WAINHOUSE RESEARCH **WHITE PAPER**

Evaluation: Polycom's Implementation of H.264 High Profile

WR Investigates Polycom's Claim of No-Compromise Performance Using up to 50% Less Bandwidth

November 2010

Study sponsored by:

BROADCONNECT Telecom

sales@broadconnect.ca
877-228-6616

WAINHOUSE Research

Table of Contents

List of Figures

Executive Summary

In Q4 2010, 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).

During the typical video meeting, the use of Polycom's H.264 High Profile (instead of H.264 Baseline Profile) provides higher video resolutions at a given call speed, or the same resolution at a lower call speed – with little or no experience compromise.

After verifying all system settings, WR conducted a series of ten (10) test calls to compare the performance of H.264 BP and H.264 HP. Each test call involved two (2) connections (one BP and one HP) at call speeds selected to deliver the same video resolution. For example, test call 1 consisted of a 512 kbps BP call and a 256 kbps HP call, each using 4SIF resolution. For each call, the WR test team performed a subjective assessment of the overall call quality / user experience under no motion, limited motion, and heavy motion conditions.

WR was impressed by the ability to reduce call speed while maintaining video resolution and call quality via the use H.264 High Profile on Polycom HDX video endpoints. In low motion situations, the use of High Profile allowed for a 25 – 50% (and in some cases even greater) bandwidth reduction with almost no compromise in call quality / user experience. In heavy motion situations with a high bandwidth reduction, some call quality issues were noted during the HP calls, but not to the point that the user experience was materially compromised.

Overall, Polycom's implementation of H.264 High Profile met – and in some ways exceeded – WR's performance expectations.

Understanding High Profile

H.264 Videoconferencing

The first implementations of H.264 for videoconferencing were in the early 2000s. Although an in-depth discussion of H.264 is beyond the scope of this document, the following primer will provide the context necessary to understand the basics of this advanced video algorithm.

According to Wikipedia, H.264 is a standard for video compression that provides good video quality using less bandwidth / at lower bit rates than required using previous compression standards.

The H.264 standard includes 17 sets or combinations of capabilities called “profiles” as follows:

- The first eight profiles are used for non-scalable video applications including mobile applications, videoconferencing, broadcast applications, disc storage applications, etc.
- The next four profiles, called “Intra-profiles,” are actually derivatives of the first eight profiles designed for professional video applications (e.g. camera systems, editing, etc.)
- The next three profiles enable the use of Scalable Video Coding (SVC) within the H.264 standard.
- The last two profiles enable Multi-view Video Coding (MVC), for example to support 3D video, within the H.264 standard.

For simplicity sake, the 17 H.264 profiles are sorted into the following four standardized profile groups listed below (in order of increasing efficiency and complexity.

- H.264 Baseline
- H.264 Extended
- H.264 Main
- H.264 High

The most commonly used form of H.264 in videoconferencing today is H.264 Baseline Profile (a.k.a. H.264 BP). Although significantly more processor-intensive than the prior generation of compression standards used for videoconferencing (H.263 and H.261), H.264’s highly efficient encoding and decoding provides enhanced video performance at lower bit rates, enabling vendors to provide “business quality” videoconferencing at call speeds as low as 256 kbps.

The “sweet” spot for H.264 BP videoconferencing is at call speeds of 512 kbps and lower. At these call speeds, H.264 BP provides a noticeably better experience compared to H.263. At higher call speeds, the user experience offered by H.264 BP and H.263 is similar enough to warrant the use of the less CPU-intensive H.263 protocol – assuming processor power is a limiting factor (which is no longer the case today for most videoconferencing systems).

H.264 High Profile Videoconferencing

Over time, the processor power within videoconferencing systems has increased significantly, to the point that H.264 is now the de facto standard video compression protocol used by almost all videoconferencing systems – at any call speed. In addition, this additional processor power has enabled vendors to provide a wide range of additional features including support for higher call speeds, higher video resolutions, wide band audio, full motion dual-stream video, higher performance embedded multipoint bridging, and more.

In 2010, Polycom announced support for a more advanced form of the H.264 standard, H.264 High Profile (H.264 HP), within the HDX video endpoint product line. Although Polycom was not the first videoconferencing vendor to support the H.264 HP standard, the release of High Profile on the HDX product line was the first such release on a mainstream, heavily deployed platform.

Designed primarily for broadcast applications, H.264 HP provides additional compression efficiency beyond that offered by H.264 BP. The advantages of using H.264 HP instead of H.264 BP for videoconferencing include …

1) The ability to support higher video resolutions at the same call speeds, or
2) The ability to support the same video resolution at lower call speeds

In addition, and unlike the advantage of H.264 BP over H.263, H.264 HP provides its bandwidth efficiency benefits over H.264 BP at all call speeds.

The only real disadvantage of using H.264 HP instead of H.264 BP for videoconferencing is the need for additional processor power to handle the complexities of High Profile. This, of course, is not an issue if your video system (or MCU for that matter) has adequate processor power available.

Although not quite a disadvantage, it is worth nothing that an H.264 HP call requires that both sides of the call support H.264 HP. In other words, a call between an H.264 HP capable and non-H.264 HP capable system will fall back to H.264 BP. Over time, the number of systems supporting H.264 HP is sure to increase, rending this point moot in the not so distant future.

Traditionally, H.264 HP is promoted as providing up to a 1/3rd bandwidth savings over BP. Polycom, however, claims that its implementation of H.264 HP offers bandwidth reductions of up to 50%.

The question here is not whether Polycom can configure its systems to support high video resolutions at relatively low call speeds (e.g. HD720p at 512 kbps). This is, of course, possible with any video system. The real question is whether Polycom's use of High Profile will allow it to offer the same video resolution (e.g. HD720p) at significantly lower call speeds (e.g. 512 kbps instead of 1 Mbps) WITHOUT materially impacting the user experience. WR's testing will focus on assessing this key point.

Test Environment

To facilitate the assessment of the effectiveness of Polycom's implementation of H.264 HP, WR created two parallel test environments.

Environment #1 – "High Profile"

The first environment consisted of two (2) Polycom HDX 8000 video endpoints running software version 2.6.1 (supports High Profile).

Environment #2 – "Baseline Profile"

The second test environment consisted of two (2) Polycom HDX 8000 video endpoints, one of which was running software version 2.6.1 (supports High Profile), while the other was running version 2.5.0 (does not support High Profile).[1] Since only one of these systems was able to support High Profile, all video calls between these two systems used Baseline Profile.

General Settings

The following items apply to both test environments:

1) The video endpoints in each test environment were directly connected to each other using identical CAT-6 network cables. This direct connection allowed us to avoid any potential network-related issues (e.g. latency, packet loss, etc.).
2) All system settings on all endpoints were set to either Default or Auto.
3) All calls used AES encryption.

Physical Setup

1) Lighting - Throughout the testing, WR used studio lighting within the WR test lab to maintain the light level on the motion source at ~ 550 lux / 51 ft. candles; a level that in WR's experience is commonly found in typical meeting rooms.
2) Camera Placement – As shown in the diagram below, one endpoint in each test environment was designated a "send" system, and the two send systems were placed equidistant from the motion source.
3) Display Placement – As shown in the diagram below, one endpoint in each test environment was designated a "receive" system, and the two send systems were connected to identical displays located directly next to each other.

The setup illustrated below enabled WR to perform side-by-side comparisons of High Profile calls to Baseline Profile calls at the same video resolution (but at different call speeds). Readers should note that side-by-side comparisons are specifically designed to highlight even the slightest differences. In a real world environment, many of the issues noted during the side-by-side comparison would likely go unnoticed.

[1] According to Polycom, the only significant difference between software versions 2.5 and 2.6 is the support for the H.264 High Profile standard.

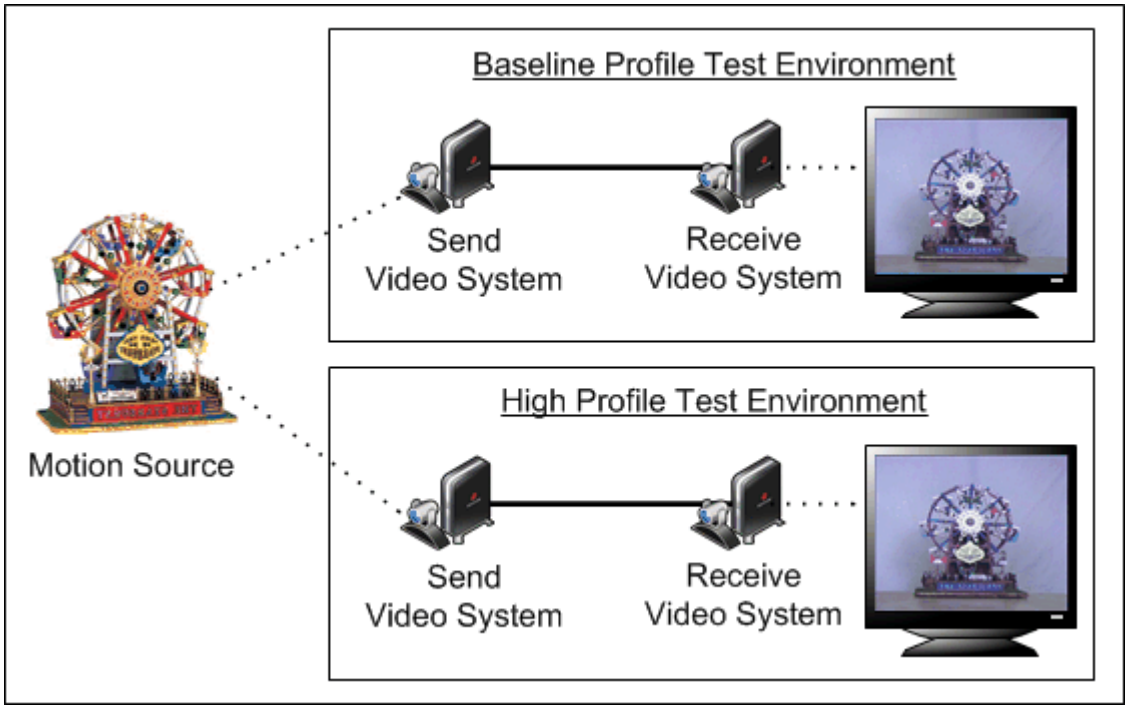

Figure 1: Side-By-Side Test Environment

Testing Details

Step 1 - Establishing the Resolution "Baseline"

Prior to the start of the formal testing, WR placed a series of test calls to establish the video resolution provided at calls speeds between 256 kbps and 1920 kbps in both the High Profile and Baseline Profile environments. The table below highlights the results of these calls.

Bandwidth (in kbps)	High Profile Resolution	Baseline Resolution
256	4SIF (704 x 480)	4SIF (704 x 480)
384	4SIF (704 x 480)	4SIF (704 x 480)
512	720p (1280 x 720)	4SIF (704 x 480)
768	720p (1280 x 720)	4SIF (704 x 480)
1024	1080p (1920 x 1080)	720p (1280 x 720)
1472	1080p (1920 x 1080)	720p (1280 x 720)
1920	1080p (1920 x 1080)	1080p (1920 x 1080)

Figure 2: Video Resolutions at Various Call Speeds - H.264 BP vs. H.264 HP (Table)

The chart below provides a different view of the information in the table above and highlights the differences in the video resolution and pixel counts provided by Baseline Profile and High Profile at different call speeds. Depending upon the call speed, the pixel count difference ranges from zero (at 256 and 384 kbps) to more than double (at 1024 and 1472 kbps).

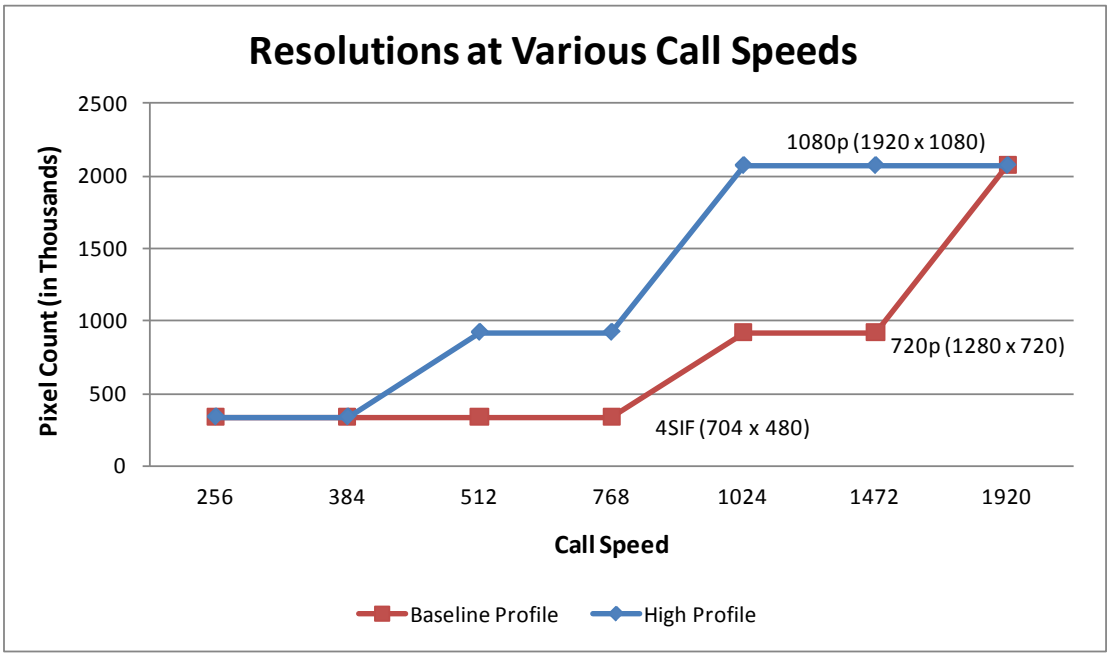

Figure 3: Video Resolutions at Various Call Speeds - H.264 BP vs. H.264 HP (Graph)

Based on the chart above, the obvious sweet spots at which the use of High Profile would have the greatest impact on video resolution would be 512 kbps (4SIF with Baseline Profile, 720p with High Profile), and 1024 kbps (720p with Baseline Profile, 1080p with High Profile).

Step 2 - Comparison Test Calls

Testing Methodology

For this part of the evaluation, WR placed a total of ten (10) "formal" test calls as shown in the table below. Each test call included two (2) video connections – one in each of the two test environments, at call speeds designed to provide the same video resolution.

For example, test call #1 involved the following two video connections:

1) A 512 kbps video call, resulting in a 4SIF video connection, between the send system and the receive system in the Baseline Profile environment.
2) A 256 kbps video call, resulting in a 4SIF video connection, between the send system and the receive system in the High Profile environment.

Call #	Video Resolution	Call Speed – Baseline Profile	Call Speed – High Profile	Bandwidth Reduction (%)
1	4SIF	512	256	50%
2	4SIF	768	256	67%
3	4SIF	512	384	25%
4	4SIF	768	384	50%
5	720p	1024	512	50%
6	720p	1472	512	65%
7	720p	1024	768	25%
8	720p	1472	768	48%
9	1080p	1920	1024	47%
10	1080p	1920	1472	23%

Figure 4: Video Test Calls - Same Resolution but Different Call Speeds

For each of the above test calls, WR completed the following steps:

1) Verified and documented the call speeds, video resolutions, and video frame rates.
2) Verified that AES encryption was in place.
3) Subjected each video call to three different motion levels as follows:
    a. No Motion (static view of the motion source)
    b. Light Motion – a member of the WR test team sat in a position ~ six (6) feet away from the cameras and simulated a typical “talking head” conference situation by speaking and using facial and upper-body gestures.
    c. Heavy Motion – a colorful, motorized, and illuminated toy carousel was used to create consistent, heavy motion covering ~ 30% of each camera’s total field of view.
4) Documented two WR analysts’ subjective opinions of the following:
    a. The overall call quality / user experience at each motion level
    b. The difference, if any, between the Baseline Profile and High Profile experience

For item #4 above (WR’s subjective opinion of the user experience), the WR analysts were specifically looking to see whether the use of H.264 HP at lower call speeds resulted in increased latency, motion handling issues (low frame rate, stuttering, etc.), and/or video artifacts (smearing, softness, pixelization, etc.).

Test Results

Summary of Test Results

After careful review and analysis of the ten (10) test calls described above, WR was able to reach the following conclusions:

1) Polycom's implementation of H.264 High Profile allows for bandwidth / call speed reductions of up to ~ 33% with little or no impact on the user experience – even in relatively high motion situations.

2) Polycom's implementation of H.264 High Profile allows for bandwidth / call speed reductions above 33% (e.g. 50 – 60%), the impact on the user experience ranged from very limited (in low motion / talking head situations) to notable but tolerable (in high motion situations). Whether or not the user experience compromise associated with this drastic bandwidth reduction represents a problem depends entirely upon the expectations of the video meeting participants.

3) Although WR did not perform any formal latency testing, WR's subjective assessment is that Polycom's implementation of H.264 High Profile does not materially increase the call latency.

To enable readers to judge for themselves, WR has posted a video clip (http://goo.gl/u1nE6) of test call 9 showing a side by side comparison of a 1920 kbps 1080p video call using Baseline Profile and a 1024 kbps 1080p video call using High Profile. To verify the setup, the call connection statistics were displayed for a few seconds during the recording.

Notes on video clip:

1) Baseline Profile is on the left side, and High Profile is on the right side.
2) Call statistics are displayed ~15 seconds into the video.
3) Heavy motion testing begins ~40 seconds into the video.
4) As described in Detailed Test Results for Call 9 below, the differences between the Baseline Profile and High Profile were extremely limited – even under heavy motion.

Detailed Test Results

This section provides detailed results of WR's H.264 High Profile vs. Baseline Profile testing.

Call 1: 4SIF Resolution – 512 kbps vs. 256 kbps

	Baseline Call	High Profile Call
Video Resolution	4SIF	4SIF
Call Speed	512 kbps	256 kbps
Test – No Motion	Very clean image	Very clean image
Test – Limited Motion	Very clean "talking head" video – no artifacts noted.	Very clean "talking head" video – slight artifacts noted after shoulder / body movements.
Test – Heavy Motion	Some softness and video artifacts (e.g. minor tiling) noted in the areas of heavy motion.	Issued noted during Baseline call were slightly more apparent. Also, movement appeared slightly "choppy" due to frame rate drop from 30 (limited motion) to 15 fps.

WR Analysis:

The ability to provide a "usable" full motion (30 fps) 4SIF resolution video call at 256 kbps is an impressive demonstration of the value of H.264 High Profile. During the limited motion testing, the impact on the user experience was extremely limited – to the point that a typical user might not even notice the quality compromise. Under the strain of high motion, the impact of the bandwidth reduction was more prominent and included notable softness, video artifacts, and motion stuttering (call statistics showed that the high profile call dropped to 15 fps under high motion at this call speed).

Call 2: 4SIF Resolution – 768 kbps vs. 256 kbps

	Baseline Call	High Profile Call
Video Resolution	4SIF	4SIF
Call Speed	768 kbps	256 kbps
Test – No Motion	Very clean image	Very clean image
Test – Limited Motion	Very clean "talking head" video – no artifacts noted.	Very clean "talking head" video – slight artifacts noted after shoulder / body movements.
Test – Heavy Motion	Some softness and video artifacts (e.g. minor tiling) noted in the areas of heavy motion, but less so than in Call 1 due to the increased call speed.	Issued noted during Baseline call were more apparent. Also, movement appeared slightly "choppy."

WR Analysis:

This call compared a 4SIF Baseline call to a 4SIF High Profile call at one-third of the call speed. As expected, the results of this test call were similar to the results of Call 1 above, except that the increased call speed for the Baseline call resulted in a slight improvement in motion handling of the Baseline call. As stated in the WR analysis for Call 1 above, WR believes that the 256 kbps 4SIF call would be deemed "acceptable" by most users in most situations.

Call 3: 4SIF Resolution – 512 kbps vs. 384 kbps

	Baseline Call	High Profile Call
Video Resolution	4SIF	4SIF
Call Speed	512 kbps	384 kbps
Test – No Motion	Very clean image	Very clean image
Test – Limited Motion	Very clean "talking head" video – no artifacts noted.	Very clean "talking head" video – no artifacts noted.
Test – Heavy Motion	Some softness and video artifacts (e.g. minor tiling) noted in the areas of heavy motion.	Overall video quality was very similar to that of the Baseline call.

WR Analysis:

This call highlights that based on WR's testing, Polycom's implementation of H.264 High Profile can provide a 25% bandwidth reduction with, a) no noticeable compromise under limited motion, and b) a slightly noticeable, but insignificant compromise under heavy motion.

Call 4: 4SIF Resolution – 768 kbps vs. 384 kbps

	Baseline Call	High Profile Call
Video Resolution	4SIF	4SIF
Call Speed	768 kbps	384 kbps
Test – No Motion	Very clean image	Very clean still image
Test – Limited Motion	Very clean "talking head" video – no artifacts noted.	Very clean "talking head" video – no artifacts noted.
Test – Heavy Motion	Some softness and video artifacts (e.g. minor tiling) noted in the areas of heavy motion, but less so than in Call 3 due to the increased call speed.	The additional bandwidth in the Baseline call made the difference between Baseline and High Profile slightly more noticeable, but still basically negligible.

WR Analysis:

This call highlights that in some situations it is possible to decrease call speed by 50% with only a limited impact on the user experience.

Call 5: 720p Resolution – 1024 kbps vs. 512 kbps

	Baseline Call	High Profile Call
Video Resolution	720p	720p
Call Speed	1024 kbps	512 kbps
Test – No Motion	Very clean still image	Very clean still image
Test – Limited Motion	Very clean "talking head" video – no artifacts noted.	Very clean "talking head" video – no artifacts noted.
Test – Heavy Motion	Trivial softness in areas of heavy motion and in darker areas. The system was a little slow redrawing the background when an object passed over it.	The issues noted in the Baseline Call were slightly more apparent in High Profile, but overall video quality was very similar to that of the Baseline call.

WR Analysis:

The ability to provide a "usable" full motion (30 fps) 720p resolution video call at 512 kbps is an impressive demonstration of the value of H.264 High Profile. Under limited motion, the WR test team was hard pressed to find any material issues with the High Profile call. Under heavy motion, some additional video artifacts were observed – especially in darker, shadowy areas of the image. However, WR does not believe these quality compromises would significantly detract from the overall user experience.

Call 6: 720p Resolution – 1472 kbps vs. 512 kbps

	Baseline Call	High Profile Call
Video Resolution	720p	720p
Call Speed	1472 kbps	512 kbps
Test – No Motion	Very clean still image	Very clean still image
Test – Limited Motion	Very clean "talking head" video – no artifacts noted.	Very clean "talking head" video – no artifacts noted.
Test – Heavy Motion	Trivial softness in areas of heavy motion and in darker areas. The system was a little slow redrawing the background when an object passed over it. Issues were less apparent than in Call 5 due to the increased call speed.	The issues noted in the Baseline Call were slightly more apparent in High Profile, but overall video quality was very similar to that of the Baseline call.

WR Analysis:

Call 6 involved an increase in the Baseline call speed compared to call 5. As a result, the quality of the Baseline call increased slightly. This, of course, made the differences between the Baseline 720p call and the High Profile 720p call (running at ~ 1/3rd of the call speed) slightly more pronounced. However, as stated in call 5 above, WR believes that the 512 kbps, 720p, High Profile call experience would be more than acceptable to most users.

Call 7: 720p Resolution – 1024 kbps vs. 768 kbps

	Baseline Call	High Profile Call
Video Resolution	720p	720p
Call Speed	1024 kbps	768 kbps
Test – No Motion	Very clean still image	Very clean still image
Test – Limited Motion	Very clean "talking head" video – no artifacts noted.	Very clean "talking head" video – no artifacts noted.
Test – Heavy Motion	Trivial softness in areas of heavy motion and in darker areas. The system was a little slow redrawing the background when an object passed over it.	The issues noted in the Baseline Call were also noted in High Profile, but overall video quality was very similar to that of the Baseline call.

WR Analysis:

This call is essentially a repeat of call 5 above with the High Profile call using 768 kbps instead of 512 kbps. As one might expect, increasing the bandwidth of the High Profile call by 50% improved the call quality slightly, making it even harder to distinguish between the Baseline and High Profile calls – even under high motion.

Call 8: 720p Resolution – 1472 kbps vs. 768 kbps

	Baseline Call	High Profile Call
Video Resolution	720p	720p
Call Speed	1472 kbps	768 kbps
Test – No Motion	Very clean still image	Very clean still image
Test – Limited Motion	Very clean "talking head" video – no artifacts noted.	Very clean "talking head" video – no artifacts noted.
Test – Heavy Motion	Trivial softness in areas of heavy motion and in darker areas. The system was a little slow redrawing the background when an object passed over it. Issues were less apparent than in Call 7 due to the increased call speed.	The issues noted in the Baseline Call were also noted in High Profile, but overall video quality was very similar to that of the Baseline call.

WR Analysis:

Once again, under limited motion WR was hard pressed to find any noticeable differences between the Baseline call and High Profile call – despite a bandwidth reduction of ~ 50%. Under high motion, the difference between the Baseline and High Profile calls was slightly more apparent, but not to the point that the High Profile call would be deemed unacceptable or even a user experience compromise.

Call 9: 1080p Resolution – 1920 kbps vs. 1024 kbps

	Baseline Call	High Profile Call
Video Resolution	1080p	1080p
Call Speed	1920 kbps	1024 kbps
Test – No Motion	Very clean still image	Very clean still image
Test – Limited Motion	Very clean "talking head" video – no artifacts noted.	Very clean "talking head" video – no artifacts noted.
Test – Heavy Motion	Minor video and motion handling artifacts noted, but mostly NOT in the areas of heavy motion.	Issues noted in Baseline call were slightly more noticeable in the High Profile call.

WR Analysis:

Under limited motion, the 50% bandwidth reduction between the Baseline and High Profile had almost no impact on the overall call quality. Under high motion, the 1080p testing revealed some limited video and motion handling issues - even at 1920 kbps call speed using Baseline profile. These issues were slightly more pronounced in the High Profile call, but not to the point that the user experience was materially compromised. In other words, using ~ half the bandwidth, the High Profile call provides a very similar 1080p call experience.

Call 10: 1080p Resolution – 1920 kbps vs. 1472 kbps

	Baseline Call	High Profile Call
Video Resolution	1080p	1080p
Call Speed	1920 kbps	1472 kbps
Test – No Motion	Very clean still image	Very clean still image
Test – Limited Motion	Very clean "talking head" video – no artifacts noted.	Very clean "talking head" video – no artifacts noted.
Test – Heavy Motion	Minor video and motion handling artifacts noted, but mostly NOT in the areas of heavy motion.	Issues noted in Baseline call were slightly more apparent in the High Profile call. Issues were less apparent than in Call 9 due to the increased call speed.

WR Analysis:

As described in call 9 above, even the Baseline call exhibited some video quality issues under high motion. In this case, however, the differences between the Baseline call and the High Profile call (at ~25% lower call speed) were less pronounced.

Additional "Informal" Testing

H.239 Testing

Although not strictly a part of the testing protocol for this project, the WR test team also conducted a limited number of test calls including H.239 / dual stream. As expected, the use of H.239 decreased the bandwidth available for the video channel. For example, activating H.239 during call 7 above decreased the bandwidth available for video during the High Profile call from 768 kbps to ~ 512 kbps, and provided the same 512 kbps High Profile call experience noted during calls 5 and 6.

Low Light Level Testing

WR also repeated several of the above test calls at a light level of ~ 300 lux / 28 ft. candles. In WR's experience, such low light levels tend to wreak havoc on cameras and encoders. As expected, both the Baseline and High Profile calls were impacted by the decreased level of illumination. However, it did not appear that the use of High Profile increased the impact of the low light level on the call quality.

Conclusion

WR's head-to-head Baseline Profile vs. High Profile testing indicates that Polycom's implementation of High Profile within the H.264 standard enables users to conduct video calls at reduced call speeds while maintaining video resolution and protecting the overall user experience.

During many of the test calls, WR's video-savvy test team was challenged to find material differences between the Baseline and High Profile calls – especially in limited motion situations. It was only under high motion with drastic bandwidth reductions (e.g. 50% or more) that the differences between the Baseline and High Profile calls reached a level that WR believes would be noticed by a casual user looking at a side-by-side comparison.

Also notable is that despite the increased processor demands of H.264 High Profile, WR did not observe any side effects often associated with limited processor power including sluggish menu performance, increased call latency, or elimination of processor-intensive features (e.g. encryption, H.239 / dual stream, high bandwidth encoding / decoding, etc.).

Speeds, feeds, and technical trivialities aside, the take-away here is that Polycom's implementation of the H.264 High Profile standard on the HDX product line provides users with important call speed vs. resolution options.

- For users demanding high resolution (e.g. 720p or 1080p), High Profile reduces the minimum bandwidth necessary. The result is the ability to host a larger number of simultaneous, high resolution video calls without increasing bandwidth.

- For users needing to host as many calls as possible within defined bandwidth constraints, High Profile provides a higher video resolution experience at lower call speeds.

Readers should understand that for the most part, videoconferencing systems are designed to support the degree of motion encountered during a typical meeting. Within the conferencing industry, this type of meeting is referred to as a "talking-head videoconferencing" session. It is in this situation (limited motion) that High Profile provides an almost no-compromise bandwidth reduction.

While not a videoconferencing panacea, this is an example of getting something (in this case, either higher video resolution at a given call speed, or the same video resolution at a lower call speed) for basically nothing. This assumes, of course, that your video system(s) and devices are H.264 HP ready.

About Wainhouse Research

Wainhouse Research, LLC (WR) provides analysis and consulting on the market trends, technologies/ products, vendors, applications, and services in the collaboration and conferencing fields. Areas of coverage include hardware, software, and services related to audio, video, and web conferencing, unified communications, and enterprise social networking. The Company publishes market intelligence reports, provides customized strategic and tactical consulting and studies, and produces industry events (conferences). Additionally, the Company operates industry-focused and end user-focused Web sites and publishes a weekly sponsored bulletin for news and analysis. For more information on Wainhouse Research, visit www.wainhouse.com.

About the Author(s)

Ira M. Weinstein is a Senior Analyst and Partner at Wainhouse Research, and a 20-year veteran of the conferencing, collaboration and audio-visual industries. Prior to joining Wainhouse Research, Ira was the VP of Marketing and Business Development at IVCi, managed a technology consulting company, and ran the global conferencing department for a Fortune 50 investment bank. Ira's current focus includes IP video conferencing, network service providers, global management systems, scheduling and automation platforms, ROI and technology justification programs, and audio-visual integration. Mr. Weinstein holds a B.S. in Engineering from Lehigh University and can be reached at iweinstein@wainhouse.com.

David Maldow is a Senior Researcher at Wainhouse Research and a member of the New York and Louisiana Bar Associations. Prior to joining WR, David was a practicing attorney focusing on environmental law. David supports a variety of IP videoconferencing, streaming, and end-user consulting projects. Mr. Maldow holds a B.S. in Psychology from the University of Illinois and a Juris Doctorate from Tulane Law School and can be reached at dmaldow@wainhouse.com.

About Polycom

(Copy provided by Polycom)

Polycom, Inc. is the global leader in telepresence, video, and voice solutions and a collaborative communications visionary empowering people to connect and collaborate anytime from everywhere.

Companies choose Polycom for solutions that allow their workforces to communicate more effectively and productively over distances. Using Polycom unified communications (UC) solutions—telepresence, video, and voice solutions and services—people connect and collaborate with one another from their desktops, meeting rooms, class rooms, and a variety of mobile settings—and from anywhere in the world. In today's economy, our customers wish to cut the time, cost, and carbon emissions associated with gathering the right people in one place to solve problems. Instead of traveling, virtual teams use Polycom solutions to easily and quickly collaborate "face-to-face" wherever they are, which allows them to focus their resources, time, and energy on addressing business challenges.

Collaborating with Polycom solutions has also become a key competitive advantage for leading organizations around the globe. Our customers tell us it makes sense to use Polycom solutions and their existing business applications to communicate and share information in real time over any device and across any network. Polycom's open-standards integration with the leading unified communications (UC) platform vendors makes it possible. Quite simply, it makes good business sense for our customers to rely on the broadest offering of unified communications solutions—from Polycom—so they can improve productivity, reduce their costs, rapidly gain a return on their technology investment—and thrive.