GENERAL

Period of Time:
July 2010

SW-Version:
TC3.1.0.215436

Device class:
The video conference device Tandberg EX90, which is offered as Personal Telepresence solution, is a 24-Inch-HD-Office-System. It is suited as desktop solution and can play video up to a resolution of 1080p with 30fps or 720p with 60fps. With the software version TC3.1.0, a multipoint conference with three participants in 720p30 can be realized.

Scope of delivery:
The office system has a 24 inch LCD monitor with a maximum resolution of 1920x1200, which can also be used as PC monitor. The embedded PrecisionHD camera with 1080p60, which can be used as document camera at the same time, can be tilted 90° down. The video conference device is offered with a newly developed 8 inch inTouch user interface (instead of a remote control) with a resolution of of 400x800 pixel, which is additionally combined with a classic telephone receiver, e.g. for telephone calls.

Bandwidth
The Tandberg EX90 enables up to 6000 kbps in LAN video conferences with H.323 as well as with SIP in point-to-point connections.

INSTALLATION

The device is ready for operation quickly. Next to LAN, power supply voltage and inTouch user interface, the laptop to be transferred is connected per DVI-I and the laptop audio per phone jack. Afterwards, the usual initial configuration, configurations for IP and H.323, can be carried out. A second monitor can be connected to the Tandberg EX90 via HDMI for Dual Stream. Further, there is the option of connecting another camera.
TEST

Operation
The newly developed inTouch user interface is well elaborated in its operator guidance and therefore very user friendly. One becomes familiar with the device quickly and accustoms oneself with it even more quickly. Wistfulness for the "missing" remote control did not occur in the VCC ;-) . A second monitor for H.239 presentations displays the current presentation immediately, without the need to change something in the configuration menu. However, the Tandberg EX90 monitor is big enough for presentation and video display.
A document transferred with the camera is displayed well readable at the remote system, at which font size 9 can still be read.

Audio/Video
The quality rating of the audio and video connections performed very good in almost all tests. The audio codecs used here were mainly AACLD or G.722. Only with the softwareclient Mirial, G.711 was negotiated for the audio connection.
H.264 was negotiated as video codec in all cases except for one. The Sony PCS-G70 sent H.263 with 4CIF and received H.264 with CIF from the Tandberg EX90. In the other connections, mainly 720p was transferred as video format and 1080p between the Tandberg devices of the new generation. The Tandberg 990 MXP uses 448p in sending direction. In connection with the PVX, this one sends QVGA and receives QCIF.
H.239
The majority of the transferred presentations could be rated with very good in quality. Here, font was well readable from 8 pixel on, there were no color falsifications, disrupting signals were compensated. The slides were mostly visible immediately at the remote system, re-sharpen times up to 2 seconds rarely occurred.
In the other tests, problems occurred in one direction at a time. The Tandberg EX90 had problems in receiving direction in connection with the Polycom PVX and the Mirial Softphone under Mac and Windows, such as: abort of the presentation at complex slides, heavy image errors or overlay of sequent slides. In connection with Tandberg Movi (4.0 Beta), some slides appear very hesitantly (up to 30 seconds transmission time) and the compensation of disrupting signals was only present weakly.
The Tandberg EX90 sent presentations mostly in XGA format with H.264 or H.263. In the tests with the Tandberg C20, C90 and Polycom HDX 8004, the presentations could be transferred with 1280x720 or 1280x1024 pixel according to the laptop resolution.
Video material in SD quality, transferred with H.239, was accepted as video at the remote system in 68% of the tests. In 16% of the tests, the transferred video was degraded to a slide show. 54% of the transferred and received HD video material were rated as such, 16% were not acceptable, in the remaining tests, the video quality was marginal.
In the most cases, the video was transferred in XGA format with H.264 or, less often, with H.263++. Only between Tandberg EX90 and C90, 1280x1024 was achieved as format with 29-30 fps. In connection with the Mirial Softphone, this one could display video with 30fps and a video format of 1024x768. Between Tandberg EX90 and C20, video was displayed with 1280x768 as format and 14-15 fps. Otherwise, useable video was usually sent and received with 6-7 fps.
Detailed test results for the tests in pairs are available in the compatibility matrix.

Camera remote control
The camera remote control worked in all tests under exisstance of the preconditions with following exceptions. The Tandberg EX90 could not operate the Sony PCS XG-80 by remote control. Tandberg 6000 MXP and Tandberg 990 MXP can surprisingly not control the camera of the Tandberg EX90.

MCU
The cooperation with the Codian MCU of the DFNVideoConference service worked without problems on video with H.264 and 720p in both directions and on audio with AAC-LD. The H.239 presentation (slides and video) is carried out in sending as well as in receiving direction with H.264 and 720p.

With the Full HD (receiving direction) Codian MCU 4520 SW-Version 4.1(1.45), the Tandberg EX90 was connected with H.264@1280x720@30 in sending direction and with H.264@1920x1088@25 in receiving direction.

**Gatekeepers**
The cooperation with the gatekeepers GNU-GK 2.2.7 and CISCO MCM 12.1 worked without restrictions.

**Miscellaneous**
SIP calls to the Codian-MCU of DFN via "97918168@mcu.vc.dfn.de" do not work. Also URI-Dialing to H.323 Annex O (e.g. via "mcu.vc.dfn.de##97918168") did not work.

The connection encoding with AES according to H.235 worked without restrictions in all connections except with Mirial Softphone (encoding functions for H.323 are not implemented here).

According to the data specification, the devices handle Firewall Traversal according to H.460.18 and H.460.19.

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**CONCLUSION**

The 24-Inch-HD-Office-System with new inTouch user interface is a representative, well to be operated video conference system. It stands out due to very good up to good audio and video features. Also the presentation of multimedia contents per H.239 can be rated with very good up to good.

**Documentation**
Manufacturer: Tandberg
Distributor: MVC

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We thank Mr. A. Kienle from the company Tandberg for providing the test material.