of the group entry.
- Add** Select the participant from the Phone Book and press 'Add' and they will be added into the Participants list in the Group Entry.
- Remove** To remove a participant from the Participants list in the Group Entry, select the participant and press 'Remove'.

Create New

To save the new group, press 'Create New'.

Cancel

Will discard all changes made and return to the 'Edit Phone Book' page.

Edit Entry

To edit an entry in the Phone Book, press the 'Edit' button and the 'Edit Entry' will open, as shown in the figure below.

Configuration	
Name	Marketing Dep.
Number	67828608
Call Type	Auto
2nd Number	
Sub Address	
Dial Profile	Auto
Restrict (56K)	<input type="checkbox"/>

Save Create New Cancel

By selecting an existing Entry in the Phone Book and then pressing the '**Edit**' button, you will be able to edit the selected entry. The same fields as for the '**Add New Entry**' will be available.

Save

The entry will be updated with the changes made.

Create New

This will create a new entry instead of replacing the old one. The old entry will not be changed.

Cancel

Will discard all changes and display the '**Edit Phone Book**' page.

View System Status

To view current MCU status, open 'System Status' as shown in the figure below.



PRI Status

To view status of the PRI, open 'PRI Status' as shown in the figure below.

The screenshot shows the 'PRI Status' page with a table of channel statuses. The table has four columns representing PRI 1, PRI 2, PRI 3, and PRI 4. Each column shows the status of 30 channels. The status can be 'idle', 'active', or 'disconnected'. Active channels show a phone number. Disconnected channels show a cause code in brackets. A vertical 'TANDBERG MCU' logo is on the left side of the table.

PRI 1 OK 25 of 30	PRI 2 OK 30 of 30	PRI 3 OK 29 of 30	PRI 4 OK 10 of 30
1: idle	1: idle	1: idle	1: idle
2: idle	2: idle	2: idle	2: idle
3: idle	3: idle	3: idle	3: idle
4: idle	4: idle	4: idle	4: idle
5: idle	5: idle	5: idle	5: idle
6: idle	6: idle	6: idle	6: idle
7: idle	7: idle	7: idle	7: idle
8: idle	8: idle	8: idle	8: idle
9: idle	9: idle	9: idle	9: idle
10: idle	10: idle	10: idle	10: active 067828674
11: idle	11: idle	11: idle	11: active 067828674
12: idle	12: idle	12: idle	12: active 067828674
13: idle	13: idle	13: idle	13: active 067828674
14: idle	14: idle	14: idle	14: active 067828674
15: idle	15: idle	15: idle	15: active 067828686
16: D-Channel	16: D-Channel	16: D-Channel	16: D-Channel
17: idle	17: idle	17: idle	17: active 067828686
18: idle	18: idle	18: idle	18: active 067828686
19: idle	19: idle	19: idle	19: active 067828686
20: idle	20: idle	20: idle	20: active 067828686
21: idle	21: idle	21: idle	21: disconnected 067838551 [2 ; 16]
22: idle	22: idle	22: idle	22: active 067828619
23: idle	23: idle	23: idle	23: active 067828619
24: idle	24: idle	24: idle	24: active 067828619
25: idle	25: idle	25: idle	25: active 067828619
26: active 067838544	26: idle	26: idle	26: active 067828619
27: active 067828674	27: idle	27: idle	27: active 067828615
28: active 067828686	28: idle	28: idle	28: active 067828615
29: disconnected 067838551 [2 ; 16]	29: idle	29: idle	29: active 067828615
30: active 067828619	30: idle	30: idle	30: active 067828615
31: active 067828615	31: idle	31: active 067838544	31: active 067828615

If a participant has been disconnected, the cause code can be viewed by pressing the link next to the PRI channel that was disconnected. See next page for a cause code example.

Example of Location Codes:

A participant was connected to channel 1 and 2 on PRI Line 1. The status shows disconnected with the cause code 2 : 16. The first part (2) is the Cause Location code. These codes describes the origin of the cause code.



Location Code 0 - User

Location Code 1 - Private network serving the local user

Note; depending on the location of the users, the local public network and remote public network may be the same network.

Location Code 2 - Public network serving the local user

Note; depending on the location of the users, the local public network and remote public network may be the same network.

Example of ISDN Cause Codes:

The second part (16) describes the reason for the disconnect. In this case, a normal call clearing.



Cause No. 16 - Normal Call Clearing

This cause indicates that the call is being cleared because one of the users involved in the call has requested that the call be cleared.

Cause No. 16/4 or 17 - User Busy

This cause is used when the called user has indicated the inability to accept another call. This cause code may be generated by the called user or by the network. Please note that the use equipment is compatible with the call.

Cause No. 16/3 or 18 - No User Responding

This cause is used when a called party does not respond to a call establishment message with either an alerting or connect indication within the prescribed period of time allocated (in Q.931 by the expiry of either time T303 or T310).

PRI Alarms

Red Alarm or Loss of signal (LOS) indicates that there is no signal and thus no framing info received. The same effect will be obtained by pulling out the PRI cable. This may also be caused by a broken connector in the receive (RX) part of the cable.

Yellow Alarm or Remote Alarm Indicator (RAI) means that the MCU is receiving framing info, but in this framing info the other side tells the MCU that it is not reading the MCU's transmitted framing info. Typically, this may be a broken connector in the transmit (TX) part of the PRI cable. This could also indicate weak or noisy signal in the transmit (TX) part of the PRI cable.

H.323 Status

To view H.323 gatekeeper status, open 'H.323 Status' as shown in the figure below.

H.323 Status	
Status	
MCU IP Address	10.0.0.181
H.323 Gatekeeper Status	Registered 10.0.0.30:1719

NOTE PARTICIPANTS CAN ALSO JOIN CONFERENCE 1 BY DIALING THIS IP ADDRESS.

MCU IP Address Shows the IP address of the MCU.

H.323 Gatekeeper Status Shows status and IP address of the Gatekeeper, which the MCU is registered to. **'Inactive'** means the MCU is not registered to a gatekeeper. **'Registering'** means the MCU is having problems registering with the selected gatekeeper.

System Information

To view MCU information, open 'System Information' as shown in the figure below. This page provides information on installed software and hardware.

System Information	
Information	
System Name:	TANDBERG MCU
Software Release:	D3.0
Software Options:	16 + 16, IP
Release Date:	2003-09-19
Boot Software Release:	Rev. 0.3, 2002-03-14
Hardware Serial Number:	00121222
Main Board:	100930 rev. 03
Board Temperature:	45° C / 113° F
Expansion Board:	100940 rev. 02
MAC Address:	00:50:60:7F:FA:69
LAN Speed:	100 mbit/s, full duplex

Available Resources

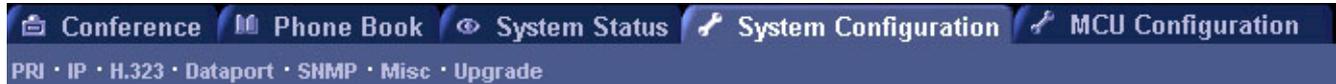
To view available resources on the MCU, open 'Available Resources' as shown in the figure below.



Resource	Available	Total
Video Calls	11	16
Telephone Calls	14	16
ISDN Channels	92	120
Total Bandwidth	6016 kbps	7680 kbps

Configure the MCU

To Configure the MCU, open 'System Configuration' and 'MCU Configuration'. Shown in the figure below is the 'System Configuration'.



PRI Configuration

To configure the PRI settings on the MCU, open 'PRI' as shown in the figure below.

The screenshot shows the 'PRI Configuration' page. The navigation bar is the same as in the previous image. The page title is 'PRI Configuration'. The configuration is divided into several sections:

- Configuration:**
 - PRI Protocol: ETSI (Euro ISDN) (dropdown)
 - Parallel Dial:
 - Sending Complete:
 - Send Own Number:
 - NSF Code Video:
 - NSF Code Telephony:
 - PRI Trunk Grouping:
- Interface Configuration:**

	PRI 1	PRI 2	PRI 3	PRI 4
Number Range Start	<input type="text" value="8669"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Number Range Stop (inclusive)	<input type="text" value="8699"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
PRI CRC-4	<input type="text" value="On"/>	<input type="text" value="On"/>	<input type="text" value="On"/>	<input type="text" value="On"/>
T1 Cable Length	<input type="text" value="0-133ft"/>	<input type="text" value="0-133ft"/>	<input type="text" value="0-133ft"/>	<input type="text" value="0-133ft"/>
- Channel Hunting:**

	PRI 1	PRI 2	PRI 3	PRI 4
Max Channels	<input type="text" value="30"/>	<input type="text" value="30"/>	<input type="text" value="30"/>	<input type="text" value="30"/>
Low Channel	<input type="text" value="1"/>	<input type="text" value="1"/>	<input type="text" value="1"/>	<input type="text" value="1"/>
High Channel	<input type="text" value="31"/>	<input type="text" value="31"/>	<input type="text" value="31"/>	<input type="text" value="31"/>
Search	<input type="text" value="High"/>	<input type="text" value="High"/>	<input type="text" value="High"/>	<input type="text" value="High"/>

At the bottom left of the configuration area, there is a 'Save' button. On the far left edge of the screenshot, there is a vertical label 'TANDBERG MCU'.

Configuration

PRI Protocol

Select between the following PRI protocols:

- ETSI (Euro ISDN)
- National ISDN
- AT&T Custom

All PRI lines must use the same PRI Protocol.

Parallel Dial

On Channels will be dialed and connected in parallel when setting up a BONDING call.

Off Channels will be dialed sequentially, which may increase call setup time.

Sending Complete

On The MCU will send the ISDN message information element "Sending Complete".

Off The MCU will not send "Sending Complete".

Send Own Number

On The MCU will send its own number to the far end.

Off The MCU will not send its own number to the far end, but please note that the network may still send your number to the far end.

PRI Trunk Grouping

When Trunk Grouping is enabled, PRI 2, 3 and 4 will use the same number range as specified for PRI 1.

NSF - Non Standard Facility

Your network provider may require a service selection in your ISDN configuration. Enter the Service code here.

Valid NSF service codes are from 1 to 31. Enter 0 to disable NSF service codes.

NSF Example:

AT&T offers several digital switched services. These include SDN with service code 1 and ACCUNET with service code 6.

<i>Example:</i>		<u>Service profiles for Sprint:</u>	
Below is a list of common service profiles. As these profiles may change, contact your service provider to get the correct profile.		NSF Service	
		Reserved	0
		Private	1
		Inwatts	2
		Outwatts	3
		FX	4
		TieTrunk	5
<u>Service profiles for AT&T:</u>		<u>Service profiles for MCI:</u>	
NSF Service		NSF Service	
Disable	0	VNET/Vision	1
SDN (including GSDN)	1	800	2
Megacom 800	2	PRISM1, PRISMII, WATS	3
Megacom	3	900	4
Accunet	6	DAL	5
Long Distance	7		
International 800	8		
MultiQuest	16		
Call Redirection Service	23		

Interface Configuration

This section configures each of the four PRI interfaces individually. There is one column for each PRI Interface. However, if PRI Trunk Grouping is enabled, the number range for PRI 1 will also apply for PRI 2, 3 and 4.

Number Range Start

The PRI lines connected to the MCU should have at least one number each, to allow dial in from ISDN. If the PRI line has a range of numbers, the start number must be entered here.

The number range must be inclusive. All numbers in the range may be used by the MCU for callback numbers, so the local ISDN switch must route all of these numbers to the configured PRI. Please contact your IT manager to obtain these numbers.

It is only necessary to enter the digits indicating the range. If the range is 67828669 to 67828699, then just enter 8669. Maximum amount of digits is 24.

NOTE REMEMBER TO ALSO CONFIGURE THE PRI NUMBERS THAT SHALL BE USED AS THE DIAL-IN NUMBERS FOR THE CONFERENCES. FOR MORE DETAILS, SEE 'MCU DIAL IN NUMBERS' SECTION UNDER 'CONFIGURE THE MCU'.

Number Range Stop

Here is where the last number in the PRI number range is entered. If the range is 67828669 to 67828699, then just enter 8699.

NOTE IF A PRI NUMBER RANGE IS NOT SPECIFIED, THE MCU MAY NOT WORK PROPERLY WHEN MAKING ISDN CALLS.

PRI CRC-4

Used for most E1-PRI configurations. If your network equipment does not support this feature, turn it off.

T1 Cable Length

Specifies the cable length between the MCU and the CSU for each of the PRI lines (only valid for T1 networks).

Possible values are:

- 0 to 133 feet
- 133 to 266 feet
- 266 to 399 feet
- 399 to 533 feet
- 533 to 655 feet

Channel Hunting

Should be used if your PRI is limited e.g:

- If only channels 1 through 18 are digital, and the rest are analogue. Use Low = 1, High = 18.
- If you have a PRI with only 12 channels. Set Max channel to 12.

Max Channels

Indicates the maximum number of B-channels the MCU is allowed to use for each of the PRI-interfaces. For E1 (ETSI/Euro ISDN), the maximum number of channels is 30. For T1 (National ISDN and AT&T Custom), the maximum number of channels is 23.

Low Channel

Indicates the lowest numbered E1/T1 B-channel the MCU is allowed to use for each PRI-line when selecting channels for outgoing calls.

High Channel

Indicates the highest numbered E1/T1 B-channel the MCU is allowed to use for each PRI-line when selecting channels for outgoing calls.

Search

Specifies where the MCU will start searching for available B-channels for each PRI-line. If 'Search' is set to 'High', the MCU will start to search for available B-channels at the highest numbered B-channel. If 'Search' is set to 'Low', the MCU will start searching for available B-channels at the lowest numbered B-channel.

Save

When all settings are entered, please press the 'Save' - button to affect the new settings

IP Configuration

To configure the IP settings on the MCU, open 'IP' as shown in the figure below.

Conference Phone Book System Status System Configuration MCU Configuration

PRI · IP · H.323 · Dataport · SNMP · Misc · Upgrade

IP Configuration

Configuration

IP Address Assignment	Static
IP Ethernet Speed	Auto
Static IP Address	10 0 0 181
Static IP Subnet Mask	255 0 0 0
Static IP Gateway	10 0 0 1

For the settings to take effect (except the "IP Ethernet Speed" setting), the TANDBERG MCU has to be restarted after pressing "Save".

Save Restart

Configuration

IP Address Assignment

DHCP: Dynamic Host Configuration Protocol can be selected when a DHCP server is present. Static IP Address, Static IP Subnet Mask and Static IP Gateway are ignored because these parameters are assigned by the DHCP server.

Static: If Static assignment is used, the MCU's IP-address and IP-subnet mask must be specified in the IP-address field.

IP Ethernet Speed

Auto The MCU will automatically detect the speed/duplex on the LAN.

10Half The MCU will connect to the LAN using 10 Mbps/Half Duplex.

10Full The MCU will connect to the LAN using 10 Mbps/Full Duplex.

100Half The MCU will connect to the LAN using 100 Mbps/Half Duplex.

100Full The MCU will connect to the LAN using 100 Mbps/Full Duplex.

Static IP Address

The Static IP Address defines the network address of the MCU. This address is only used in static mode. Your LAN administrator will provide you with the correct address for this field.

Static IP Subnet Mask

The Static IP Subnet Mask defines the type of network. Your LAN administrator will provide the correct value for this field.

Static IP Gateway

The Static IP Gateway defines the Gateway address. Your LAN administrator will provide the correct value for this field.

Save

When ready to store the new settings, press 'Save'. These settings will take effect when the system is restarted.

Restart

This button will restart the MCU. Any changes made after pressing 'Save' in the IP Configuration will then take effect.

H.323 Configuration

To dial in to a conference from IP requires the use of H.323 numbers (E.164 aliases). This means that the MCU must be registered to a Gatekeeper.

H.323 Configuration

Gatekeeper: H.323 Gatekeeper Status: Registered 10.0.0.30:1719

Gatekeeper IP Address:

Quality of Service

RSVP:

QoS Mode:

QoS Mode Configuration	Precedence	Diffserv
Telephone Calls	<input type="text" value="Auto"/>	<input type="text" value="0"/>
Video Calls, Signaling	<input type="text" value="Auto"/>	<input type="text" value="0"/>
Video Calls, Audio	<input type="text" value="Auto"/>	<input type="text" value="0"/>
Video Calls, Video	<input type="text" value="Auto"/>	<input type="text" value="0"/>
Video Calls, Data	<input type="text" value="Auto"/>	<input type="text" value="0"/>
Type of Service	<input type="text" value="Off"/>	

TIP H.323 GATEKEEPER STATUS SHOWS CURRENT STATUS OF GATEKEEPER REGISTRATION.

H.323 Configuration

Gatekeeper

Manual

Enables the MCU to register to a Gatekeeper. The Gatekeeper IP Address must also be filled in. When registered, the H.323 Gatekeeper Status shows Registered, Gatekeeper's IP address and the port used.

Problems with registration will be shown as 'Registering' and a Red alarm on the 'Conference Overview' page.

Off

Set Gatekeeper to 'Off' if the MCU should not register to any Gatekeeper. The H.323 Gatekeeper Status window will show 'Inactive' and it is only possible to dial in to conference 1, by using the MCU's IP address.

Gatekeeper IP Address

Enter the Gatekeeper IP Address that the MCU should register to.

Quality of Service

The network must support Quality of Service for these settings to work.

RSVP

- Off** No RSVP Quality of Service is initiated for any connections.
- Auto** Resource Reservation Protocol enables the MCU to request the optimal amount of bandwidth for the duration of an IP video call.

QoS Mode

- Off** No QoS is used.
- Diffserv** Diffserv QoS method is used. Please see 'QoS Mode Configuration' for details.
- Precedence** IP Precedence QoS method is used. Please see 'QoS Mode Configuration' for details.

QoS Mode Configuration

Diffserv is used to define which priority audio, video, data and signaling packets should have in an IP network. The priority ranges from 0 to 63 for each type of packets.

Precedence is used to define which priority audio, video, data and signaling should have in an IP network. The higher the number, the higher the priority. The priority ranges from 0 (off) to 7 for each type of packets.

In addition to Precedence, Type of Service can be used and enables the user to define what type of connection that should be chosen for the IP traffic. Helps a router select a routing path when multiple paths are available.

- Off** Service not active.
- Min. Delay** Will choose a route where minimum delay is prioritized.
- Max. Throughput** Will choose the route with highest bandwidth.
- Max. Reliability** Will choose the route where minimum packet loss is prioritized.
- Min. Cost** Will choose the cheapest connection available.

Save

Press 'Save' to activate the new settings.

Dataport Configuration

To configure the Data port on the MCU, open 'Dataport' as shown in the figure below.

NOTE WHEN CONNECTING TO A PC THE CONNECTING CABLE *MUST* BE A STRAIGHT THROUGH RS232 CABLE.

Dataport Configuration is used to configure the RS 232 serial port on the MCU. If you want to connect a PC to the dataport, you must ensure that the PC and the MCU are identically configured.

Configuration

Baudrate	Possible values are: 1200 bps, 2400 bps, 4800 bps, 9600 bps, 19200 bps, 38400 bps, 56600 bps and 115200 bps.
Parity	Select 'None', 'Odd' or 'Even'.
Databits	Select 7 or 8 databits.
Stopbits	Select 1 or 2 stopbits.

NOTE THERE ARE NO HARDWARE OR SOFTWARE HANDSHAKE OPTIONS. MAKE SURE THE PC HANDSHAKING IS TURNED **OFF**.

Save

Press 'Save' to activate the new settings.

SNMP Configuration

SNMP or Simple Network Management Protocol is used for monitoring and configuring different units in a network. The MCU's **SNMP Agent** responds to requests from **SNMP Managers** (a PC program etc.). **SNMP traps** are generated by the agent to inform the manager about important events.

NOTE THE SNMP COMMUNITY NAME IS CASE SENSITIVE.

Configuration

SNMP Community Name

SNMP Community names are used to authenticate SNMP requests. SNMP requests must have this 'password' in order to receive a response from the SNMP agent in the MCU.

SNMP Trap Host (1, 2 and 3)

Identifies the IP-address of the SNMP manager. Up to three different SNMP Trap Hosts can be defined. Your LAN administrator should provide the correct values for these fields.

System Contact

Used to identify the system contact via SNMP tools such as HPOpenView or TANDBERG Management Suite.

Location

Used to identify the system location via SNMP tools such as HPOpenView or TANDBERG Management Suite.

Save

Press 'Save' to activate the new settings.

Miscellaneous Configuration

To configure the miscellaneous settings on the MCU, open 'Misc' as shown in the figure below.

Conference Phone Book System Status System Configuration MCU Configuration

PRI · IP · H.323 · Dataport · SNMP · Misc · Upgrade

Miscellaneous Configuration

Configuration	
System Name	TANDBERG MCU

Password	
New Administrator Password	<input type="text"/>
Delete Password	<input type="checkbox"/>

Services	
FTP Service	<input checked="" type="checkbox"/>
Telnet Service	<input checked="" type="checkbox"/>
Telnet Challenge Service	<input checked="" type="checkbox"/> Port: 57
HTTP Service	<input checked="" type="checkbox"/>
HTTPS Service	<input type="checkbox"/>
SNMP Service	On

A restart of the system is necessary for the services settings to take effect (after save).

Save Restart

Configuration

To change the system name of the MCU, enter the new system name in the '**System Name**'.

Password

To change the system password of the MCU, enter the new password in the '**New Administrator Password**'.

To delete the existing password, select '**Delete Password**'.

Services

The different IP services on the MCU - FTP, Telnet, Telnet Challenge, HTTP, HTTPS and SNMP can be independently disabled to prevent access to the MCU.

In addition, the SNMP Service Read Only/Traps Only will make it possible to read SNMP messages in addition to enable/disable SNMP.

SNMP Security alert

This function will notify any Management Application, such as TANDBERG Management Suite, if anyone tries to perform Remote Management on the MCU using an illegal password. The Security alert that is sent to the Management Application will contain information about the IP address and the service (WEB, Telnet, FTP) being used for the attempt.

If TANDBERG Management Suite is used, email notifications or alarms about the attempt can be sent to selected persons.

Save

Press 'Save' to save changes and then 'Restart'.

Software Upgrade

Software upgrade is where new software to the MCU can be installed. It also shows the current software version and the MCU's hardware serial number.

System Information

Software Version	D3.0
Hardware Serial Number	00121222
Installed Options	16 + 16, IP
Current Option Key	IOIFHQ

Software Option

New Option Key

Enable Option: Enter the option key in the Key field and press "Enable Option". The system will validate the key, and if valid a restart would be requested for the new option to take effect.

Install Software

Release Key

Software Upgrade: Enter the release key in the Key field and press "Install Software". You will be presented with a new page where you select the software package file to upload.

NOTE TO UPGRADE THE MCU, A VALID RELEASE KEY AND SOFTWARE FILE IS REQUIRED. CONTACT YOUR TANDBERG REPRESENTATIVE FOR MORE INFO.

System Information

Software Version Shows the currently installed Software version.

Hardware Serial Number This unique identifier number for the MCU must be provided when ordering Software Upgrade.

Installed Options Shows the currently installed Options.

Current Option Key Shows the current Option Key.

Software Option

New Option Key Enter the option key in the Key field and press 'Enable Option'. The system will validate the key, and if valid a restart would be requested for the new option to take effect.

Install Software

Release Key Enter the release key in the Key field and press 'Install Software'. You will be presented with a new page where you select the software package file to upload.

MCU Dial In Numbers

To configure the dial in number for each conference, open 'MCU Dial In Numbers' as shown in the figure below.

ISDN Numbers	
Conference 1	67828668
Conference 2	67828669
Conference 3	67828673

H.323 Numbers (E.164 Alias)	
Conference 1	9222
Conference 2	9223
Conference 3	9224

Save

NOTE TO USE THE H.323 NUMBERS (E.164 ALIAS), THE MCU MUST BE REGISTERED TO A GATEKEEPER. FOR MORE INFO, PLEASE SEE 'H323 CONFIGURATION' UNDER 'SYSTEM CONFIGURATION'.

ISDN Numbers

Conference 1 Enter the ISDN number each participant should dial to join conference 1 when dialing from ISDN.

Conference 2 Enter the ISDN number each participant should dial to join conference 2 when dialing from ISDN.

Conference 3 Enter the ISDN number each participant should dial to join conference 3 when dialing from ISDN.

H.323 Numbers (E.164 Alias)

Conference 1 Enter the H.323 number each participant should dial to join conference 1 when dialing from IP.

Conference 2 Enter the H.323 number each participant should dial to join conference 2 when dialing from IP.

Conference 3 Enter the H.323 number each participant should dial to join conference 3 when dialing from IP.

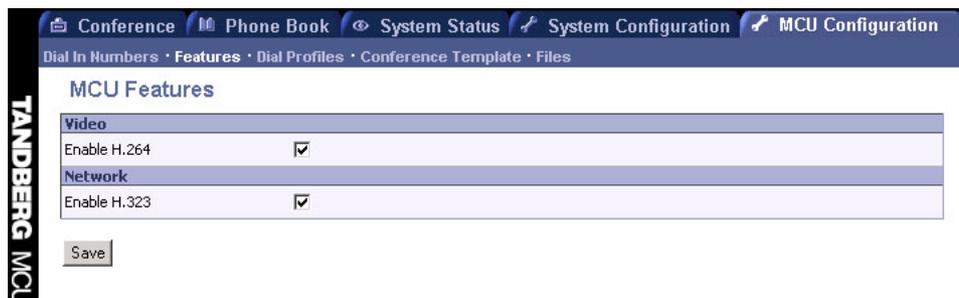
Save

Press 'Save' to save changes.

MCU Features

Experience has shown that new standardized features might cause interoperability problems between legacy video conferencing products. If you disable features on this page, the MCU can be used as a filter to ensure interoperability with legacy products.

To configure the MCU features, open 'Features' as shown in the figure below.



Video

Enable H.264 Allows H.264 video capabilities to be transmitted through the MCU. When disabled no H.264 video capabilities will be transmitted.

H.264 is supported in Voice Switched conferences and conferences with Continuous Presence 4 layout.

H.264 will be disabled if not supported by the video participants, if Duo Video is active, if more than one conference is active on the MCU or if Continuous Presence 5+1, Continuous Presence 7+1, Continuous Presence 9 or Continuous Presence 16 is selected.

Network

Enable H.323 Allows IP participants in a conference. When disabled no H.323 traffic is allowed.

Save

Press 'Save' to activate the new settings.

Dial Profiles

Specifies the service prefix which the MCU must use when dialing out. Example: If you have to use '0' in order to call outside your location, create a profile called 'Ext' with a prefix set to '0'.

Name	Prefix	Network
Auto	<input type="text"/>	Auto
ISDN	<input type="text"/>	H320
H323	<input type="text"/>	H323
Ext0	0	Auto
Ext1	1	ISDN
Local	2	LAN (H.323)

Save Cancel

Name

Enter the name of the new profile here.

Prefix

Enter the call prefix of the new profile. This could for example be 0 for external calls.

Network

Auto IP addresses will select H.323. All other numbers will select H.320.

H.320 The MCU will always use H.320 when this dial profile is selected.

H.323 The MCU will always use H.323 when this dial profile is selected.

Save

Press 'Save' to activate the new Dial Profiles.

Cancel

Discard changes made, and display the previous settings.

Conference Template

The Conference Template is the settings that will be used as default settings when creating new conferences.

Conference Template

Configuration

Name: MCU Conference

Default Call Type: 384 kbps

Restrict (56K):

Allow Incoming Calls:

Cascading Mode: Auto

Max Call Duration: 0 minutes

Legacy Mode:

Floor to Full Screen:

Billing Code:

Video

Picture Mode: Auto

Video Format: Auto

Custom Video Formats:

Duo Video & P+C:

Audio

Audio Levelling (AGC):

Telephone Noise Suppression:

Allow G.728:

Security

Password:

Encryption:

Encryption Mode: Auto

Participants

Video Participant Limit: 16

Telephone Participant Limit: 16

Welcome Picture and Sound:

Entry and Exit Tones:

Save

TIP TO LEARN MORE ABOUT EACH SETTING, SEE THE 'SET UP A NEW CONFERENCE' SECTION UNDER 'USING THE MCU'.

Save

Press 'Save' to activate the new settings.

File Management

The File Management allows viewing or changing pictures and sounds shown to the participant when connecting to the MCU.

File	Type	Upload
Pictures		
Welcome Screen	System Default	<input type="text"/> <input type="button" value="Browse..."/> <input type="button" value="Upload"/>
Password Enquiry Screen	System Default	<input type="text"/> <input type="button" value="Browse..."/> <input type="button" value="Upload"/>
Password Reject Screen	User Defined	<input type="button" value="Delete"/> <input type="text"/> <input type="button" value="Browse..."/> <input type="button" value="Upload"/>
Encryption Required Screen	System Default	<input type="text"/> <input type="button" value="Browse..."/> <input type="button" value="Upload"/>
Sounds		
Welcome Sound	System Default	<input type="text"/> <input type="button" value="Browse..."/> <input type="button" value="Upload"/>
Password Enquiry Sound	System Default	<input type="text"/> <input type="button" value="Browse..."/> <input type="button" value="Upload"/>
System Settings		
System Parameters	Special File	<input type="text"/> <input type="button" value="Browse..."/> <input type="button" value="Upload"/>
Directory	Special File	<input type="text"/> <input type="button" value="Browse..."/> <input type="button" value="Upload"/>
Legal File Formats		
Pictures	JPEG (.jpg) files that are not grayscale and non-progressive coded. Recommended maximum size is 352x288.	
Sounds	16bit 8Khz mono Wave (.wav) file.	
System Settings	TANDBERG parameter files.	

NOTE PLEASE REFER TO THE 'LEGAL FILE TYPES' FIELD AT THE BOTTOM OF THE WEB PAGE FOR INFORMATION ABOUT LEGAL FILE FORMATS.

To view/hear the currently installed files, press the name of the 'File' on the left side of the window. The file will then be shown/played. At the bottom of the page, custom file requirements are listed for each of the file-types.

The following can be specified:

- Welcome Screen
- Password Enquiry Screen
- Password Reject Screen
- Encryption Required Screen
- Welcome Sound
- Password Enquiry Sound
- System Parameters
- Directory

To add a new file, press 'Browse...' to locate the file, and then press 'Upload'.

For each of the customized files, a 'Delete' button will be added in the 'Type' column. By pressing 'Delete', the default file will replace the custom file.

Clicking on 'System Parameters' allows users to backup the system configuration, which may be restored at a later time.

Clicking on 'Directory' allows users to save the directory file, which can be useful for backup purposes, and pushing a common directory onto multiple MCUs.

Appendices

Appendix 1: Using the file system

It is possible to access a file system within the TANDBERG MCU by using ftp:

DOS-window: ftp <IP-address of MCU>, or

Web-browser: ftp:// <IP-address of MCU>

Description of the different files

all.prm - all settings in the system (including directory)

dir.prm - directory entries

event.log - logs fault situations etc.

sw.pkg - the system software

Description of the different folders

user - a folder to be used for custom files, images and audio files etc.

What can be done by using the file system?

- upload of custom images
- upload software

Appendix 2: Declaration of Conformity

EC DECLARATION OF CONFORMITY

MANUFACTURER: TANDBERG
TYPE NUMBER: TTC2-01
MODEL NUMBER: TANDBERG MCU
DESCRIPTION: Video Conferencing Equipment
DIRECTIVES: LVD 73/23/EEC
 This equipment EMC 89/336/EEC
 complies with. R&TTE 99/5/EEC
HARMONISED STANDARDS: EN 60950 (1992) A1/A2/A3/A4/A11
 Applied in order to verify EN 55022 : 1994
 compliance with directives. EN 55024 : 1998
 EN 61000-3-2 : 1995 A1/A2
 EN 61000-3-3 : 1995
 CTR4 Layer 1, 2 and 3

TEST REPORTS/ CERTIFICATES ISSUED BY:	Report/Certificates No.:
LVD (Nemko AS)	200214280
EMC (Nemko AS)	200218144
R&TTE (Comlab)	2002/02826/3 2002/02826/4

**TECHNICAL CONSTRUCTION
FILE NO.:** D12927

**YEAR WHICH THE
CE-MARK WAS AFFIXED:** 2002

AUTHORISED REPRESENTATIVE Date of issue

NAME: PER H. KOGSTAD 07.06.2002
 TITLE: Executive Vice President

Appendix 3: Capacity

MCU Capacity - calculation

The total capacity in the MCU is defined by the following rules:

- 1) Software version defines maximum number of sites:
 - 8+8 -> Maximum 8 video sites and maximum 8 telephones
 - 16+16 -> Maximum 16 video sites and maximum 16 telephones
- 2) The total system bandwidth (ISDN/IP) is 7680 kbps (120x64kbps) regardless of software version.
- 3) In addition, each call has a weight depending on bandwidth/encryption:

Bandwidth	Teleph.	64	128	192	256	320	384	512	768	1152	1472	1920
Non-encr.	11	37	40	41	42	44	46	54	62	80	88	110
Encrypted	N/A	53	59	60	61	68	73	84	111	N/A	N/A	N/A

The sum of the call weights cannot exceed 845. Users will be prevented from setting up calls that exceeds this limit.

Example:

If the MCU has made 6 calls at 768, 4 calls at 384, and 4 encrypted calls at 192 the calculation will be:
 $6 \times 62 + 4 \times 46 + 4 \times 60 = 372 + 184 + 240 = 796$. Since 796 is less than 845, this will be possible.

MCU Capacity – typical scenarios (16 video sites and 16 telephony calls option)

Below some typical capacity scenarios are listed. They can be derived by the calculation above:

Bandwidth	Non-encrypted	Encrypted
128 kbps	16 +16*	14
256 kbps	16+15	13
384 kbps	16+9	11
512 kbps	15+0**	10
768 kbps	10+0**	7
1472 kbps (1.5Mbps)	5+5	N/A
1920 kbps (2Mbps)	4+0**	N/A

* 16+16 indicates 16 video sites and 16 telephones.

** Limited by the maximum capacity 7680 kbps, see 2) above.

Cascaded Conference Capacity

Up to seventeen MCUs (one master and up to sixteen slaves) can be cascaded together in one big conference, giving a total number of 240 participants.

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