IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLORADO

REALTIME ADAPTIVE STREAMING LLC, Plaintiff, v. POLYCOM, INC., Defendant.	Case No. _____ JURY TRIAL DEMANDED

COMPLAINT FOR PATENT INFRINGEMENT

This is an action for patent infringement arising under the Patent Laws of the United States of America, 35 U.S.C. § 1 *et seq.* in which Plaintiff Realtime Adaptive Streaming LLC ("Plaintiff" or "Realtime") makes the following allegations against Defendant Polycom, Inc. ("Polycom" or "Defendant").

PARTIES

1. Realtime is a Texas limited liability company. Realtime has a place of business at 1828 E.S.E. Loop 323, Tyler, Texas 75701. Realtime has researched and developed specific solutions for data compression, including, for example, those that increase the speeds at which data can be stored and accessed. As recognition of its innovations rooted in this technological field, Realtime holds multiple United States patents and pending patent applications.

2. On information and belief, Polycom is a Delaware corporation with its principal place of business at 6001 America Center Drive, San Jose, California 95002. Polycom offers its products and/or services, including those accused herein of infringement, to customers and potential customers located in Colorado and in this District. For example,

Polycom has an Office in Westminster, Colorado at Primecenter at Northridge, Building B, First Floor, 1765 West 121st Avenue, Westminster, Colorado 80234-2301. Polycom may also be served with process through its registered agent for service, The Corporation Company at 7700 East Arapahoe Road, Suite 220, Centennial, Colorado 80112-1268.

JURISDICTION AND VENUE

3. This action arises under the patent laws of the United States, Title 35 of the United States Code. This Court has original subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a).

4. This Court has personal jurisdiction over Polycom in this action because Polycom has committed acts within the District of Colorado giving rise to this action and has established minimum contacts with this forum such that the exercise of jurisdiction over Polycom would not offend traditional notions of fair play and substantial justice. Polycom has also committed and continues to commit acts of infringement in this District by, among other things, offering to sell and selling products and/or services that infringe the asserted patents.

5. Venue is proper in this district, e.g., under 28 U.S.C. § 1400(b). Polycom has a regular and established place of business in this District at Primecenter at Northridge, Building B, First Floor, 1765 West 121st Avenue, Westminster, Colorado 80234-2301. Furthermore, upon information and belief, Polycom has transacted business in the District of Colorado and has committed acts of direct and indirect infringement in the District of Colorado.

COUNT I

INFRINGEMENT OF U.S. PATENT NO. 7,386,046

6. Plaintiff re-alleges and incorporates by reference the foregoing paragraphs, as if fully set forth herein.

7. Plaintiff Realtime is the owner by assignment of United States Patent No. 7,386,046 ("the '046 patent") entitled "Bandwidth Sensitive Data Compression and Decompression." The '046 patent was duly and legally issued by the United States Patent and Trademark Office on June 10, 2008. A true and correct copy of the '046 patent is included as Exhibit A.

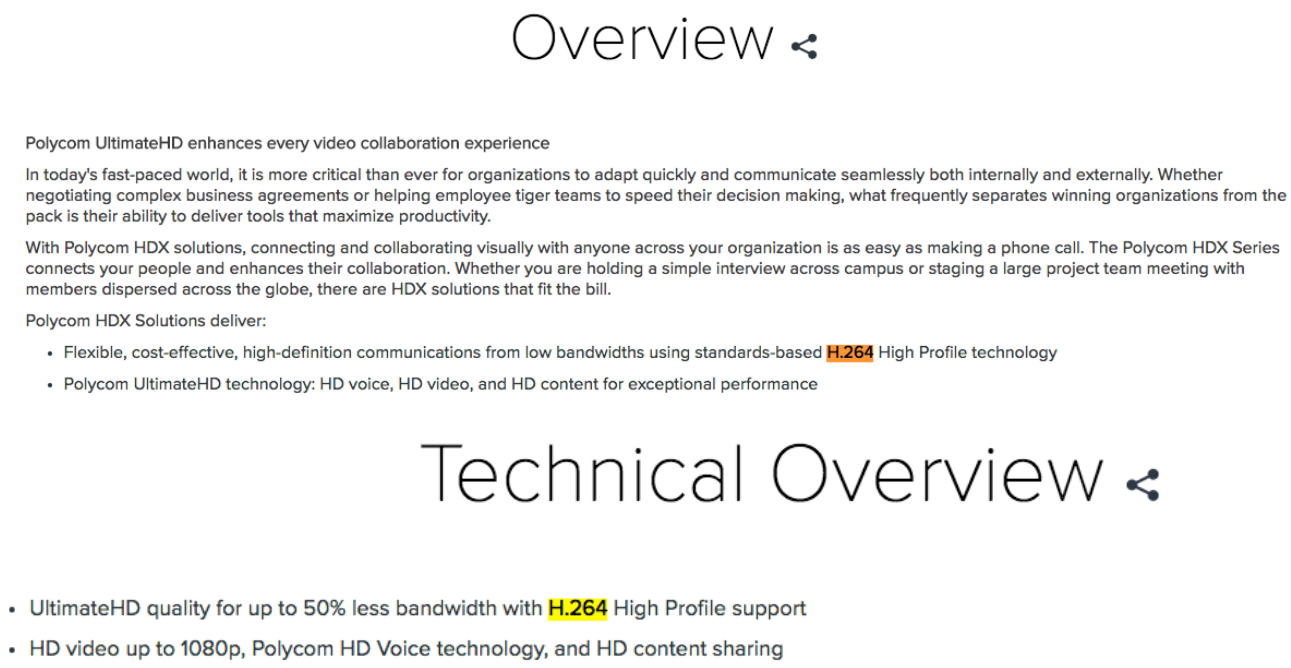
8. On information and belief, Polycom has made, used, offered for sale, sold and/or imported into the United States products that infringe the '046 patent, and continues to do so. By way of illustrative example, these infringing products include, without limitation, Polycom's telepresence, videoconferencing as well as video and voice communication solutions utilizing H.264 High Profile, such as, for example, the Polycom RealPresence Experience High Definition (RPX HD 200 & 400 Series) including the Polycom RPX HD 204M, RPX HD 208M, RPX HD 210M, RPX HD 218M, RPX HD 408M, RPX HD 418M, RPX HD 428M; the Polycom HDX Series including the Polycom HDX 9000, Polycom HDX 8000, Polycom HDX 7000, Polycom HDX 6000, Polycom HDX 4000, Polycom HDX 4500, Polycom HDX 4002, Polycom HDX 4001, Polycom HDX Packaged Solutions, Polycom HDX Executive Collection, Polycom HDX Media Center, Polycom EagleEye Director, Polycom Eagle Eye IV, Polycom Touch Control interface, Polycom VisualBoard Technology; the Polycom Open Telepresence Experience (OTX) including the Polycom OTX 100 and Polycom OTX 300; the Polycom

RealPresence Series including the Polycom RealPresence Desktop, Polycom RealPresence Mobile for Android, Polycom RealPresence Medialign, Polycom RealPresence Immersive Studio, Polycom RealPresence Immersive Studio Flex, Polycom RealPresence Clarity, Polycom RealPresence Group 310, Polycom RealPresence Group 500, Polycom RealPresence Group 700; the Polycom RMX Media Platforms including the Polycom RMX v7.0 with MPMx modules, Polycom RMX 1000 platform, Polycom RMX 1500 platform, Polycom RMX 2000 platform and Polycom RMX 4000 platform; the Polycom ATX Series including the Polycom ATX 300; the Polycom TPX Series including the Polycom TPX HD 306M (3-screens); the Polycom QDX Series including the Polycom QDX 6000; the Polycom CX Series including the Polycom CX5000 and Polycom CX7000; the Polycom VVX Series including the Polycom VVX 1500D; the Polycom load balancers e.g. the Polycom DMA 7000; the Polycom desktop video infrastructure or servers e.g. the Polycom CMA 4000 and Polycom CMA 5000; the Polycom firewall traversal infrastructure including the Polycom VBP ST and E models including the Polycom VBP 200 E, Polycom VBP 200EW, Polycom VBP 4300 Series (including the Polycom VBP 4350E and Polycom VBP 4350E-3), the Polycom 5300 Series (including the Polycom 5300E, Polycom 5300ST, Polycom VBP T5300-E10, Polycom VBP T3500-E25, Polycom VBP T5300-ST10 and Polycom VBP T5300-ST25), the Polycom 6400 Series (including the Polycom 6400E, Polycom 6400ST, Polycom VBP 6400-E85 and Polycom VBP 6400-ST85); and other Polycom infrastructure e.g. the Polycom RSS 2000 and Polycom RSS 4000, the Polycom VVX Business Media Phones and the Polycom VVX Camera, the Polycom Trio Family of conference phones including

the Polycom Trio 8500 and Polycom Trio 8800, and all versions and variations thereof since the issuance of the '046 patent ("Accused Instrumentalities").

9. For example, the Accused Instrumentalities utilize the H.264 video compression standard, or H.264 High Profile. According to an official press release from Polycom on the Polycom website dated February 16, 2010, Polycom "the global leader in telepresence, video and voice communication solutions, today announced support for a breakthrough, standards-based video compression technology, **H.264 High profile**, that will reduce the bandwidth requirements for high-definition (HD) telepresence and standard definition (SD) video conferencing by as much as 50 percent, representing substantial network bandwidth cost savings for customers…Support for **H.264 High Profile** on Polycom HDX room and personal telepresence systems is planned for April. Polycom also plans to support **H.264 High Profile** across its visual communication infrastructure and recording and streaming solutions, and across its immersive telepresence solutions in the coming months." *See* "Polycom Delivers Breakthrough Video Quality Innovation That Cuts Telepresence Bandwidth Requirements in Half," Feb. 16, 2010, http://www.polycom.com/company/news/press-releases/2010/20100216.html (emphasis added).

10. Furthermore, this website from the official Polycom site advertising their "Polycom HDX Series" states under "Overview": "Flexible, cost-effective, high-definition communications from low bandwidths using standards-based H.264 High Profile Technology" and under "Technical Overview": H.264 High Profile support." *See* http://www.polycom.com/products-services/hd-telepresence-video-conferencing/realpresence-room/realpresence-room-hdx-series.html:



Overview

Polycom UltimateHD enhances every video collaboration experience

In today's fast-paced world, it is more critical than ever for organizations to adapt quickly and communicate seamlessly both internally and externally. Whether negotiating complex business agreements or helping employee tiger teams to speed their decision making, what frequently separates winning organizations from the pack is their ability to deliver tools that maximize productivity.

With Polycom HDX solutions, connecting and collaborating visually with anyone across your organization is as easy as making a phone call. The Polycom HDX Series connects your people and enhances their collaboration. Whether you are holding a simple interview across campus or staging a large project team meeting with members dispersed across the globe, there are HDX solutions that fit the bill.

Polycom HDX Solutions deliver:

- Flexible, cost-effective, high-definition communications from low bandwidths using standards-based H.264 High Profile technology
- Polycom UltimateHD technology: HD voice, HD video, and HD content for exceptional performance

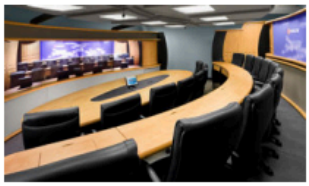
Technical Overview

- UltimateHD quality for up to 50% less bandwidth with H.264 High Profile support
- HD video up to 1080p, Polycom HD Voice technology, and HD content sharing

11. The first page of this data sheet also states that the Polycom RealPresence Experience High Definition (RPX HD 200 & 400 Series) supports a "H.264 video codec with H.239 People+Content" and "H.264 and H.263 Video Error Concealment". *See* http://supportdocs.polycom.com/PolycomService/support/global/documents/support/technical/products/video/rpx_hd_technical_specs.pdf:

Technical Specifications

Polycom® RealPresence™ Experience High Definition (RPX™ HD 200 & 400 Series)



Video and Audio Technology

Technology Components

- Polycom HDX video codecs supporting 720p at 30 fps
- Polycom Digital Ceiling Microphone Arrays
- Polycom StereoSurround™ Speaker Kit
- High Definition Rear Screen Projectors
- 3-CCD High Definition Video Cameras
- Room control system with 10-inch color touch panel
- 15- inch personal high resolution content displays embedded in the tables of RPX HD 200 Series suites
- 19- inch personal high resolution content displays embedded in the RPX HD 400 Series multipurpose main table and 15-inch personal high resolution content displays embedded in second and third tier tables if applicable

Video Displays

- Seamless panoramic video display screens
  - Polycom RPX HD 200 Series Suites support 8-foot x 42-inch high definition video in a 24:9 aspect ratio at 1920 x 720p resolution
  - Polycom RPX HD 400 Series Suites support 16-foot x 42-inch high definition video in a 48:9 aspect ratio at 3840 x 720p resolution

Video Standards

- H.264 video codec with H.239 People+Content
- H.261 and H.263++ for compatibility with legacy video conferencing endpoints
- H.264 and H.263 Video Error Concealment (including LPR-Lost Packet Recovery) for resiliency against network issues
- AES Media Encryption for secure video/audio and content

12. In addition, the first page of this data sheet states that the Polycom Open Telepresence Experience OTX 100 supports "H. 264 / H. 264 High Profile" for its "Video codec" and one of its "Video and Audio Specifications." *See* http://support.polycom.com/global/documents/support/technical/products/video/otx100_technical_specifications.pdf:



Technical Specifications

Polycom® Open Telepresence Experience™
OTX™ 100

VIDEO & AUDIO TECHNOLOGY

Solution Includes:

- Polycom HDX™ video codec supporting 1080p at 30fps or 720p at 60fps
- Polycom Digital Ceiling Microphone Array
- Polycom StereoSurround™ speaker kit
- High-definition 65-inch LCD display
- High-definition video camera
- Polycom Touch Control user interface
- Motorized 21.5-inch high resolution content displays integrated in conference table (Standard Version Only)
- Power and LAN access for laptop at the table (Standard Version Only)

Video and Audio Specifications

Video Standards	Description
H.264/ H. 264 High Profile	Video codec

13. Moreover, the firm of Wainhouse Research ("WR") was retained by Polycom "to conduct a third-party evaluation of the user experience provided by Polycom's implementation of High Profile within the H.264 video compression standard. Specifically, WR was asked to verify the ability to reduce call speed while maintaining video resolution and call quality by using H.264 High Profile…To facilitate the evaluation, Polycom provided WR with four (4) HDX 8000 videoconferencing systems with 1080p capable cameras. WR then created two parallel test environments – the first using H.264 Baseline Profile (BP) video compression, and the second using H.264 High Profile (HP)." *See* http://cp.wainhouse.com/download/1440/wrplatinum.com_Downloads_11977.pdf?redirect=node/1218. Thus, it is clear that at least Polycom's HDX 8000 videoconferencing systems use the H.264 video compression standard.

14. A third-party vendor of Polycom products also lists on a page entitled "H.264/SVC Complaint Video Conferencing Products" various Polycom products including the Polycom RealPresence Desktop and RealPresence Groups 310, 500 and 700. The site also adds that the "Polycom…products listed here comply with H.264/SVC". *See* http://www.c21video.com/vcsvc.html:

H.264/SVC Compliant Video Conferencing Products

H.264/SVC Compliant Video Conferencing Products

Lists Video Conferencing products that use the H.264/SVC (Scalable Video Coding) video codec. Be aware that H.264/SVC is not a complete standard, it only applies to the video coding. H.264/SVC is not a complete protocol like H.323 or SIP. Whilst both Polycom and Vidyo products listed here comply with H.264/SVC video, Vidyo's unique technology at the network level means it's proprietary and cannot directly interoperate with H.323 or SIP systems; it requires a VidyoGateway.

There are also technical papers available to provide more information on:

- *How to choose a Video Conferencing system?*
- *Video Conferencing Standards and Terminology.*
- *H.323 Gatekeepers and Endpoints.*
- *H.323 (E.164) Numbers and Dial Plan used by Gatekeepers etc.*
- *IP Ports and Protocols used by H.323/SIP Devices.*
- *H.460 NAT/Firewall Traversal and SIP Registrars.*
- *H.239 Data Sharing with Video Conferencing.*
- *Cloud or On-Premise Video Conferencing systems?*
- *H.320 ISDN Video Conferencing.*
- *H.221 Framing used in ISDN Conferences.*
- *H.320 ISDN Gateways & MCUs.*

Polycom RealPresence Desktop

The Polycom RealPresence Desktop application brings its legendary quality audio, video and content sharing to your PC and USB camera. The RealPresence Desktop solution is perfect for businesses that need a cost-effective way to add to their communications tools. RealPresence Desktop delivers premier quality video conferencing using H.264 AVC/SVC High Profile technology, high fidelity 14 kHz audio and HD content sharing. Innovative features include Constant Clarity technology.



RealPresence Desktop

Polycom RealPresence Group 310

Optimized for smaller groups, the Polycom RealPresence Group 310 solution is ideal for small meeting rooms, huddle rooms and offices. It features simple setup and configuration, and a compact, sleek design that is easily hidden out of sight, keeping your rooms clutter-free. Choice of EagleEye Acoustic or EagleEye IV camera. Polycom's unique interoperable SVC architecture is the first to provide video calling between both existing video systems and new SVC systems, delivering unmatched investment protection.



Group 310

Polycom RealPresence Group 500

The RealPresence Group 500 is ideal for conference and other collaborative environments, from small meeting rooms to larger rooms with dual screens. Optional built-in 6-way multipoint enables more people to join the conference calls without needing a bridge. Next generation performance is combined with a simple user interface and choice of EagleEye Acoustic or EagleEye IV camera. Polycom's unique interoperable SVC architecture is the first to provide video calling between both existing video systems and new SVC systems, delivering unmatched investment protection.



Group 500

Polycom RealPresence Group 700

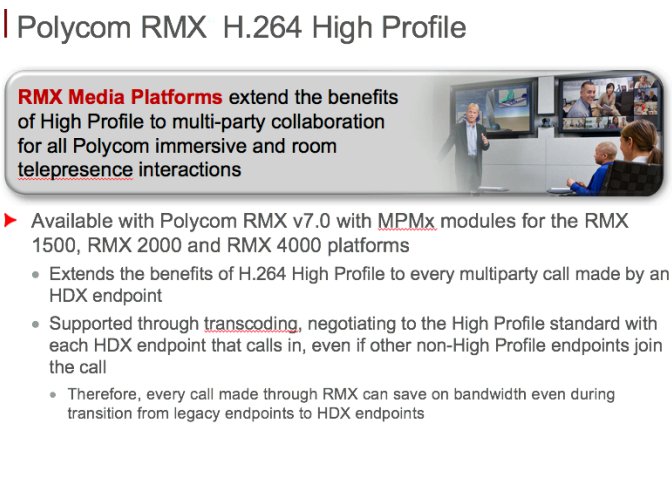
The RealPresence Group 700 sets a new standard for ease of use and with the EagleEye IV camera adds a new level of clarity and realism to your business communications. Plus the optional built-in 8-way multipoint enables more people to join the calls without needing a bridge. Polycom's unique interoperable SVC architecture is the first to provide video calling between both existing video systems and new SVC systems, delivering unmatched investment protection.

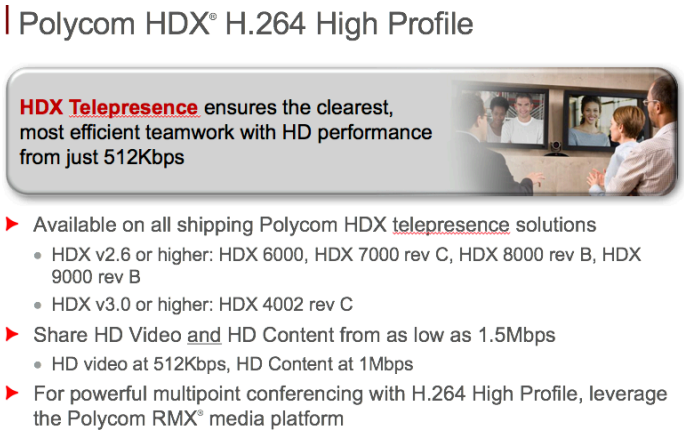


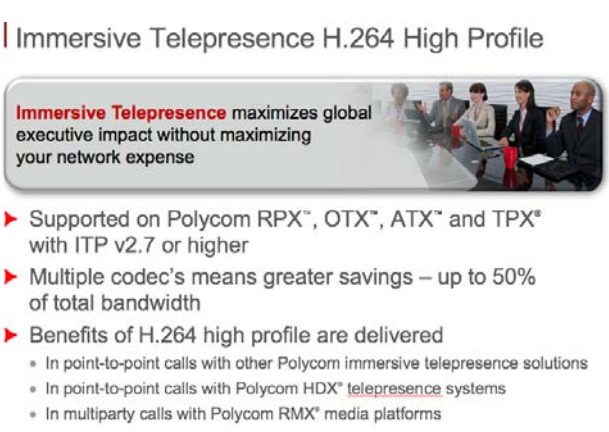
Group 700

15. Polycom also actively advertises H.264 High Profile capabilities (claiming that "Polycom is the first to bring [H.264 High Profile] to market") in various products such as the Polycom HDX Series, Immersive Telepresence H.264 in its RPX, OTX, ATX and TPX Series, and Polycom RMX H.264 High Profile in its RMX 1500, 2000 and 4000 platforms (for Polycom RMX v.7.0 with MPMx modules). *See* http://www.adeoproav.it/site/adeogroup54_webprofessional_it/allegati/high-profile-overview.pptx:









16. The Accused Instrumentalities determine a parameter of at least a portion of a video data block. As shown below, examples of such parameters include bitrate (or max video bitrate) and resolution parameters. Different parameters correspond with different end applications. H.264 provides for multiple different ranges of such parameters, each included in the "profiles" and "levels" defined by the H.264 standard. *See* http://www.axis.com/files/whitepaper/wp_h264_31669_en_0803_lo.pdf at 5:

4. H.264 profiles and levels

The joint group involved in defining H.264 focused on creating a simple and clean solution, limiting options and features to a minimum. An important aspect of the standard, as with other video standards, is providing the capabilities in profiles (sets of algorithmic features) and levels (performance classes) that optimally support popular productions and common formats.

H.264 has seven profiles, each targeting a specific class of applications. Each profile defines what feature set the encoder may use and limits the decoder implementation complexity.

Network cameras and video encoders will most likely use a profile called the baseline profile, which is intended primarily for applications with limited computing resources. The baseline profile is the most suitable given the available performance in a real-time encoder that is embedded in a network video product. The profile also enables low latency, which is an important requirement of surveillance video and also particularly important in enabling real-time, pan/tilt/zoom (PTZ) control in PTZ network cameras.

H.264 has 11 levels or degree of capability to limit performance, bandwidth and memory requirements. Each level defines the bit rate and the encoding rate in macroblock per second for resolutions ranging from QCIF to HDTV and beyond. The higher the resolution, the higher the level required.

See https://en.wikipedia.org/wiki/H.264/MPEG-4_AVC:

Levels with maximum property values

Level	Max decoding speed		Max frame size		Max video bit rate for video coding layer (VCL) kbit/s			Examples for high resolution @ highest frame rate (max stored frames) Toggle additional details
	Luma samples/s	Macroblocks/s	Luma samples	Macroblocks	Baseline, Extended and Main Profiles	High Profile	High 10 Profile	
1	380,160	1,485	25,344	99	64	80	192	176×144@15.0 (4)
1b	380,160	1,485	25,344	99	128	160	384	176×144@15.0 (4)
1.1	768,000	3,000	101,376	396	192	240	576	352×288@7.5 (2)
1.2	1,536,000	6,000	101,376	396	384	480	1,152	352×288@15.2 (6)
1.3	3,041,280	11,880	101,376	396	768	960	2,304	352×288@30.0 (6)
2	3,041,280	11,880	101,376	396	2,000	2,500	6,000	352×288@30.0 (6)
2.1	5,068,800	19,800	202,752	792	4,000	5,000	12,000	352×576@25.0 (6)
2.2	5,184,000	20,250	414,720	1,620	4,000	5,000	12,000	720×576@12.5 (5)
3	10,368,000	40,500	414,720	1,620	10,000	12,500	30,000	720×576@25.0 (5)
3.1	27,648,000	108,000	921,600	3,600	14,000	17,500	42,000	1,280×720@30.0 (5)
3.2	55,296,000	216,000	1,310,720	5,120	20,000	25,000	60,000	1,280×1,024@42.2 (4)
4	62,914,560	245,760	2,097,152	8,192	20,000	25,000	60,000	2,048×1,024@30.0 (4)
4.1	62,914,560	245,760	2,097,152	8,192	50,000	62,500	150,000	2,048×1,024@30.0 (4)
4.2	133,693,440	522,240	2,228,224	8,704	50,000	62,500	150,000	2,048×1,080@60.0 (4)
5	150,994,944	589,824	5,652,480	22,080	135,000	168,750	405,000	3,672×1,536@26.7 (5)
5.1	251,658,240	983,040	9,437,184	36,864	240,000	300,000	720,000	4,096×2,304@26.7 (5)
5.2	530,841,600	2,073,600	9,437,184	36,864	240,000	300,000	720,000	4,096×2,304@56.3 (5)

17. A video data block is organized by the group of pictures (GOP) structure, which is a "collection of successive pictures within a coded video stream." *See* https://en.wikipedia.org/wiki/Group_of_pictures. A GOP structure can contain intra coded pictures (I picture or I frame), predictive coded pictures (P picture or P frame), bipredictive coded pictures (B picture or B frame) and direct coded pictures (D picture or D frames, or DC direct coded pictures which are used only in MPEG-1 video). *See* https://en.wikipedia.org/wiki/Video_compression_picture_types (for descriptions of I frames, P frames and B frames); https://en.wikipedia.org/wiki/MPEG-1#D-frames (for descriptions of D frames). Thus, at least a portion of a video data block would also make up a GOP structure and could also contain I frames, P frames, B frames and/or D frames. The GOP structure also reflects the size of a video data block, and the GOP structure can be controlled and used to fine-tune other parameters (*e.g.* bitrate, max video bitrate and resolution parameters) or even be considered as a parameter by itself.

18. Based on the bitrate and/or resolution parameter identified (*e.g.* bitrate, max video bitrate, resolution, GOP structure or frame type within a GOP structure), any H.264-compliant system such as the Accused Instrumentalities would determine which profile (*e.g.*, "baseline," "extended," "main", or "high") corresponds with that parameter, then select between at least two asymmetric compressors. If baseline or extended is the corresponding profile, then the system will select a Context-Adaptive Variable Length Coding ("CAVLC") entropy encoder. If main or high is the corresponding profile, then the system will select a Context-Adaptive Binary Arithmetic Coding ("CABAC") entropy encoder. Both encoders are asymmetric compressors because it takes a longer period of time for them to compress data than to decompress data. *See* https://sonnati.wordpress.com/2007/10/29/how-h-264-works-part-ii/:

	Baseline	Extended	Main	High	High 10
I and P Slices	Yes	Yes	Yes	Yes	Yes
B Slices	No	Yes	Yes	Yes	Yes
SI and SP Slices	No	Yes	No	No	No
Multiple Reference Frames	Yes	Yes	Yes	Yes	Yes
In-Loop Deblocking Filter	Yes	Yes	Yes	Yes	Yes
CAVLC Entropy Coding	Yes	Yes	Yes	Yes	Yes
CABAC Entropy Coding	No	No	Yes	Yes	Yes
Flexible Macroblock Ordering (FMO)	Yes	Yes	No	No	No
Arbitrary Slice Ordering (ASO)	Yes	Yes	No	No	No
Redundant Slices (RS)	Yes	Yes	No	No	No
Data Partitioning	No	Yes	No	No	No
Interlaced Coding (PicAFF, MBAFF)	No	Yes	Yes	Yes	Yes
4:2:0 Chroma Format	Yes	Yes	Yes	Yes	Yes
Monochrome Video Format (4:0:0)	No	No	No	Yes	Yes
4:2:2 Chroma Format	No	No	No	No	No
4:4:4 Chroma Format	No	No	No	No	No
8 Bit Sample Depth	Yes	Yes	Yes	Yes	Yes
9 and 10 Bit Sample Depth	No	No	No	No	Yes
11 to 14 Bit Sample Depth	No	No	No	No	No
8×8 vs. 4×4 Transform Adaptivity	No	No	No	Yes	Yes
Quantization Scaling Matrices	No	No	No	Yes	Yes
Separate Cb and Cr QP control	No	No	No	Yes	Yes
Separate Color Plane Coding	No	No	No	No	No
Predictive Lossless Coding	No	No	No	No	No

See http://web.cs.ucla.edu/classes/fall03/cs218/paper/H.264_MPEG4_Tutorial.pdf at 7:

The following table summarizes the two major types of entropy coding: Variable Length Coding (VLC) and Context Adaptive Binary Arithmetic Coding (CABAC). CABAC offers superior coding efficiency over VLC by adapting to the changing probability distribution of symbols, by exploiting correlation between symbols, and by adaptively exploiting bit correlations using arithmetic coding. H.264 also supports Context Adaptive Variable Length Coding (CAVLC) which offers superior entropy coding over VLC without the full cost of CABAC.

H.264 Entropy Coding – Comparison of Approaches

Characteristics	Variable Length Coding (VLC)	Context Adaptive Binary Arithmetic Coding(CABAC)
• Where it is used	MPEG-2, MPEG-4 ASP	H.264/MPEG-4 AVC (high efficiency option)
• Probability distribution	**Static** - Probabilities never change	**Adaptive** - Adjusts probabilities based on actual data
• Leverages correlation between symbols	**No** - Conditional probabilities ignored	**Yes** - Exploits symbol correlations by using "contexts"
• Non-integer code words	**No** - Low coding efficiency forhigh probability symbols	**Yes** - Exploits "arithmetic coding" which generates non-integer code words for higher efficiency

Moreover, the H.264 Standard requires a bit-flag descriptor, which is set to determine the correct decoder for the corresponding encoder. As shown below, if the flag = 0, then CAVLC must have been selected as the encoder; if the flag = 1, then CABAC must have been selected as the encoder. *See* https://www.itu.int/rec/dologin_pub.asp?lang=e&id=T-REC-H.264-201304-S!!PDF-E&type=items (Rec. ITU-T H.264 (04/2013)) at 80:

entropy_coding_mode_flag selects the entropy decoding method to be applied for the syntax elements for which two descriptors appear in the syntax tables as follows:

– If entropy_coding_mode_flag is equal to 0, the method specified by the left descriptor in the syntax table is applied (Exp-Golomb coded, see clause 9.1 or CAVLC, see clause 9.2).

– Otherwise (entropy_coding_mode_flag is equal to 1), the method specified by the right descriptor in the syntax table is applied (CABAC, see clause 9.3).

19. The Accused Instrumentalities compress the at least the portion of the data block with the selected one or more asymmetric compressors to provide one or more compressed data blocks, which can be organized in a GOP structure (see above). After its

selection, the asymmetric compressor (CAVLC or CABAC) will compress the video data to provide various compressed data blocks, which can also be organized in a GOP structure.

See https://sonnati.wordpress.com/2007/10/29/how-h-264-works-part-ii/:

Entropy Coding

For entropy coding, H.264 may use an enhanced VLC, a more complex context-adaptive variable-length coding (CAVLC) or an ever more complex Context-adaptive binary-arithmetic coding (CABAC) which are complex techniques to losslessly compress syntax elements in the video stream knowing the probabilities of syntax elements in a given context. The use of CABAC can improve the compression of around 5-7%. CABAC may requires a 30-40% of total processing power to be accomplished.

See

http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.602.1581&rep=rep1&type=pdf

at 13:

Typical compression ratios to maintain excellent quality are:

- 10:1 for general images using JPEG
- 30:1 for general video using H.263 and MPEG-2
- 60:1 for general video using H.264 and WMV9

See http://www.ijera.com/papers/Vol3_issue4/BM34399403.pdf at 2:

Most visual communication systems today use Baseline Profile. Baseline is the simplest H.264 profile and defines, for example, zigzag scanning of the picture and using 4:2:0 (YUV video formats) chrominance sampling. In Baseline Profile, the picture is split in blocks consisting of 4x4 pixels, and each block is processed separately. Another important element of the Baseline Profile is the use of Universal Variable Length Coding (UVLC) and Context Adaptive Variable Length Coding (CAVLC) entropy coding techniques.

The Extended and Main Profiles includes the functionality of the Baseline Profile and add improvements to the predictions algorithms. Since transmitting every single frame (think 30 frames per second for good quality video) is not feasible if you are trying to reduce the bit rate 1000-2000 times, temporal and motion prediction are heavily used in H.264, and allow transmitting only the difference between one frame and the previous frames. The result is spectacular efficiency gain, especially for scenes with little change and motion.

The High Profile is the most powerful profile in H.264, and it allows most efficient coding of video. For example, large coding gain achieved through the use of Context Adaptive Binary Arithmetic Coding (CABAC) encoding which is more efficient than the UVLC/CAVLC used in Baseline Profile.

The High Profile also uses adaptive transform that decides on the fly if 4x4 or 8x8-pixel blocks should be used. For example, 4x4 blocks are used for the parts of the picture that are dense with detail, while parts that have little detail are transformed using 8x8 blocks.

20. From above, and on information and belief, Polycom has directly infringed and continues to infringe the '046 patent, for example, through its own use and testing of the Accused Instrumentalities, which when used, practices the system claimed by Claim 40 of the '046 patent, namely, a system, comprising: a data compression system for compressing and decompressing data input; a plurality of compression routines selectively utilized by the data compression system, wherein a first one of the plurality of compression routines includes a first compression algorithm and a second one of the plurality of compression routines includes a second compression algorithm; and a controller for tracking throughput and generating a control signal to select a compression routine based on the throughput, wherein said tracking throughput comprises tracking a number of pending access requests to a storage device; and wherein when the controller determines that the throughput falls below a predetermined throughput threshold, the controller commands the data compression engine to use one of the plurality of compression routines to provide a faster rate of compression so as to increase the throughput. Upon information and belief, Polycom uses the Accused Instrumentalities to practice infringing methods for its own internal non-testing business purposes, while testing the Accused Instrumentalities, and while providing technical support and repair services for the Accused Instrumentalities to their customers.

21. On information and belief, the Accused Instrumentalities store at least a portion of the one or more compressed data blocks in buffers, hard disk, or other forms of memory/storage.

22. On information and belief, Polycom also directly infringes and continues to infringe other claims of the ’046 patent, for similar reasons as explained above with respect to Claim 40 of the ’046 patent.

23. On information and belief, all of the Accused Instrumentalities perform the claimed methods in substantially the same way, *e.g.*, in the manner specified in the H.264 standard.

24. On information and belief, use of the Accused Instrumentalities in their ordinary and customary fashion results in infringement of the systems and/or methods claimed by the ’046 patent.

25. On information and belief, Polycom has had knowledge of the ’046 patent since at least the filing of this Complaint or shortly thereafter, and on information and belief, Polycom knew of the ’046 patent and knew of its infringement, including by way of this lawsuit. By the time of trial, Polycom will have known and intended (since receiving such notice) that its continued actions would actively induce and contribute to the infringement of the claims of the ’046 patent.

26. Upon information and belief, Polycom’s affirmative acts of making, using, and selling the Accused Instrumentalities, and providing implementation services and technical support to users of the Accused Instrumentalities, including, *e.g.*, through training, demonstrations, brochures, installation and user guides, have induced and continue to induce users of the Accused Instrumentalities to use them in their normal and customary way to infringe the ’046 patent by practicing a system, comprising: a data compression system for compressing and decompressing data input; a plurality of compression routines selectively utilized by the data compression system, wherein a first one of the plurality of

compression routines includes a first compression algorithm and a second one of the plurality of compression routines includes a second compression algorithm; and a controller for tracking throughput and generating a control signal to select a compression routine based on the throughput, wherein said tracking throughput comprises tracking a number of pending access requests to a storage device; and wherein when the controller determines that the throughput falls below a predetermined throughput threshold, the controller commands the data compression engine to use one of the plurality of compression routines to provide a faster rate of compression so as to increase the throughput. For example, Polycom adopted H.264 (e.g. its H.264 High Profile) in its telepresence, videoconference as well as video and voice communication solutions. For similar reasons, Polycom also induces their customers to use the Accused Instrumentalities to infringe other claims of the '046 patent. Polycom specifically intended and were aware that these normal and customary activities would infringe the '046 patent. Polycom performed the acts that constitute induced infringement, and would induce actual infringement, with the knowledge of the '046 patent and with the knowledge, or willful blindness to the probability, that the induced acts would constitute infringement. On information and belief, Polycom engaged in such inducement to promote the sales of the Accused Instrumentalities. Accordingly, Polycom has induced and continues to induce users of the Accused Instrumentalities to use the Accused Instrumentalities in their ordinary and customary way to infringe the '046 patent, knowing that such use constitutes infringement of the '046 patent. Accordingly, Polycom has been, and currently is, inducing infringement of the '046 patent, in violation of 35 U.S.C. § 271(b).

27. Polycom has also infringed, and continues to infringe, claims of the '046 patent by offering to commercially distribute, commercially distributing, making, and/or importing the Accused Instrumentalities, which are used in practicing the process, or using the systems, of the '046 patent, and constitute a material part of the invention. Polycom knows the components in the Accused Instrumentalities to be especially made or especially adapted for use in infringement of the '046 patent, not a staple article, and not a commodity of commerce suitable for substantial noninfringing use. Accordingly, Polycom has been, and currently is, contributorily infringing the '046 patent, in violation of 35 U.S.C. § 271(c).

28. By making, using, offering for sale, selling and/or importing into the United States the Accused Instrumentalities, and touting the benefits of using the Accused Instrumentalities' compression features, Polycom has injured Realtime and is liable to Realtime for infringement of the '046 patent pursuant to 35 U.S.C. § 271.

29. As a result of Polycom's infringement of the '046 patent, Plaintiff Realtime is entitled to monetary damages in an amount adequate to compensate for Polycom's infringement, but in no event less than a reasonable royalty for the use made of the invention by Polycom, together with interest and costs as fixed by the Court.

COUNT II

INFRINGEMENT OF U.S. PATENT NO. 8,929,442

30. Plaintiff re-alleges and incorporates by reference the foregoing paragraphs, as if fully set forth herein.

31. Plaintiff Realtime is the owner by assignment of United States Patent No. 8,929,442 ("the '442 patent") entitled "System and method for video and audio data distribution." The '442 patent was duly and legally issued by the United States Patent

and Trademark Office on January 6, 2015. A true and correct copy of the '442 patent is included as Exhibit B.

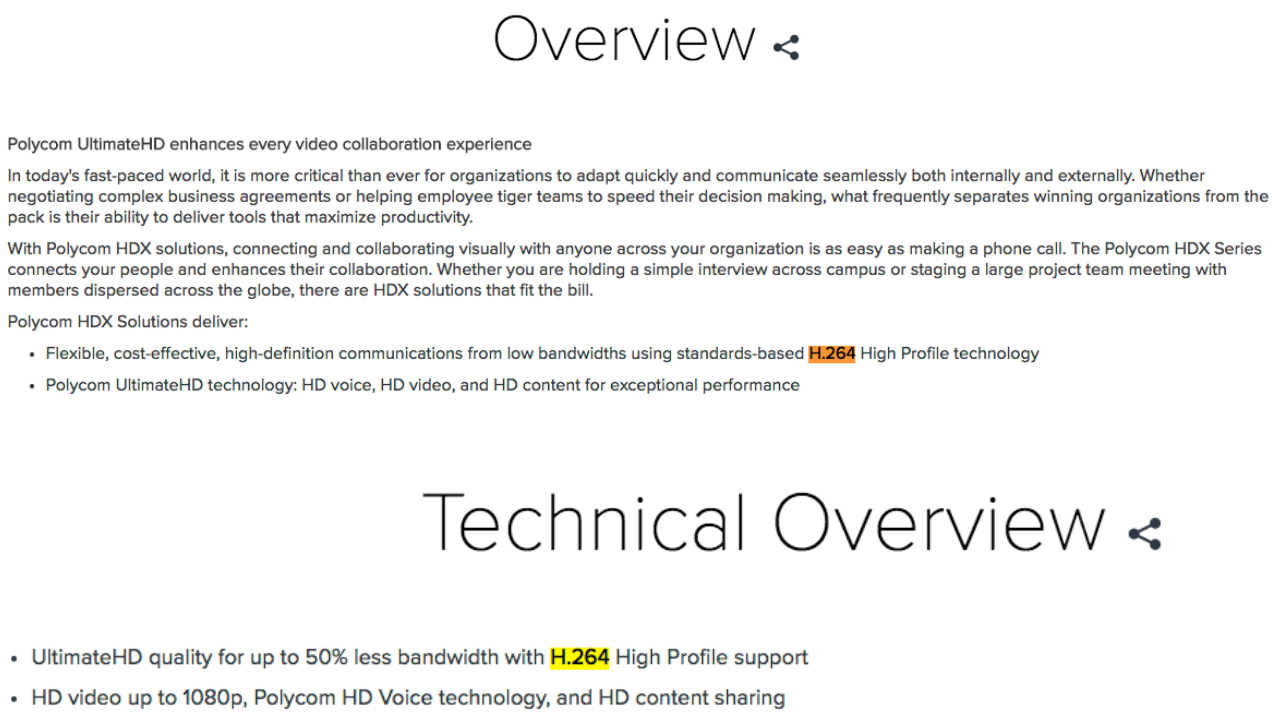
32. On information and belief, Polycom has made, used, offered for sale, sold and/or imported into the United States products that infringe the '442 patent, and continues to do so. By way of illustrative example, these infringing products include, without limitation, Polycom's telepresence, videoconferencing as well as video and voice communication solutions utilizing H.264 High Profile, such as, for example, the Polycom RealPresence Experience High Definition (RPX HD 200 & 400 Series) including the Polycom RPX HD 204M, RPX HD 208M, RPX HD 210M, RPX HD 218M, RPX HD 408M, RPX HD 418M, RPX HD 428M; the Polycom HDX Series including the Polycom HDX 9000, Polycom HDX 8000, Polycom HDX 7000, Polycom HDX 6000, Polycom HDX 4000, Polycom HDX 4500, Polycom HDX 4002, Polycom HDX 4001, Polycom HDX Packaged Solutions, Polycom HDX Executive Collection, Polycom HDX Media Center, Polycom EagleEye Director, Polycom Eagle Eye IV, Polycom Touch Control interface, Polycom VisualBoard Technology; the Polycom Open Telepresence Experience (OTX) including the Polycom OTX 100 and Polycom OTX 300; the Polycom RealPresence Series including the Polycom RealPresence Desktop, Polycom RealPresence Mobile for Android, Polycom RealPresence Medialign, Polycom RealPresence Immersive Studio, Polycom RealPresence Immersive Studio Flex, Polycom RealPresence Clarity, Polycom RealPresence Group 310, Polycom RealPresence Group 500, Polycom RealPresence Group 700; the Polycom RMX Media Platforms including the Polycom RMX v7.0 with MPMx modules, Polycom RMX 1000 platform, Polycom RMX 1500 platform, Polycom RMX 2000 platform and Polycom RMX 4000 platform;

the Polycom ATX Series including the Polycom ATX 300; the Polycom TPX Series including the Polycom TPX HD 306M (3-screens); the Polycom QDX Series including the Polycom QDX 6000; the Polycom CX Series including the Polycom CX5000 and Polycom CX7000; the Polycom VVX Series including the Polycom VVX 1500D; the Polycom load balancers e.g. the Polycom DMA 7000; the Polycom desktop video infrastructure or servers e.g. the Polycom CMA 4000 and Polycom CMA 5000; the Polycom firewall traversal infrastructure including the Polycom VBP ST and E models including the Polycom VBP 200 E, Polycom VBP 200EW, Polycom VBP 4300 Series (including the Polycom VBP 4350E and Polycom VBP 4350E-3), the Polycom 5300 Series (including the Polycom 5300E, Polycom 5300ST, Polycom VBP T5300-E10, Polycom VBP T3500-E25, Polycom VBP T5300-ST10 and Polycom VBP T5300-ST25), the Polycom 6400 Series (including the Polycom 6400E, Polycom 6400ST, Polycom VBP 6400-E85 and Polycom VBP 6400-ST85); and other Polycom infrastructure e.g. the Polycom RSS 2000 and Polycom RSS 4000, the Polycom VVX Business Media Phones and the Polycom VVX Camera, the Polycom Trio Family of conference phones including the Polycom Trio 8500 and Polycom Trio 8800, and all versions and variations thereof since the issuance of the ’442 patent (“Accused Instrumentalities”).

33. For example, the Accused Instrumentalities utilize the H.264 video compression standard, or H.264 High Profile. According to an official press release from Polycom on the Polycom website dated February 16, 2010, Polycom “the global leader in telepresence, video and voice communication solutions, today announced support for a breakthrough, standards-based video compression technology, **H.264 High profile**, that will reduce the bandwidth requirements for high-definition (HD) telepresence and

standard definition (SD) video conferencing by as much as 50 percent, representing substantial network bandwidth cost savings for customers…Support for **H.264 High Profile** on Polycom HDX room and personal telepresence systems is planned for April. Polycom also plans to support **H.264 High Profile** across its visual communication infrastructure and recording and streaming solutions, and across its immersive telepresence solutions in the coming months." *See* "Polycom Delivers Breakthrough Video Quality Innovation That Cuts Telepresence Bandwidth Requirements in Half," Feb. 16, 2010, http://www.polycom.com/company/news/press-releases/2010/20100216.html (emphasis added).

34. Furthermore, this website from the official Polycom site advertising their "Polycom HDX Series" states under "Overview": "Flexible, cost-effective, high-definition communications from low bandwidths using standards-based H.264 High Profile Technology" and under "Technical Overview": H.264 High Profile support." *See* http://www.polycom.com/products-services/hd-telepresence-video-conferencing/realpresence-room/realpresence-room-hdx-series.html:



Overview

Polycom UltimateHD enhances every video collaboration experience

In today's fast-paced world, it is more critical than ever for organizations to adapt quickly and communicate seamlessly both internally and externally. Whether negotiating complex business agreements or helping employee tiger teams to speed their decision making, what frequently separates winning organizations from the pack is their ability to deliver tools that maximize productivity.

With Polycom HDX solutions, connecting and collaborating visually with anyone across your organization is as easy as making a phone call. The Polycom HDX Series connects your people and enhances their collaboration. Whether you are holding a simple interview across campus or staging a large project team meeting with members dispersed across the globe, there are HDX solutions that fit the bill.

Polycom HDX Solutions deliver:

- Flexible, cost-effective, high-definition communications from low bandwidths using standards-based H.264 High Profile technology
- Polycom UltimateHD technology: HD voice, HD video, and HD content for exceptional performance

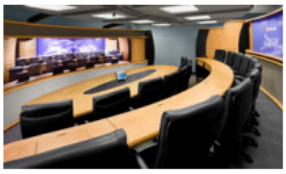
Technical Overview

- UltimateHD quality for up to 50% less bandwidth with H.264 High Profile support
- HD video up to 1080p, Polycom HD Voice technology, and HD content sharing

35. The first page of this data sheet also states that the Polycom RealPresence Experience High Definition (RPX HD 200 & 400 Series) supports a "H.264 video codec with H.239 People+Content" and "H.264 and H.263 Video Error Concealment". *See* http://supportdocs.polycom.com/PolycomService/support/global/documents/support/technical/products/video/rpx_hd_technical_specs.pdf:

Technical Specifications

Polycom® RealPresence™ Experience High Definition (RPX™ HD 200 & 400 Series)



Video and Audio Technology

Technology Components

- Polycom HDX video codecs supporting 720p at 30 fps
- Polycom Digital Ceiling Microphone Arrays
- Polycom StereoSurround™ Speaker Kit
- High Definition Rear Screen Projectors
- 3-CCD High Definition Video Cameras
- Room control system with 10-inch color touch panel
- 15- inch personal high resolution content displays embedded in the tables of RPX HD 200 Series suites
- 19- inch personal high resolution content displays embedded in the RPX HD 400 Series multipurpose main table and 15-inch personal high resolution content displays embedded in second and third tier tables if applicable

Video Displays

- Seamless panoramic video display screens
  - Polycom RPX HD 200 Series Suites support 8-foot x 42-inch high definition video in a 24:9 aspect ratio at 1920 x 720p resolution
  - Polycom RPX HD 400 Series Suites support 16-foot x 42-inch high definition video in a 48:9 aspect ratio at 3840 x 720p resolution

Video Standards

- H.264 video codec with H.239 People+Content
- H.261 and H.263++ for compatibility with legacy video conferencing endpoints
- H.264 and H.263 Video Error Concealment (including LPR-Lost Packet Recovery) for resiliency against network issues
- AES Media Encryption for secure video/audio and content

36. In addition, the first page of this data sheet states that the Polycom Open Telepresence Experience OTX 100 supports "H. 264 / H. 264 High Profile" for its "Video codec" and one of its "Video and Audio Specifications." *See* http://support.polycom.com/global/documents/support/technical/products/video/otx100_technical_specifications.pdf:



Technical Specifications

Polycom® Open Telepresence Experience™
OTX™ 100

VIDEO & AUDIO TECHNOLOGY

Solution Includes:

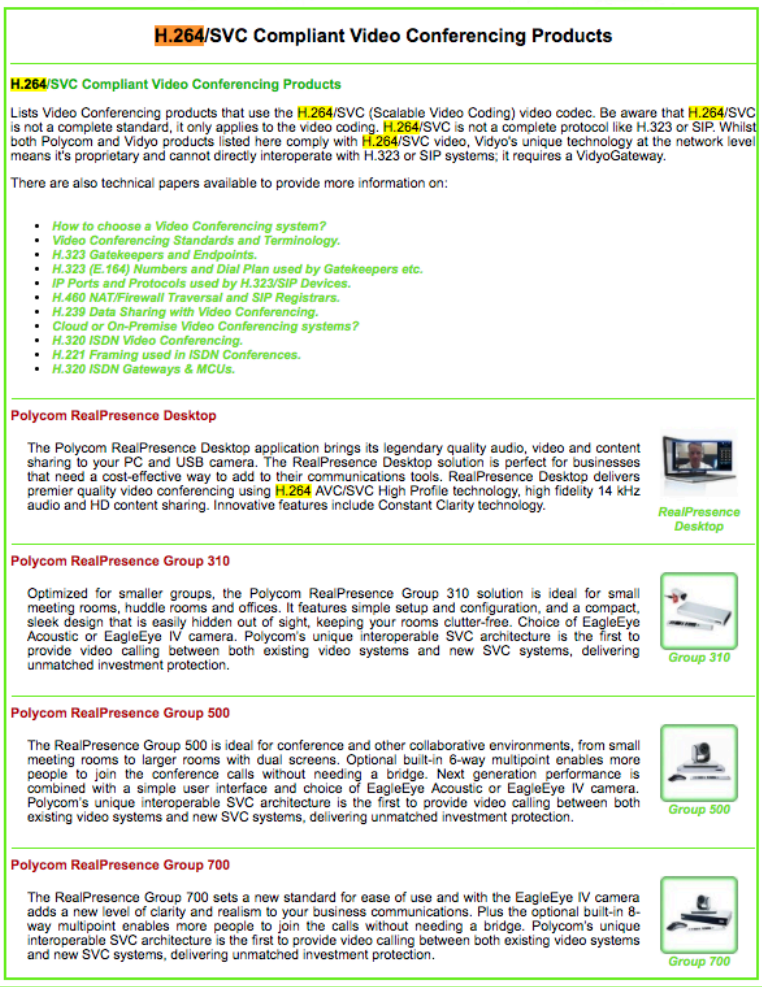
- Polycom HDX™ video codec supporting 1080p at 30fps or 720p at 60fps
- Polycom Digital Ceiling Microphone Array
- Polycom StereoSurround™ speaker kit
- High-definition 65-inch LCD display
- High-definition video camera
- Polycom Touch Control user interface
- Motorized 21.5-inch high resolution content displays integrated in conference table (Standard Version Only)
- Power and LAN access for laptop at the table (Standard Version Only)

Video and Audio Specifications

Video Standards	Description
H.264/ H. 264 High Profile	Video codec

37. Moreover, the firm of Wainhouse Research ("WR") was retained by Polycom "to conduct a third-party evaluation of the user experience provided by Polycom's implementation of High Profile within the H.264 video compression standard. Specifically, WR was asked to verify the ability to reduce call speed while maintaining video resolution and call quality by using H.264 High Profile…To facilitate the evaluation, Polycom provided WR with four (4) HDX 8000 videoconferencing systems with 1080p capable cameras. WR then created two parallel test environments – the first using H.264 Baseline Profile (BP) video compression, and the second using H.264 High Profile (HP)." *See* http://cp.wainhouse.com/download/1440/wrplatinum.com_Downloads_11977.pdf?redirect=node/1218. Thus, it is clear that at least Polycom's HDX 8000 videoconferencing systems use the H.264 video compression standard.

38. A third-party vendor of Polycom products also lists on a page entitled "H.264/SVC Complaint Video Conferencing Products" various Polycom products including the Polycom RealPresence Desktop and RealPresence Groups 310, 500 and 700. The site also adds that the "Polycom…products listed here comply with H.264/SVC". *See* http://www.c21video.com/vcsvc.html:



H.264/SVC Compliant Video Conferencing Products

H.264/SVC Compliant Video Conferencing Products

Lists Video Conferencing products that use the H.264/SVC (Scalable Video Coding) video codec. Be aware that H.264/SVC is not a complete standard, it only applies to the video coding. H.264/SVC is not a complete protocol like H.323 or SIP. Whilst both Polycom and Vidyo products listed here comply with H.264/SVC video, Vidyo's unique technology at the network level means it's proprietary and cannot directly interoperate with H.323 or SIP systems; it requires a VidyoGateway.

There are also technical papers available to provide more information on:

- *How to choose a Video Conferencing system?*
- *Video Conferencing Standards and Terminology.*
- *H.323 Gatekeepers and Endpoints.*
- *H.323 (E.164) Numbers and Dial Plan used by Gatekeepers etc.*
- *IP Ports and Protocols used by H.323/SIP Devices.*
- *H.460 NAT/Firewall Traversal and SIP Registrars.*
- *H.239 Data Sharing with Video Conferencing.*
- *Cloud or On-Premise Video Conferencing systems?*
- *H.320 ISDN Video Conferencing.*
- *H.221 Framing used in ISDN Conferences.*
- *H.320 ISDN Gateways & MCUs.*

Polycom RealPresence Desktop

The Polycom RealPresence Desktop application brings its legendary quality audio, video and content sharing to your PC and USB camera. The RealPresence Desktop solution is perfect for businesses that need a cost-effective way to add to their communications tools. RealPresence Desktop delivers premier quality video conferencing using H.264 AVC/SVC High Profile technology, high fidelity 14 kHz audio and HD content sharing. Innovative features include Constant Clarity technology.

RealPresence Desktop

Polycom RealPresence Group 310

Optimized for smaller groups, the Polycom RealPresence Group 310 solution is ideal for small meeting rooms, huddle rooms and offices. It features simple setup and configuration, and a compact, sleek design that is easily hidden out of sight, keeping your rooms clutter-free. Choice of EagleEye Acoustic or EagleEye IV camera. Polycom's unique interoperable SVC architecture is the first to provide video calling between both existing video systems and new SVC systems, delivering unmatched investment protection.

Group 310

Polycom RealPresence Group 500

The RealPresence Group 500 is ideal for conference and other collaborative environments, from small meeting rooms to larger rooms with dual screens. Optional built-in 6-way multipoint enables more people to join the conference calls without needing a bridge. Next generation performance is combined with a simple user interface and choice of EagleEye Acoustic or EagleEye IV camera. Polycom's unique interoperable SVC architecture is the first to provide video calling between both existing video systems and new SVC systems, delivering unmatched investment protection.

Group 500

Polycom RealPresence Group 700

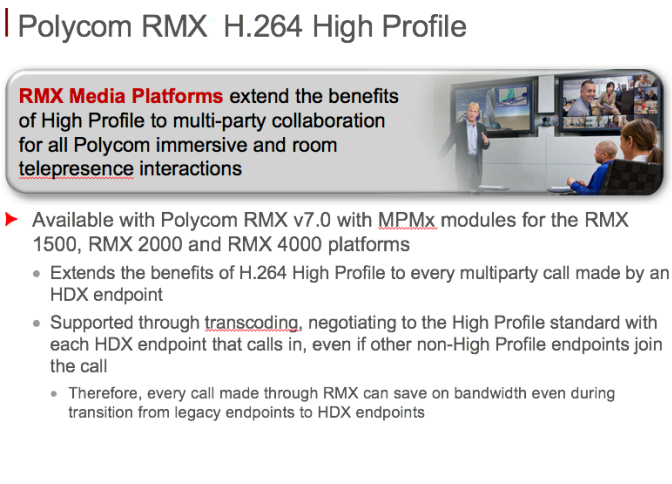
The RealPresence Group 700 sets a new standard for ease of use and with the EagleEye IV camera adds a new level of clarity and realism to your business communications. Plus the optional built-in 8-way multipoint enables more people to join the calls without needing a bridge. Polycom's unique interoperable SVC architecture is the first to provide video calling between both existing video systems and new SVC systems, delivering unmatched investment protection.

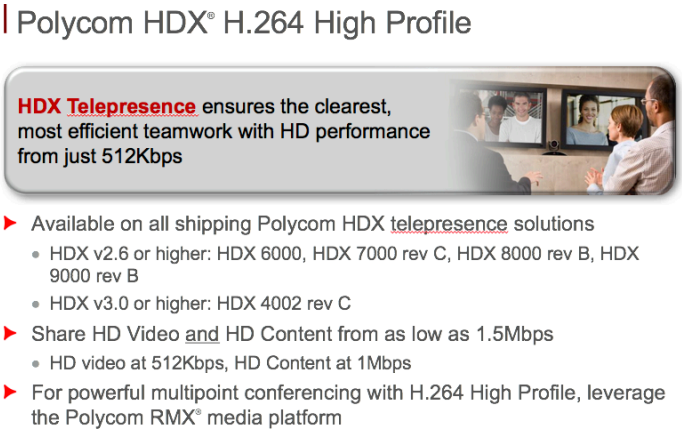
Group 700

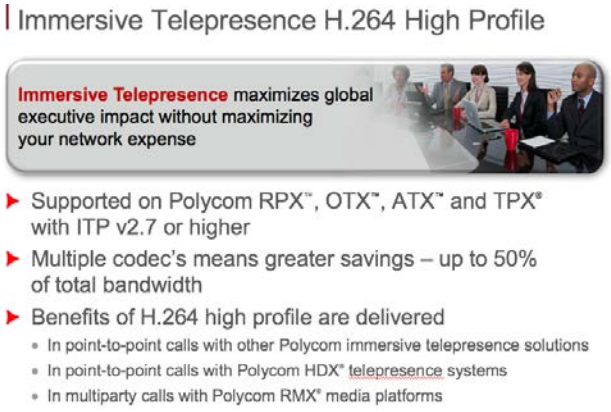
39. Polycom also actively advertises H.264 High Profile capabilities (claiming that "Polycom is the first to bring [H.264 High Profile] to market") in various products such as the Polycom HDX Series, Immersive Telepresence H.264 in its RPX, OTX, ATX and TPX Series, and Polycom RMX H.264 High Profile in its RMX 1500, 2000 and 4000 platforms (for Polycom RMX v.7.0 with MPMx modules). *See*

http://www.adeoproav.it/site/adeogroup54_webprofessional_it/allegati/high-profile-overview.pptx:









40. The Accused Instrumentalities determine a parameter of at least a portion of a video data block. As shown below, examples of such parameters include bitrate (or max video bitrate) and resolution parameters. Different parameters correspond with different end applications. H.264 provides for multiple different ranges of such parameters, each included in the "profiles" and "levels" defined by the H.264 standard. *See* http://www.axis.com/files/whitepaper/wp_h264_31669_en_0803_lo.pdf at 5:

4. H.264 profiles and levels

The joint group involved in defining H.264 focused on creating a simple and clean solution, limiting options and features to a minimum. An important aspect of the standard, as with other video standards, is providing the capabilities in profiles (sets of algorithmic features) and levels (performance classes) that optimally support popular productions and common formats.

H.264 has seven profiles, each targeting a specific class of applications. Each profile defines what feature set the encoder may use and limits the decoder implementation complexity.

Network cameras and video encoders will most likely use a profile called the baseline profile, which is intended primarily for applications with limited computing resources. The baseline profile is the most suitable given the available performance in a real-time encoder that is embedded in a network video product. The profile also enables low latency, which is an important requirement of surveillance video and also particularly important in enabling real-time, pan/tilt/zoom (PTZ) control in PTZ network cameras.

H.264 has 11 levels or degree of capability to limit performance, bandwidth and memory requirements. Each level defines the bit rate and the encoding rate in macroblock per second for resolutions ranging from QCIF to HDTV and beyond. The higher the resolution, the higher the level required.

See https://en.wikipedia.org/wiki/H.264/MPEG-4_AVC:

Levels with maximum property values

Level	Max decoding speed		Max frame size		Max video bit rate for video coding layer (VCL) kbit/s			Examples for high resolution @ highest frame rate (max stored frames) Toggle additional details
	Luma samples/s	Macroblocks/s	Luma samples	Macroblocks	Baseline, Extended and Main Profiles	High Profile	High 10 Profile	
1	380,160	1,485	25,344	99	64	80	192	176×144@15.0 (4)
1b	380,160	1,485	25,344	99	128	160	384	176×144@15.0 (4)
1.1	768,000	3,000	101,376	396	192	240	576	352×288@7.5 (2)
1.2	1,536,000	6,000	101,376	396	384	480	1,152	352×288@15.2 (6)
1.3	3,041,280	11,880	101,376	396	768	960	2,304	352×288@30.0 (6)
2	3,041,280	11,880	101,376	396	2,000	2,500	6,000	352×288@30.0 (6)
2.1	5,068,800	19,800	202,752	792	4,000	5,000	12,000	352×576@25.0 (6)
2.2	5,184,000	20,250	414,720	1,620	4,000	5,000	12,000	720×576@12.5 (5)
3	10,368,000	40,500	414,720	1,620	10,000	12,500	30,000	720×576@25.0 (5)
3.1	27,648,000	108,000	921,600	3,600	14,000	17,500	42,000	1,280×720@30.0 (5)
3.2	55,296,000	216,000	1,310,720	5,120	20,000	25,000	60,000	1,280×1,024@42.2 (4)
4	62,914,560	245,760	2,097,152	8,192	20,000	25,000	60,000	2,048×1,024@30.0 (4)
4.1	62,914,560	245,760	2,097,152	8,192	50,000	62,500	150,000	2,048×1,024@30.0 (4)
4.2	133,693,440	522,240	2,228,224	8,704	50,000	62,500	150,000	2,048×1,080@60.0 (4)
5	150,994,944	589,824	5,652,480	22,080	135,000	168,750	405,000	3,672×1,536@26.7 (5)
5.1	251,658,240	983,040	9,437,184	36,864	240,000	300,000	720,000	4,096×2,304@26.7 (5)
5.2	530,841,600	2,073,600	9,437,184	36,864	240,000	300,000	720,000	4,096×2,304@56.3 (5)

41. A video data block is organized by the group of pictures (GOP) structure, which is a "collection of successive pictures within a coded video stream." *See* https://en.wikipedia.org/wiki/Group_of_pictures. A GOP structure can contain intra

coded pictures (I picture or I frame), predictive coded pictures (P picture or P frame), bipredictive coded pictures (B picture or B frame) and direct coded pictures (D picture or D frames, or DC direct coded pictures which are used only in MPEG-1 video). *See* https://en.wikipedia.org/wiki/Video_compression_picture_types (for descriptions of I frames, P frames and B frames); https://en.wikipedia.org/wiki/MPEG-1#D-frames (for descriptions of D frames). Thus, at least a portion of a video data block would also make up a GOP structure and could also contain I frames, P frames, B frames and/or D frames. The GOP structure also reflects the size of a video data block, and the GOP structure can be controlled and used to fine-tune other parameters (*e.g.* bitrate, max video bitrate and resolution parameters) or even be considered as a parameter by itself.

42. Based on the bitrate and/or resolution parameter identified (*e.g.* bitrate, max video bitrate, resolution, GOP structure or frame type within a GOP structure), any H.264-compliant system such as the Accused Instrumentalities would determine which profile (*e.g.*, "baseline," "extended," "main", or "high") corresponds with that parameter, then select between at least two asymmetric compressors. If baseline or extended is the corresponding profile, then the system will select a Context-Adaptive Variable Length Coding ("CAVLC") entropy encoder. If main or high is the corresponding profile, then the system will select a Context-Adaptive Binary Arithmetic Coding ("CABAC") entropy encoder. Both encoders are asymmetric compressors because it takes a longer period of time for them to compress data than to decompress data. *See* https://sonnati.wordpress.com/2007/10/29/how-h-264-works-part-ii/:

	Baseline	Extended	Main	High	High 10
I and P Slices	Yes	Yes	Yes	Yes	Yes
B Slices	No	Yes	Yes	Yes	Yes
SI and SP Slices	No	Yes	No	No	No
Multiple Reference Frames	Yes	Yes	Yes	Yes	Yes
In-Loop Deblocking Filter	Yes	Yes	Yes	Yes	Yes
CAVLC Entropy Coding	Yes	Yes	Yes	Yes	Yes
CABAC Entropy Coding	No	No	Yes	Yes	Yes
Flexible Macroblock Ordering (FMO)	Yes	Yes	No	No	No
Arbitrary Slice Ordering (ASO)	Yes	Yes	No	No	No
Redundant Slices (RS)	Yes	Yes	No	No	No
Data Partitioning	No	Yes	No	No	No
Interlaced Coding (PicAFF, MBAFF)	No	Yes	Yes	Yes	Yes
4:2:0 Chroma Format	Yes	Yes	Yes	Yes	Yes
Monochrome Video Format (4:0:0)	No	No	No	Yes	Yes
4:2:2 Chroma Format	No	No	No	No	No
4:4:4 Chroma Format	No	No	No	No	No
8 Bit Sample Depth	Yes	Yes	Yes	Yes	Yes
9 and 10 Bit Sample Depth	No	No	No	No	Yes
11 to 14 Bit Sample Depth	No	No	No	No	No
8×8 vs. 4×4 Transform Adaptivity	No	No	No	Yes	Yes
Quantization Scaling Matrices	No	No	No	Yes	Yes
Separate Cb and Cr QP control	No	No	No	Yes	Yes
Separate Color Plane Coding	No	No	No	No	No
Predictive Lossless Coding	No	No	No	No	No

See http://web.cs.ucla.edu/classes/fall03/cs218/paper/H.264_MPEG4_Tutorial.pdf at 7:

The following table summarizes the two major types of entropy coding: Variable Length Coding (VLC) and Context Adaptive Binary Arithmetic Coding (CABAC). CABAC offers superior coding efficiency over VLC by adapting to the changing probability distribution of symbols, by exploiting correlation between symbols, and by adaptively exploiting bit correlations using arithmetic coding. H.264 also supports Context Adaptive Variable Length Coding (CAVLC) which offers superior entropy coding over VLC without the full cost of CABAC.

H.264 Entropy Coding – Comparison of Approaches

Characteristics	Variable Length Coding (VLC)	Context Adaptive Binary Arithmetic Coding(CABAC)
• Where it is used	MPEG-2, MPEG-4 ASP	H.264/MPEG-4 AVC (high efficiency option)
• Probability distribution	**Static** - Probabilities never change	**Adaptive** - Adjusts probabilities based on actual data
• Leverages correlation between symbols	**No** - Conditional probabilities ignored	**Yes** - Exploits symbol correlations by using "contexts"
• Non-integer code words	**No** - Low coding efficiency forhigh probability symbols	**Yes** - Exploits "arithmetic coding" which generates non-integer code words for higher efficiency

Moreover, the H.264 Standard requires a bit-flag descriptor, which is set to determine the correct decoder for the corresponding encoder. As shown below, if the flag = 0, then CAVLC must have been selected as the encoder; if the flag = 1, then CABAC must have been selected as the encoder. *See* https://www.itu.int/rec/dologin_pub.asp?lang=e&id=T-REC-H.264-201304-S!!PDF-E&type=items (Rec. ITU-T H.264 (04/2013)) at 80:

entropy_coding_mode_flag selects the entropy decoding method to be applied for the syntax elements for which two descriptors appear in the syntax tables as follows:

– If entropy_coding_mode_flag is equal to 0, the method specified by the left descriptor in the syntax table is applied (Exp-Golomb coded, see clause 9.1 or CAVLC, see clause 9.2).

– Otherwise (entropy_coding_mode_flag is equal to 1), the method specified by the right descriptor in the syntax table is applied (CABAC, see clause 9.3).

43. The Accused Instrumentalities compress the at least the portion of the data block with the selected one or more asymmetric compressors to provide one or more compressed data blocks, which can be organized in a GOP structure (see above). After its selection, the asymmetric compressor (CAVLC or CABAC) will compress the video data

to provide various compressed data blocks, which can also be organized in a GOP structure.

See https://sonnati.wordpress.com/2007/10/29/how-h-264-works-part-ii/:

Entropy Coding

For entropy coding, H.264 may use an enhanced VLC, a more complex context-adaptive variable-length coding (CAVLC) or an ever more complex Context-adaptive binary-arithmetic coding (CABAC) which are complex techniques to losslessly compress syntax elements in the video stream knowing the probabilities of syntax elements in a given context. The use of CABAC can improve the compression of around 5-7%. CABAC may requires a 30-40% of total processing power to be accomplished.

See

http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.602.1581&rep=rep1&type=pdf

at 13:

Typical compression ratios to maintain excellent quality are:

- 10:1 for general images using JPEG
- 30:1 for general video using H.263 and MPEG-2
- 60:1 for general video using H.264 and WMV9

See http://www.ijera.com/papers/Vol3_issue4/BM34399403.pdf at 2:

Most visual communication systems today use Baseline Profile. Baseline is the simplest H.264 profile and defines, for example, zigzag scanning of the picture and using 4:2:0 (YUV video formats) chrominance sampling. In Baseline Profile, the picture is split in blocks consisting of 4x4 pixels, and each block is processed separately. Another important element of the Baseline Profile is the use of Universal Variable Length Coding (UVLC) and Context Adaptive Variable Length Coding (CAVLC) entropy coding techniques.

The Extended and Main Profiles includes the functionality of the Baseline Profile and add improvements to the predictions algorithms. Since transmitting every single frame (think 30 frames per second for good quality video) is not feasible if you are trying to reduce the bit rate 1000-2000 times, temporal and motion prediction are heavily used in H.264, and allow transmitting only the difference between one frame and the previous frames. The result is spectacular efficiency gain, especially for scenes with little change and motion.

The High Profile is the most powerful profile in H.264, and it allows most efficient coding of video. For example, large coding gain achieved through the use of Context Adaptive Binary Arithmetic Coding (CABAC) encoding which is more efficient than the UVLC/CAVLC used in Baseline Profile.

The High Profile also uses adaptive transform that decides on the fly if 4x4 or 8x8-pixel blocks should be used. For example, 4x4 blocks are used for the parts of the picture that are dense with detail, while parts that have little detail are transformed using 8x8 blocks.

44. From above, and on information and belief, Polycom has directly infringed and continues to infringe the ’442 patent, for example, through its own use and testing of the Accused Instrumentalities, which when used, practices the system claimed by Claim 8 of the ’442 patent, namely, an apparatus, comprising: a data decompression system configured to decompress a compressed data block; and a storage medium configured to store at least a portion of the decompressed data block, wherein at least a portion of a data block having video or audio data was compressed with one or more compression algorithms selected from among a plurality of compression algorithms based upon a throughput of a communication channel and a parameter or an attribute of the at least the portion of the data block to create at least the compressed data block, and wherein at least one of the plurality of compression algorithms is asymmetric. Upon information and belief, Polycom uses the Accused Instrumentalities to practice infringing methods for its own internal non-testing business purposes, while testing the Accused Instrumentalities, and while providing technical support and repair services for the Accused Instrumentalities to their customers.

45. On information and belief, the Accused Instrumentalities store at least a portion of the one or more compressed data blocks in buffers, hard disk, or other forms of memory/storage.

46. On information and belief, Polycom also directly infringes and continues to infringe other claims of the ’442 patent, for similar reasons as explained above with respect to Claim 8 of the ’442 patent.

47. On information and belief, all of the Accused Instrumentalities perform the claimed methods in substantially the same way, *e.g.*, in the manner specified in the H.264 standard.

48. On information and belief, use of the Accused Instrumentalities in their ordinary and customary fashion results in infringement of the systems and/or methods claimed by the ’442 patent.

49. On information and belief, Polycom has had knowledge of the ’442 patent since at least the filing of this Complaint or shortly thereafter, and on information and belief, Polycom knew of the ’442 patent and knew of its infringement, including by way of this lawsuit. By the time of trial, Polycom will have known and intended (since receiving such notice) that its continued actions would actively induce and contribute to the infringement of the claims of the ’442 patent.

50. Upon information and belief, Polycom’s affirmative acts of making, using, and selling the Accused Instrumentalities, and providing implementation services and technical support to users of the Accused Instrumentalities, including, *e.g.*, through training, demonstrations, brochures, installation and user guides, have induced and continue to induce users of the Accused Instrumentalities to use them in their normal and customary way to infringe the ’442 patent by practicing an apparatus, comprising: a data decompression system configured to decompress a compressed data block; and a storage medium configured to store at least a portion of the decompressed data block, wherein at least a portion of a data block having video or audio data was compressed with one or more compression algorithms selected from among a plurality of compression algorithms based upon a throughput of a communication channel and a parameter or an attribute of the at

least the portion of the data block to create at least the compressed data block, and wherein at least one of the plurality of compression algorithms is asymmetric. For similar reasons, Polycom also induces their customers to use the Accused Instrumentalities to infringe other claims of the '442 patent. Polycom specifically intended and were aware that these normal and customary activities would infringe the '442 patent. Polycom performed the acts that constitute induced infringement, and would induce actual infringement, with the knowledge of the '442 patent and with the knowledge, or willful blindness to the probability, that the induced acts would constitute infringement. On information and belief, Polycom engaged in such inducement to promote the sales of the Accused Instrumentalities. Accordingly, Polycom has induced and continues to induce users of the Accused Instrumentalities to use the Accused Instrumentalities in their ordinary and customary way to infringe the '442 patent, knowing that such use constitutes infringement of the '442 patent. Accordingly, Polycom has been, and currently is, inducing infringement of the '442 patent, in violation of 35 U.S.C. § 271(b).

51. Polycom has also infringed, and continues to infringe, claims of the '442 patent by offering to commercially distribute, commercially distributing, making, and/or importing the Accused Instrumentalities, which are used in practicing the process, or using the systems, of the '442 patent, and constitute a material part of the invention. Polycom knows the components in the Accused Instrumentalities to be especially made or especially adapted for use in infringement of the '442 patent, not a staple article, and not a commodity of commerce suitable for substantial noninfringing use. Accordingly, Polycom has been, and currently is, contributorily infringing the '442 patent, in violation of 35 U.S.C. § 271(c).

52. By making, using, offering for sale, selling and/or importing into the United States the Accused Instrumentalities, and touting the benefits of using the Accused Instrumentalities' compression features, Polycom has injured Realtime and is liable to Realtime for infringement of the '442 patent pursuant to 35 U.S.C. § 271.

53. As a result of Polycom's infringement of the '442 patent, Plaintiff Realtime is entitled to monetary damages in an amount adequate to compensate for Polycom's infringement, but in no event less than a reasonable royalty for the use made of the invention by Polycom, together with interest and costs as fixed by the Court.

COUNT III

INFRINGEMENT OF U.S. PATENT NO. 8,934,535

54. Plaintiff re-alleges and incorporates by reference the foregoing paragraphs, as if fully set forth herein.

55. Plaintiff Realtime is the owner by assignment of United States Patent No. 8,934,535 ("the '535 patent") entitled "Systems and Methods for Video and Audio Data Storage and Distribution." The '535 patent was duly and legally issued by the United States Patent and Trademark Office on January 13, 2015. A true and correct copy of the '535 patent is included as Exhibit C.

56. On information and belief, Polycom has made, used, offered for sale, sold and/or imported into the United States products that infringe the '535 patent, and continues to do so. By way of illustrative example, these infringing products include, without limitation, Polycom's telepresence, videoconferencing as well as video and voice communication solutions utilizing H.264 High Profile, such as, for example, the Polycom

RealPresence Experience High Definition (RPX HD 200 & 400 Series) including the Polycom RPX HD 204M, RPX HD 208M, RPX HD 210M, RPX HD 218M, RPX HD 408M, RPX HD 418M, RPX HD 428M; the Polycom HDX Series including the Polycom HDX 9000, Polycom HDX 8000, Polycom HDX 7000, Polycom HDX 6000, Polycom HDX 4000, Polycom HDX 4500, Polycom HDX 4002, Polycom HDX 4001, Polycom HDX Packaged Solutions, Polycom HDX Executive Collection, Polycom HDX Media Center, Polycom EagleEye Director, Polycom Eagle Eye IV, Polycom Touch Control interface, Polycom VisualBoard Technology; the Polycom Open Telepresence Experience (OTX) including the Polycom OTX 100 and Polycom OTX 300; the Polycom RealPresence Series including the Polycom RealPresence Desktop, Polycom RealPresence Mobile for Android, Polycom RealPresence Medialign, Polycom RealPresence Immersive Studio, Polycom RealPresence Immersive Studio Flex, Polycom RealPresence Clarity, Polycom RealPresence Group 310, Polycom RealPresence Group 500, Polycom RealPresence Group 700; the Polycom RMX Media Platforms including the Polycom RMX v7.0 with MPMx modules, Polycom RMX 1000 platform, Polycom RMX 1500 platform, Polycom RMX 2000 platform and Polycom RMX 4000 platform; the Polycom ATX Series including the Polycom ATX 300; the Polycom TPX Series including the Polycom TPX HD 306M (3-screens); the Polycom QDX Series including the Polycom QDX 6000; the Polycom CX Series including the Polycom CX5000 and Polycom CX7000; the Polycom VVX Series including the Polycom VVX 1500D; the Polycom load balancers e.g. the Polycom DMA 7000; the Polycom desktop video infrastructure or servers e.g. the Polycom CMA 4000 and Polycom CMA 5000; the Polycom firewall traversal infrastructure including the Polycom VBP ST and E models

including the Polycom VBP 200 E, Polycom VBP 200EW, Polycom VBP 4300 Series (including the Polycom VBP 4350E and Polycom VBP 4350E-3), the Polycom 5300 Series (including the Polycom 5300E, Polycom 5300ST, Polycom VBP T5300-E10, Polycom VBP T3500-E25, Polycom VBP T5300-ST10 and Polycom VBP T5300-ST25), the Polycom 6400 Series (including the Polycom 6400E, Polycom 6400ST, Polycom VBP 6400-E85 and Polycom VBP 6400-ST85); and other Polycom infrastructure e.g. the Polycom RSS 2000 and Polycom RSS 4000, the Polycom VVX Business Media Phones and the Polycom VVX Camera, the Polycom Trio Family of conference phones including the Polycom Trio 8500 and Polycom Trio 8800, and all versions and variations thereof since the issuance of the '535 patent ("Accused Instrumentalities").

57. For example, the Accused Instrumentalities utilize the H.264 video compression standard, or H.264 High Profile. According to an official press release from Polycom on the Polycom website dated February 16, 2010, Polycom "the global leader in telepresence, video and voice communication solutions, today announced support for a breakthrough, standards-based video compression technology, **H.264 High profile**, that will reduce the bandwidth requirements for high-definition (HD) telepresence and standard definition (SD) video conferencing by as much as 50 percent, representing substantial network bandwidth cost savings for customers…Support for **H.264 High Profile** on Polycom HDX room and personal telepresence systems is planned for April. Polycom also plans to support **H.264 High Profile** across its visual communication infrastructure and recording and streaming solutions, and across its immersive telepresence solutions in the coming months." *See* "Polycom Delivers Breakthrough Video Quality Innovation That Cuts Telepresence Bandwidth Requirements in Half,"

Feb. 16, 2010, http://www.polycom.com/company/news/press-releases/2010/20100216.html (emphasis added).

58. Furthermore, this website from the official Polycom site advertising their "Polycom HDX Series" states under "Overview": "Flexible, cost-effective, high-definition communications from low bandwidths using standards-based H.264 High Profile Technology" and under "Technical Overview": H.264 High Profile support." *See* http://www.polycom.com/products-services/hd-telepresence-video-conferencing/realpresence-room/realpresence-room-hdx-series.html:

Overview

Polycom UltimateHD enhances every video collaboration experience

In today's fast-paced world, it is more critical than ever for organizations to adapt quickly and communicate seamlessly both internally and externally. Whether negotiating complex business agreements or helping employee tiger teams to speed their decision making, what frequently separates winning organizations from the pack is their ability to deliver tools that maximize productivity.

With Polycom HDX solutions, connecting and collaborating visually with anyone across your organization is as easy as making a phone call. The Polycom HDX Series connects your people and enhances their collaboration. Whether you are holding a simple interview across campus or staging a large project team meeting with members dispersed across the globe, there are HDX solutions that fit the bill.

Polycom HDX Solutions deliver:

- Flexible, cost-effective, high-definition communications from low bandwidths using standards-based H.264 High Profile technology
- Polycom UltimateHD technology: HD voice, HD video, and HD content for exceptional performance

Technical Overview

- UltimateHD quality for up to 50% less bandwidth with H.264 High Profile support
- HD video up to 1080p, Polycom HD Voice technology, and HD content sharing

59. The first page of this data sheet also states that the Polycom RealPresence Experience High Definition (RPX HD 200 & 400 Series) supports a "H.264 video codec with H.239 People+Content" and "H.264 and H.263 Video Error Concealment". *See* http://supportdocs.polycom.com/PolycomService/support/global/documents/support/technical/products/video/rpx_hd_technical_specs.pdf:



Technical Specifications

Polycom® RealPresence™ Experience High Definition (RPX™ HD 200 & 400 Series)

Video and Audio Technology

Technology Components

- Polycom HDX video codecs supporting 720p at 30 fps
- Polycom Digital Ceiling Microphone Arrays
- Polycom StereoSurround™ Speaker Kit
- High Definition Rear Screen Projectors
- 3-CCD High Definition Video Cameras
- Room control system with 10-inch color touch panel
- 15- inch personal high resolution content displays embedded in the tables of RPX HD 200 Series suites
- 19- inch personal high resolution content displays embedded in the RPX HD 400 Series multipurpose main table and 15-inch personal high resolution content displays embedded in second and third tier tables if applicable

Video Displays

- Seamless panoramic video display screens
  - Polycom RPX HD 200 Series Suites support 8-foot x 42-inch high definition video in a 24:9 aspect ratio at 1920 x 720p resolution
  - Polycom RPX HD 400 Series Suites support 16-foot x 42-inch high definition video in a 48:9 aspect ratio at 3840 x 720p resolution

Video Standards

- H.264 video codec with H.239 People+Content
- H.261 and H.263++ for compatibility with legacy video conferencing endpoints
- H.264 and H.263 Video Error Concealment (including LPR-Lost Packet Recovery) for resiliency against network issues
- AES Media Encryption for secure video/audio and content

60. In addition, the first page of this data sheet states that the Polycom Open Telepresence Experience OTX 100 supports "H. 264 / H. 264 High Profile" for its "Video codec" and one of its "Video and Audio Specifications." *See* http://support.polycom.com/global/documents/support/technical/products/video/otx100_technical_specifications.pdf:



Technical Specifications

Polycom® Open Telepresence Experience™
OTX™ 100

VIDEO & AUDIO TECHNOLOGY

Solution Includes:

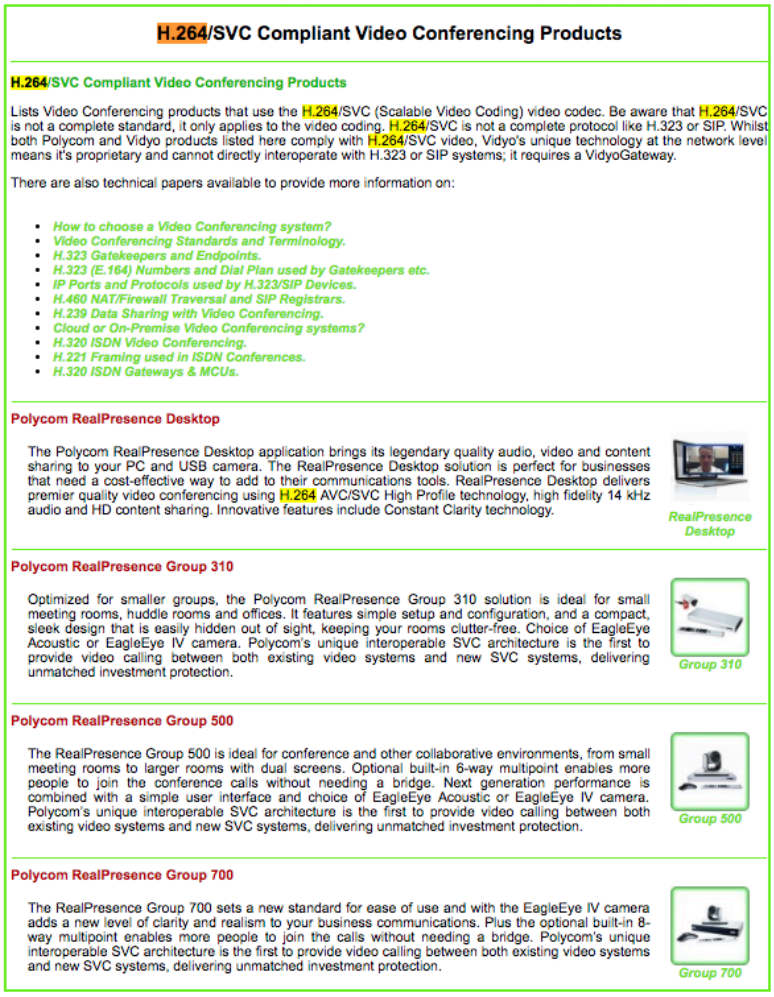
- Polycom HDX™ video codec supporting 1080p at 30fps or 720p at 60fps
- Polycom Digital Ceiling Microphone Array
- Polycom StereoSurround™ speaker kit
- High-definition 65-inch LCD display
- High-definition video camera
- Polycom Touch Control user interface
- Motorized 21.5-inch high resolution content displays integrated in conference table (Standard Version Only)
- Power and LAN access for laptop at the table (Standard Version Only)

Video and Audio Specifications

Video Standards	Description
H.264/ H. 264 High Profile	Video codec

61. Moreover, the firm of Wainhouse Research ("WR") was retained by Polycom "to conduct a third-party evaluation of the user experience provided by Polycom's implementation of High Profile within the H.264 video compression standard. Specifically, WR was asked to verify the ability to reduce call speed while maintaining video resolution and call quality by using H.264 High Profile…To facilitate the evaluation, Polycom provided WR with four (4) HDX 8000 videoconferencing systems with 1080p capable cameras. WR then created two parallel test environments – the first using H.264 Baseline Profile (BP) video compression, and the second using H.264 High Profile (HP)." *See* http://cp.wainhouse.com/download/1440/wrplatinum.com_Downloads_11977.pdf?redirect=node/1218. Thus, it is clear that at least Polycom's HDX 8000 videoconferencing systems use the H.264 video compression standard.

62. A third-party vendor of Polycom products also lists on a page entitled "H.264/SVC Complaint Video Conferencing Products" various Polycom products including the Polycom RealPresence Desktop and RealPresence Groups 310, 500 and 700. The site also adds that the "Polycom…products listed here comply with H.264/SVC". *See* http://www.c21video.com/vcsvc.html:



H.264/SVC Compliant Video Conferencing Products

H.264/SVC Compliant Video Conferencing Products

Lists Video Conferencing products that use the H.264/SVC (Scalable Video Coding) video codec. Be aware that H.264/SVC is not a complete standard, it only applies to the video coding. H.264/SVC is not a complete protocol like H.323 or SIP. Whilst both Polycom and Vidyo products listed here comply with H.264/SVC video, Vidyo's unique technology at the network level means it's proprietary and cannot directly interoperate with H.323 or SIP systems; it requires a VidyoGateway.

There are also technical papers available to provide more information on:

- *How to choose a Video Conferencing system?*
- *Video Conferencing Standards and Terminology.*
- *H.323 Gatekeepers and Endpoints.*
- *H.323 (E.164) Numbers and Dial Plan used by Gatekeepers etc.*
- *IP Ports and Protocols used by H.323/SIP Devices.*
- *H.460 NAT/Firewall Traversal and SIP Registrars.*
- *H.239 Data Sharing with Video Conferencing.*
- *Cloud or On-Premise Video Conferencing systems?*
- *H.320 ISDN Video Conferencing.*
- *H.221 Framing used in ISDN Conferences.*
- *H.320 ISDN Gateways & MCUs.*

Polycom RealPresence Desktop

The Polycom RealPresence Desktop application brings its legendary quality audio, video and content sharing to your PC and USB camera. The RealPresence Desktop solution is perfect for businesses that need a cost-effective way to add to their communications tools. RealPresence Desktop delivers premier quality video conferencing using H.264 AVC/SVC High Profile technology, high fidelity 14 kHz audio and HD content sharing. Innovative features include Constant Clarity technology.

RealPresence Desktop

Polycom RealPresence Group 310

Optimized for smaller groups, the Polycom RealPresence Group 310 solution is ideal for small meeting rooms, huddle rooms and offices. It features simple setup and configuration, and a compact, sleek design that is easily hidden out of sight, keeping your rooms clutter-free. Choice of EagleEye Acoustic or EagleEye IV camera. Polycom's unique interoperable SVC architecture is the first to provide video calling between both existing video systems and new SVC systems, delivering unmatched investment protection.

Group 310

Polycom RealPresence Group 500

The RealPresence Group 500 is ideal for conference and other collaborative environments, from small meeting rooms to larger rooms with dual screens. Optional built-in 6-way multipoint enables more people to join the conference calls without needing a bridge. Next generation performance is combined with a simple user interface and choice of EagleEye Acoustic or EagleEye IV camera. Polycom's unique interoperable SVC architecture is the first to provide video calling between both existing video systems and new SVC systems, delivering unmatched investment protection.

Group 500

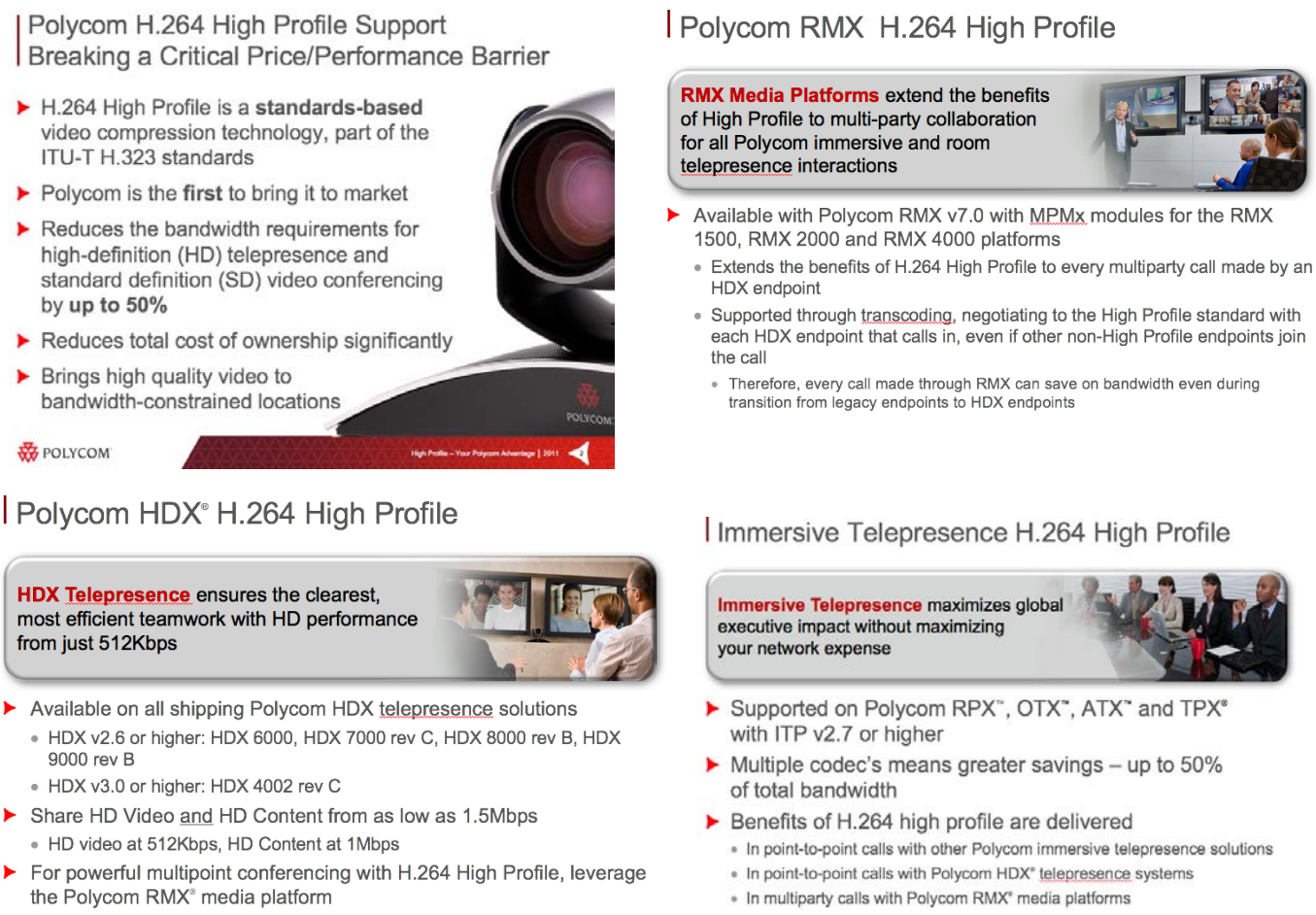
Polycom RealPresence Group 700

The RealPresence Group 700 sets a new standard for ease of use and with the EagleEye IV camera adds a new level of clarity and realism to your business communications. Plus the optional built-in 8-way multipoint enables more people to join the calls without needing a bridge. Polycom's unique interoperable SVC architecture is the first to provide video calling between both existing video systems and new SVC systems, delivering unmatched investment protection.

Group 700

63. Polycom also actively advertises H.264 High Profile capabilities (claiming that "Polycom is the first to bring [H.264 High Profile] to market") in various products such as the Polycom HDX Series, Immersive Telepresence H.264 in its RPX, OTX, ATX and TPX Series, and Polycom RMX H.264 High Profile in its RMX 1500, 2000 and 4000 platforms (for Polycom RMX v.7.0 with MPMx modules). *See*

http://www.adeoproav.it/site/adeogroup54_webprofessional_it/allegati/high-profile-overview.pptx:



64. The Accused Instrumentalities determine a parameter of at least a portion of a video data block. As shown below, examples of such parameters include bitrate (or max video bitrate) and resolution parameters. Different parameters correspond with different end applications. H.264 provides for multiple different ranges of such parameters, each included in the "profiles" and "levels" defined by the H.264 standard. *See* http://www.axis.com/files/whitepaper/wp_h264_31669_en_0803_lo.pdf at 5:

4. H.264 profiles and levels

The joint group involved in defining H.264 focused on creating a simple and clean solution, limiting options and features to a minimum. An important aspect of the standard, as with other video standards, is providing the capabilities in profiles (sets of algorithmic features) and levels (performance classes) that optimally support popular productions and common formats.

H.264 has seven profiles, each targeting a specific class of applications. Each profile defines what feature set the encoder may use and limits the decoder implementation complexity.

Network cameras and video encoders will most likely use a profile called the baseline profile, which is intended primarily for applications with limited computing resources. The baseline profile is the most suitable given the available performance in a real-time encoder that is embedded in a network video product. The profile also enables low latency, which is an important requirement of surveillance video and also particularly important in enabling real-time, pan/tilt/zoom (PTZ) control in PTZ network cameras.

H.264 has 11 levels or degree of capability to limit performance, bandwidth and memory requirements. Each level defines the bit rate and the encoding rate in macroblock per second for resolutions ranging from QCIF to HDTV and beyond. The higher the resolution, the higher the level required.

See https://en.wikipedia.org/wiki/H.264/MPEG-4_AVC:

Levels with maximum property values

Level	Max decoding speed		Max frame size		Max video bit rate for video coding layer (VCL) kbit/s			Examples for high resolution @ highest frame rate (max stored frames) Toggle additional details
	Luma samples/s	Macroblocks/s	Luma samples	Macroblocks	Baseline, Extended and Main Profiles	High Profile	High 10 Profile	
1	380,160	1,485	25,344	99	64	80	192	176×144@15.0 (4)
1b	380,160	1,485	25,344	99	128	160	384	176×144@15.0 (4)
1.1	768,000	3,000	101,376	396	192	240	576	352×288@7.5 (2)
1.2	1,536,000	6,000	101,376	396	384	480	1,152	352×288@15.2 (6)
1.3	3,041,280	11,880	101,376	396	768	960	2,304	352×288@30.0 (6)
2	3,041,280	11,880	101,376	396	2,000	2,500	6,000	352×288@30.0 (6)
2.1	5,068,800	19,800	202,752	792	4,000	5,000	12,000	352×576@25.0 (6)
2.2	5,184,000	20,250	414,720	1,620	4,000	5,000	12,000	720×576@12.5 (5)
3	10,368,000	40,500	414,720	1,620	10,000	12,500	30,000	720×576@25.0 (5)
3.1	27,648,000	108,000	921,600	3,600	14,000	17,500	42,000	1,280×720@30.0 (5)
3.2	55,296,000	216,000	1,310,720	5,120	20,000	25,000	60,000	1,280×1,024@42.2 (4)
4	62,914,560	245,760	2,097,152	8,192	20,000	25,000	60,000	2,048×1,024@30.0 (4)
4.1	62,914,560	245,760	2,097,152	8,192	50,000	62,500	150,000	2,048×1,024@30.0 (4)
4.2	133,693,440	522,240	2,228,224	8,704	50,000	62,500	150,000	2,048×1,080@60.0 (4)
5	150,994,944	589,824	5,652,480	22,080	135,000	168,750	405,000	3,672×1,536@26.7 (5)
5.1	251,658,240	983,040	9,437,184	36,864	240,000	300,000	720,000	4,096×2,304@26.7 (5)
5.2	530,841,600	2,073,600	9,437,184	36,864	240,000	300,000	720,000	4,096×2,304@56.3 (5)

65. A video data block is organized by the group of pictures (GOP) structure, which is a "collection of successive pictures within a coded video stream." *See* https://en.wikipedia.org/wiki/Group_of_pictures. A GOP structure can contain intra

coded pictures (I picture or I frame), predictive coded pictures (P picture or P frame), bipredictive coded pictures (B picture or B frame) and direct coded pictures (D picture or D frames, or DC direct coded pictures which are used only in MPEG-1 video). *See* https://en.wikipedia.org/wiki/Video_compression_picture_types (for descriptions of I frames, P frames and B frames); https://en.wikipedia.org/wiki/MPEG-1#D-frames (for descriptions of D frames). Thus, at least a portion of a video data block would also make up a GOP structure and could also contain I frames, P frames, B frames and/or D frames. The GOP structure also reflects the size of a video data block, and the GOP structure can be controlled and used to fine-tune other parameters (*e.g.* bitrate, max video bitrate and resolution parameters) or even be considered as a parameter by itself.

66. Based on the bitrate and/or resolution parameter identified (*e.g.* bitrate, max video bitrate, resolution, GOP structure or frame type within a GOP structure), any H.264-compliant system such as the Accused Instrumentalities would determine which profile (*e.g.*, "baseline," "extended," "main", or "high") corresponds with that parameter, then select between at least two asymmetric compressors. If baseline or extended is the corresponding profile, then the system will select a Context-Adaptive Variable Length Coding ("CAVLC") entropy encoder. If main or high is the corresponding profile, then the system will select a Context-Adaptive Binary Arithmetic Coding ("CABAC") entropy encoder. Both encoders are asymmetric compressors because it takes a longer period of time for them to compress data than to decompress data. *See* https://sonnati.wordpress.com/2007/10/29/how-h-264-works-part-ii/:

	Baseline	Extended	Main	High	High 10
I and P Slices	Yes	Yes	Yes	Yes	Yes
B Slices	No	Yes	Yes	Yes	Yes
SI and SP Slices	No	Yes	No	No	No
Multiple Reference Frames	Yes	Yes	Yes	Yes	Yes
In-Loop Deblocking Filter	Yes	Yes	Yes	Yes	Yes
CAVLC Entropy Coding	Yes	Yes	Yes	Yes	Yes
CABAC Entropy Coding	No	No	Yes	Yes	Yes
Flexible Macroblock Ordering (FMO)	Yes	Yes	No	No	No
Arbitrary Slice Ordering (ASO)	Yes	Yes	No	No	No
Redundant Slices (RS)	Yes	Yes	No	No	No
Data Partitioning	No	Yes	No	No	No
Interlaced Coding (PicAFF, MBAFF)	No	Yes	Yes	Yes	Yes
4:2:0 Chroma Format	Yes	Yes	Yes	Yes	Yes
Monochrome Video Format (4:0:0)	No	No	No	Yes	Yes
4:2:2 Chroma Format	No	No	No	No	No
4:4:4 Chroma Format	No	No	No	No	No
8 Bit Sample Depth	Yes	Yes	Yes	Yes	Yes
9 and 10 Bit Sample Depth	No	No	No	No	Yes
11 to 14 Bit Sample Depth	No	No	No	No	No
8×8 vs. 4×4 Transform Adaptivity	No	No	No	Yes	Yes
Quantization Scaling Matrices	No	No	No	Yes	Yes
Separate Cb and Cr QP control	No	No	No	Yes	Yes
Separate Color Plane Coding	No	No	No	No	No
Predictive Lossless Coding	No	No	No	No	No

See http://web.cs.ucla.edu/classes/fall03/cs218/paper/H.264_MPEG4_Tutorial.pdf at 7:

The following table summarizes the two major types of entropy coding: Variable Length Coding (VLC) and Context Adaptive Binary Arithmetic Coding (CABAC). CABAC offers superior coding efficiency over VLC by adapting to the changing probability distribution of symbols, by exploiting correlation between symbols, and by adaptively exploiting bit correlations using arithmetic coding. H.264 also supports Context Adaptive Variable Length Coding (CAVLC) which offers superior entropy coding over VLC without the full cost of CABAC.

H.264 Entropy Coding – Comparison of Approaches

Characteristics	Variable Length Coding (VLC)	Context Adaptive Binary Arithmetic Coding(CABAC)
• Where it is used	MPEG-2, MPEG-4 ASP	H.264/MPEG-4 AVC (high efficiency option)
• Probability distribution	**Static** - Probabilities never change	**Adaptive** - Adjusts probabilities based on actual data
• Leverages correlation between symbols	**No** - Conditional probabilities ignored	**Yes** - Exploits symbol correlations by using "contexts"
• Non-integer code words	**No** - Low coding efficiency forhigh probability symbols	**Yes** - Exploits "arithmetic coding" which generates non-integer code words for higher efficiency

Moreover, the H.264 Standard requires a bit-flag descriptor, which is set to determine the correct decoder for the corresponding encoder. As shown below, if the flag = 0, then CAVLC must have been selected as the encoder; if the flag = 1, then CABAC must have been selected as the encoder. *See* https://www.itu.int/rec/dologin_pub.asp?lang=e&id=T-REC-H.264-201304-S!!PDF-E&type=items (Rec. ITU-T H.264 (04/2013)) at 80:

entropy_coding_mode_flag selects the entropy decoding method to be applied for the syntax elements for which two descriptors appear in the syntax tables as follows:

– If entropy_coding_mode_flag is equal to 0, the method specified by the left descriptor in the syntax table is applied (Exp-Golomb coded, see clause 9.1 or CAVLC, see clause 9.2).

– Otherwise (entropy_coding_mode_flag is equal to 1), the method specified by the right descriptor in the syntax table is applied (CABAC, see clause 9.3).

67. The Accused Instrumentalities compress the at least the portion of the data block with the selected one or more asymmetric compressors to provide one or more compressed data blocks, which can be organized in a GOP structure (see above). After its selection, the asymmetric compressor (CAVLC or CABAC) will compress the video data

to provide various compressed data blocks, which can also be organized in a GOP structure.

See https://sonnati.wordpress.com/2007/10/29/how-h-264-works-part-ii/:

Entropy Coding

For entropy coding, H.264 may use an enhanced VLC, a more complex context-adaptive variable-length coding (CAVLC) or an ever more complex Context-adaptive binary-arithmetic coding (CABAC) which are complex techniques to losslessly compress syntax elements in the video stream knowing the probabilities of syntax elements in a given context. The use of CABAC can improve the compression of around 5-7%. CABAC may requires a 30-40% of total processing power to be accomplished.

See

http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.602.1581&rep=rep1&type=pdf

at 13:

Typical compression ratios to maintain excellent quality are:

- 10:1 for general images using JPEG
- 30:1 for general video using H.263 and MPEG-2
- 60:1 for general video using H.264 and WMV9

See http://www.ijera.com/papers/Vol3_issue4/BM34399403.pdf at 2:

Most visual communication systems today use Baseline Profile. Baseline is the simplest H.264 profile and defines, for example, zigzag scanning of the picture and using 4:2:0 (YUV video formats) chrominance sampling. In Baseline Profile, the picture is split in blocks consisting of 4x4 pixels, and each block is processed separately. Another important element of the Baseline Profile is the use of Universal Variable Length Coding (UVLC) and Context Adaptive Variable Length Coding (CAVLC) entropy coding techniques.

The Extended and Main Profiles includes the functionality of the Baseline Profile and add improvements to the predictions algorithms. Since transmitting every single frame (think 30 frames per second for good quality video) is not feasible if you are trying to reduce the bit rate 1000-2000 times, temporal and motion prediction are heavily used in H.264, and allow transmitting only the difference between one frame and the previous frames. The result is spectacular efficiency gain, especially for scenes with little change and motion.

The High Profile is the most powerful profile in H.264, and it allows most efficient coding of video. For example, large coding gain achieved through the use of Context Adaptive Binary Arithmetic Coding (CABAC) encoding which is more efficient than the UVLC/CAVLC used in Baseline Profile.

The High Profile also uses adaptive transform that decides on the fly if 4x4 or 8x8-pixel blocks should be used. For example, 4x4 blocks are used for the parts of the picture that are dense with detail, while parts that have little detail are transformed using 8x8 blocks.

68. From above, and on information and belief, Polycom has directly infringed and continues to infringe the ’535 patent, for example, through its own use and testing of the Accused Instrumentalities, which when used, practices the system claimed by Claim 15 of the ’535 patent, namely, a method, comprising: determining a parameter of at least a portion of a data block; selecting one or more asymmetric compressors from among a plurality of compressors based upon the determined parameter or attribute; compressing the at least the portion of the data block with the selected one or more asymmetric compressors to provide one or more compressed data blocks; and storing at least a portion of the one or more compressed data blocks. Upon information and belief, Polycom uses the Accused Instrumentalities to practice infringing methods for its own internal non-testing business purposes, while testing the Accused Instrumentalities, and while providing technical support and repair services for the Accused Instrumentalities to their customers.

69. On information and belief, the Accused Instrumentalities store at least a portion of the one or more compressed data blocks in buffers, hard disk, or other forms of memory/storage.

70. On information and belief, Polycom also directly infringes and continues to infringe other claims of the ’535 patent, for similar reasons as explained above with respect to Claim 15 of the ’535 patent.

71. On information and belief, all of the Accused Instrumentalities perform the claimed methods in substantially the same way, *e.g.*, in the manner specified in the H.264 standard.

72. On information and belief, use of the Accused Instrumentalities in their ordinary and customary fashion results in infringement of the systems and/or methods claimed by the ’535 patent.

73. On information and belief, Polycom has had knowledge of the ’535 patent since at least the filing of this Complaint or shortly thereafter, and on information and belief, Polycom knew of the ’535 patent and knew of its infringement, including by way of this lawsuit. By the time of trial, Polycom will have known and intended (since receiving such notice) that its continued actions would actively induce and contribute to the infringement of the claims of the ’535 patent.

74. Upon information and belief, Polycom’s affirmative acts of making, using, and selling the Accused Instrumentalities, and providing implementation services and technical support to users of the Accused Instrumentalities, including, *e.g.*, through training, demonstrations, brochures, installation and user guides, have induced and continue to induce users of the Accused Instrumentalities to use them in their normal and customary way to infringe the ’535 patent by practicing a method, comprising: determining a parameter of at least a portion of a data block; selecting one or more asymmetric compressors from among a plurality of compressors based upon the determined parameter or attribute; compressing the at least the portion of the data block with the selected one or more asymmetric compressors to provide one or more compressed data blocks; and storing at least a portion of the one or more compressed data blocks. For example, Polycom adopted H.264 (e.g. its H.264 High Profile) in its telepresence, videoconference as well as video and voice communication solutions. For similar reasons, Polycom also induces their customers to use the Accused Instrumentalities to infringe other claims of the ’535 patent.

Polycom specifically intended and were aware that these normal and customary activities would infringe the '535 patent. Polycom performed the acts that constitute induced infringement, and would induce actual infringement, with the knowledge of the '535 patent and with the knowledge, or willful blindness to the probability, that the induced acts would constitute infringement. On information and belief, Polycom engaged in such inducement to promote the sales of the Accused Instrumentalities. Accordingly, Polycom has induced and continues to induce users of the Accused Instrumentalities to use the Accused Instrumentalities in their ordinary and customary way to infringe the '535 patent, knowing that such use constitutes infringement of the '535 patent. Accordingly, Polycom has been, and currently is, inducing infringement of the '535 patent, in violation of 35 U.S.C. § 271(b).

75. Polycom has also infringed, and continues to infringe, claims of the '535 patent by offering to commercially distribute, commercially distributing, making, and/or importing the Accused Instrumentalities, which are used in practicing the process, or using the systems, of the '535 patent, and constitute a material part of the invention. Polycom knows the components in the Accused Instrumentalities to be especially made or especially adapted for use in infringement of the '535 patent, not a staple article, and not a commodity of commerce suitable for substantial noninfringing use. Accordingly, Polycom has been, and currently is, contributorily infringing the '535 patent, in violation of 35 U.S.C. § 271(c).

76. By making, using, offering for sale, selling and/or importing into the United States the Accused Instrumentalities, and touting the benefits of using the Accused Instrumentalities' compression features, Polycom has injured Realtime and is liable to Realtime for infringement of the '535 patent pursuant to 35 U.S.C. § 271.

77. As a result of Polycom's infringement of the '535 patent, Plaintiff Realtime is entitled to monetary damages in an amount adequate to compensate for Polycom's infringement, but in no event less than a reasonable royalty for the use made of the invention by Polycom, together with interest and costs as fixed by the Court.

COUNT IV

INFRINGEMENT OF U.S. PATENT NO. 9,762,907

78. Plaintiff re-alleges and incorporates by reference the foregoing paragraphs, as if fully set forth herein.

79. Plaintiff Realtime is the owner by assignment of United States Patent No. 9,762,907 ("the '907 patent") entitled "System and methods for video and audio data distribution." The '907 patent was duly and legally issued by the United States Patent and Trademark Office on September 12, 2017. A true and correct copy of the '907 patent is included as Exhibit D.

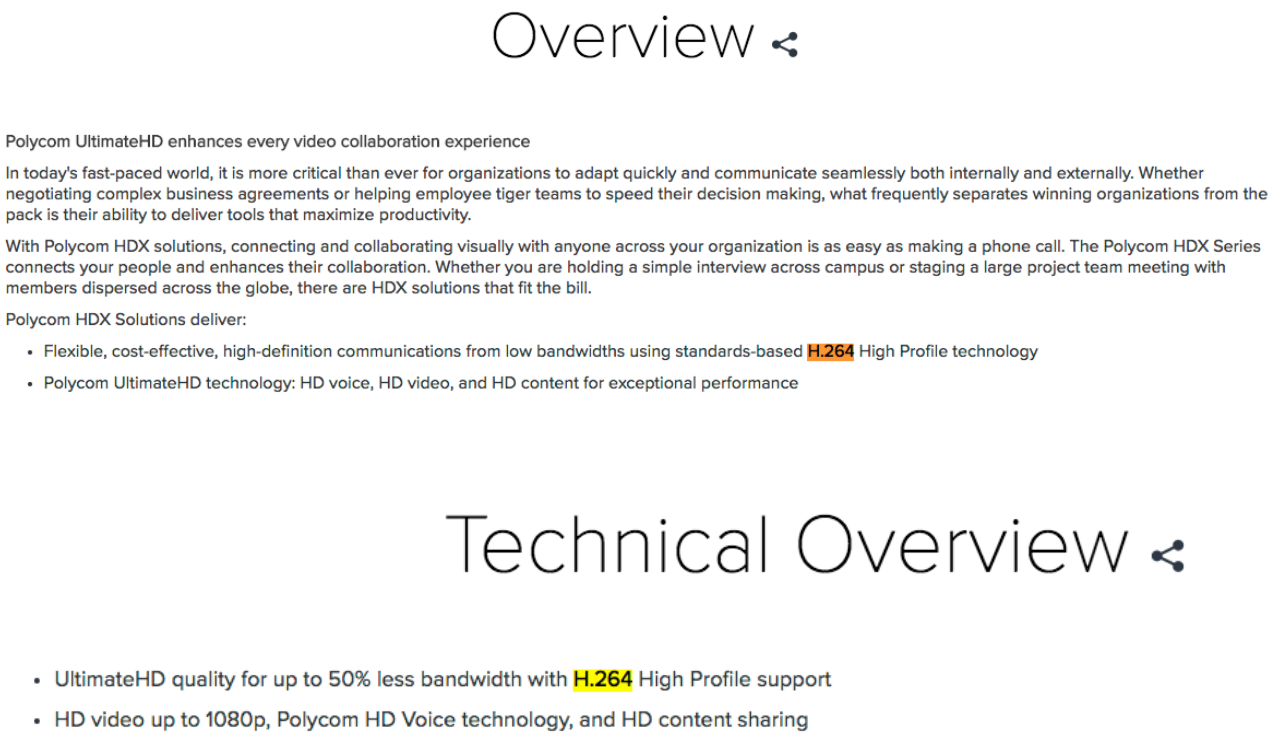
80. On information and belief, Polycom has made, used, offered for sale, sold and/or imported into the United States products that infringe the '907 patent, and continues to do so. By way of illustrative example, these infringing products include, without limitation, Polycom's telepresence, videoconferencing as well as video and voice communication solutions utilizing H.264 High Profile, such as, for example, the Polycom RealPresence Experience High Definition (RPX HD 200 & 400 Series) including the Polycom RPX HD 204M, RPX HD 208M, RPX HD 210M, RPX HD 218M, RPX HD 408M, RPX HD 418M, RPX HD 428M; the Polycom HDX Series including the Polycom HDX 9000, Polycom HDX 8000, Polycom HDX 7000, Polycom HDX 6000, Polycom

HDX 4000, Polycom HDX 4500, Polycom HDX 4002, Polycom HDX 4001, Polycom HDX Packaged Solutions, Polycom HDX Executive Collection, Polycom HDX Media Center, Polycom EagleEye Director, Polycom Eagle Eye IV, Polycom Touch Control interface, Polycom VisualBoard Technology; the Polycom Open Telepresence Experience (OTX) including the Polycom OTX 100 and Polycom OTX 300; the Polycom RealPresence Series including the Polycom RealPresence Desktop, Polycom RealPresence Mobile for Android, Polycom RealPresence Medialign, Polycom RealPresence Immersive Studio, Polycom RealPresence Immersive Studio Flex, Polycom RealPresence Clarity, Polycom RealPresence Group 310, Polycom RealPresence Group 500, Polycom RealPresence Group 700; the Polycom RMX Media Platforms including the Polycom RMX v7.0 with MPMx modules, Polycom RMX 1000 platform, Polycom RMX 1500 platform, Polycom RMX 2000 platform and Polycom RMX 4000 platform; the Polycom ATX Series including the Polycom ATX 300; the Polycom TPX Series including the Polycom TPX HD 306M (3-screens); the Polycom QDX Series including the Polycom QDX 6000; the Polycom CX Series including the Polycom CX5000 and Polycom CX7000; the Polycom VVX Series including the Polycom VVX 1500D; the Polycom load balancers e.g. the Polycom DMA 7000; the Polycom desktop video infrastructure or servers e.g. the Polycom CMA 4000 and Polycom CMA 5000; the Polycom firewall traversal infrastructure including the Polycom VBP ST and E models including the Polycom VBP 200 E, Polycom VBP 200EW, Polycom VBP 4300 Series (including the Polycom VBP 4350E and Polycom VBP 4350E-3), the Polycom 5300 Series (including the Polycom 5300E, Polycom 5300ST, Polycom VBP T5300-E10, Polycom VBP T3500-E25, Polycom VBP T5300-ST10 and Polycom VBP T5300-ST25),

the Polycom 6400 Series (including the Polycom 6400E, Polycom 6400ST, Polycom VBP 6400-E85 and Polycom VBP 6400-ST85); and other Polycom infrastructure e.g. the Polycom RSS 2000 and Polycom RSS 4000, the Polycom VVX Business Media Phones and the Polycom VVX Camera, the Polycom Trio Family of conference phones including the Polycom Trio 8500 and Polycom Trio 8800, and all versions and variations thereof since the issuance of the '907 patent ("Accused Instrumentalities").

81. For example, the Accused Instrumentalities utilize the H.264 video compression standard, or H.264 High Profile. According to an official press release from Polycom on the Polycom website dated February 16, 2010, Polycom "the global leader in telepresence, video and voice communication solutions, today announced support for a breakthrough, standards-based video compression technology, **H.264 High profile**, that will reduce the bandwidth requirements for high-definition (HD) telepresence and standard definition (SD) video conferencing by as much as 50 percent, representing substantial network bandwidth cost savings for customers…Support for **H.264 High Profile** on Polycom HDX room and personal telepresence systems is planned for April. Polycom also plans to support **H.264 High Profile** across its visual communication infrastructure and recording and streaming solutions, and across its immersive telepresence solutions in the coming months." *See* "Polycom Delivers Breakthrough Video Quality Innovation That Cuts Telepresence Bandwidth Requirements in Half," Feb. 16, 2010, http://www.polycom.com/company/news/press-releases/2010/20100216.html (emphasis added).

82. Furthermore, this website from the official Polycom site advertising their "Polycom HDX Series" states under "Overview": "Flexible, cost-effective, high-definition communications from low bandwidths using standards-based H.264 High Profile Technology" and under "Technical Overview": H.264 High Profile support." *See* http://www.polycom.com/products-services/hd-telepresence-video-conferencing/realpresence-room/realpresence-room-hdx-series.html:



Overview

Polycom UltimateHD enhances every video collaboration experience

In today's fast-paced world, it is more critical than ever for organizations to adapt quickly and communicate seamlessly both internally and externally. Whether negotiating complex business agreements or helping employee tiger teams to speed their decision making, what frequently separates winning organizations from the pack is their ability to deliver tools that maximize productivity.

With Polycom HDX solutions, connecting and collaborating visually with anyone across your organization is as easy as making a phone call. The Polycom HDX Series connects your people and enhances their collaboration. Whether you are holding a simple interview across campus or staging a large project team meeting with members dispersed across the globe, there are HDX solutions that fit the bill.

Polycom HDX Solutions deliver:

- Flexible, cost-effective, high-definition communications from low bandwidths using standards-based H.264 High Profile technology
- Polycom UltimateHD technology: HD voice, HD video, and HD content for exceptional performance

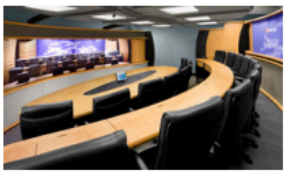
Technical Overview

- UltimateHD quality for up to 50% less bandwidth with H.264 High Profile support
- HD video up to 1080p, Polycom HD Voice technology, and HD content sharing

83. The first page of this data sheet also states that the Polycom RealPresence Experience High Definition (RPX HD 200 & 400 Series) supports a "H.264 video codec with H.239 People+Content" and "H.264 and H.263 Video Error Concealment". *See* http://supportdocs.polycom.com/PolycomService/support/global/documents/support/technical/products/video/rpx_hd_technical_specs.pdf:

Technical Specifications

Polycom® RealPresence™ Experience High Definition (RPX™ HD 200 & 400 Series)



Video and Audio Technology

Technology Components

- Polycom HDX video codecs supporting 720p at 30 fps
- Polycom Digital Ceiling Microphone Arrays
- Polycom StereoSurround™ Speaker Kit
- High Definition Rear Screen Projectors
- 3-CCD High Definition Video Cameras
- Room control system with 10-inch color touch panel
- 15- inch personal high resolution content displays embedded in the tables of RPX HD 200 Series suites
- 19- inch personal high resolution content displays embedded in the RPX HD 400 Series multipurpose main table and 15-inch personal high resolution content displays embedded in second and third tier tables if applicable

Video Displays

- Seamless panoramic video display screens
  - Polycom RPX HD 200 Series Suites support 8-foot x 42-inch high definition video in a 24:9 aspect ratio at 1920 x 720p resolution
  - Polycom RPX HD 400 Series Suites support 16-foot x 42-inch high definition video in a 48:9 aspect ratio at 3840 x 720p resolution

Video Standards

- H.264 video codec with H.239 People+Content
- H.261 and H.263++ for compatibility with legacy video conferencing endpoints
- H.264 and H.263 Video Error Concealment (including LPR-Lost Packet Recovery) for resiliency against network issues
- AES Media Encryption for secure video/audio and content

84. In addition, the first page of this data sheet states that the Polycom Open Telepresence Experience OTX 100 supports "H. 264 / H. 264 High Profile" for its "Video codec" and one of its "Video and Audio Specifications." *See* http://support.polycom.com/global/documents/support/technical/products/video/otx100_technical_specifications.pdf:



Technical Specifications

Polycom® Open Telepresence Experience™
OTX™ 100

VIDEO & AUDIO TECHNOLOGY

Solution Includes:

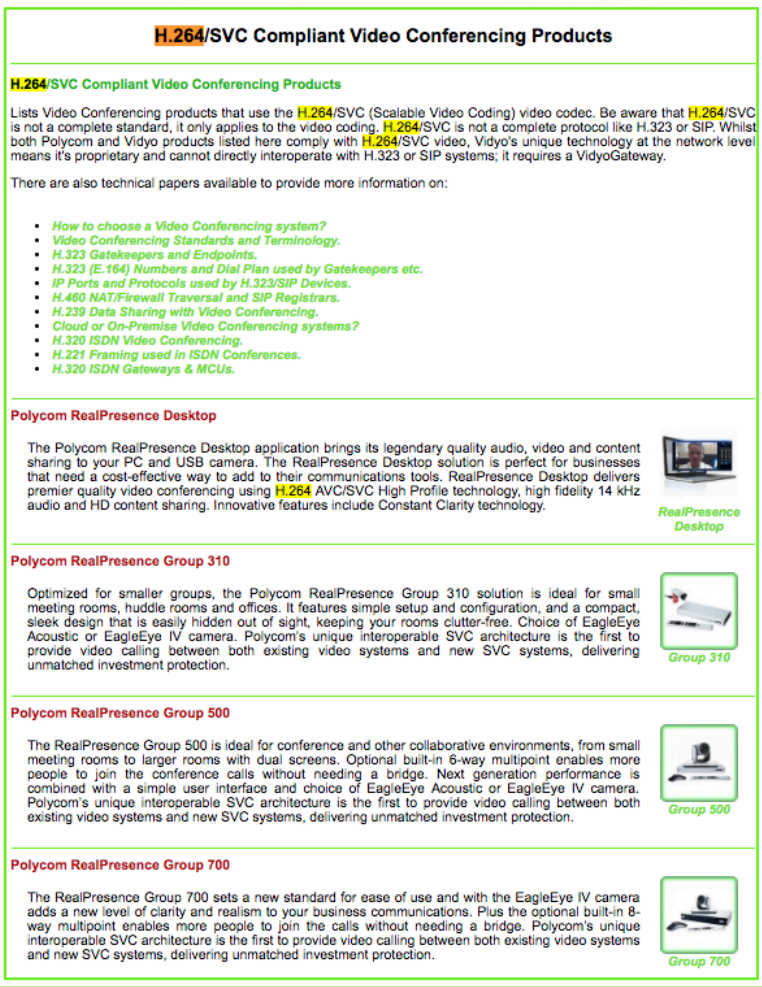
- Polycom HDX™ video codec supporting 1080p at 30fps or 720p at 60fps
- Polycom Digital Ceiling Microphone Array
- Polycom StereoSurround™ speaker kit
- High-definition 65-inch LCD display
- High-definition video camera
- Polycom Touch Control user interface
- Motorized 21.5-inch high resolution content displays integrated in conference table (Standard Version Only)
- Power and LAN access for laptop at the table (Standard Version Only)

Video and Audio Specifications

Video Standards	Description
H.264/ H. 264 High Profile	Video codec

85. Moreover, the firm of Wainhouse Research ("WR") was retained by Polycom "to conduct a third-party evaluation of the user experience provided by Polycom's implementation of High Profile within the H.264 video compression standard. Specifically, WR was asked to verify the ability to reduce call speed while maintaining video resolution and call quality by using H.264 High Profile…To facilitate the evaluation, Polycom provided WR with four (4) HDX 8000 videoconferencing systems with 1080p capable cameras. WR then created two parallel test environments – the first using H.264 Baseline Profile (BP) video compression, and the second using H.264 High Profile (HP)." *See* http://cp.wainhouse.com/download/1440/wrplatinum.com_Downloads_11977.pdf?redirect=node/1218. Thus, it is clear that at least Polycom's HDX 8000 videoconferencing systems use the H.264 video compression standard.

86. A third-party vendor of Polycom products also lists on a page entitled "H.264/SVC Complaint Video Conferencing Products" various Polycom products including the Polycom RealPresence Desktop and RealPresence Groups 310, 500 and 700. The site also adds that the "Polycom…products listed here comply with H.264/SVC". *See* http://www.c21video.com/vcsvc.html:



H.264/SVC Compliant Video Conferencing Products

H.264/SVC Compliant Video Conferencing Products

Lists Video Conferencing products that use the H.264/SVC (Scalable Video Coding) video codec. Be aware that H.264/SVC is not a complete standard, it only applies to the video coding. H.264/SVC is not a complete protocol like H.323 or SIP. Whilst both Polycom and Vidyo products listed here comply with H.264/SVC video, Vidyo's unique technology at the network level means it's proprietary and cannot directly interoperate with H.323 or SIP systems; it requires a VidyoGateway.

There are also technical papers available to provide more information on:

- *How to choose a Video Conferencing system?*
- *Video Conferencing Standards and Terminology.*
- *H.323 Gatekeepers and Endpoints.*
- *H.323 (E.164) Numbers and Dial Plan used by Gatekeepers etc.*
- *IP Ports and Protocols used by H.323/SIP Devices.*
- *H.460 NAT/Firewall Traversal and SIP Registrars.*
- *H.239 Data Sharing with Video Conferencing.*
- *Cloud or On-Premise Video Conferencing systems?*
- *H.320 ISDN Video Conferencing.*
- *H.221 Framing used in ISDN Conferences.*
- *H.320 ISDN Gateways & MCUs.*

Polycom RealPresence Desktop

The Polycom RealPresence Desktop application brings its legendary quality audio, video and content sharing to your PC and USB camera. The RealPresence Desktop solution is perfect for businesses that need a cost-effective way to add to their communications tools. RealPresence Desktop delivers premier quality video conferencing using H.264 AVC/SVC High Profile technology, high fidelity 14 kHz audio and HD content sharing. Innovative features include Constant Clarity technology.

RealPresence Desktop

Polycom RealPresence Group 310

Optimized for smaller groups, the Polycom RealPresence Group 310 solution is ideal for small meeting rooms, huddle rooms and offices. It features simple setup and configuration, and a compact, sleek design that is easily hidden out of sight, keeping your rooms clutter-free. Choice of EagleEye Acoustic or EagleEye IV camera. Polycom's unique interoperable SVC architecture is the first to provide video calling between both existing video systems and new SVC systems, delivering unmatched investment protection.

Group 310

Polycom RealPresence Group 500

The RealPresence Group 500 is ideal for conference and other collaborative environments, from small meeting rooms to larger rooms with dual screens. Optional built-in 6-way multipoint enables more people to join the conference calls without needing a bridge. Next generation performance is combined with a simple user interface and choice of EagleEye Acoustic or EagleEye IV camera. Polycom's unique interoperable SVC architecture is the first to provide video calling between both existing video systems and new SVC systems, delivering unmatched investment protection.

Group 500

Polycom RealPresence Group 700

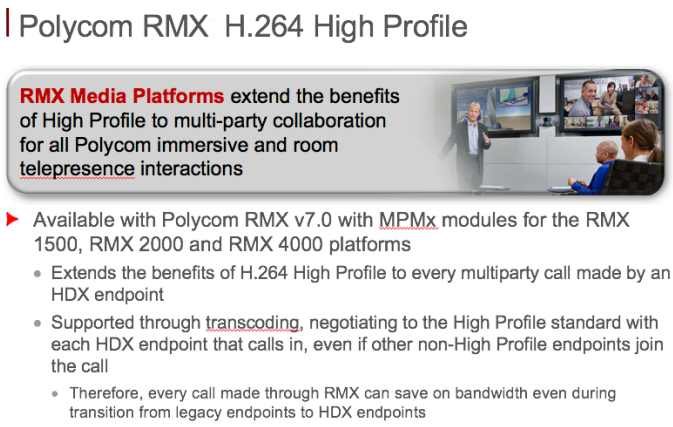
The RealPresence Group 700 sets a new standard for ease of use and with the EagleEye IV camera adds a new level of clarity and realism to your business communications. Plus the optional built-in 8-way multipoint enables more people to join the calls without needing a bridge. Polycom's unique interoperable SVC architecture is the first to provide video calling between both existing video systems and new SVC systems, delivering unmatched investment protection.

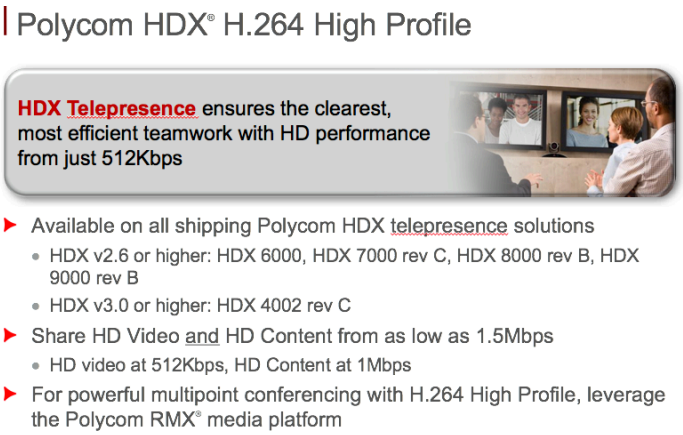
Group 700

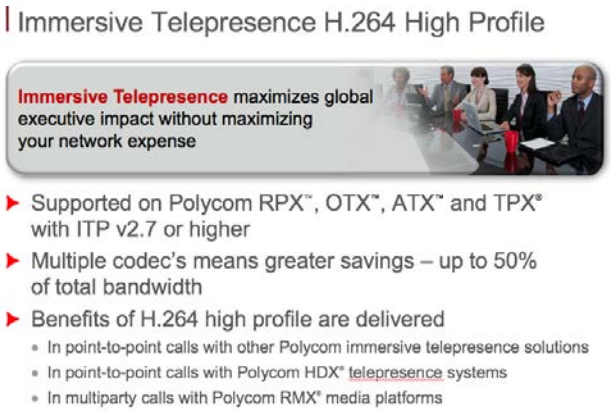
87. Polycom also actively advertises H.264 High Profile capabilities (claiming that "Polycom is the first to bring [H.264 High Profile] to market") in various products such as the Polycom HDX Series, Immersive Telepresence H.264 in its RPX, OTX, ATX and TPX Series, and Polycom RMX H.264 High Profile in its RMX 1500, 2000 and 4000 platforms (for Polycom RMX v.7.0 with MPMx modules). *See*

http://www.adeoproav.it/site/adeogroup54_webprofessional_it/allegati/high-profile-overview.pptx:









88. The Accused Instrumentalities determine a parameter of at least a portion of a video data block. As shown below, examples of such parameters include bitrate (or max video bitrate) and resolution parameters. Different parameters correspond with different end applications. H.264 provides for multiple different ranges of such parameters, each included in the "profiles" and "levels" defined by the H.264 standard. *See* http://www.axis.com/files/whitepaper/wp_h264_31669_en_0803_lo.pdf at 5:

4. H.264 profiles and levels

The joint group involved in defining H.264 focused on creating a simple and clean solution, limiting options and features to a minimum. An important aspect of the standard, as with other video standards, is providing the capabilities in profiles (sets of algorithmic features) and levels (performance classes) that optimally support popular productions and common formats.

H.264 has seven profiles, each targeting a specific class of applications. Each profile defines what feature set the encoder may use and limits the decoder implementation complexity.

Network cameras and video encoders will most likely use a profile called the baseline profile, which is intended primarily for applications with limited computing resources. The baseline profile is the most suitable given the available performance in a real-time encoder that is embedded in a network video product. The profile also enables low latency, which is an important requirement of surveillance video and also particularly important in enabling real-time, pan/tilt/zoom (PTZ) control in PTZ network cameras.

H.264 has 11 levels or degree of capability to limit performance, bandwidth and memory requirements. Each level defines the bit rate and the encoding rate in macroblock per second for resolutions ranging from QCIF to HDTV and beyond. The higher the resolution, the higher the level required.

See https://en.wikipedia.org/wiki/H.264/MPEG-4_AVC:

Levels with maximum property values

Level	Max decoding speed		Max frame size		Max video bit rate for video coding layer (VCL) kbit/s			Examples for high resolution @ highest frame rate (max stored frames) Toggle additional details
	Luma samples/s	Macroblocks/s	Luma samples	Macroblocks	Baseline, Extended and Main Profiles	High Profile	High 10 Profile	
1	380,160	1,485	25,344	99	64	80	192	176×144@15.0 (4)
1b	380,160	1,485	25,344	99	128	160	384	176×144@15.0 (4)
1.1	768,000	3,000	101,376	396	192	240	576	352×288@7.5 (2)
1.2	1,536,000	6,000	101,376	396	384	480	1,152	352×288@15.2 (6)
1.3	3,041,280	11,880	101,376	396	768	960	2,304	352×288@30.0 (6)
2	3,041,280	11,880	101,376	396	2,000	2,500	6,000	352×288@30.0 (6)
2.1	5,068,800	19,800	202,752	792	4,000	5,000	12,000	352×576@25.0 (6)
2.2	5,184,000	20,250	414,720	1,620	4,000	5,000	12,000	720×576@12.5 (5)
3	10,368,000	40,500	414,720	1,620	10,000	12,500	30,000	720×576@25.0 (5)
3.1	27,648,000	108,000	921,600	3,600	14,000	17,500	42,000	1,280×720@30.0 (5)
3.2	55,296,000	216,000	1,310,720	5,120	20,000	25,000	60,000	1,280×1,024@42.2 (4)
4	62,914,560	245,760	2,097,152	8,192	20,000	25,000	60,000	2,048×1,024@30.0 (4)
4.1	62,914,560	245,760	2,097,152	8,192	50,000	62,500	150,000	2,048×1,024@30.0 (4)
4.2	133,693,440	522,240	2,228,224	8,704	50,000	62,500	150,000	2,048×1,080@60.0 (4)
5	150,994,944	589,824	5,652,480	22,080	135,000	168,750	405,000	3,672×1,536@26.7 (5)
5.1	251,658,240	983,040	9,437,184	36,864	240,000	300,000	720,000	4,096×2,304@26.7 (5)
5.2	530,841,600	2,073,600	9,437,184	36,864	240,000	300,000	720,000	4,096×2,304@56.3 (5)

89. A video data block is organized by the group of pictures (GOP) structure, which is a "collection of successive pictures within a coded video stream." *See* https://en.wikipedia.org/wiki/Group_of_pictures. A GOP structure can contain intra

coded pictures (I picture or I frame), predictive coded pictures (P picture or P frame), bipredictive coded pictures (B picture or B frame) and direct coded pictures (D picture or D frames, or DC direct coded pictures which are used only in MPEG-1 video). *See* https://en.wikipedia.org/wiki/Video_compression_picture_types (for descriptions of I frames, P frames and B frames); https://en.wikipedia.org/wiki/MPEG-1#D-frames (for descriptions of D frames). Thus, at least a portion of a video data block would also make up a GOP structure and could also contain I frames, P frames, B frames and/or D frames. The GOP structure also reflects the size of a video data block, and the GOP structure can be controlled and used to fine-tune other parameters (*e.g.* bitrate, max video bitrate and resolution parameters) or even be considered as a parameter by itself.

90. Based on the bitrate and/or resolution parameter identified (*e.g.* bitrate, max video bitrate, resolution, GOP structure or frame type within a GOP structure), any H.264-compliant system such as the Accused Instrumentalities would determine which profile (*e.g.*, "baseline," "extended," "main", or "high") corresponds with that parameter, then select between at least two asymmetric compressors. If baseline or extended is the corresponding profile, then the system will select a Context-Adaptive Variable Length Coding ("CAVLC") entropy encoder. If main or high is the corresponding profile, then the system will select a Context-Adaptive Binary Arithmetic Coding ("CABAC") entropy encoder. Both encoders are asymmetric compressors because it takes a longer period of time for them to compress data than to decompress data. *See* https://sonnati.wordpress.com/2007/10/29/how-h-264-works-part-ii/:

	Baseline	Extended	Main	High	High 10
I and P Slices	Yes	Yes	Yes	Yes	Yes
B Slices	No	Yes	Yes	Yes	Yes
SI and SP Slices	No	Yes	No	No	No
Multiple Reference Frames	Yes	Yes	Yes	Yes	Yes
In-Loop Deblocking Filter	Yes	Yes	Yes	Yes	Yes
CAVLC Entropy Coding	Yes	Yes	Yes	Yes	Yes
CABAC Entropy Coding	No	No	Yes	Yes	Yes
Flexible Macroblock Ordering (FMO)	Yes	Yes	No	No	No
Arbitrary Slice Ordering (ASO)	Yes	Yes	No	No	No
Redundant Slices (RS)	Yes	Yes	No	No	No
Data Partitioning	No	Yes	No	No	No
Interlaced Coding (PicAFF, MBAFF)	No	Yes	Yes	Yes	Yes
4:2:0 Chroma Format	Yes	Yes	Yes	Yes	Yes
Monochrome Video Format (4:0:0)	No	No	No	Yes	Yes
4:2:2 Chroma Format	No	No	No	No	No
4:4:4 Chroma Format	No	No	No	No	No
8 Bit Sample Depth	Yes	Yes	Yes	Yes	Yes
9 and 10 Bit Sample Depth	No	No	No	No	Yes
11 to 14 Bit Sample Depth	No	No	No	No	No
8×8 vs. 4×4 Transform Adaptivity	No	No	No	Yes	Yes
Quantization Scaling Matrices	No	No	No	Yes	Yes
Separate Cb and Cr QP control	No	No	No	Yes	Yes
Separate Color Plane Coding	No	No	No	No	No
Predictive Lossless Coding	No	No	No	No	No

See http://web.cs.ucla.edu/classes/fall03/cs218/paper/H.264_MPEG4_Tutorial.pdf at 7:

The following table summarizes the two major types of entropy coding: Variable Length Coding (VLC) and Context Adaptive Binary Arithmetic Coding (CABAC). CABAC offers superior coding efficiency over VLC by adapting to the changing probability distribution of symbols, by exploiting correlation between symbols, and by adaptively exploiting bit correlations using arithmetic coding. H.264 also supports Context Adaptive Variable Length Coding (CAVLC) which offers superior entropy coding over VLC without the full cost of CABAC.

H.264 Entropy Coding – Comparison of Approaches

Characteristics	Variable Length Coding (VLC)	Context Adaptive Binary Arithmetic Coding(CABAC)
• Where it is used	MPEG-2, MPEG-4 ASP	H.264/MPEG-4 AVC (high efficiency option)
• Probability distribution	**Static** - Probabilities never change	**Adaptive** - Adjusts probabilities based on actual data
• Leverages correlation between symbols	**No** - Conditional probabilities ignored	**Yes** - Exploits symbol correlations by using "contexts"
• Non-integer code words	**No** - Low coding efficiency forhigh probability symbols	**Yes** - Exploits "arithmetic coding" which generates non-integer code words for higher efficiency

Moreover, the H.264 Standard requires a bit-flag descriptor, which is set to determine the correct decoder for the corresponding encoder. As shown below, if the flag = 0, then CAVLC must have been selected as the encoder; if the flag = 1, then CABAC must have been selected as the encoder. *See* https://www.itu.int/rec/dologin_pub.asp?lang=e&id=T-REC-H.264-201304-S!!PDF-E&type=items (Rec. ITU-T H.264 (04/2013)) at 80:

entropy_coding_mode_flag selects the entropy decoding method to be applied for the syntax elements for which two descriptors appear in the syntax tables as follows:

- If entropy_coding_mode_flag is equal to 0, the method specified by the left descriptor in the syntax table is applied (Exp-Golomb coded, see clause 9.1 or CAVLC, see clause 9.2).
- Otherwise (entropy_coding_mode_flag is equal to 1), the method specified by the right descriptor in the syntax table is applied (CABAC, see clause 9.3).

91. The Accused Instrumentalities compress the at least the portion of the data block with the selected one or more asymmetric compressors to provide one or more compressed data blocks, which can be organized in a GOP structure (see above). After its selection, the asymmetric compressor (CAVLC or CABAC) will compress the video data

to provide various compressed data blocks, which can also be organized in a GOP structure.

See https://sonnati.wordpress.com/2007/10/29/how-h-264-works-part-ii/:

Entropy Coding

For entropy coding, H.264 may use an enhanced VLC, a more complex context-adaptive variable-length coding (CAVLC) or an ever more complex Context-adaptive binary-arithmetic coding (CABAC) which are complex techniques to losslessly compress syntax elements in the video stream knowing the probabilities of syntax elements in a given context. The use of CABAC can improve the compression of around 5-7%. CABAC may requires a 30-40% of total processing power to be accomplished.

See

http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.602.1581&rep=rep1&type=pdf

at 13:

Typical compression ratios to maintain excellent quality are:

- 10:1 for general images using JPEG
- 30:1 for general video using H.263 and MPEG-2
- 60:1 for general video using H.264 and WMV9

See http://www.ijera.com/papers/Vol3_issue4/BM34399403.pdf at 2:

Most visual communication systems today use Baseline Profile. Baseline is the simplest H.264 profile and defines, for example, zigzag scanning of the picture and using 4:2:0 (YUV video formats) chrominance sampling. In Baseline Profile, the picture is split in blocks consisting of 4x4 pixels, and each block is processed separately. Another important element of the Baseline Profile is the use of Universal Variable Length Coding (UVLC) and Context Adaptive Variable Length Coding (CAVLC) entropy coding techniques.

The Extended and Main Profiles includes the functionality of the Baseline Profile and add improvements to the predictions algorithms. Since transmitting every single frame (think 30 frames per second for good quality video) is not feasible if you are trying to reduce the bit rate 1000-2000 times, temporal and motion prediction are heavily used in H.264, and allow transmitting only the difference between one frame and the previous frames. The result is spectacular efficiency gain, especially for scenes with little change and motion.

The High Profile is the most powerful profile in H.264, and it allows most efficient coding of video. For example, large coding gain achieved through the use of Context Adaptive Binary Arithmetic Coding (CABAC) encoding which is more efficient than the UVLC/CAVLC used in Baseline Profile.

The High Profile also uses adaptive transform that decides on the fly if 4x4 or 8x8-pixel blocks should be used. For example, 4x4 blocks are used for the parts of the picture that are dense with detail, while parts that have little detail are transformed using 8x8 blocks.

92. From above, and on information and belief, Polycom has directly infringed and continues to infringe the ’907 patent, for example, through its own use and testing of the Accused Instrumentalities, which when used, practices the system claimed by Claim 1 of the ’907 patent, namely, a system comprising: one or more different asymmetric data compression algorithms, wherein each algorithm of the one or more different asymmetric data compression algorithms utilizes one or more asymmetric data compression routines of a plurality of different asymmetric data compression routines, wherein a first asymmetric data compression routine of the plurality of different asymmetric data compression routines is configured to produce compressed data with a higher data rate for a given data throughput than a second asymmetric data compression routine of the plurality of different asymmetric data compression routines; and a processor configured: to analyze one or more data parameters from one or more data blocks containing video data, wherein at least one data parameter relates to an expected or anticipated throughput of a communications channel; and to select two or more different data compression routines from among a plurality of different data compression routines based upon, at least in part, the one or more data parameters relating to the expected or anticipated throughput of the communications channel. Upon information and belief, Polycom uses the Accused Instrumentalities to practice infringing methods for its own internal non-testing business purposes, while testing the Accused Instrumentalities, and while providing technical support and repair services for the Accused Instrumentalities to their customers.

93. On information and belief, the Accused Instrumentalities store at least a portion of the one or more compressed data blocks in buffers, hard disk, or other forms of memory/storage.

94. On information and belief, Polycom also directly infringes and continues to infringe other claims of the ’907 patent, for similar reasons as explained above with respect to Claim 1 of the ’907 patent.

95. On information and belief, all of the Accused Instrumentalities perform the claimed methods in substantially the same way, *e.g.*, in the manner specified in the H.264 standard.

96. On information and belief, use of the Accused Instrumentalities in their ordinary and customary fashion results in infringement of the systems and/or methods claimed by the ’907 patent.

97. On information and belief, Polycom has had knowledge of the ’907 patent since at least the filing of this Complaint or shortly thereafter, and on information and belief, Polycom knew of the ’907 patent and knew of its infringement, including by way of this lawsuit. By the time of trial, Polycom will have known and intended (since receiving such notice) that its continued actions would actively induce and contribute to the infringement of the claims of the ’907 patent.

98. Upon information and belief, Polycom’s affirmative acts of making, using, and selling the Accused Instrumentalities, and providing implementation services and technical support to users of the Accused Instrumentalities, including, *e.g.*, through training, demonstrations, brochures, installation and user guides, have induced and continue to induce users of the Accused Instrumentalities to use them in their normal and customary

way to infringe the ’907 patent by practicing a system comprising: one or more different asymmetric data compression algorithms, wherein each algorithm of the one or more different asymmetric data compression algorithms utilizes one or more asymmetric data compression routines of a plurality of different asymmetric data compression routines, wherein a first asymmetric data compression routine of the plurality of different asymmetric data compression routines is configured to produce compressed data with a higher data rate for a given data throughput than a second asymmetric data compression routine of the plurality of different asymmetric data compression routines; and a processor configured: to analyze one or more data parameters from one or more data blocks containing video data, wherein at least one data parameter relates to an expected or anticipated throughput of a communications channel; and to select two or more different data compression routines from among a plurality of different data compression routines based upon, at least in part, the one or more data parameters relating to the expected or anticipated throughput of the communications channel. For similar reasons, Polycom also induces their customers to use the Accused Instrumentalities to infringe other claims of the ’907 patent. Polycom specifically intended and were aware that these normal and customary activities would infringe the ’907 patent. Polycom performed the acts that constitute induced infringement, and would induce actual infringement, with the knowledge of the ’907 patent and with the knowledge, or willful blindness to the probability, that the induced acts would constitute infringement. On information and belief, Polycom engaged in such inducement to promote the sales of the Accused Instrumentalities. Accordingly, Polycom has induced and continues to induce users of the Accused Instrumentalities to use the Accused Instrumentalities in their ordinary and customary way

to infringe the '907 patent, knowing that such use constitutes infringement of the '907 patent. Accordingly, Polycom has been, and currently is, inducing infringement of the '907 patent, in violation of 35 U.S.C. § 271(b).

99. Polycom has also infringed, and continues to infringe, claims of the '907 patent by offering to commercially distribute, commercially distributing, making, and/or importing the Accused Instrumentalities, which are used in practicing the process, or using the systems, of the '907 patent, and constitute a material part of the invention. Polycom knows the components in the Accused Instrumentalities to be especially made or especially adapted for use in infringement of the '907 patent, not a staple article, and not a commodity of commerce suitable for substantial noninfringing use. Accordingly, Polycom has been, and currently is, contributorily infringing the '907 patent, in violation of 35 U.S.C. § 271(c).

100. By making, using, offering for sale, selling and/or importing into the United States the Accused Instrumentalities, and touting the benefits of using the Accused Instrumentalities' compression features, Polycom has injured Realtime and is liable to Realtime for infringement of the '907 patent pursuant to 35 U.S.C. § 271.

101. As a result of Polycom's infringement of the '907 patent, Plaintiff Realtime is entitled to monetary damages in an amount adequate to compensate for Polycom's infringement, but in no event less than a reasonable royalty for the use made of the invention by Polycom, together with interest and costs as fixed by the Court.

COUNT V

INFRINGEMENT OF U.S. PATENT NO. 9,769,477

102. Plaintiff re-alleges and incorporates by reference the foregoing paragraphs, as if fully set forth herein.

103. Plaintiff Realtime is the owner by assignment of United States Patent No. 9,769,477 ("the '477 patent") entitled "Video Data Compression Systems." The '477 patent was duly and legally issued by the United States Patent and Trademark Office on September 19, 2017. A true and correct copy of the '477 patent is included as Exhibit E.

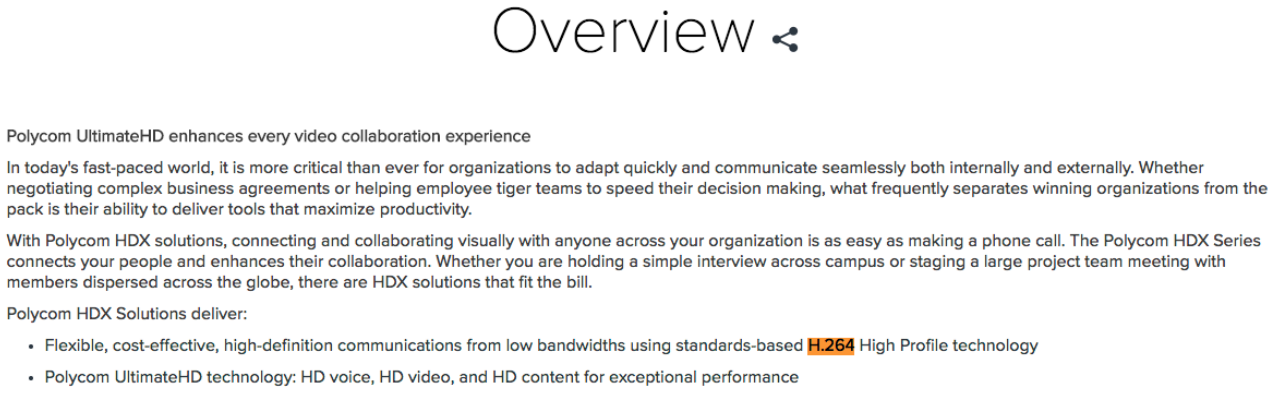
104. On information and belief, Polycom has made, used, offered for sale, sold and/or imported into the United States products that infringe the '477 patent, and continues to do so. By way of illustrative example, these infringing products include, without limitation, Polycom's telepresence, videoconferencing as well as video and voice communication solutions utilizing H.264 High Profile, such as, for example, the Polycom RealPresence Experience High Definition (RPX HD 200 & 400 Series) including the Polycom RPX HD 204M, RPX HD 208M, RPX HD 210M, RPX HD 218M, RPX HD 408M, RPX HD 418M, RPX HD 428M; the Polycom HDX Series including the Polycom HDX 9000, Polycom HDX 8000, Polycom HDX 7000, Polycom HDX 6000, Polycom HDX 4000, Polycom HDX 4500, Polycom HDX 4002, Polycom HDX 4001, Polycom HDX Packaged Solutions, Polycom HDX Executive Collection, Polycom HDX Media Center, Polycom EagleEye Director, Polycom Eagle Eye IV, Polycom Touch Control interface, Polycom VisualBoard Technology; the Polycom Open Telepresence Experience (OTX) including the Polycom OTX 100 and Polycom OTX 300; the Polycom RealPresence Series including the Polycom RealPresence Desktop, Polycom RealPresence Mobile for Android, Polycom RealPresence Medialign, Polycom RealPresence Immersive Studio, Polycom RealPresence Immersive Studio Flex, Polycom RealPresence Clarity, Polycom RealPresence Group 310, Polycom RealPresence Group 500, Polycom RealPresence Group 700; the Polycom RMX Media Platforms including

the Polycom RMX v7.0 with MPMx modules, Polycom RMX 1000 platform, Polycom RMX 1500 platform, Polycom RMX 2000 platform and Polycom RMX 4000 platform; the Polycom ATX Series including the Polycom ATX 300; the Polycom TPX Series including the Polycom TPX HD 306M (3-screens); the Polycom QDX Series including the Polycom QDX 6000; the Polycom CX Series including the Polycom CX5000 and Polycom CX7000; the Polycom VVX Series including the Polycom VVX 1500D; the Polycom load balancers e.g. the Polycom DMA 7000; the Polycom desktop video infrastructure or servers e.g. the Polycom CMA 4000 and Polycom CMA 5000; the Polycom firewall traversal infrastructure including the Polycom VBP ST and E models including the Polycom VBP 200 E, Polycom VBP 200EW, Polycom VBP 4300 Series (including the Polycom VBP 4350E and Polycom VBP 4350E-3), the Polycom 5300 Series (including the Polycom 5300E, Polycom 5300ST, Polycom VBP T5300-E10, Polycom VBP T3500-E25, Polycom VBP T5300-ST10 and Polycom VBP T5300-ST25), the Polycom 6400 Series (including the Polycom 6400E, Polycom 6400ST, Polycom VBP 6400-E85 and Polycom VBP 6400-ST85); and other Polycom infrastructure e.g. the Polycom RSS 2000 and Polycom RSS 4000, the Polycom VVX Business Media Phones and the Polycom VVX Camera, the Polycom Trio Family of conference phones including the Polycom Trio 8500 and Polycom Trio 8800, and all versions and variations thereof since the issuance of the ’477 patent (“Accused Instrumentalities”).

105. For example, the Accused Instrumentalities utilize the H.264 video compression standard, or H.264 High Profile. According to an official press release from Polycom on the Polycom website dated February 16, 2010, Polycom “the global leader in telepresence, video and voice communication solutions, today announced support for a

breakthrough, standards-based video compression technology, **H.264 High profile**, that will reduce the bandwidth requirements for high-definition (HD) telepresence and standard definition (SD) video conferencing by as much as 50 percent, representing substantial network bandwidth cost savings for customers…Support for **H.264 High Profile** on Polycom HDX room and personal telepresence systems is planned for April. Polycom also plans to support **H.264 High Profile** across its visual communication infrastructure and recording and streaming solutions, and across its immersive telepresence solutions in the coming months." *See* "Polycom Delivers Breakthrough Video Quality Innovation That Cuts Telepresence Bandwidth Requirements in Half," Feb. 16, 2010, http://www.polycom.com/company/news/press-releases/2010/20100216.html (emphasis added).

106. Furthermore, this website from the official Polycom site advertising their "Polycom HDX Series" states under "Overview": "Flexible, cost-effective, high-definition communications from low bandwidths using standards-based H.264 High Profile Technology" and under "Technical Overview": H.264 High Profile support." *See* http://www.polycom.com/products-services/hd-telepresence-video-conferencing/realpresence-room/realpresence-room-hdx-series.html:


Overview

Polycom UltimateHD enhances every video collaboration experience

In today's fast-paced world, it is more critical than ever for organizations to adapt quickly and communicate seamlessly both internally and externally. Whether negotiating complex business agreements or helping employee tiger teams to speed their decision making, what frequently separates winning organizations from the pack is their ability to deliver tools that maximize productivity.

With Polycom HDX solutions, connecting and collaborating visually with anyone across your organization is as easy as making a phone call. The Polycom HDX Series connects your people and enhances their collaboration. Whether you are holding a simple interview across campus or staging a large project team meeting with members dispersed across the globe, there are HDX solutions that fit the bill.

Polycom HDX Solutions deliver:

- Flexible, cost-effective, high-definition communications from low bandwidths using standards-based H.264 High Profile technology
- Polycom UltimateHD technology: HD voice, HD video, and HD content for exceptional performance

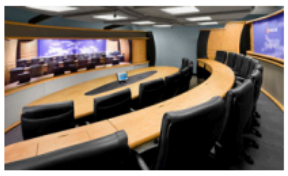
Technical Overview

- UltimateHD quality for up to 50% less bandwidth with H.264 High Profile support
- HD video up to 1080p, Polycom HD Voice technology, and HD content sharing

107. The first page of this data sheet also states that the Polycom RealPresence Experience High Definition (RPX HD 200 & 400 Series) supports a "H.264 video codec with H.239 People+Content" and "H.264 and H.263 Video Error Concealment". *See* http://supportdocs.polycom.com/PolycomService/support/global/documents/support/technical/products/video/rpx_hd_technical_specs.pdf:

Technical Specifications

Polycom® RealPresence™ Experience High Definition (RPX™ HD 200 & 400 Series)



Video and Audio Technology

Technology Components

- Polycom HDX video codecs supporting 720p at 30 fps
- Polycom Digital Ceiling Microphone Arrays
- Polycom StereoSurround™ Speaker Kit
- High Definition Rear Screen Projectors
- 3-CCD High Definition Video Cameras
- Room control system with 10-inch color touch panel
- 15- inch personal high resolution content displays embedded in the tables of RPX HD 200 Series suites
- 19- inch personal high resolution content displays embedded in the RPX HD 400 Series multipurpose main table and 15-inch personal high resolution content displays embedded in second and third tier tables if applicable

Video Displays

- Seamless panoramic video display screens
  - Polycom RPX HD 200 Series Suites support 8-foot x 42-inch high definition video in a 24:9 aspect ratio at 1920 x 720p resolution
  - Polycom RPX HD 400 Series Suites support 16-foot x 42-inch high definition video in a 48:9 aspect ratio at 3840 x 720p resolution

Video Standards

- H.264 video codec with H.239 People+Content
- H.261 and H.263++ for compatibility with legacy video conferencing endpoints
- H.264 and H.263 Video Error Concealment (including LPR-Lost Packet Recovery) for resiliency against network issues
- AES Media Encryption for secure video/audio and content

108. In addition, the first page of this data sheet states that the Polycom Open Telepresence Experience OTX 100 supports "H. 264 / H. 264 High Profile" for its "Video codec" and one of its "Video and Audio Specifications." *See* http://support.polycom.com/global/documents/support/technical/products/video/otx100_technical_specifications.pdf:



Polycom® Open Telepresence Experience™ OTX™ 100

VIDEO & AUDIO TECHNOLOGY

Solution Includes:

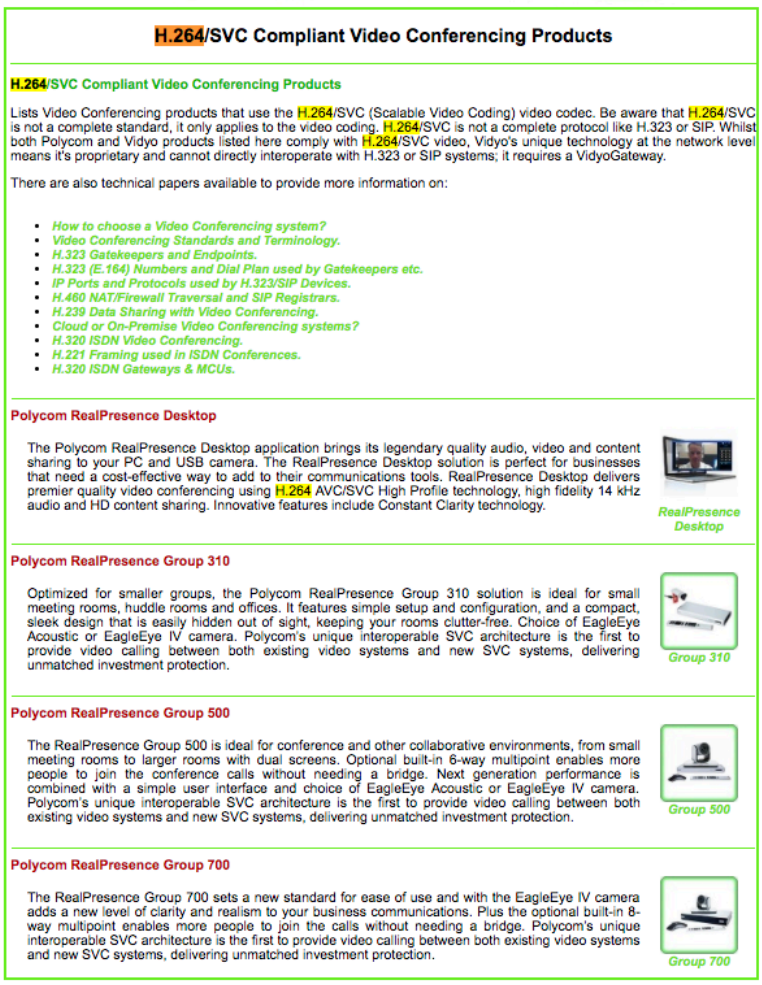
- Polycom HDX™ video codec supporting 1080p at 30fps or 720p at 60fps
- Polycom Digital Ceiling Microphone Array
- Polycom StereoSurround™ speaker kit
- High-definition 65-inch LCD display
- High-definition video camera
- Polycom Touch Control user interface
- Motorized 21.5-inch high resolution content displays integrated in conference table (Standard Version Only)
- Power and LAN access for laptop at the table (Standard Version Only)

Video and Audio Specifications

Video Standards	Description
H.264/ H. 264 High Profile	Video codec

109. Moreover, the firm of Wainhouse Research ("WR") was retained by Polycom "to conduct a third-party evaluation of the user experience provided by Polycom's implementation of High Profile within the H.264 video compression standard. Specifically, WR was asked to verify the ability to reduce call speed while maintaining video resolution and call quality by using H.264 High Profile…To facilitate the evaluation, Polycom provided WR with four (4) HDX 8000 videoconferencing systems with 1080p capable cameras. WR then created two parallel test environments – the first using H.264 Baseline Profile (BP) video compression, and the second using H.264 High Profile (HP)." *See* http://cp.wainhouse.com/download/1440/wrplatinum.com_Downloads_11977.pdf?redirect=node/1218. Thus, it is clear that at least Polycom's HDX 8000 videoconferencing systems use the H.264 video compression standard.

110. A third-party vendor of Polycom products also lists on a page entitled "H.264/SVC Complaint Video Conferencing Products" various Polycom products including the Polycom RealPresence Desktop and RealPresence Groups 310, 500 and 700. The site also adds that the "Polycom…products listed here comply with H.264/SVC". *See* http://www.c21video.com/vcsvc.html:



H.264/SVC Compliant Video Conferencing Products

H.264/SVC Compliant Video Conferencing Products

Lists Video Conferencing products that use the H.264/SVC (Scalable Video Coding) video codec. Be aware that H.264/SVC is not a complete standard, it only applies to the video coding. H.264/SVC is not a complete protocol like H.323 or SIP. Whilst both Polycom and Vidyo products listed here comply with H.264/SVC video, Vidyo's unique technology at the network level means it's proprietary and cannot directly interoperate with H.323 or SIP systems; it requires a VidyoGateway.

There are also technical papers available to provide more information on:

- *How to choose a Video Conferencing system?*
- *Video Conferencing Standards and Terminology.*
- *H.323 Gatekeepers and Endpoints.*
- *H.323 (E.164) Numbers and Dial Plan used by Gatekeepers etc.*
- *IP Ports and Protocols used by H.323/SIP Devices.*
- *H.460 NAT/Firewall Traversal and SIP Registrars.*
- *H.239 Data Sharing with Video Conferencing.*
- *Cloud or On-Premise Video Conferencing systems?*
- *H.320 ISDN Video Conferencing.*
- *H.221 Framing used in ISDN Conferences.*
- *H.320 ISDN Gateways & MCUs.*

Polycom RealPresence Desktop

The Polycom RealPresence Desktop application brings its legendary quality audio, video and content sharing to your PC and USB camera. The RealPresence Desktop solution is perfect for businesses that need a cost-effective way to add to their communications tools. RealPresence Desktop delivers premier quality video conferencing using H.264 AVC/SVC High Profile technology, high fidelity 14 kHz audio and HD content sharing. Innovative features include Constant Clarity technology.

RealPresence Desktop

Polycom RealPresence Group 310

Optimized for smaller groups, the Polycom RealPresence Group 310 solution is ideal for small meeting rooms, huddle rooms and offices. It features simple setup and configuration, and a compact, sleek design that is easily hidden out of sight, keeping your rooms clutter-free. Choice of EagleEye Acoustic or EagleEye IV camera. Polycom's unique interoperable SVC architecture is the first to provide video calling between both existing video systems and new SVC systems, delivering unmatched investment protection.

Group 310

Polycom RealPresence Group 500

The RealPresence Group 500 is ideal for conference and other collaborative environments, from small meeting rooms to larger rooms with dual screens. Optional built-in 6-way multipoint enables more people to join the conference calls without needing a bridge. Next generation performance is combined with a simple user interface and choice of EagleEye Acoustic or EagleEye IV camera. Polycom's unique interoperable SVC architecture is the first to provide video calling between both existing video systems and new SVC systems, delivering unmatched investment protection.

Group 500

Polycom RealPresence Group 700

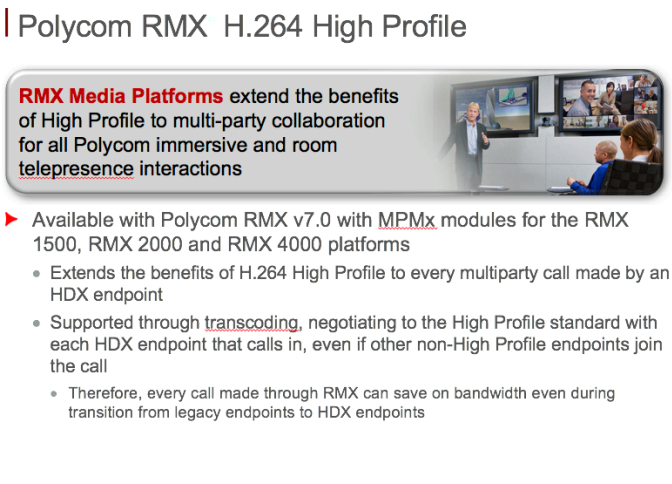
The RealPresence Group 700 sets a new standard for ease of use and with the EagleEye IV camera adds a new level of clarity and realism to your business communications. Plus the optional built-in 8-way multipoint enables more people to join the calls without needing a bridge. Polycom's unique interoperable SVC architecture is the first to provide video calling between both existing video systems and new SVC systems, delivering unmatched investment protection.

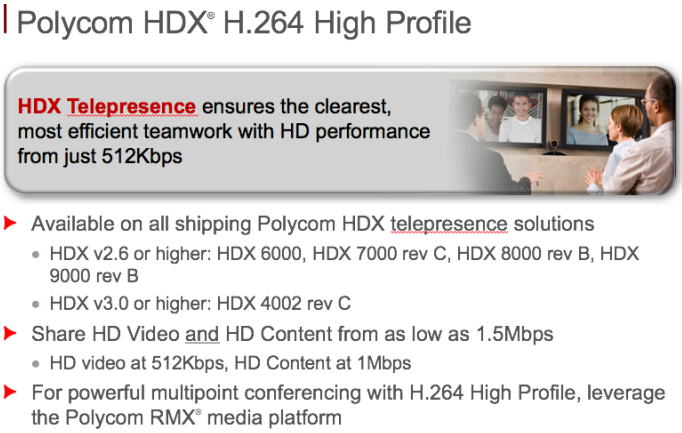
Group 700

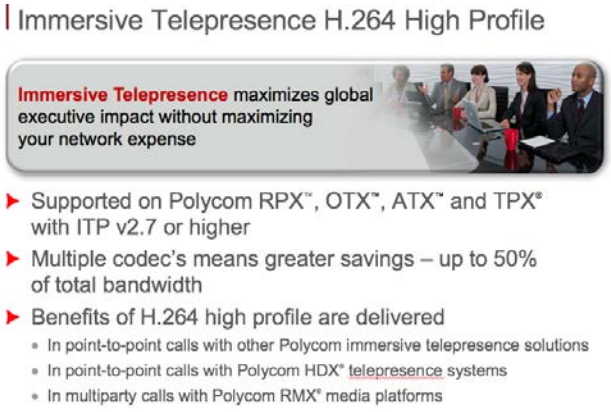
111. Polycom also actively advertises H.264 High Profile capabilities (claiming that "Polycom is the first to bring [H.264 High Profile] to market") in various products such as the Polycom HDX Series, Immersive Telepresence H.264 in its RPX, OTX, ATX and TPX Series, and Polycom RMX H.264 High Profile in its RMX 1500, 2000 and 4000 platforms (for Polycom RMX v.7.0 with MPMx modules). *See*

http://www.adeoproav.it/site/adeogroup54_webprofessional_it/allegati/high-profile-overview.pptx:









112. The Accused Instrumentalities determine a parameter of at least a portion of a video data block. As shown below, examples of such parameters include bitrate (or max video bitrate) and resolution parameters. Different parameters correspond with different end applications. H.264 provides for multiple different ranges of such parameters, each included in the "profiles" and "levels" defined by the H.264 standard. *See* http://www.axis.com/files/whitepaper/wp_h264_31669_en_0803_lo.pdf at 5:

4. H.264 profiles and levels

The joint group involved in defining H.264 focused on creating a simple and clean solution, limiting options and features to a minimum. An important aspect of the standard, as with other video standards, is providing the capabilities in profiles (sets of algorithmic features) and levels (performance classes) that optimally support popular productions and common formats.

H.264 has seven profiles, each targeting a specific class of applications. Each profile defines what feature set the encoder may use and limits the decoder implementation complexity.

Network cameras and video encoders will most likely use a profile called the baseline profile, which is intended primarily for applications with limited computing resources. The baseline profile is the most suitable given the available performance in a real-time encoder that is embedded in a network video product. The profile also enables low latency, which is an important requirement of surveillance video and also particularly important in enabling real-time, pan/tilt/zoom (PTZ) control in PTZ network cameras.

H.264 has 11 levels or degree of capability to limit performance, bandwidth and memory requirements. Each level defines the bit rate and the encoding rate in macroblock per second for resolutions ranging from QCIF to HDTV and beyond. The higher the resolution, the higher the level required.

See https://en.wikipedia.org/wiki/H.264/MPEG-4_AVC:

Levels with maximum property values

Level	Max decoding speed		Max frame size		Max video bit rate for video coding layer (VCL) kbit/s			Examples for high resolution @ highest frame rate (max stored frames) Toggle additional details
	Luma samples/s	Macroblocks/s	Luma samples	Macroblocks	Baseline, Extended and Main Profiles	High Profile	High 10 Profile	
1	380,160	1,485	25,344	99	64	80	192	176×144@15.0 (4)
1b	380,160	1,485	25,344	99	128	160	384	176×144@15.0 (4)
1.1	768,000	3,000	101,376	396	192	240	576	352×288@7.5 (2)
1.2	1,536,000	6,000	101,376	396	384	480	1,152	352×288@15.2 (6)
1.3	3,041,280	11,880	101,376	396	768	960	2,304	352×288@30.0 (6)
2	3,041,280	11,880	101,376	396	2,000	2,500	6,000	352×288@30.0 (6)
2.1	5,068,800	19,800	202,752	792	4,000	5,000	12,000	352×576@25.0 (6)
2.2	5,184,000	20,250	414,720	1,620	4,000	5,000	12,000	720×576@12.5 (5)
3	10,368,000	40,500	414,720	1,620	10,000	12,500	30,000	720×576@25.0 (5)
3.1	27,648,000	108,000	921,600	3,600	14,000	17,500	42,000	1,280×720@30.0 (5)
3.2	55,296,000	216,000	1,310,720	5,120	20,000	25,000	60,000	1,280×1,024@42.2 (4)
4	62,914,560	245,760	2,097,152	8,192	20,000	25,000	60,000	2,048×1,024@30.0 (4)
4.1	62,914,560	245,760	2,097,152	8,192	50,000	62,500	150,000	2,048×1,024@30.0 (4)
4.2	133,693,440	522,240	2,228,224	8,704	50,000	62,500	150,000	2,048×1,080@60.0 (4)
5	150,994,944	589,824	5,652,480	22,080	135,000	168,750	405,000	3,672×1,536@26.7 (5)
5.1	251,658,240	983,040	9,437,184	36,864	240,000	300,000	720,000	4,096×2,304@26.7 (5)
5.2	530,841,600	2,073,600	9,437,184	36,864	240,000	300,000	720,000	4,096×2,304@56.3 (5)

113. A video data block is organized by the group of pictures (GOP) structure, which is a "collection of successive pictures within a coded video stream." *See* https://en.wikipedia.org/wiki/Group_of_pictures. A GOP structure can contain intra

coded pictures (I picture or I frame), predictive coded pictures (P picture or P frame), bipredictive coded pictures (B picture or B frame) and direct coded pictures (D picture or D frames, or DC direct coded pictures which are used only in MPEG-1 video). *See* https://en.wikipedia.org/wiki/Video_compression_picture_types (for descriptions of I frames, P frames and B frames); https://en.wikipedia.org/wiki/MPEG-1#D-frames (for descriptions of D frames). Thus, at least a portion of a video data block would also make up a GOP structure and could also contain I frames, P frames, B frames and/or D frames. The GOP structure also reflects the size of a video data block, and the GOP structure can be controlled and used to fine-tune other parameters (*e.g.* bitrate, max video bitrate and resolution parameters) or even be considered as a parameter by itself.

114. Based on the bitrate and/or resolution parameter identified (*e.g.* bitrate, max video bitrate, resolution, GOP structure or frame type within a GOP structure), any H.264-compliant system such as the Accused Instrumentalities would determine which profile (*e.g.*, "baseline," "extended," "main", or "high") corresponds with that parameter, then select between at least two asymmetric compressors. If baseline or extended is the corresponding profile, then the system will select a Context-Adaptive Variable Length Coding ("CAVLC") entropy encoder. If main or high is the corresponding profile, then the system will select a Context-Adaptive Binary Arithmetic Coding ("CABAC") entropy encoder. Both encoders are asymmetric compressors because it takes a longer period of time for them to compress data than to decompress data. *See* https://sonnati.wordpress.com/2007/10/29/how-h-264-works-part-ii/:

	Baseline	Extended	Main	High	High 10
I and P Slices	Yes	Yes	Yes	Yes	Yes
B Slices	No	Yes	Yes	Yes	Yes
SI and SP Slices	No	Yes	No	No	No
Multiple Reference Frames	Yes	Yes	Yes	Yes	Yes
In-Loop Deblocking Filter	Yes	Yes	Yes	Yes	Yes
CAVLC Entropy Coding	Yes	Yes	Yes	Yes	Yes
CABAC Entropy Coding	No	No	Yes	Yes	Yes
Flexible Macroblock Ordering (FMO)	Yes	Yes	No	No	No
Arbitrary Slice Ordering (ASO)	Yes	Yes	No	No	No
Redundant Slices (RS)	Yes	Yes	No	No	No
Data Partitioning	No	Yes	No	No	No
Interlaced Coding (PicAFF, MBAFF)	No	Yes	Yes	Yes	Yes
4:2:0 Chroma Format	Yes	Yes	Yes	Yes	Yes
Monochrome Video Format (4:0:0)	No	No	No	Yes	Yes
4:2:2 Chroma Format	No	No	No	No	No
4:4:4 Chroma Format	No	No	No	No	No
8 Bit Sample Depth	Yes	Yes	Yes	Yes	Yes
9 and 10 Bit Sample Depth	No	No	No	No	Yes
11 to 14 Bit Sample Depth	No	No	No	No	No
8×8 vs. 4×4 Transform Adaptivity	No	No	No	Yes	Yes
Quantization Scaling Matrices	No	No	No	Yes	Yes
Separate Cb and Cr QP control	No	No	No	Yes	Yes
Separate Color Plane Coding	No	No	No	No	No
Predictive Lossless Coding	No	No	No	No	No

See http://web.cs.ucla.edu/classes/fall03/cs218/paper/H.264_MPEG4_Tutorial.pdf at 7:

The following table summarizes the two major types of entropy coding: Variable Length Coding (VLC) and Context Adaptive Binary Arithmetic Coding (CABAC). CABAC offers superior coding efficiency over VLC by adapting to the changing probability distribution of symbols, by exploiting correlation between symbols, and by adaptively exploiting bit correlations using arithmetic coding. H.264 also supports Context Adaptive Variable Length Coding (CAVLC) which offers superior entropy coding over VLC without the full cost of CABAC.

H.264 Entropy Coding – Comparison of Approaches

Characteristics	Variable Length Coding (VLC)	Context Adaptive Binary Arithmetic Coding(CABAC)
• Where it is used	MPEG-2, MPEG-4 ASP	H.264/MPEG-4 AVC (high efficiency option)
• Probability distribution	**Static** - Probabilities never change	**Adaptive** - Adjusts probabilities based on actual data
• Leverages correlation between symbols	**No** - Conditional probabilities ignored	**Yes** - Exploits symbol correlations by using "contexts"
• Non-integer code words	**No** - Low coding efficiency forhigh probability symbols	**Yes** - Exploits "arithmetic coding" which generates non-integer code words for higher efficiency

Moreover, the H.264 Standard requires a bit-flag descriptor, which is set to determine the correct decoder for the corresponding encoder. As shown below, if the flag = 0, then CAVLC must have been selected as the encoder; if the flag = 1, then CABAC must have been selected as the encoder. *See* https://www.itu.int/rec/dologin_pub.asp?lang=e&id=T-REC-H.264-201304-S!!PDF-E&type=items (Rec. ITU-T H.264 (04/2013)) at 80:

entropy_coding_mode_flag selects the entropy decoding method to be applied for the syntax elements for which two descriptors appear in the syntax tables as follows:

– If entropy_coding_mode_flag is equal to 0, the method specified by the left descriptor in the syntax table is applied (Exp-Golomb coded, see clause 9.1 or CAVLC, see clause 9.2).

– Otherwise (entropy_coding_mode_flag is equal to 1), the method specified by the right descriptor in the syntax table is applied (CABAC, see clause 9.3).

115. The Accused Instrumentalities compress the at least the portion of the data block with the selected one or more asymmetric compressors to provide one or more compressed data blocks, which can be organized in a GOP structure (see above). After its selection, the asymmetric compressor (CAVLC or CABAC) will compress the video data

to provide various compressed data blocks, which can also be organized in a GOP structure.

See https://sonnati.wordpress.com/2007/10/29/how-h-264-works-part-ii/:

Entropy Coding

For entropy coding, H.264 may use an enhanced VLC, a more complex context-adaptive variable-length coding (CAVLC) or an ever more complex Context-adaptive binary-arithmetic coding (CABAC) which are complex techniques to losslessly compress syntax elements in the video stream knowing the probabilities of syntax elements in a given context. The use of CABAC can improve the compression of around 5-7%. CABAC may requires a 30-40% of total processing power to be accomplished.

See

http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.602.1581&rep=rep1&type=pdf

at 13:

Typical compression ratios to maintain excellent quality are:

- 10:1 for general images using JPEG
- 30:1 for general video using H.263 and MPEG-2
- 60:1 for general video using H.264 and WMV9

See http://www.ijera.com/papers/Vol3_issue4/BM34399403.pdf at 2:

Most visual communication systems today use Baseline Profile. Baseline is the simplest H.264 profile and defines, for example, zigzag scanning of the picture and using 4:2:0 (YUV video formats) chrominance sampling. In Baseline Profile, the picture is split in blocks consisting of 4x4 pixels, and each block is processed separately. Another important element of the Baseline Profile is the use of Universal Variable Length Coding (UVLC) and Context Adaptive Variable Length Coding (CAVLC) entropy coding techniques.

The Extended and Main Profiles includes the functionality of the Baseline Profile and add improvements to the predictions algorithms. Since transmitting every single frame (think 30 frames per second for good quality video) is not feasible if you are trying to reduce the bit rate 1000-2000 times, temporal and motion prediction are heavily used in H.264, and allow transmitting only the difference between one frame and the previous frames. The result is spectacular efficiency gain, especially for scenes with little change and motion.

The High Profile is the most powerful profile in H.264, and it allows most efficient coding of video. For example, large coding gain achieved through the use of Context Adaptive Binary Arithmetic Coding (CABAC) encoding which is more efficient than the UVLC/CAVLC used in Baseline Profile.

The High Profile also uses adaptive transform that decides on the fly if 4x4 or 8x8-pixel blocks should be used. For example, 4x4 blocks are used for the parts of the picture that are dense with detail, while parts that have little detail are transformed using 8x8 blocks.

116. From above, and on information and belief, Polycom has directly infringed and continues to infringe the ’477 patent, for example, through its own use and testing of the Accused Instrumentalities, which when used, practices the system claimed by Claim 1 of the ’477 patent, namely a system, comprising: a plurality of different asymmetric data compression encoders, wherein each asymmetric data compression encoder of the plurality of different asymmetric data compression encoders is configured to utilize one or more data compression algorithms, and wherein a first asymmetric data compression encoder of the plurality of different asymmetric data compression encoders is configured to compress data blocks containing video or image data at a higher data compression rate than a second asymmetric data compression encoder of the plurality of different asymmetric data compression encoders; and one or more processors configured to: determine one or more data parameters, at least one of the determined one or more data parameters relating to a throughput of a communications channel measured in bits per second; and select one or more asymmetric data compression encoders from among the plurality of different asymmetric data compression encoders based upon, at least in part, the determined one or more data parameters. Upon information and belief, Polycom uses the Accused Instrumentalities to practice infringing methods for its own internal non-testing business purposes, while testing the Accused Instrumentalities, and while providing technical support and repair services for the Accused Instrumentalities to their customers.

117. On information and belief, the Accused Instrumentalities store at least a portion of the one or more compressed data blocks in buffers, hard disk, or other forms of memory/storage.

118. On information and belief, Polycom also directly infringes and continues to infringe other claims of the ’477 patent, for similar reasons as explained above with respect to Claim 1 of the ’477 patent.

119. On information and belief, all of the Accused Instrumentalities perform the claimed methods in substantially the same way, *e.g.*, in the manner specified in the H.264 standard.

120. On information and belief, use of the Accused Instrumentalities in their ordinary and customary fashion results in infringement of the systems and/or methods claimed by the ’477 patent.

121. On information and belief, Polycom has had knowledge of the ’477 patent since at least the filing of this Complaint or shortly thereafter, and on information and belief, Polycom knew of the ’477 patent and knew of its infringement, including by way of this lawsuit. By the time of trial, Polycom will have known and intended (since receiving such notice) that its continued actions would actively induce and contribute to the infringement of the claims of the ’477 patent.

122. Upon information and belief, Polycom’s affirmative acts of making, using, and selling the Accused Instrumentalities, and providing implementation services and technical support to users of the Accused Instrumentalities, including, *e.g.*, through training, demonstrations, brochures, installation and user guides, have induced and continue to induce users of the Accused Instrumentalities to use them in their normal and customary way to infringe the ’477 patent by practicing a system, comprising: a plurality of different asymmetric data compression encoders, wherein each asymmetric data compression encoder of the plurality of different asymmetric data compression encoders is configured

to utilize one or more data compression algorithms, and wherein a first asymmetric data compression encoder of the plurality of different asymmetric data compression encoders is configured to compress data blocks containing video or image data at a higher data compression rate than a second asymmetric data compression encoder of the plurality of different asymmetric data compression encoders; and one or more processors configured to: determine one or more data parameters, at least one of the determined one or more data parameters relating to a throughput of a communications channel measured in bits per second; and select one or more asymmetric data compression encoders from among the plurality of different asymmetric data compression encoders based upon, at least in part, the determined one or more data parameters. For similar reasons, Polycom also induces their customers to use the Accused Instrumentalities to infringe other claims of the '477 patent. Polycom specifically intended and were aware that these normal and customary activities would infringe the '477 patent. Polycom performed the acts that constitute induced infringement, and would induce actual infringement, with the knowledge of the '477 patent and with the knowledge, or willful blindness to the probability, that the induced acts would constitute infringement. On information and belief, Polycom engaged in such inducement to promote the sales of the Accused Instrumentalities. Accordingly, Polycom has induced and continues to induce users of the Accused Instrumentalities to use the Accused Instrumentalities in their ordinary and customary way to infringe the '477 patent, knowing that such use constitutes infringement of the '477 patent. Accordingly, Polycom has been, and currently is, inducing infringement of the '477 patent, in violation of 35 U.S.C. § 271(b).

123. Polycom has also infringed, and continues to infringe, claims of the ’477 patent by offering to commercially distribute, commercially distributing, making, and/or importing the Accused Instrumentalities, which are used in practicing the process, or using the systems, of the ’477 patent, and constitute a material part of the invention. Polycom knows the components in the Accused Instrumentalities to be especially made or especially adapted for use in infringement of the ’477 patent, not a staple article, and not a commodity of commerce suitable for substantial noninfringing use. Accordingly, Polycom has been, and currently is, contributorily infringing the ’477 patent, in violation of 35 U.S.C. § 271(c).

124. By making, using, offering for sale, selling and/or importing into the United States the Accused Instrumentalities, and touting the benefits of using the Accused Instrumentalities’ compression features, Polycom has injured Realtime and is liable to Realtime for infringement of the ’477 patent pursuant to 35 U.S.C. § 271.

125. As a result of Polycom’s infringement of the ’477 patent, Plaintiff Realtime is entitled to monetary damages in an amount adequate to compensate for Polycom’s infringement, but in no event less than a reasonable royalty for the use made of the invention by Polycom, together with interest and costs as fixed by the Court.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff Realtime respectfully requests that this Court enter:

a. A judgment in favor of Plaintiff that Polycom has infringed, literally and/or under the doctrine of equivalents, the '046, ’422, ’535, ’907 and ’477 patents (the “Asserted Patents”);

b. A judgment and order requiring Polycom to pay Plaintiff its damages, costs, expenses, and prejudgment and post-judgment interest for its infringement of the Asserted Patents, as provided under 35 U.S.C. § 284;

c. A judgment and order requiring Polycom to provide an accounting and to pay supplemental damages to Realtime, including without limitation, prejudgment and post-judgment interest;

d. A permanent injunction prohibiting Polycom from further acts of infringement of the Asserted Patents;

e. A judgment and order finding that this is an exceptional case within the meaning of 35 U.S.C. § 285 and awarding to Plaintiff its reasonable attorneys' fees against Polycom; and

f. Any and all other relief as the Court may deem appropriate and just under the circumstances.

DEMAND FOR JURY TRIAL

Plaintiff, under Rule 38 of the Federal Rules of Civil Procedure, requests a trial by jury of any issues so triable by right.

Respectfully Submitted,

Dated: November 10, 2017

/s/ Eric B. Fenster

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