TEST REPORT TANDBERG 6000 MXP (WITH HD OPTION)

PDF-Version (optimized for print)

GENERAL

testing period: August 2007

SW-Version: F6.0 PAL (Update im Juni 2007)

Device Class
The Tandberg 6000 MXP Codec is an independent (stand-alone) system which is currently connected to a Tandberg precision HD camera by a proprietary cable. The flat Codec is designed in a way which allows it to be integrated by default in a 19 inch rack. The device has a multitude of ports and an interior mains adapter. Other components can be purchased separately.

Scope of Delivery
The purchasing included the Tandberg MXP Integrator Package as a base model with Codec, Precision HD camera, two table microphones, a tracker, 768 kbps flaring for ISDN according to H.320, three Mbps flaring for IP according to H.323, 19 metres of proprietary extension cable for the camera connection with three segments, repeaters and current supply. The additional WAVE II camera was exchanged by a 3-chip camera Sony BRC-300 PAL with S-video and analogical component-output for reasons of poor image quality.

Bandwidths
According to the scope of delivery, bandwidths of up to 768 kbps for ISDN / H.320 and up to 3 Mbps for IP / H.323 are possible. The selection of the bandwidth can be carried out automatically by the system, or alternately adjusted by the administrator. When connecting, the bandwidth of the call can be adjusted separately.

INSTALLATION

Configuration
The connection of the device can be arranged without troubles. The well-defined labeling of the inputs and outputs as well as the further labeling and the division into logically belonging-together groups facilitate the work highly. However, the proprietary cables disturb the working process rather than digital cables or analogical standard-connections of video-signals, which complicates the usage of better cameras and inexpensive components of leading brands and from the mass market.

Tandberg 6000 Codec with connections
Operation

The operation of the version resembles the operation of preceding software versions (F 4.x or F 5.x). In addition, the remote control is congruent with the preceding Tandberg VC systems, e.g. the Tandberg 990 MXP. Rethinking or familiarizing is therefore not necessary.

Admittedly, several shortcomings in operation and settings are preserved unimproved. It is not possible to access the control mode of the far end camera directly. The switch from close to far end camera (FECC Far End Camera Control) is extremely laborious in comparison to other systems.

The theoretically maximum bandwidth is not in evidence in the checkout program of the connecting data. A rather severe fact is that there is absolutely no information on the rate of frames per second in the video display.

In actual fact, there exist two possibilities to receive the IR remote control signals - at the codec and at the main camera. The infrared remote control is quite strong in interplay with the codec and even allows a safe control without direct intervisibility and works indirectly over walls or through windows. It is problematic, though, that the very good possibility of controlling is ultimately cut off a the codec in case a proprietary Tandberg camera without standardized useable video outputs is connected. The IR-recipient in the camera can neither compete in sensitivity nor in aspects of operating range with the IR-recipient in the codec. In case several Tandberg systems are used, a channel selection for the respective system would be preferable in order to avoid maloperation or unintended misadjustment with other systems.
Audio/Video

The audio quality is very good. The interface microphones are excellent and the XLR junctions are professional. The echo suppression and the further audio functions (mixing, test sound, absolute level control) are exemplary. However, the test sound or the audio demo are only accessible locally and are not available for an audio connection test.

Suchlike excellence is absent in video quality. A video test image in order to control the incoming image signals or for the remote station is absent. The 1-chip (1/3 CMOS sensor) 1 MegaPixel camera by Tandberg does not make the grade. It is neither precise nor High Definition. 67% or the necessary color information are highly interpolated because they are not present physically as RGB colored picture elements. The camera has a poor dynamic scale and outshines easily when confronted with bright or back light. It even hisses in case of inadequate lighting. In consequence, the camera cannot deal easily with fast and precise focusing. In case of unfavorable conditions of light and contrast, the focus search commences with steady pumping.

The abutting edge at the front-side lens which protrudes for the camera is absent. A thread for transport covering and lens screen are missing likewise. Annoying reflections fade in into the video conference through the surface of the lens. Moreover, the mechanic construction is not safe for transport. The heavy front of the camera can easily quarry out of the simple plastic body. When controlling PTZ (Pan Tilt and Zoom), the mechanism produces squeaky sounds, while analogous cameras of other producers as Sony or Polycom are nearly silent during the active video conference.

For camera connection, only proprietary cables are used. Standardized inputs are neither available analogously nor digitally. The HDMI gateway is not implemented yet at the remote station and declarations for the necessary copy protection HDCP or for digital audio integration (e.g. for playback on modern displays or beamers) are not existant.

The video output signal is metrologically and subjectively worse as the signal of standard SD cameras which use the S-video PAL signal. Totaling, both Tandberg cameras WAVE II and the so-called Precision HD are the respectively worst cameras of their category in comparison to LifeSize, Polycom, Canon, JVC, Panasonic or Sony. Therefore, they are not recommended for use.

H.264

The video codification via H.264 is possible without presentation in maximum bandwidth and also in high resolution HD720p. In this case, 3072 kbps were achieved. However, resolution and video bandwidth collapse and achieve far less than the possible connection bandwidth if a presentation is hooked up via H.239. In case the Tandberg 6000 MXP is connected with other HD720p remote stations (e.g. Polycom HDX 9004 or Codian MCU 4520), the scope of reception decreases immensely from w720p to w576p (1024x576 @ 16:9) or even only to 4CIF (704x576 @ 4:3). The complete combination MPEG-4 / AVC and AAC while sending and receiving as well as Duo Video in XGA (Additional Media Channel according to H.239) cannot be accomplished simultaneously by the Tandberg 6000 MXP.
The Tandberg 6000 MXP works satisfactorily in data presentations in respect to text and image quality in XGA resolution 1024x768 @ 4:3. Readability and determination of borders are very good. Color display is correct, charge time after image change is comparatively short and normally, there are no compression errors. The aspect-ratio stays correct 4:3 and the image is handled completely and displayed without cut-offs of borders (which is the case with Video Overscan).

The image updating proceeds with 7.5 frames per second and thus even allows smaller animations in the presentation. In video-compression of the additional media channel, H.264 is prioritized. The bandwidth achieves up to 400 kbps during image change in this case.

However, in case a presentation is realized with H.239, an inexplicable phenomenon disturbs the working process: the bandwidth, resolution and picture quality of the primary video channel are far worse than the recorded connection bandwidth. Partly, the video bandwidth decreases by 1 Mbps up to 2 Mbps if an XGA presentation is running simultaneously. Sometimes, the resolution of HD720p with originally 1280x720 @ 16:9 decreases, resulting in a Wide-CIF resolution with only 868x488 picture elements. In this case, the video bandwidth may come under 512 kbps, although actually 3 Mbps are available for connection. In an earlier technical description of the systems Tandberg 770/880/990 as also later on of the Tandberg 6000, the following statements were made in the section "Duo Video (Optional)": "When network is H.323: The system will use approximately 1/2 of its original bandwidth for Duo Video ... the DuoVideo rate will be less than the main video rate for higher call rates."

For H.320 via ISDN, inter alia the following dispartments of call rate in kbps and Duo Video rate in kbps are stated: 128 kbps / 64 kbps, 768 kbps / 256 kbps and 1920 kbps / 384 kbps. Besides, there are hints concerning the composition and calculation of the respective bandwidths. "When using the Duo Video feature the main video bandwidth can be calculated by using the formula below: Main video rate = Call rate DuoVideo Audio Framing (1.6 kbps) Encryption control (0.8 kbps)"

In the settings section of the menu presentation, only 3 ranges are available for the sliding controller which regulates the rate of the presentation (Duo Video Quality). These are: 25%, 50% or 75%. However, the mentioned 384 kbps / 1920 kbps are only 20% for Duo Video, so that a better video quality is not achievable anyway, even if higher bandwidths are used.

The description of Tandberg and our expectations concerning the residual video quality were not delivered: Utilizable video bandwidth = 3.072 kbps - 384 kbps - 64 kbps - 2 kbps - 1 kbps = 2.621 kbps (!, ?)

Therewith, we have to refer to Tandberg with this question. Apparently, with this codec the upper limit of productivity is reached, it cannot allocate higher bandwidths simultaneously at 2 or 3 high-quality video channels, e.g. sending and receiving in HD720p as well as H.239 Dual Video in XGA.

Remote control
Remote control (FECC) was possible at the remote stations in both directions if the technical requirements were fulfilled.

MCU
The cooperation with the MCU by RADVision and Codian within the service DFNVideoConference worked fluently in general in the limits of moderate bandwidths. With the rather old Codian MCU 4220, it was not always possible to achieve the best possible bandwidths and video qualities. When using the Codian MCU 4520, the achievable quality was better and eachched punctually or at least in one direction HD720p.

Gatekeeper
The cooperation with the Gatekeepers GNU-GK 2.0.7 and CISCO MCM worked fluently.

Miscellaneous
When the connection data is compared in a diagnosis, it is striking that sending and receiving audio works symmetrically and with the same efficiency in compression and bandwidth. In video, the reception seems to be less efficient than the sending. Frequently, it is not possible to send in HD and simultaneously be received in HD in the setting "Motion" (with 30 fps [25 fps]), in particular.
Other producers also deliver standardized gateways for input and output signals with their systems. For instance digital HD-SDI is part of the equipment and included in the scope of delivery by Sony or Aethra, as well as analogue components or adapters are by Polycom or LifeSize. A comparable feature is absent in Tandberg systems. This serious shortcoming is now supposed to be compensated by a Tandberg Video-Switch TVS from August 2007 on. This hardware option is a self-contained device which is qualified for rack-installation. The expansion are directed to the codec via a proprietary gateway with two needless plug-and-socket connections, which rather deteriorate the signals. HDMI happens to feature the same problems as the camera and is for the time being not connected in an active mode at all.

A demand of users are at least direct adapters which are comparable to those of other producers, or even standardized gateways instead of proprietary ones in the main device. Otherwise, the analogue connections can be soldered by oneself and far more low-priced. The cross bars or matrix-switchers which are available in trade are also cheaper and rather flexible than the introduced TVS by Tandberg with an essential update to the software version F 6.1 (PAL) which only serves for customer retention.

CONCLUSION

The Tandberg 6000 MXP does not fulfill the requirements of a HD720p video conference system. The illuminating resolution of the Tandberg camera is under 900x500 pixels and thus does even not reach Wide-PAL with 1024x576 picture elements. The codec cannot cope with the minimum requirements as an introduction in High Definition Video according to the standard MPEG-4 (part 10) AVC/H.264 and Baseline Profile with Level 3.1 (AVC BP@L3.1) with other remote stations simultaneously sending and receiving HD720p with respectively 30 frames per second. In case a presentation in XGA is realized simultaneously after H.239, the bandwidth declines heavily and is not near the available quality.

One should not dare to assume that the maximum bandwidth of up to 3 Mbps of the testing gear might reach HD quality, as the video signal is far stronger compressed than with DVD-video (up to 15 Mbps, in standard NTSC or PAL), miniDV (25 Mbps in NTSC or PAL) or HD-DV (up to 35 Mbps). The cost-performance ratio is rather awkward, as it is sold by the marketing like a HD system.

Apart from that, the Tandberg 6000 MXP appears acceptable and solid as a standard system in the Slimline Design. It is possible to choose between the standard aspect ratio 4:3 and wide picture 16:9, even HD720p is sometimes possible. The video quality of the input signal can be increased decisively by the use of external cameras from 2 or 3 MegaPixels or 3-Chip-cameras.

Standard gateways, both digital, like HD-SDI (SDI) and analogue, like HD-YPbPr (YPbPr) should be called for directly at the system by the users, at least direct adapters should be included to the scope of delivery without other optional devices.

Documentation

Producer: TANDBERG [ www.TANDBERG.net ]
Distributor: Matec GmbH Dresden [ www.Matec-Dresden.de ]
<table>
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<tr>
<th>Standards</th>
<th>H.323 via IP, H.320 via ISDN, SIP,</th>
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<tbody>
<tr>
<td>Audio encoding</td>
<td>G.711, G.722, G.722.1, G.728, MPEG-4 AAC-LD, (activation and deactivation are separately possible)</td>
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<tr>
<td>Video compression</td>
<td>H.261, H.263, H.263+, H.263++, H.264, (activation and deactivation are separately possible)</td>
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<tr>
<td>Data compression</td>
<td>H.239 dual stream, Dual Video,</td>
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<tr>
<td>Audio input</td>
<td>3 x mikrophone (XLR mono, each with separate Echo Canceller), 1 x RCA/Phono, Line Level Input (with separate Echo Canceller), 1 x RCA/Phono, Line Level Input: Aux (Auxiliary or VCR/DVD Stereo L), 1 x RCA/Phono, Line Level Input: VCR/DVD (Stereo R),</td>
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<tr>
<td>Audio output</td>
<td>1 x RCA/Phono, S/PDIF (Mono /Stereo), or Analogue Line Level: Main -Audio or Analogue Stereo L, 1 x RCA/Phono, Line Level: Aux (Auxiliary, Analog Stereo R or VCR Stereo L), 1 x RCA/Phono, Line Level: VCR (Mono or Stereo R),</td>
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<tr>
<td>Video input</td>
<td>1 HD Camera (1 proprietary connection HD-Video or 1 MiniDin S-Video for SD-Video), 1 MiniDin, S-Video: Aux / Document-camera, 1 RCA/Cinch, Composite, Video: Aux / Document-camera, 1 RCA/Cinch, Composite, Video: VCR,</td>
</tr>
<tr>
<td>Video output</td>
<td>1 MiniDin, S-Video: Main-Monitor, 1 MiniDin, S-Video: Dual-Monitor, 1 RCA/Cinch, Composite, Video: Main-Monitor or VCR, 1 RCA/Cinch, Composite, Video: Dual-Monitor or VCR, 2 DVI-I / XGA: Main- und Dual Monitor (SVGA 800x600, XGA 1024x768, WXGA 1280x768, HD720p 1280x720 @ 60 Hz),</td>
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<tr>
<td>Data input</td>
<td>1 DVI-I: PC (SVGA 800x600, XGA 1024x768, HD720p 1280x720, SXGA 1280x1024, and EDID),</td>
</tr>
<tr>
<td>Bandwidth</td>
<td>H.320 up to 2 Mbps; H.323 up to 4 Mbps; SIP up to 4 Mbps; multipoint total up to 6 Mbps; - according to equipment-</td>
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