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WAINHOUSE Research

Evaluation of the Zoom Cloud Video Conferencing Service

Hands-on testing of a leading video calling service

Background

Founded in 2011 by Eric S. Yuan and other senior executives and engineers from WebEx and Cisco, California-based Zoom Video Communications (Zoom) offers cloud-based collaboration services.[1]

When first launched, Zoom was heavily focused on video conferencing. Over time, the company has expanded its service to include additional capabilities such as audio dial-in with local numbers around the world, group messaging, wireless presentation, content co-annotation, and more.

Zoom's current portfolio includes the following elements:

- **Zoom Cloud Video Conferencing** – the company's flagship cloud-based collaboration service which includes video, audio, content sharing and collaboration, and group messaging
- **Zoom Rooms** – a software-based group video conferencing client designed for installation on a customer-provided Mac OSX computer with an iPad controller.
- **Zoom Room Connector** – a gateway allowing H.323 and SIP systems to connect to Zoom meetings. Room Connector is available in both cloud and as software (VMWare) for installation on the customer premise.
- **Zoom Meeting Connector** – a software (VMWare) version of the Zoom Cloud infrastructure intended for installation on the customer premise.

Zoom Rooms is a stand-alone product, and Zoom Room and Meeting Connectors are add-ons to the Zoom Cloud Video Conferencing service.

The visual collaboration team at Wainhouse Research (WR) have been avid users of the Zoom service for several years, and clearly we're not alone. According to the company, as of October 2015 the Zoom user base was ~ 85 million including subscribers from 115,000 companies and 3,200 educational institutions.

Zoom's "claim to fame" in the industry has been its aggressive pricing plans, with per-user pricing ranging from FREE (for a "Basic" user able to host unlimited one-to-one meetings and limited duration multiparty meetings) to $19.99 / month for a "Business" user (with full access to all key features).

Unlike many competing collaboration services, Zoom sells its service primarily directly to end-users. Zoom also has a small but growing channel partner program. And similar to many other SaaS offerings, smaller companies can purchase their Zoom subscriptions with their credit card on the Zoom website.

In Q3 2015, the team at Zoom commissioned the WR test team to perform a third-party assessment of the Zoom collaboration portfolio. To facilitate the assessment, Zoom provided WR with a Zoom Room system, and upgraded our company's Zoom account to include all available features and options. This document contains the results of our hands-on testing of Zoom.

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[1] While technically true that parts of the Zoom service can be deployed on the customer premise (CPE), for the vast majority of users, Zoom is a cloud service.

Understanding the Zoom Service

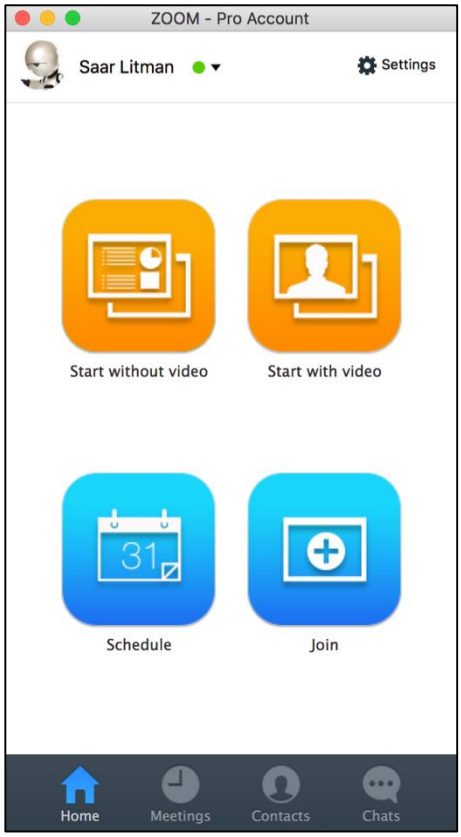
At its core, Zoom is a hosted / cloud-based collaboration service that supports high quality point-to-point (two participant) and multiparty video conferencing (up to 1080p), content sharing, and group and individual chat. Zoom is purchased on a per-named-user basis, and each paying Zoom user (called a 'meeting host') has his own a virtual meeting room (VMR) that can support up to 200 participants.

The table below highlights some of Zoom's key features and functions.

Feature / Function	Description
User Roles and Types	The Zoom system understands several user roles and types including account owner, account administrator, and standard user. Zoom also allows non-paying company members to host unlimited point-to-point meetings and multiparty (up to 50 participants) meetings of up to 40 minutes.
Web Portal Features and Functions	The Zoom web portal provides access to various functions (access depends on each user's role): - Account management (create / manage users, define system defaults, manage recordings, view company-wide reports, etc.) - Manage advanced features and add-ons (e.g. Meeting Connector, Room Connector, Zoom Rooms, integration with other systems such as Slack) - Manage user profile (name, email, password, preferences, etc.) - Manage meetings (view prior meetings, schedule a meeting, view list of pending scheduled meetings, and launch / host a meeting) - View session recordings (access based on user role)
Meeting Scheduling Options	Zoom users (including Basic / free) can schedule meetings in several ways: - Using the Zoom app (Mac, PC, tablet or mobile) - From within Microsoft Outlook (requires a Zoom plug-in) - From within Chrome or Firefox (requires install of a Zoom extension and enables connection to Google Calendar) - Using the Zoom web portal
Connectivity Options	Zoom supports a wide range of connectivity options including: - Using the Zoom apps (Windows, Mac, Linux, iOS, Android, Blackberry) - Using the Zoom Rooms group video system - Using any SIP / H323 endpoint (via Room Connector gateway) - Using any standard telephone (PSTN)
Call Recording	Zoom supports two different recording methods – local recording (generates MP4 and M4A files on the user's PC) or cloud recording (accessible to meeting host only).
Large Meeting Support (optional)	Supports video meetings including up to 200 two-way video participants.
Webinar Support (optional)	Supports meetings including 25 two-way video participants and 3,000 viewers.
Advanced Features / Functions	Hybrid – Zoom supports the installation of the Zoom Meeting Connector and/or the Zoom Room Connector on the customer premise (CPE). Integrations – Zoom integrates with many other systems (e.g. Slack, Salesforce) and allows for additional integrations via its API / SDK.

Strengths, Differentiators, and Features

Based on numerous discussions with Zoom and our hands-on testing, WR has identified the following key differentiators / power features. Note that this is NOT intended to be an exhaustive list of all features, functions, and capabilities of this offering.



The Zoom Apps / Clients

Zoom is an application-based solution, with dedicated clients available for Windows, Mac, Linux, iOS (see image at right), Android, and Blackberry users.

However, to simplify the install (and allow standard / non-admin users to install the application), Zoom has packaged its application as a browser plug-in. This method, which Zoom pointed out is the same method used by various web conferencing service providers, allows the Zoom app to be installed almost transparently the first time a user tries to join a Zoom meeting.

At this time, Zoom does not support browser-based calling – either using WebRTC or via a browser plug-in. However, when a Zoom meeting URL is clicked, Zoom leverages the browser to launch the Zoom app. This simplifies the workflow for the meeting participant.

Unlike some competitors, Zoom has chosen to run its application outside of the browser environment. With this approach, Zoom maintains full control of the end-to-end experience. For example, Zoom is able to offer users the ability to select their camera, mic, and speaker devices from within the Zoom app. Browser-based clients, in contrast, depend on the user having selected the appropriate speaker device within the Browser settings; a dependency that has caused many meeting delays and failures on other platforms for the WR test team.

In addition, the use of a dedicated app gives Zoom full control of the call launching workflow and the in-call experience (audio / video quality, content sharing, meeting management, etc.).

Thanks, at least in part, to the use of a dedicated app, Zoom meetings work every time. The same cannot be said for Browser-based calling – at least not today.

On the other hand, by supporting WebRTC connections, Zoom could allow users to participate in calls without having to download and install a client. For some use cases (e.g. a video-enabled help desk environment), this is very important. In addition, WebRTC support, or at least support for Browser-based calling, has become a common request – or even requirement - in many RFPs.

Based on the above, WR suggests that Zoom add WebRTC support to its offering, but continue to drive users toward the Zoom apps to maximize reliability and the user experience.

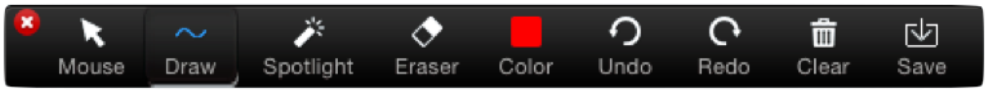
Notable Features / Functions / Capabilities

While not unique, Zoom is one of a handful of video calling services that support direct (point-to-point) calls with automatic escalation to a multi-party call. In addition, instead of forcing all traffic up to Zoom's servers (over the public Internet), during point-to-point calls Zoom attempts to route the media directly between the participants. For example, calls between two people or systems on the same data network will remain internal.

Furthermore, Zoom offers a range of collaboration and content sharing options, some unique to Zoom and others not commonly found in video calling services. For example, the Zoom apps support presence and instant messaging between Zoom users. We tested this function, and although it works well, we think its value is limited by its ability to include only Zoom users.

Zoom's content sharing capabilities are also quite strong. Specifically, the system allows users to share their desktops, a single app, or content on any AirPlay-capable device (e.g. iPhone, iPad, or Mac PC). As far as we know, AirPlay server support within a video calling client is a Zoom-only capability at this time, and it works extremely well. AirPlay server capabilities within a Windows App is also noteworthy.

Furthermore, users can annotate on top of any shared content, and save annotations for future viewing (see screenshot of annotation options below). Also, any user sharing content can allow other users to remotely control his PC. The system also includes a whiteboard function, and supports both local and cloud-based recording.



Zoom also allows users to conduct audio + content only sessions for low bandwidth situations and situations when content (and not video) is what matters.

WR tested all of the above and we were pleased with both the functionality and the "feel" of the functions. The apps themselves were designed well. And despite the low cost, Zoom didn't skimp on the functions within each feature. For example, when an app is being shared, the shared window is outlined with a green halo to remind the user that his content is being shared with others. Similarly, the content share function is dual-monitor aware. These items may not be unique to Zoom … but they are often missing in other solutions.

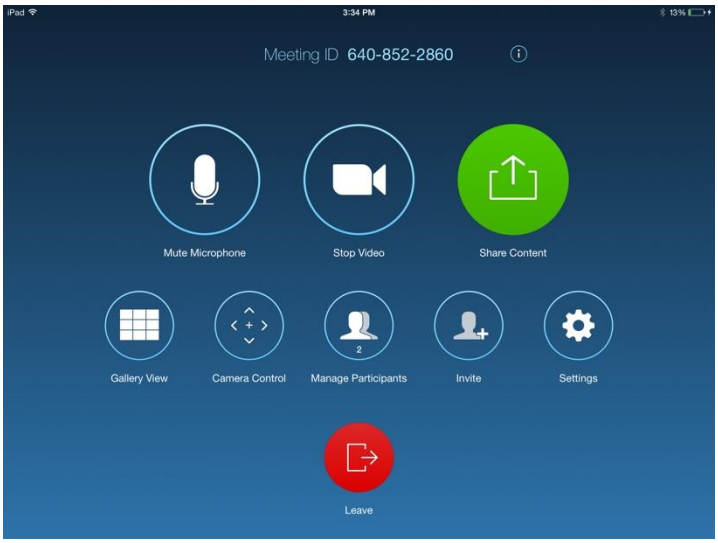
Zoom Rooms

Zoom Rooms is a Mac (OS X) software application that turns a Mac Mini into a dedicated, Zoom-based meeting room collaboration system. A complete Zoom Rooms system requires the following:

- A suitable Mac computer (e.g. Mac Mini)
- A USB camera / speakerphone combination (e.g. a Logitech webcam, a Logitech CC3000e, or a HuddleCam HD system, Jabra SPEAK 510, etc.)
- An iPad to control the Zoom Rooms system
- A Zoom Rooms license ($49 / month)
- The Zoom Rooms software (available for download from the Zoom website)

The Zoom Room registration process varies based on the type of calendaring system the user wishes to integrate with Zoom. Supported options include Google Calendar, Office 365, and Exchange 2007 / 2010 / 2013, or no calendar integration at all. WR's stepped through the registration process with the "no calendar integration" option and found it doable, but far from intuitive. When calendar integration is used, the process is apparently a bit harder. For example, in Exchange environments, an IT admin must run a few shell commands on one Exchange server in order to display meeting subject information on the Zoom iPad controller.

Zoom Room is controlled via the Zoom Room iOS App (available from the App Store), and the overall functionality is similar to that of the Zoom PC apps. For example, using the iPad, Zoom Room users can start a meeting, join a meeting, invite users, manage participants, change the screen layout, control the camera (if a PTZ camera is used), mute audio and video, share content, and more (See image of in-meeting control on right).



Advanced features include support for two displays (video and content), wireless content sharing, wired content sharing (requires a separate USB capture device), and audio-only calling (requires Zoom's Premium Audio license).

WR conducted a wide range of test calls using Zoom Rooms, and the system performed extremely well. In our case, we used the Logitech CC3000e as our camera and speakerphone, and thus enjoyed a strong audio / video experience.

To be clear – in many ways, Zoom Rooms offers similar functionality to group video conferencing systems from Cisco, Polycom, and others. However, Zoom Rooms was designed to extend the Zoom ecosystem into a meeting room environment. And while Zoom allow SIP / H.323 endpoints to join Zoom meetings (via the Zoom Room Connector / gateway), Zoom Rooms cannot directly connect to SIP or H.323 systems. This limits Zoom Rooms' ability to directly replace standards-based group video systems.

While we were very pleased with Zoom Rooms, we believe the registration process – especially when calendaring is in use – should be streamlined. Also we suggest that Zoom add support for BYO devices to control Zoom Rooms.

The Zoom Hybrid Model

By default, Zoom is a cloud service. However, Zoom Business or Enterprise Level customers ($19.99 / user / month) can opt to run elements of the Zoom service locally, on their own data network. This hybrid architecture, called Zoom Meeting Connector, offers several key benefits including:

- Enhanced user experience - the traffic stays local, and an enterprise's QoS policies can be used
- Reduced network cost – by keeping traffic internal, less Internet bandwidth is required
- Enhanced security - the data never leaves the corporate network

In our humble view, Zoom went above and beyond with its hybrid approach. First of all, Zoom Meeting Connector supports various deployment options starting from a single VM running a Zoom Zone Controller and Zoom Multi-Media Router [2], to a distributed deployment including redundant Zoom Zone Controllers and multiple Zoom Multi-Media Routers running in multiple VMs on multiple machines.

Furthermore, Zoom even allows a single company to use different license levels. So some users could leverage Zoom cloud, while others could use on premise Zoom Meeting Connector servers.

Zoom offers three other applications, deployed as VMs, for installation on the customer premise:

- Zoom Room Connector allows standards-based video systems to connect to Zoom meetings.
- Zoom Recording Connector enables on premise recording of Zoom meetings.
- Zoom Broadcast enables Zoom customers to host on premise webinars.

While each of the above apps is useful on its own, the ability to deploy the apps in the same environment adds even more power to the environment. For example, by using all four apps together, a company could use one of its standards-based video conferencing rooms as the broadcast studio for a Zoom-powered on premise webinar.

WR tested the Zoom Meeting Connector and Room Connector in our test environment running on our VMWare environment. Without exception, these apps worked as expected, offering a high quality Zoom experience running on our internal servers. While we did not load test the servers,[3] the Zoom Meeting Connector stats showed only a trivial amount of activity during our testing. The Room Connector, however, showed an increase in resource utilization each time we added another SIP endpoint to the call. Given the Room Connector's need to transcode between SIP and Zoom formats, this makes perfect sense.

It is also worth pointing out that unlike other systems we've tested, the installation of the Zoom VMs was basically turnkey. Zoom obviously invested time and money in making its hybrid solutions not only functional and extensible, but also easy. Our testers noted that even a mid-level IT admin could install this complete environment independently.

One minor nit – we find it interesting that Zoom charges $19.99 / month / Business Plan user, regardless of whether the user is connecting to Zoom's cloud service or to Zoom Connectors on the customer's premise. FWIW – this is not the first time we've seen this same pricing paradox.

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[2] Zoom Meeting Connector requires two parts; a "Zoom Zone Controller" that manages the deployment, and at least one "Zoom Media Server" that handles the audio, video, and content media for the session. The actual number of connections supported by a single Zoom Meeting Connector server depends on various factors. However, since Zoom endpoints interoperate natively, no transcoding is required. As a result, a single Zoom Meeting Connector can support up to 350 simultaneous connections.

[3] Our largest test call included eight (8) participants including PCs, mobile devices, and group video conferencing systems. Some of the test systems used the Zoom apps, while others used SIP.

Zoom Integrations / Advanced Features

Zoom also integrates – to various degrees – with a handful of third party solutions. Examples include:

- Skype for Business (S4B) / Lync – Zoom offers a Windows plug-in that adds a "Start Zoom Meeting" option to the S4B / Lync user interface. When selected, the plug-in automatically launches the host's Zoom app, starts a Zoom meeting, connects the user to the Zoom meeting, and sends an invite via a S4B / Lync instant message to the selected user. Assuming both users have the Zoom app installed, a Zoom meeting with a S4B / Lync contact is just a click away.
- Salesforce.Com (SFDC) – Zoom's SFDC integration allows users to start an instant Zoom meeting from a Salesforce contact or lead, convert existing Salesforce calendar events into Zoom meetings, and schedule Zoom meetings within the Salesforce user interface.
- Slack – Zoom's Slack integration is menu driven and allows Slack users to start a Zoom meeting or join a scheduled Zoom meeting from within the Slack user interface.
- Other Integrations – Zoom also integrates with other third-party systems including various learning management systems (via the LTI protocol) and many other systems via Zapier.

Zoom also provides a robust API / SDK to enable other systems to integrate with Zoom. Furthermore, Zoom supports single sign-on (SSO) via SAML 2.0 and with Google and Facebook.

WR tested the S4B integration and found that it worked exactly as expected.

Key Weaknesses

In general, the WR test team was very pleased with the Zoom service in both its cloud form and its customer premise (hybrid) form. However, as with any technology product / service, some things could always be improved. In this case of Zoom, the list of items to remediate is fairly limited and includes:

- Lack of S4B / Lync Interop – although Zoom offers a Lync plug-in to redirect S4B / Lync users into Zoom meetings, Zoom does not currently offer S4B / Lync interop. Given the popularity of Lync in the enterprise, WR urges Zoom to add real Lync interop to its offering.
- Lack of WebRTC Support – although the Zoom apps are reliable, powerful, and easy to install, the lack of a WebRTC support is a noted weakness for this platform – especially as it pertains to infrequent, guest users.
- Presence / IM User Interface – Zoom's user interface is optimized for audio / video / content sessions, and not for presence and instant messaging. For example, the contact list is the third menu item on the bottom, and the chat function can be opened in two places – from the contacts menu, and from the chat menu. Note that this is not a functionality issue. In fact, the system offers power features including an indication of whether the user is logged in from a PC or mobile app. It is more of a look / feel challenge related to the fact that presence and IM are not the focal points for this offering.

CONCLUSION

The WR test team has hosted literally hundreds of Zoom meetings over the last few years, and with very few exceptions the results have been outstanding. Calls connect very quickly, regardless of which app (Windows client, Mac client, Linux client, iOS client, Android client, Blackberry client) is in use. And the audio / video / data sharing experience is strong time and time again. In fact, with the exception of situations with severe network issues unrelated to Zoom, we cannot identify a single Zoom call that has failed to meet our quality of experience expectations.

During this round of testing, most of our time was spent on Zoom's collaboration / content sharing features, the Zoom Rooms system, and the Zoom Connector software offerings. Once again, Zoom did not disappoint. The collaboration and content sharing worked beautifully. Zoom Rooms was easy to install, easy to use, and provided a strong user experience in our conference room. And the Zoom Meeting and Room Connector virtual software solutions provided a no-compromise Zoom experience running on our own servers and using our internal bandwidth.

Overall, we like Zoom's approach to collaboration including the use of apps for better control, management, and quality, and the flexibility to host the entire service within the customer premise.

But mostly we like the fact that Zoom calls always work --- no matter what. From the office. From home. From the hotel. From the airport. From the coffee shop. Despite our best efforts, it was hard to break Zoom. And despite a recent price increase from $9.99 to $14.99 / month (for a Pro user), Zoom still provides quite a bit of bang for the buck.

And according to the company, S4B / Lync interop (via the Zoom gateway) is slated for release around the end of this year, and WebRTC support is planned for release around the time the WebRTC 2.0 spec is ratified. The company also expects to release support for three displays (near-end video, far-end video, and content) in Q1 2016.

While nothing is perfect, Zoom is not that far off.

About the Authors

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Saar Litman is a Senior Researcher & Consultant at Wainhouse Research and has 15 years' of experience in the audio-visual and video conferencing industry. Saar's primary focus is the products, services, and companies within the audio-visual space. In addition, Saar provides AV design services, helps enterprise organizations define and implement global AV standard systems and designs, and manages the WR test lab in Coral Springs, Florida. Saar can be reached at slitman@wainhouse.com.

About Wainhouse Research

Wainhouse Research, www.wainhouse.com, is an independent analyst firm that focuses on critical issues in the Unified Communications and Collaboration (UC&C). The company conducts multi-client and custom research studies, consults with end users on key implementation issues, publishes white papers and market statistics, and delivers public and private seminars as well as speaker presentations at industry group meetings.

About Zoom

(copy provided by Zoom)

Zoom unifies cloud video conferencing, simple online meetings, group messaging, and a software-defined conference room solution into one easy-to-use platform. Our solution offers the best video, audio, and wireless screen-sharing experience across Windows, Mac, Linux, iOS, Android, Blackberry, Zoom Rooms, and H.323/SIP room systems. Founded in 2011, Zoom's mission is to develop a people-centric cloud service that transforms the real-time collaboration experience and improves the quality and effectiveness of communications forever.

For more information about Zoom, please go to zoom.us.