Test LifeSize Room (TM) + LifeSize Phone (TM)

General

Period: 23 Juny to 4 July 2006
SW-Version LS.RM1-2.0.0 (15)
Device Class
LifeSize Room (TM) + LifeSize Phone (TM) is a stand-alone device and can be ranked among group and room systems.
Scope of Delivery
The system consists of separate hardware codec, external power supply, external FireWire wide angle camera head and a remote control. An according LifeSize Phone (TM) as well as other components are optionally available.
Bandwidths
LifeSize Room System makes video conferences up to 2500 kbps in LAN over IP possible. Concerning the automatic choice of bandwidths with LifeSize there is, as in other systems, a tendency to overestimate or a too optimistic connection take-up. As a result either the other side and/or the LifeSize-owned codec are overstrained. The results are desynchronisation, package loss, disturbances in picture and sound, up to the rupturing of the speech communication. The image memory freezes with 1 fps, then a reset or restart of the system becomes necessary.
That is why often there was the strange effect that an audio/video connection only ran fluently and without problems at e.g. 768 kbps, whereas with a higher available bandwidth, against expectations it became considerably worse up to impossible.
If another LifeSize partner is dialled with LifeSize at a maximum rate of 2500 kbps, the codec works to full capacity. Inviting further video partners into multipoint conferences is impossible or further partners generally cannot be dialled up anymore. If, the other way around, a classical partner with a medium bandwidth of about 1024 kbps and CIF resolution starts, another LifeSize can be added in the still free bandwidth up to a maximum of 2500 kbps sending and receiving. Accordingly, the HD resolution of 1280x720p@16:9 is reduced clearly if required.

Installation

Installing the device works without problems first. The coloured guidance system of connectors and cables, labelling and the division into groups belonging together logically (net, VC in/out and other video and extension) facilitate this work very much. After attaching the net adapter - unfortunately there is no net switch - loading the codec and restart with reset as well as the sequential check of all external components take rather long. Attaching the components with the accompanying cinch was not sufficient for our professional display and required at least three further video cinch to BNC plug adapters.
The LifeSize codec is missing a modern and possibly digital DVI in- or output. It only has classical analogue PC VGA. Furthermore, new HD displays or a beamer cannot be attached as a standard after HD-ready specification directly with the component cable YPbPr. At LifeSize this is carried out over a VGA component adapter so far.
A difficulty is, that the multiple sound and video supplies are not identical, even though they have the same colour and plug connections. The red/white audio in the video group does not have echo cancelling (EC). In order to set this up, the supplies of the group with the black connectors Center (C) or Mono are necessary. The NTSC/PAL switch is not responsible for all of the yellow video supplies as well, but apparently only for those of the Video group. Video signalisation is not identical anymore since HD resolution. What leaves the codec and is displayed on an HD display or documented over a frame grabber, often stays a matter of surprise or is even uselessly incompatible.
Test

Operation
After a little familiarisation the software is very user-friendly. A lot of menu languages are available. A help text is shown at the individual menu points. These, however, only refer to the main menu point. If there are several choice options, up to now there is no further differentiated explanation. The menu guidance has several levels, each of which takes up the whole screen, thus they are covering each other completely. A certain degree of training is necessary to get used to this and to know when which level covers another and how to navigate between these levels. There are no tabs or a main menu bar with direct access.

Besides the numeric block there are four differently-coloured control buttons with different symbols on the remote control, which can be differently occupied in the single menu levels. This enlarges the range of functions considerably. However, it takes some attention to recognise on which level which function is located. Some settings can be defined by the individual user. There is even a colour temperature setting for inside and outside as well as an excellent test picture already.

Camera Remote Control
If the technical requirements on both sides were met, remote control of the camera was possible in both directions.

Audio/Video and approaching HD-ready Resolution
Tests with other end systems ran with good up to very good video and audio qualities. The LifeSize codec prefers high bandwidths, but to a maximum of 2500 kbps. Audio codec G.722.1 with a scanning of 7 kHz and compressed to 32 kbps instead of G.722 with 64 kbps and H.264 as video codec at 30 frames per second (30fps) in a fixed raster of 1280x720p@16:9 are preferred.

The audio output of LifeSize Codec L+C+R is no surround sound with stereo and bass, but a 3.0 combination for three mono room signals (left, centre, right). The camera head already has according bore holes for direct speech recording on the left, right and front sides, this, however, is not yet fully implemented. These signals of the three microphone openings can also be positioned over according room loudspeakers for audio replay. For usual HD displays with two surround sound loudspeakers left and right as well as Virtual Sound a simple prioritisation in Audio for Red/White L+R Stereo are desirable.

Picture Aspect Ratio, Scaling and Presentations between 16:9 and 4:3 (Aspect Ratio)
Wide Screen with a new screen ratio width-height 16:9 becomes a part of video conference technology with LifeSize. In mixed surroundings the picture quality becomes worse and more unnatural because of scaling, interpolation and distortion. The participants of the conferences are displayed in a stretched, compressed or cut-off way.

Because of the reduced resolution texts in presentations are less readable as well. In the send-direction the user has hardly any influence on the LifeSize Room (TM) codec. 1280x720p HD ready@16:9 is sent. If 4:3 is sent, the receiving LifeSize unfavourable and unnecessarily displays in 16:9.

H.239 for Presentations
The system does not hint on the older standard T.120 and gives the term "presentation" for H.239. The explanation of the presentation mode directly refers to H.239 "Activation/Deactivation of H.239 dual streaming". With some VC devices the transmission of the presentation worked in both directions. Some other VC systems, however, did not send presentations to LifeSize Room (TM). H.239, which worked otherwise, was automatically deactivated. LifeSize Room (TM) was able to send presentations over the analogue VGA input from a PC in XGA resolution. However, there were oddities. The presentation of LifeSize Room (TM) was sent in the receiver's video window, whereas the video picture or even the own image was shown in the window opened for the presentation.

Identification according to H.239 standard of the additional dual streaming for presentations and conform interpretation in replay are still a general problem of different VC systems. LifeSize Room (TM) has different menu points such as Video, View or Design as well as Selection of primary and secondary camera. But despite PIP mode we did not really succeed in displaying received and own video as well as the presentation window on an HD display in the layout desired.

MCU, Codian MCU and Codian IP VCR 2220
The cooperation of the MCUs within DFNVideo Conference service generally worked without problems in moderate bandwidths. But since LifeSize has a small MCU integrated, in our tests there were repeatedly problems if another MCU with further participants in voice activated operation were invited or if an IP-VCR recording was intended. In this case, there is a cascading of the screens like in Video Feedback Looping or when calling a device with the same, thus several times placed IP (endless IP video echo). In the current versions of Codian (MCU and IPVCR) and LifeSize there are
still incompatibilities in the cooperation of the systems, which are to be eliminated in the next release.

**Gatekeepers, IP Call, H.323 Prefix and E.164 Alias Call**

Cooperation with the gatekeepers GNU-GK 2.0.7 and CISCO MCM worked without problems. When registering an alternative second gatekeeper surprisingly there was a double registration of the LifeSize terminal. Initially, IP calls took unusually long and started the actual IP call to the intended end device only after 30 s. There was also an unintended connection and video conference spontaneously as a SIP call. The reason for this supposedly is, that there are different administrator settings for SIP, SIP server and a so-called LifeSize transit, a routing over American servers. Within a couple of seconds normal IP call speed is reached again if in all of the three menus all is completely deactivated, unlike the presets. This deactivation solves another persisting problem. LifeSize was unable to make E.164 calls. There were no valid or valuable call streams at the gatekeepers, so that the desired connections were rejected. But after the deactivations mentioned, E.164 calls to MCU or IP-VCR worked as well.

**Miscellaneous**

The design of all parts is harmonised and felicitous at first glance. The LifeSize codec, as expected, becomes quite warm, despite vertical positioning and four ventilation holes. The external power supply, which has a capacity of 8 A and has to cope without cooling fins, even becomes hot. The wide-angle objective of the HD camera does not have a lens-protection integrated. Thus the surface of the unprotected lens is sensitive to scratches, although it is responsible for securing the input quality for HD video conferences over a long period of utilisation.

The automatic camera focus sometimes is problematic, e.g. it starts only slowly. For support then manual tilting and pivoting of the camera were necessary. This, however, disturbs the video conference. LifeSize utilises FireWire cables for power supply of the own HD camera with a proprietary protocol. Other digital DV, HDV or HD cameras with IEEE-1394 or i.Link up to now cannot be connected to both of the (current carrying!) FireWire inputs of the LifeSize (Attention: Defect possibly!).

**Conclusion**

LifeSize Room (TM) is, according to standard MPEG-4 (Part 10) AVC/H.264, part of Baseline Profile with Level 3.1 (AVC BP@L3.1), thus representing the lowest level step into High Definition Video. Manual adjustability of the codec also backward compatible to H.263 is important. Options for the Aspect Ratio are necessary. The system is also able to work more efficient, if there is a better, undistorted video picture quality.

Section 4:3 (respective 12:9) from 16:9 should be available when sending to expand compatibility and at the same time a better sharpness and a lower objective-frame trimming. Contrarily, when receiving current standards, a 4:3 presentation, free of overlapping, is desirable. This enables comfortable 3 CIF views on 16:9 displays backwards compatible and free of distortion.

If there are H.239 dual streams the LifeSize codec currently only supports H.264 at resolutions above CIF. If the other side uses H.263, LifeSize sends the dual stream only as CIF (352x240 NTSC @ 4:3). Up to now there are no digital DVI supplies and no direct component supplies YPbPr. The different standard- and HD-norms of video signals should better be either adjustable in the menu in different variants and/or usable with different labelling at separate supplies Standard @4:3 (NTSC/PAL) und HD- (ready, Full) @16:9.

If LifeSize Room does not aim at being a solution within HD@16:9 and manages to build a bridge to Standard video conferences SD@4:3, the chances for its success are very good. Its video quality currently is much better than that of current standard systems. For real HD challenges, however, further improvements are necessary.
**Technical Data**

The documentation of the current version LifeSize Room (TM) codec v2.0 is currently being set up and revised. Partly there are already references to intended features, which are not yet actively implemented. On the other hand, there are options recognisable, which have already been changed in the course of development.

Manufacturer: LifeSize

<table>
<thead>
<tr>
<th>Supported General Standards</th>
<th>H.323 for IP Call, H.320 IP to ISDN, (H.245 tunneling can be activated)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sound Coding</td>
<td>AAC-LC nach MPEG-4 (Low Complexity with VBR Variable Bit Rate, 96 kbps, CD quality), G.722.1 (compressed 7 kHz, 32 kbps), G.722.1 (compressed 7 kHz, 24 kbps), G.722 (7 kHz, 48 kbps, 56 kbps or 64 kbps, High Quality), G.729 compressed 8 kbps, telephone quality), G.711 (my-Law, 3.1 kHz, 64 kbps, telephone quality), G.711 (A-Law, 3.1 kHz, 64 kbps, telephone quality), all mono and mono loudspeakers in LifeSize Phone (TM)</td>
</tr>
<tr>
<td>Video Compression</td>
<td>H.264, (backwards compatible H.263, only in automatic system decisions), no manual choice H.264 or H.263 possible, sending H.264 and receiving at the same time H.263 possible, (not implemented H.261, MPEG-4 Video, only MPEG-4 Audio conference possible)</td>
</tr>
<tr>
<td>Data Compression</td>
<td>Presentation Start / Stop over VGA PC output =&gt; Codec input, Dual Streaming, (H.239 secondary media channel), alternatively transmission in video window with H.263</td>
</tr>
<tr>
<td>Audio Inputs</td>
<td>1 x RJ-45 (PoE support, 1 x RCA Line in, 1 x RCA line level input</td>
</tr>
<tr>
<td>Audio Outputs</td>
<td>1 x main Audio output (L+C+R), 1 x RCA output</td>
</tr>
<tr>
<td>Video Inputs</td>
<td>HD camera 1 (HD-Video) and 2 (document Cam) with FireWire (High Definition Cameras), S-Video (Life-Video) and additional S-Video (DVD), Composite (RCA Eingang) 1 (Video) and 2 (document Cam), VGA (PC) for presentations</td>
</tr>
<tr>
<td>Video Outputs</td>
<td>2 analogue VGA with adapters toVGA/Component/S-Video/Composite (720p to some extend compatibility problems with standard NTSC / PAL interlaced), 1 S-Video, 1 Composite Video (RCA output), with switch NTSC / PAL</td>
</tr>
<tr>
<td>Data Input</td>
<td>analogue VGA input for presentations from PC (XVGA), (2. Video Input for HD camera FireWire, S-Video or Video Composite for document camera or Video replay)</td>
</tr>
<tr>
<td>Bandwidths</td>
<td>IP up to 2500 kbps</td>
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</tbody>
</table>

Thanks to LifeSize for supplying the test.