Technical Description of TANDBERG Gateway with software version G2

TANDBERG

D13192 Rev. 02

TANDBERG

Table of contents

1 Introduction

The TANDBERG Gateway is designed to connect up to 8 videoconferencing calls and 8 telephone calls simultaneously between ISDN and IP Networks.

The TANDBERG Gateway supports the ITU-T H.320 standard and a combination of H.221 and BONDING for communication on up to 30 ISDN B-channels as well as ITU-T H.323 v.4 standard for communication up to 2 Mbps over IP networks.

The TANDBERG Gateway is 'configurationless' in the sense that no extensive knowledge is required for installation and maintenance. All features are included in the TANDBERG Gateway – thus, there is no additional hardware required to use any of the inbuilt features.

All features of the TANDBERG Gateway are based on standards set by the ITU-T.

The TANDBERG Gateway is best utilised when used together with TANDBERG Management Suite (TMS) and TANDBERG Scheduler, since they have incorporated features like System Management and Scheduling (Optional).
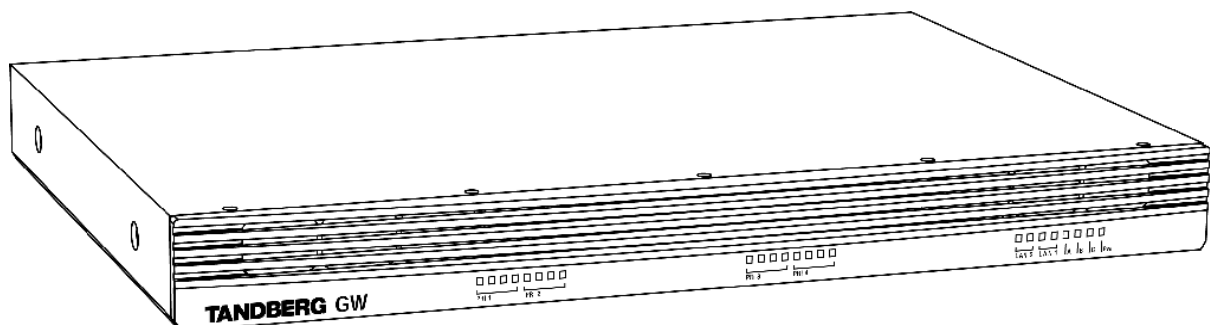
Major features supported:
- Up to eight separate video and eight separate telephone calls
- Maximum bandwidth for all calls combined is 7680 kbps
- Flexible ISDN Dial-in Services
- Flexible IP Dial-out Services
- Call Transfer
- IP QoS Features
- H.243 Transparency
- H.264 Video Standard
- Custom video formats (e.g. XGA video resolution)
- Full implementation of Downspeeding
- Secure Conference (AES/DES Encryption)

- Dual Stream - supports Duo Video^{TF} on ISDN and IP, and People+Content on ISDN.
- Secure Access - Supports XML/SOAP over HTTPS
- Support for TANDBERG Scheduler and TANDBERG Management Suite - (Optional)
- ISDN Hotline
- Terminal Control Session (TCS-4)
- Interactive Voice Response (IVR)
- Direct Inward Dialing (DID)

2   Product Description

The TANDBERG Gateway is built on a standard 19-inch rack mounted chassis of only 1U in height.
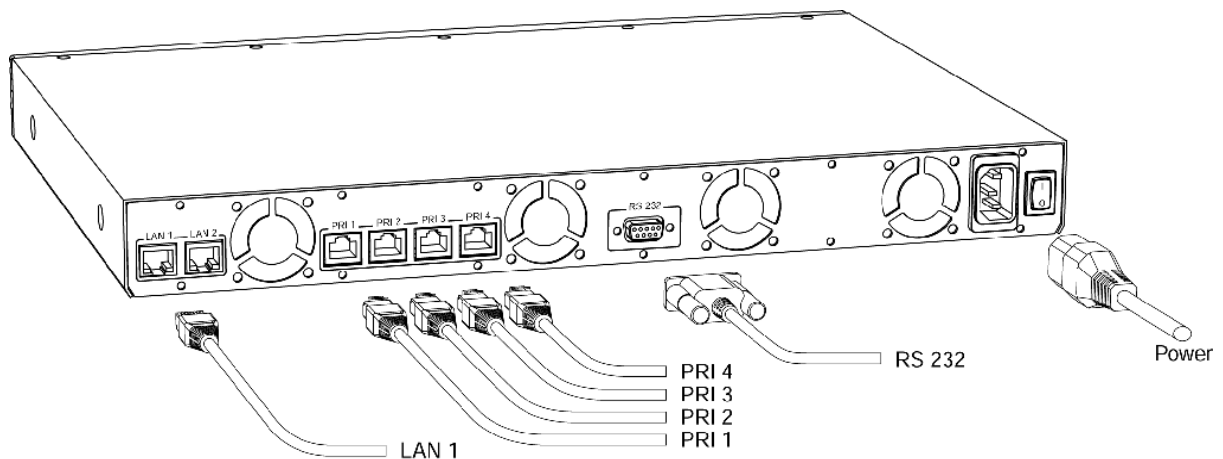
2.1   Software

In the standard version, the TANDBERG Gateway supports up to 2 Mbps bandwidth on ISDN. With the bandwidth option installed, it can handle up to 4 Mbps bandwidth on ISDN.

3   Operation and User Interface

The TANDBERG Gateway is normally controlled via the web interface. The TANDBERG Gateway can also be controlled via Telnet (or the RS232 port) by using a comprehensive set of API commands[1]. This enables the TANDBERG Gateway to be controlled by a different user interface, such as an AMX or Crestron system.

For information on how to operate the system, please see the documents *TANDBERG Gateway User Manual* or *TANDBERG Gateway API* supplied with the system.

---

[1] Please, refer to document 'TANDBERG Gateway API' (D13202)

---

4   TANDBERG Gateway Interfaces & Features

Extensive use of industry standard interfaces and connectors ensure effortless integration of external equipment with the TANDBERG Gateway. These interfaces can easily be controlled via the web user interface.
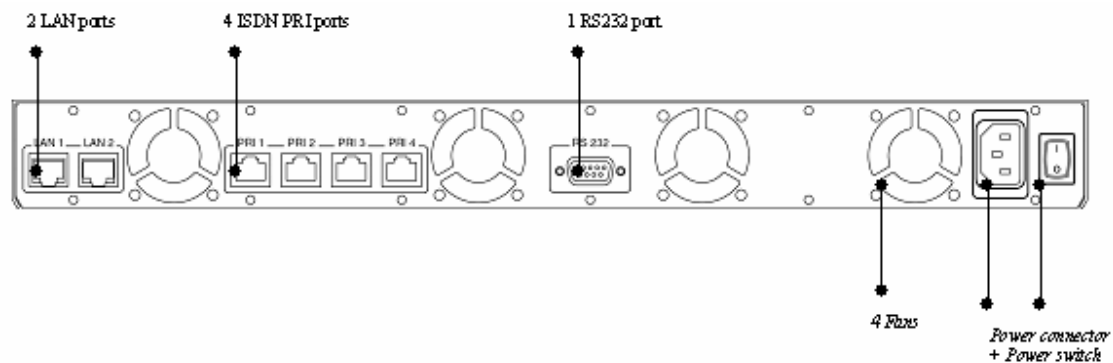
4.1   Network Interfaces and Features

Network Interfaces	4 x PRI (RJ-45 Jack) Primary Rate (G.703) Interfaces
	2 x Ethernet (RJ-45 Jack) LAN interfaces (10/100 Mb)[2]

- 4 x PRI (RJ-45 jack) Primary Rate (G.703) interface for transmission speeds from 112 kbps up to 2 Mbps (1.5 Mbps PRI/T1).
- 2 x Ethernet (RJ-45 jack) Local Area Network interface (10/100Mb) for transmission speeds up to 2 Mbps[2].

4.1.1   Multiple Calls

The TANDBERG Gateway may run 8 separate simultaneous videocalls and 8 phone calls. Please refer to the *Capacity* section for more information on available resources.

---

[2] Only Ethernet port no. 1 is used in software version G2.

4.1.2 PRI E1/T1 ISDN

4.1.2.1 ISDN number plan

The TANDBERG Gateway's PRI lines may use one or more numbers for dial in. If more than one number is used, the numbers must be consecutive.

4.1.2.2 PRI Trunk Grouping

When using more than one PRI line, the same properties for PRI 1 can be used for all PRI's by defining them all as a trunk group.

4.1.2.3 PRI E1/T1 ISDN

The PRI interface may require an external CSU depending on the network layout. 'Cable Length' in the PRI set-up menu specifies the distance from the TANDBERG Gateway to the CSU or last repeater.

A CSU is not required if the system is within 200 m (655 ft) of the last repeater.

The TANDBERG Gateway supports the PRI protocols AT&T Custom, National ISDN and ETSI (Euro ISDN). The AT&T and National protocols will give a total of (23*4) = 92 channels while the ETSI protocol will give a total of (30*4) = 120 channels.

Within these protocols the following switches are supported:

Switches	Protocols supported
4ESS (AT&T)	AT&T Custom
5ESS (AT&T)	AT&T Custom and National ISDN[3]
DMS250 (Nortel)	National ISDN
DMS100 (Nortel)	National ISDN
(Any switch)	ETSI (Euro ISDN)

Channel hunting is provided for outgoing calls. This feature is normally used when the number of channels needs to be specified. When no value is specified for low or high channel, they default to 1 (low), 23 (high US) and 30 (high Europe). Default search is from high to low.

---

[3] Dependent on the configuration of the switch

Pinout of PRI E1/T1 Interface:[4]

PRI	Pinout
1	TIP RX
2	RING RX
4	RING TX
5	TIP TX

NOTE: TANDBERG recommends always using category 5 cabling.

PRI T1 (US only):

Network Service Facility (NSF) can be configured as blank/no value (i.e. NSF not used – default) or any value between 0 and 31, to describe the service facility on the PRI/T1 line.

AT&T Service code (ref.1)	Service
0	Disable
1	SDN (Including GSDN)
2	Toll Free Megacom (800)
3	Megacom
6	ACCUNET Switched Digital Service (incl. Switched Digital International)
7	Long Distance Service (incl. AT&T World Connect)
8	International Toll Free Service (1800)
16	AT&T MultiQuest
23	Call Redirection Service

Sprint Service code (ref.2)	Service
0	Reserved
1	Private
2	Inwatts
3	Outwatts
4	FX
5	TieTrunk

MCI Service code (ref.2)	Service
1	VNET/Vision
2	800
3	PRISM1, PRISMII, WATS
4	900
5	DAL

Ref. 1: AT&T TR 414859 Specification, June 1999, page 76
Ref. 2: Ascend Multiband Plus-T1/PRI, User Documentation, Page 6-8

---

[4] The cable of use should be a straight through configuration.

4.1.3   Dial In Services

4.1.3.1   *Direct Inwards Dialing (DID)*

By enabling this feature, it is possible to make a direct mapping between ISDN numbers and H323 aliases. This requires that the PRI lines connected to the TANDBERG Gateway are configured with a range of numbers. This range of numbers should be large enough to associate one ISDN number to each H.323 device that is intended to make use of the DID feature.

The H.323 aliases must be a portion of the ISDN number plus a prefix.

Example:
The TANDBERG Gateway is configured to use 4 digits of the ISDN Number, and 9 as the H.323 prefix:

An endpoint dials the ISDN number 6711**7780**
The TANDBERG Gateway transfers the call to the H.323 Alias 9**7780**

4.1.3.2   *Interactive Voice Response (IVR)*

This feature is used when one 'main' ISDN number is used for the TANDBERG Gateway. When dialing into the TANDBERG Gateway on this number, the user will be greeted with a welcome picture and sound. The user can then enter the H.323 Alias of the site they wish to call using DTMF tones.

IVR should be used when one single ISDN number is to be used for the TANDBERG Gateway and when the endpoints using H.323 should be independent of the ISDN number used for the TANDBERG Gateway.

4.1.3.3   *TCS-4*

TCS-4 uses the same ISDN number as IVR. The user can add the H.323 alias to the ISDN number separated by a * . The TANDBERG Gateway will automatically transfer the call to the H.323 alias.

Example:

Endpoint dials 6711111*1234
Gateway will transfer the call to the H.323 alias 1234

4.1.3.4 Hotline

When calling the Hotline number specified in the TANDBERG Gateway, the call is automatically transferred to a predefined H.323 alias. This feature can be used when an operator or helpdesk is needed.

All ISDN Dial In features (DID, IVR, TCS-4 and Hotline) can be used in any combination.

4.1.4   IP Dial Out Services

4.1.4.1 Service Prefixes

A Service Prefix is used when dialing from a H.323 endpoint to a ISDN endpoint. By dialling the prefix, followed by the ISDN number, the call is transferred through the gateway, to the remote site on ISDN. The service defines the type of call (telephone/video) and bandwidth for the connection.

It is possible to define up to 20 different services on the TANDBERG Gateway.

The TANDBERG Gateway have two default services:

Service   Prefix '0'   Video call with maximum bandwidth 384kbps
Service   Prefix '1'   Telephone call

4.1.5   Ethernet / LAN Interface (H.323)

The TANDBERG Gateway has two RJ-45 jacks[5] for the Ethernet interface (manual or automatic detection of 10/100Mb) and supports call rates up to 2 Mbps. The ITU-T standard H.323 v4 protocol is implemented in the TANDBERG Gateway.

The following features are specifically relevant for this network interface:

4.1.5.1 Quality of Service features (QoS)

4.1.5.1.1 IP precedence

IP precedence is a classification of packets from 0 (low priority) to 7 (high priority). The values 6 and 7 are typically reserved for congestion control. IP precedence helps a router select what kind of traffic to prioritise. By means of queue mechanisms, it can select

---

[5] Ethernet port no.2 is not used in software version G2.

which packets to send first and which to throw away. Some information/traffic is time critical while other is not, and classification is used to differentiate this traffic.

One may set separate IP precedence for Signalling, Audio, Video and Data (values 1 – 7) as well as turn IP precedence off.

The *auto* setting uses the following values for IP precedence:
> Signalling=6
>
> Audio/Video=4
>
> Data=3 (e.g. FECC commands)

This means that in *auto,* IP precedence has the value 6 (i.e. signalling value) while both audio and video value is 4; data value is 3. Setting the IP precedence value in system's menu is actually setting the signalling value. The audio/video and data values are changed accordingly in respect to the signalling value (i.e. audio/video value = - 2; data value = - 3).

4.1.5.1.2 Diffserv

Diffserv is an extension of IP precedence, where values from 0 to 63 (63=Highest priority) can be set.

4.1.5.1.3 IP type of service (TOS)

TOS helps a router select a routing path when multiple paths are available.
> *Delay*- tells router to minimize delay
>
> *Throughput*- tells router to maximize throughput
>
> *Reliability*- tells router to maximize reliability
>
> *Cost*- tells router to minimized cost
>
> *Off*- Turns TOS off

4.1.5.1.4 Resource-Reservation Protocol (RSVP)

RSVP is a protocol that allows the TANDBERG Gateway to request the network to reserve the bandwidth needed for the IP meeting.

4.1.5.2 *IP adaptive bandwidth management*

- The TANDBERG Gateway never produces more traffic than needed for better utilization of network resources. Most of the data sent in a videoconference is video data. Thus, by incorporating smart video algorithms, the codec sends no more video data than necessary. Little movement in the picture gives low bit rate; while a lot of movement gives higher bit rate.
- The TANDBERG Gateway regulates outgoing and incoming media bit rates by means of flow control signalling.

D13192 Rev. 02   11

An example of this is automatic adjustment of total bandwidth used when DuoVideo is opened.

4.1.5.3 Dynamic playout buffering

Shapes the incoming data for better playout and re-sequencing of packet delivered out of order. This ensures better lip sync.

4.1.5.4 Asymmetrical media capabilities

Audio and video protocols can be fully asymmetrical.
E.g., the TANDBERG Gateway can send H.263 and receive H.261 at the same time.

4.1.5.5 Diagnostic tools for IP

Q.931   To show Q.931 trace during a conference you need to issue the command *syslog on*. One can get traces for RAS, Q.931 and H.245 with this command. It is a complex trace and requires an extensive knowledge in H.323 signalling to be understood.

Ping   Ping is used to see if the TANDBERG Gateway is able to reach a specific IP-address, using a mechanism in IP called ICMP. If the TANDBERG Gateway is unable to register to its gatekeeper, or if it is unable to dial a specific endpoint, one can use ping to see if there is at least an IP-route to the gatekeeper or to the endpoint.

Traceroute   Traceroute does exactly that; it traces the route an IP-packet takes to reach its destination and displays all router hops. Traceroute is very useful for seeing exactly where there is a routing-problem in the IP-network, and for checking where transport-delay is introduced.

4.1.5.6 Latency & Jitter

Latency is defined as the time between a node sending a message and receipt of the message by another node. The TANDBERG Gateway can handle any value of latency-however, the higher the latency, the longer the delay in video and audio. This may lead to conferences with undesirable delays causing participants to interrupt and speak over each other.

Jitter is defined as the variation in latency for packets sent between two nodes in the network. Where constant latency simply produces delays in audio and video, jitter can have a more adverse effect. Jitter causes packets to arrive out of order or at the wrong times, which again leads to packet loss. The TANDBERG Gateway can manage packets with jitter up to 100ms. If excessive packet loss is detected, the TANDBERG Gateway will downspeed the connection until acceptable packet loss is achieved.

4.1.5.7 *Layer 4 Ports used in H.323*

The following tables describes which layer 4 ports are being used by the TANDBERG Gateway when a call is made on an H.323 network.

TANDBERG Gateway meetings + Duo Video

Function	Port	Type
Gatekeeper Discovery (RAS)	1719	UDP
Q.931 Call Setup	1720	TCP
H.245	Range 5555—5587	TCP
Video	Range 2326—2837	UDP
Audio	Range 2326—2837	UDP
Data/FECC	Range 2326—2837	UDP

4.1.5.8 *IP packet sizes*

Audio

The TANDBERG Gateway can receive up to 60 ms of audio in each packet. The TANDBERG Gateway is sending 20 ms of audio in each packet, thus:

- G.711 – 160 bytes per packet
- G.728 – 40 bytes per packet
- G.722 – 160 bytes per packet
- G.722.1 – 60 bytes per packet

Video

The TANDBERG Gateway is sending maximum 1450 bytes of video per packet.

Note:

In addition, the system needs to add the following header information for each of the audio and video packets above:

20 bytes IP-header, 8 bytes UDP-header and 12 bytes RTP-header (i.e. 40 bytes in total).

4.1.5.9 Intelligent Packet Loss Recovery (IPLR)

IPLR is an ITU standards based packet loss compensation for H.323 that improves received video into the TANDBERG Gateway. IPLR supports all video protocols and resolutions that TANDBERG Gateway already has implemented and is compatible with all terminals.

IPLR is a special algorithm developed at TANDBERG that will make efforts to reconstruct the lost packets and reduce the visual effects caused by packet losses.

- If the TANDBERG Gateway experiences packet loss from an endpoint, it will ask the endpoint to handle packet loss. This requires Intelligent Packet Loss Recovery functionality on the endpoint.

- If an endpoint experiences packet loss from the TANDBERG Gateway, the TANDBERG Gateway encoder will not start IPLR since this would affect the received video quality for the other endpoint.

4.1.6 LEDs Description

The TANDBERG Gateway has 24 LEDs (Light Emitting Diodes) on the front panel. Each giving various information, as shown below.
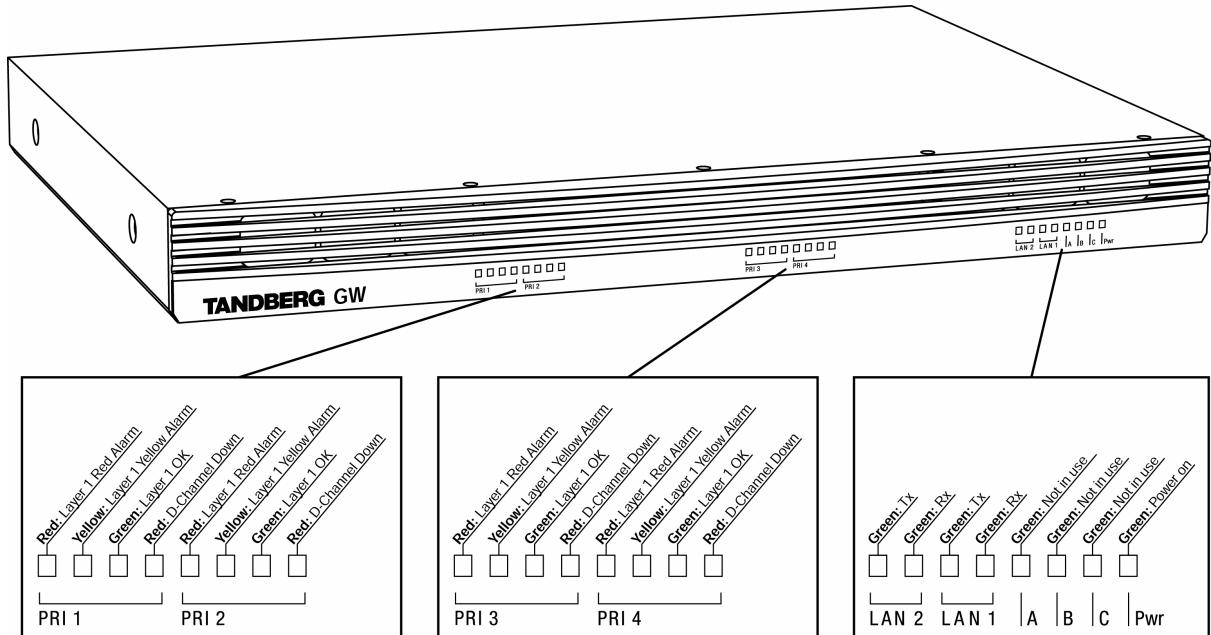
4.1.6.1 Description of PRI Alarms

A PRI cable consists of four wires (2 pairs of wires): One pair for Transmit (TX) and one pair for Receive (RX) signals.

Red Alarm

Red alarm or *Loss of signal (LOS)* means that there is no signal and thus no framing info received. (This has same effect as pulling out the PRI cable).

Yellow Alarm

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

Blue Alarm

Blue alarm means that network on the far side of the CSU is unavailable.

D13192 Rev. 02   15

Scenario: TANDBERG Gateway is connected via a CSU (i.e. a NT 'Network Termination') as follows:

TANDBERG Gateway –cableA–CSU–cableB–Network

If a CSU loses framing/sync from the network (example: a bad cable B), it shall no longer send valid framing out on cable A towards the TANDBERG Gateway. Instead it transmits "Blue Alarm". Seen from the TANDBERG Gateway receiving blue alarm, this means that the network on the far side of the CSU is unavailable.

4.1.7 Intelligent Call Management (ICM)

By using TANDBERG's inbuilt Intelligent Call Management (ICM), TANDBERG Gateway conferences can be made from data rates up to 2 Mbps via ISDN networks.

ICM is a highly sophisticated feature provided by the TANDBERG Gateway that e.g. makes the connection between two sites more reliable and safe. If the ISDN network drops channels during a meeting, the conference will not shut down but adjust to the remaining number of available channels[6]. This ability is called 'Downspeeding' and is in accordance to the BONDING Mode 1 standard.

By defining a maximum bandwidth for the different services (DID, IVR, TCS-4, Hotline, H.323 services), all connections will be restricted to these bandwidths.

If the requested bandwidth is not available in the TANDBERG Gateway or in the receiving endpoint, the TANDBERG Gateway will set up the connection using the available resources.

---

[6] If the connected site does not support downspeeding, the site will drop out of the call.

4.1.8   TANDBERG Gateway Capacity

The total capacity of the TANDBERG Gateway is defined by the following rules.

I.   Maximum 8 video calls and 8 telephones calls.

II. Total system bandwidth (IP + ISDN) of the TANDBERG Gateway is 7680 kbps. The maximum bandwidth used for ISDN calls is depending on the number and type of PRI's installed:

   a) The maximum bandwidth for each **ISDN E1** is 1920 kbps (30x64kbps).

   b) The maximum bandwidth for **ISDN T1** is 1472 kbps (23x64kbps).

III. In addition, each call has a ***Call Weight*** depending on bandwidth and encryption as follows:

Video calls:

Bandwidth	64	128	192	256	320	384	512	768	1152	1472	1920
Non-encr.	74	80	82	84	88	92	108	124	160	176	220
Encrypted	106	118	120	122	136	146	168	222	N/A	N/A	N/A

Telephone calls:

Bandwidth	Telephone
Non-encr.	22
Encrypted	N/A

The total sum of the *Call Weights* on the TANDBERG Gateway can not exceed **845**.
(Users will be prevented from setting up calls that exceeds this limit).

Example of call weight calculation:
If the TANDBERG Gateway has made 1 encrypted call at 768kbps and two unencrypted calls at 384kbps the calculation will be:

$$222 + 2(92) = 222 + 184 = 406$$

Since 406 is less than 845, this will be OK.

4.1.8.1   TANDBERG Gateway Capacity – typical scenarios for 4Mb Option

In the table below some typical capacity scenarios are listed (they can be derived by the calculation above):

Bandwidth	Non-encrypted (Max. no. of video calls + telephone calls) *IP & E1*	Encrypted (Max. no. of video calls)
128 kbps	8 + 8	7
256 kbps	8 + 7	6
384 kbps	8 + 4	5
512 kbps	7 + 4	5
768 kbps	5 + 0	3
1472 kbps (1.5Mbps)	2 + 8	N/A
1920 kbps (2Mbps)	2 + 0*	N/A

*) Limited by the maximum capacity 7680 kbps, see *rule II a)* above.

4.1.9   Secure Conference (Encryption)

The TANDBERG Gateway has built-in encryption of audio, video and data for both H.323 (based on ITU standard H.235) and H.320 (based on ITU standard H.233 and H.234).

The encryption algorithms used in the TANDBERG Gateway and all other TANDBERG systems are:
- The Data Encryption Standard (DES) with a 56 bits session key
- The Advanced Encryption Standard (AES) with a 128 bits session key

Although there are small differences between H.323 and H.320, a typical set-up of a secure call can be defined as follow:

1. Establishement of a common shared secret and selection of a encryption algorithm.

2. Exchange of the keys according to the common shared secret and the selected encryption algorithm.

3. Start the encryption.

The establishment of the common shared secret is done through the computation of the Diffie-Hellman (DH) algorithm. The DH method uses primes numbers of 512 bits length for DES and 1024 bits for AES. The shared secret is then used as a key for the selected encryption algorithm

which encrypts "the session keys". When the session are collected by the remote end, encryption of the audio, video and data channels can start.

The encryption will be established automatically when both endpoints in the conference supports encryption with automatic key generation (and the conference is set up for encryption mode of operation).

Encryption is supported for meetings up to 768 kbps and for the TANDBERG feature DuoVideo.

Note: For an encrypted call, the endpoints must support encryption (AES or DES).

If *encryption* is enabled, the TANDBERG Gateway accepts both AES and DES encryption.

If one of the sites does not support encryption, encryption on both sides is disabled.

4.1.10 H.243 Multipoint Transparency

All MCU commands and information signalling are transparent through the TANDBERG Gateway. The most important commands and information signals are:

- Request/Release floor
- Site Naming
- Cascading Signalling
- OnAir Signalling
- Microphone Off signalling(not supported by IP endpoint)

4.2   Aggregation Standards

ISDN Aggregation	H.221	Frame Structure from 64 (56*) kbps to 128 kbps
	ISO 13871	BONDING, Mode 1 from 64 (56*) kbps to 2 Mbps
	H0	One 384 kbps channel

4.2.1   BONDING

- ISO 13871, BONDING Mode 1 for bit rates from 56 kbps up to 2 Mbps (1 to 30 channels).
- The maximum relative delay difference between B-channels is 0.5 second (i.e. to compensate for different routing of channels).

The following are the standard bandwidths on H.320:
     30ch – 24 – 23 – 18 – 12 – 8 – 6 – 5 – 4 – 3 – 2 – 1

4.2.1.1   ISDN channel set-up

The following is a description of how the ISDN channels are set up.

Incoming & Outgoing TANDBERG Gateway calls: Normally the TANDBERG Gateway will set up only 1 channel from PRI 1 and build up the channels starting from the 'bottom' of the last PRI in use.

This will ensure that the TANDBERG Gateway always have available channels on the first PRI number (which normally should be the TANDBERG Gateway 's main number).

4.2.2   H.221

- For bit rates from 56 kbps up to 128 kbps (1 or 2 channels).
- The maximum relative delay difference between the 2 B-channels is 0.6 second.

4.2.3   H0

H0 is an ITU defined 384 kbps service available for ISDN PRI. The TANDBERG Gateway supports H0 on incoming ISDN calls. H0 is defined as a group of 6 ISDN channels multiplexed to provide one 384 kbps channel. H0 may have a shorter connection time, since there is only one channel to set up.
This service is sometimes called *Switched 384* or *ISDN H0*.

4.3   RS232 Interface/Application Programmable Interface (API)

Data Standards	**Data**	**TANDBERG Dynamic Data Channel (DDC)**
	Modem	**Standard modem commands**
Data Interfaces		**1 x Data port, RS-232 (9-pin D-sub), Up to 115200 Baud for Data & Control**

The RS232 port on the TANDBERG Gateway is implemented as Digital Circuit Terminating Equipment (DCE).

The connectors used are female 9-pin D-subs and the pin-out is shown in table below.

Signal Name	Direction	Pin number
Carrier detect, CD	From DCE	1
Receive data, RXD	From DCE	2
Transmit data, TXD	To DCE	3
Data terminal ready, DTR	From DCE	4
Signal ground, GND		5
Data set ready, DSR	From DCE	6
Ready to send, RTS	To DCE	7
Clear to send, CTS	From DCE	8
Ring indicator, RI	From DCE	9

Note: The API commands may also be accessed via Telnet, through the TANDBERG Gateway's Ethernet connection.

4.3.1   API commands

Please refer to the document 'TANDBERG Gateway API' (D13202) for details.
The RS232 port is used for local software upgrades, local control and diagnostics.

Also, refer to 'TANDBERG SNMP' (D12190) for SNMP implementation.

4.4 Video Features

The TANDBERG Gateway supports the ITU video standards H.261, H.263, H.263+ and H.264.

4.4.1 Optimised Video Compression

The ITU standard H.264 provides:

- Optimised compression and decompression of video at lower bandwidths.
- A sharper picture than provided by H.261 and H.263.
- Improved contrast and enhanced clarity of the finer details within an image.
- Improved motion handling that removes the characteristic blocking that tends to occur during normal H.261 and H.263 movement.

4.4.2 Video Formats

The TANDBERG Gateway supports the following video formats:

Native NTSC:
- SIF, *Source Input Format*   (352 x 240 pixels)
- 4SIF   (704 x 480 pixels)

Native PAL:
- CIF, *Common Intermediate Format* (352 x 288 pixels)
- 4CIF   (704 x 576 pixels)
- QCIF, *Quarter CIF*   (176 x 144 pixels)

Native PC:
- VGA, *Video Graphics Array*   (640 x 480 pixels)
- SVGA, *Super VGA*   (800 x 600 pixels)
- XGA, *eXtended VGA*   (1024 x 768 pixels)

4.4.3 Asymmetric Video Formats

The TANDBERG Gateway can send and receive asymmetric video formats. This means any combination of the supported custom video formats may be sent/received to/from the TANDBERG Gateway.

Changes in the video formats during the conference are done automatically either when one of the sites changes its transmitting video format or if these formats are changed from the TANDBERG Gateway itself.

4.4.4   Duo Video

The TANDBERG Gateway is capable of receiving/transmitting two simultaneous video signals from/to the connected sites[7] on all call rates from 128kbps and above. When one of the sites requests for Duo Video, the TANDBERG Gateway will open Duo Video towards the other video site if capable of receiving it. If the other site requests for Duo Video the TANDBERG Gateway will automatically transmit this site's Duo Video to the first site.

The TANDBERG Gateway uses High Speed Data rates (HSD) for Duo Video.

The Video format of Duo Video is described in ch.4.4.2.

Duo Video Interoperability with other vendors
The TANDBERG Gateway is compatible with the Polycom feature 'People + Content'.
The TANDBERG Gateway can receive Duo Video (from a TANDBERG endpoint) and transmit it as People + Content to PolyCom iPower[8] (on H.320).

Note: This feature must be enabled in the TANDBERG Gateway configuration (Web page or via Telnet) to work with the iPower. There is also a setting for enabling People + Content on the iPower system.

4.4.5   Custom pictures

The TANDBERG Gateway has a variety of pictures that may be changed by storing new files on the FTP file system of the TANDBERG Gateway.

Please, see ch.5.2 for details on file sizes.

Gateway Call Proceeding
The Call Proceeding image is shown while the TANDBERG Gateway connects to the second participant in the call.

GW Extension Enquire picture
This is an image asking the calling site to enter the extension number to reach a site.

Downspeeding in progress
This is an image shown when a connection is downspeeding.

---

[7] Depending on the connected sites ability to transmit/receive Duo Video.

[8] This features is tested with: PictureTel iPower 680, 970 with software version 4.0.6.909 & Accord MCU with software version 4.01.448

4.5   Audio Features

4.5.1   Custom Sounds

The TANDBERG Gateway has a variety of sounds that may be changed by storing new files on the FTP file system of the TANDBERG Gateway. Ref. Ch.5.2 for details.

4.5.1.1.1   Gateway Welcome

When endpoints are entering a conference, they will be greeted with a default welcome sound. It is possible to customize this welcome sound by storing a WAV-file in the system.

4.5.1.1.2   Extension Enquire sound

When endpoints are entering a conference and a extension number is required, they will be asked to enter the extension number by using DTMF tones. It is possible to customize this sound by storing a WAV-file in the system.

4.5.2   Telephony

The TANDBERG Gateway may also be used to connect telephone calls. The TANDBERG Gateway supports up to 8 simultaneous telephone calls. See also Ch. 4.1.8 for possible connected telephone sites in a conference.

4.5.3   Audio Compression Algorithms

The following audio algorithms are supported on the TANDBERG Gateway:
- G.711 48/56/64 kbps, 3.1 kHz bandwidth.
- G.728 16 kbps, 3.1 kHz bandwidth.
- G.722 48/56/64 kbps, 7 kHz bandwidth.
- G.722.1 24 kbps or 32 kbps, 7 kHz bandwidth.

4.6   System Management

TANDBERG provides a comprehensive set of management tools, and is committed to the use of standards-based tools.

The TANDBERG Gateway can be managed in many ways:
- The internal web server allows for remote control of the TANDBERG Gateway using a web interface from anywhere on the LAN/WAN/Internet (open browser http://*TANDBERG Gateway-ipaddress*)
- The Application Program Interface (API) allows for connecting a computer directly to the system via the RS232 port or from anywhere on the LAN/WAN/Internet via Telnet or FTP.
- The TANDBERG Management Suite (TMS) may also be used to manage the system and the TANDBERG Scheduler may be used to schedule conference meetings (Optional).

4.6.1   Ethernet/LAN Interface

There are two Ethernet/LAN interfaces on the TANDBERG Gateway, of which only one is currently in use. The LAN interface supported on the TANDBERG Gateway is 10base-T and 100base-T compatible, and is used for H.323 conferences as well as management features of the TANDBERG Gateway, such as connecting to the internal web-server, Telnet and FTP-server.

The system supports the following settings of this interface:
- Auto   The TANDBERG Gateway will auto-detect the speed/duplex on the LAN
- 10/Half   The TANDBERG Gateway will connect to the LAN using 10Mbps speed/Half Duplex
- 10/Full   10 Mbps speed/Full Duplex
- 100/Half   100 Mbps speed/Half Duplex
- 100/Full   100 Mbps speed/Full Duplex

'DHCP' (Dynamic Host Configuration Protocol) can be selected when a DHCP server is present. When using DHCP, IP-address and IP-subnet mask and IP gateway are not used since the DHCP server assigns these parameters.

If 'Static' is selected, the system's IP-address and IP-subnet mask must be specified in the IP configuration menu.

4.6.2   Platform Requirements

The management tools are based on standard protocols, obviating the need for special programs running on the management computer.

The management computer may be any computer running a standard operating system (i.e. the management computer may be a Personal Computer running the Windows 95/98/2000/NT

operating systems), which includes the necessary programs such as:

- An FTP client (please see 'Upgrading software in TANDBERG Videoconferencing units'- document D10238 - for details)
- A web-browser (please see 'TANDBERG Gateway User Manual'- document D13187 - for details)
- A Telnet client (please see 'TANDBERG Gateway API'- document D13202 - for details)
- A terminal emulator for the RS232 port (please see 'TANDBERG Gateway API' - document D13202 - for details)

4.6.3   Protocols Supported

TCP/UDP/IP -	*Transport Control Protocol/User Datagram Protocol/Internet Protocol*, providing connectivity over LAN/WAN to any networked computer.
HTTP -	*HyperText Transport Protocol*, providing a Web-browser interface to the management computer. ('Max. number of simultaneous connections' = unlimited, although only one is processed at a time)
HTTPS -	Hypertext Transfer Protocol over Secure Socket Layer is a Web protocol that encrypts and decrypts user page requests as well as the pages that are returned by the Web server. It uses Secure Socket Layer (SSL) as a sublayer under its regular HTTP application layering. HTTPS uses port 443 instead of HTTP port 80 in its interactions with the lower layer, TCP/IP. SSL uses a 40-bit key size for the RC4 stream encryption algorithm, which is considered an adequate degree of encryption for commercial exchange.
FTP -	*File Transfer Protocol*, providing access to the 'FTP file system' of the TANDBERG Gateway. ('Max. number of simultaneous connections' = 1)
TELNET -	Provide a standard command-line interface to management functions. ('Max. number of simultaneous connections' = 8)
TELNET CHALLENGE -	An option to the standard Telnet service. Telnet Challenge offers a telnet connection where the password is not sent over the network, hence impossible to sniff.
SNMP[9] -	*Simple Network Management Protocol*, standard for network management and surveillance. (RFC1157 SNMPv1, RFC 1213 MIB-II).
DHCP -	*Dynamic Host Configuration Protocol,* enabling the system to automatically be given IP address and Subnet Mask when connected to a network with a DHCP server.

In addition to the above, TCP/IP based protocols allowing management to be performed

---

[9] For further info on SNMP refer to document 'TANDBERG SNMP' (D12190)

---

remotely. Local management, control and software upgrade facilities are also available through a standard RS232 interface.

4.6.4 System Management Functionality

4.6.4.1 Remote software upgrades using FTP:

This service is provided by the standard TCP/IP based FTP protocol. Any networked PC may perform software upgrades either locally or over the Internet depending on the LAN connectivity on the customer premises (firewalls etc.). By using any FTP-client software (such as the FTP-client bundled with the Windows operating system), it is possible to upload the new software release to the TANDBERG Gateway. The software file is in binary format in order to decrease upload time. All settings of the TANDBERG Gateway will be restored after a software upgrade.

4.6.4.2 Management using a standard Web-browser:

The web-browser is the most common way to manage the TANDBERG Gateway giving access to all managing features of the TANDBERG Gateway. Using a standard Web-browser (Netscape, MS Internet Explorer 3.0 or later), the user may perform all forms of meeting set-up and control, but also diagnostics, troubleshooting and software upgrade.

4.6.4.3 Management using a standard Telnet-client:

(i.e. a Telnet program bundled with the Windows operating system)

This gives the user the same functionality as from the web interface and the RS232 port. It provides advanced debug capabilities such as ISDN layer 3 (D-channel) traces on the Primary Rate interfaces, low-level H.320 protocol diagnostics (e.g. H.221 traces), etc. This interface is a command-line type interface, not a graphical interface like the Web-browser interface. The system supports multiple simultaneous Telnet sessions. See chapter 4.3 and the document 'TANDBERG Gateway API' (D13202) for details of API commands available via RS232/Telnet.

4.6.4.4 Management using a terminal connected to the RS232 port:

(i.e. using the HyperTerminal program bundled with the Windows operating system).

Provides the same services and features as the Telnet-interface does, but locally. See chapter 4.3 and the document 'TANDBERG Gateway API' (D13202) for details of API commands available via RS232/Telnet.

4.6.5 Security

4.6.5.1 HTTPS, TLS/SSL

The TANDBERG Gateway supports HTTPS in order to ensure secure transmission of the information displayed on the administrator's PC (i.e. a secure connection between any Web browser and the TANDBERG Gateway (the *TANDBERG Gateway web server*) will be established if the HTTPS service on the TANDBERG Gateway is enabled). HTTPS allows for password exchange which is especially important.

- SSL
  Secure Sockets Layer, protocol developed by Netscape for transmitting private documents via the Internet. SSL works by using a private key to encrypt data that is transferred over the SSL connection.

- HTTPS - Web pages that require an SSL connection start with *https:* instead of *http:*.

- TLS - Transport Layer Security

- SOAP - Simple Object Access Protocol is a lightweight protocol for exchange of information in a decentralized, distributed environment

- XML - Extensible Markup Language is a flexible way to create common information formats and share both the format and the data on the World Wide Web, intranets, and elsewhere.

To enable HTTPS, use the API command *services https on*. The HTTPS server will then be activated at next restart.

If the TANDBERG Gateway's HTTP service also is activated, the user will automatically be redirected to HTTPS. If HTTP is de-activated, you will have to specify HTTPS. (In the latter case https://10.0.5.203 will work, but not http://10.0.5.203).

4.6.5.2 Telnet Challenge Service

When password protection is enabled for a system, a user will be requested for a password when connecting using normal telnet. The password provided is sent unencrypted, making it possible to sniff the password on the network.

In order to avoid making it possible to obtain the password by sniffing, the telnet challenge service is available. This service can be activated either on a separate IP port 57, or on IP port 23. When activated on IP port 23, the challenge service will override the normal telnet service.

The intention of the telnet challenge service is that the client will use the password with a server provided string to generate a response that does not contain the password. Thus, the response can not be used to deduct the password, but the server can use it to know whether the client knows the correct password or not. This increases the security by not sending the password over the network.

Notice that if password protection is disabled, there will be no challenge request when connecting, and the service is equal to the normal telnet service.

It is also important to understand that only the password is protected with this service. The actual connection is not encrypted, and can be sniffed as for a normal telnet connection.

4.6.5.3 Disable Services

There is no router inside the system that can route between the ISDN side and the IP side of the TANDBERG Gateway. This means it is not possible to get access to the Ethernet port via an ISDN conference. However, if wanted the following services may be disabled/enabled (with API commands):

- Telnet Service
- Telnet Challenge Service
- HTTP Service
- HTTPS Service
- FTP Service
- SNMP Service (may also be set to *read only* or *Traps Only*)

4.6.5.4 Security Alert

The system will notify any management application when someone tries remote access over IP with illegal password (via SNMP traps). Information about the *intruder's* IP-address and the service used (Web, Telnet and FTP) will be given.
When the (optional) TANDBERG Management Suite (TMS) is used, an email notification may also be sent e.g. to the administrator of the network.

4.6.6 Layer 4 ports used by the system

The following TCP and UDP ports are relevant for the TANDBERG Gateway.

Function	Port	Type	Direction
Gatekeeper RAS	1719	UDP	⇔
Gatekeeper Discovery	224.0.1.41:1718	UDP	⇔
Q.931 Call Setup	1720	TCP*	⇔
H.245/Q.931	Range 5555—5587	TCP	⇔
Video	Range 2326—2837	UDP	⇔
Audio	Range 2326—2837	UDP	⇔
Data/FECC	Range 2326—2837	UDP	⇔
FTP (control)	21	TCP*	⇔
Telnet	23	TCP*	⇔
HTTP	80	TCP*	⇔
HTTPS	443	TCP	⇔
NTP	123	UDP*	⇐ (incoming to TANDBERG Gateway)
SNMP (Queries)	161	UDP*	⇔
SNMP (Traps)	962	UDP	⇒ (outgoing from TANDBERG Gateway)
Netlog	963	TCP	⇔
FTP (data)	1026	TCP	⇔

Outgoing H.323 call:
First call uses 5555 for outgoing Q.931 and 5556 for H.245, next uses 5557 for Q.931 and 5558 for H.245, etc.
Please see the TANDBERG and IP document (D12434) for more details.

Incoming H.323 call:
All incoming calls use 1720 for Q.931 messaging. First call uses 5555 for H.245, second 5556 etc.
Please see the TANDBERG and IP document (D12434) for more details.

(*) Listening sockets

5   Miscellaneous features

5.1   Phone book

The TANDBERG Gateway can store up to 100 numbers in the phonebook. The phonebook may be edited through the web interface or by editing the *dir.prm* file, stored on file system of the TANDBERG Gateway (FTP). It also interacts with the Phone book features in TANDBERG Management Suite.

5.2   File system (FTP)

The TANDBERG Gateway incorporates an internal FTP-server where various files can be stored.

The TANDBERG Gateway uses default files unless the administrator specifies/stores any of these custom files (the default files are hidden). All the files described below are stored with the filenames indicated in brackets. When storing any of these files directly from FTP the filenames specified must be used. However, storing from the web page will change filenames automatically.

Legal File Formats:

Pictures	JPEG (.jpg) files that are not greyscale and non-progressive coded. Recommended maximum size is 352x288.
Sounds	16bit 8Khz mono Wave (.wav) files.
System Settings	TANDBERG parameter (.prm) files

5.2.1   Picture files
Gateway Call Proceeding - callproc.jpg

GW Extension Enquire Screen - extreq.jpg

Downspeeding In Progress - downspeed.jpg

5.2.2   Sound files
Gateway Welcome - callproc.wav

Extension Enquire Sound - extreq.wav

5.2.3   Other files
Parameter settings of TANDBERG Gateway - all.prm
This file contains the current TANDBERG Gateway parameter settings.

Directory - dir.prm
This file contains the directory/phonebook of the TANDBERG Gateway.

6 Environmental Issues

6.1 TANDBERG's Environmental Policy

- TANDBERG's Research and Development is continuously improving TANDBERG's products towards less use of environmentally hazardous components and substances as well as to make the products easier to recycle.
- TANDBERG's products are Video Conferencing Solutions. The idea of Video Conferencing is to reduce the need for expensive, time demanding and polluting transport of people. Through people's use of TANDBERG's products, the environment will benefit from less use of polluting transport.
- TANDBERG's wide use of the concepts of outsourcing makes the company itself a company with a low rate of emissions and effects on the environment.
- TANDBERG's policy is to make sure our partners produce our products with minimal influence on the environment and to demand and audit their compatibility according to applicable agreements and laws (national and international).

6.2 Environmental Considerations

Like other electronic equipment, the TANDBERG Gateway contains components that may have a detrimental effect on the environment.
- Printed-wiring boards made of plastic, with flame-retardants like Chloride or Bromide.
- Component soldering that contains lead.
- Smaller components containing substances with possible environmental effect.

After the product's end of life cycle, it should be returned to authorized waste handling and should be treated according to National and International Regulations for waste of electronic equipment.

7   Product Approvals

The product has been approved by various international approval agencies, among others: UL, BABT and NEMKO. According to their Follow-Up Inspection Scheme, these agencies also perform production inspections at a regular basis, for all production of TANDBERG's equipment.

The test reports and certificates issued by the approval agencies show that the TANDBERG Gateway complies with the following standards.

7.1   Connection of Tele-Terminal Equipment

- TBR 4
  (Comply with EU's Commission Decision 1999/5/EC).

7.2   EMC Emission - Radiated Electromagnetic Interference

- EN55022:1994 + A1:1995 + A2:1997 (CISPR 22:1993 + Corr. and Am.1 and Am.2) Class B (Comply with EU's Commission Decision 89/336/EEC).
- FCC Rules and Regulations Part 15, Subpart B, Class A.

7.3   EMC Immunity

- EN 55024:1998
- EN 61000-3-2:1995 + A12:1995
- EN 61000-3-3:1995
  (Comply with EU's Commission Decision 89/336/EEC).

7.4   Electrical Safety

- IEC 60950:1991 + Amd.1:1992 + Amd.2:1993 + Amd.3:1995 + Amd.4:1996
- EN 60950:1992 + Amd.1:1993 + Amd.2:1993 + Amd.3:1995 + Amd.4:1997 + Amd.11:1997 (Comply with EU's Commission Decision 73/23/EEC).
- UL 1950 3. Edition
- CSA C22.2 No. 950-M95

7.5   EMC Immunity

- EN 55024:1998

7.6 NEBS approval

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.

8 Product Reliability

The predicted reliability of the TANDBERG Gateway is expressed in the expected random Mean Time Between Failures (MTBF) for the electronic components based on the Power On Hours (POH).

- The POH for the TANDBERG Gateway is > 69 000 hours.

The MTBF value is dependent on correct handling (e.g.: ESD protective measures are used), installation and use of the TANDBERG Gateway.

Note

- The Useful Life Cycle for the TANDBERG Gateway is in excess of 6 years.
- TANDBERG is in a position to identify batches of products with possibly less reliability than stated above ('product tracking') and will in such an event inform their customers.
- ISO 9001 certificate is available upon request from the manufacturer.

9 Technical specification of TANDBERG Gateway

9.1 Mechanical information[10]

	TANDBERG Gateway	
Height	4.4 cm	1.7 in
Width	44.2 cm	17.4 in
Depth	31.8 cm	12.5 in
Weight	5.15 kg	11.3 lbs

The TANDBERG Gateway is a standard 19 inch rack mountable with 1U height.

Standard cables for TANDBERG Gateway	Part no.	Length	
PRI cables (4)	111890 M1,M2,M3,M4	5.0 m	16.7 ft
Ethernet cable	112083	5.0 m	16.7 ft
RS232 cable	112489	3.0 m	10.0 ft
Power cables (International package)	110207 (EU) 110208 (UK) 110209 (SW) 110212 (AUS)	2.5 m	8.3 ft
Power cable (US only)	110210	2.0 m	6.7 ft

9.2 Packaging

The following table shows the approximate measurements on the cardboard packaging of the TANDBERG Gateway system- as shipped from production.

Height	29 cm
Width	68 cm
Depth	56 cm
Weight	13 kg

---

[10] All figures are subject to change without any further notice.

9.3   Operating Temperature and Humidity

- 0° C to 35° C (32° F to 95° F) ambient temperature.
- 10% to 90 % Relative Humidity (RH)

9.4   Storage and Transport Temperature

- -20° C to 60° C (-4° F to 140° F) at RH 10-90 % (non-condensing)

9.5   System Power Consumption

- Maximum power consumption for TANDBERG Gateway is 90 W.

10 Technical Specification sheet

System Capacity
Maximum number of video conferencing calls: 8
Maximum number of audio calls: 8

Endpoints Supported
H.320 conferencing endpoints
H.323 conferencing endpoints
Analogue/ IP telephones

Bandwidth
H.320 up to 3840 kbps
H.323 up to 3840 kbps

Video Standards
H.261, H.263, H.263+, H.263++, H.264

Audio Standards
G.711, G.728, G.722, G.722.1

Live Video Resolutions
Native PAL:
QCIF (176 x 144 pixels)
CIF (352 x 288 pixels)
4CIF (704 x 576 pixels)
Native NTSC:
SIF (352 x 240 pixels)
4SIF (704 x 480 pixels)
Native PC resolutions:
VGA (640 x 480 pixels)
SVGA (800 x 600 pixels)
XGA (1024 x 768 pixels)

Network Interfaces
4 x E1/T1 G.703 (RJ-45) for ISDN PRI
2 x LAN/Ethernet (RJ-45) 10/100 Mbit

Ethernet / Internet / Intranet Connectivity
TCP/IP,DHCP,SSL,ARP,FTP,Telnet,HTTP, HTTPS
SNMP Enterprise Management
XML/SOAP
Embedded WEB server
Support for TANDBERG Management Suite
10/100Mbit full/half duplex (manual or auto detect selection)

Other Supported ITU Standards
H.320, BONDING (ISO 13871), H.231, H.243, H.221, H.242, H.245

TANDBERG Gateway Features
Dial in / dial out capabilities
ISDN & IP Downspeeding at call setup
ISDN Downspeeding in call
H.243 Terminal names

Embedded Encryption
Standards based on ISDN, IP and mixed ISDN / IP:
H.235, H.233, H.234, DES 56 bit key, AES 128 bit key
Automatic key generation and exchange

Audio Features
Automatic Gain Control
Custom Welcome Sound (WAV)
Custom Extension Enquire Sound (WAV)

Video Features
Custom "Welcome" Picture (JPEG)
Custom "Extension Enquire" Picture (JPEG)
Custom "Downspeed" Picture (JPEG)

Frame Rates
Up to 30fps

Dual Stream
DuoVideo (all video resolutions supported)
Support for "People + Content"

Security Features
IP Administration passwords
Management via HTTPS
IP password
Services may be disabled: FTP, Telnet, SNMP, HTTP, HTTPS

H.323 Network Features
DiffServ
IP Precedence
TOS
RSVP
IPLR TF

System Management
Total management via embedded WEB server using HTTPS, SNMP, Telnet and FTP
1 x RS-232 for local software upgrades, local control and diagnostics
Management using TANDBERG Management Suite
Call scheduling via TANDBERG Scheduler and TANDBERG Management Suite (Optional)

Embedded WEB server
Total Conference and Call control
System diagnostics

Environmental Data
Operating Temperature:
0° C to 35° C (32° F to 95° F) ambient temperature
Relative Humidity(RH): 10% to 90%
Storage and Transport Temperature:
-20° C to 60° C (-4° F to 140° F) at RH 10-90 % (non-condensing)

Physical Dimensions
Height 4,4 cm (1,7 inches)
Width 44,2 cm (17,4inches) Depth 31,8cm (12,5 inches)
Weight Net 5,15 kg (11,3lbs)
Power 100-240 VAC, 50/60 Hz
90W max. power consumption
19 inch rack mountable

Free Manuals Download Website

http://myh66.com

http://usermanuals.us

http://www.somanuals.com

http://www.4manuals.cc

http://www.manual-lib.com

http://www.404manual.com

http://www.luxmanual.com

http://aubethermostatmanual.com

Golf course search by state

http://golfingnear.com

Email search by domain

http://emailbydomain.com

Auto manuals search

http://auto.somanuals.com

TV manuals search

http://tv.somanuals.com