Vivoh Zoom Webinar Multicast Solution

Technical Overview and Requirements

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1: Introducing the Vivoh Zoom Webinar Multicast Solution

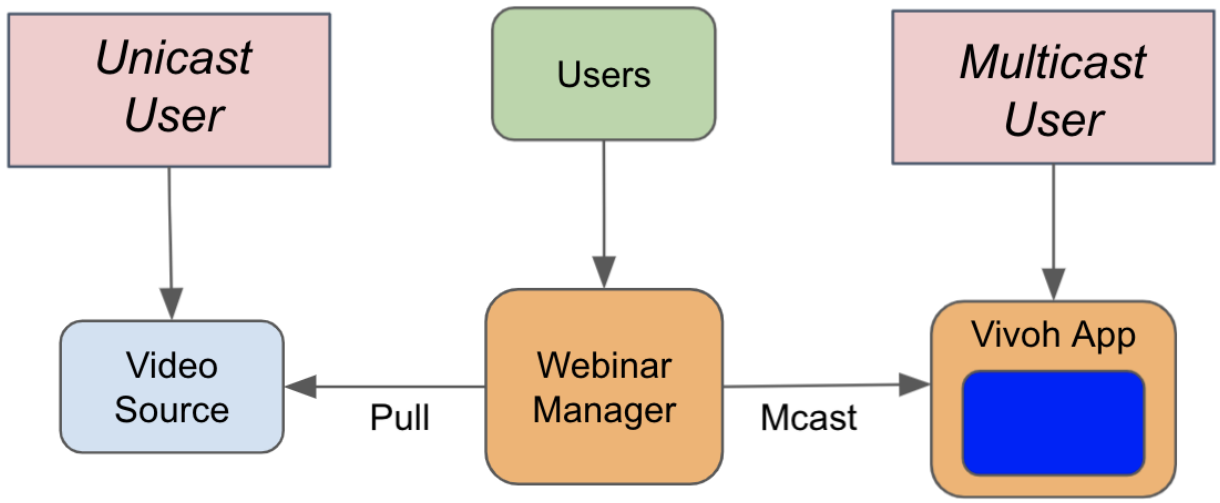
The Vivoh Zoom Webinar Multicast solution enables IT Service Delivery Managers to provide a seamless way to scale Zoom Webinars for enterprise webcasting using the multicast protocol.

Zoom hosts and participants will use the familiar Zoom user interface and experience high quality video without impacting their network. IT Service Delivery Managers will use the Vivoh Webinar Manager server to register their multicast networks as Rules to redirect user requests to either the Vivoh Multicast App or the native Zoom App.

They can also associate third-party messaging resources to the Vivoh Multicast App for their users. These are shared between Zoom Apps and Vivoh so users are part of the same messaging across both in a seamless way. Sli.do and Poll Everywhere are examples of this.

IT Service Delivery Managers can monitor in real-time how many of their users are connecting via Zoom or Vivoh. Logs are provided on both the server-side and client-side and these can be forwarded to central logging servers such as Splunk for further monitoring and analysis.

The Vivoh solution expands the use of Zoom Webinars by enabling multicast delivery of the webinar content. This allows thousands of enterprise users to participate without network disruption.



2: Installation Prerequisites

- Supported Browsers
- Supported Operating Systems
- Required Ports
- System Requirements

Supported Browsers

To access the Vivoh Webinar Manager, your computer must meet the following requirements:

- Windows
    - Internet Explorer 11 and above
    - Firefox 45.0.2 and above
    - Microsoft Edge 44 and above
    - Chrome 49 and above
- MacOS
    - Firefox 45.0.2 and above
    - Chrome 49 and above
    - Safari 10.1.2 and above
- Linux
    - Firefox 45.0.2 and above
    - Chrome 49 and above

Supported Operating Systems

The Vivoh Multicast App is supported by the following:

- Windows 10 and above
- MacOS 10.10 and above
- Ubuntu Linux 14.04 LTS and above

The Vivoh Webinar Manager is supported by the following:

- Microsoft Server 2012 R2 or Microsoft Server 2016 and 2019
- RedHat Enterprise Linux 6.5, CentOS 6.5, Ubuntu 14.04 LTS and above
- Windows 10 and above

The Vivoh Video Server is supported by the following:

- Microsoft Server 2012 R2 or Microsoft Server 2016 and 2019
- RedHat Enterprise Linux 6.5, CentOS 6.5, Ubuntu 14.04 LTS and above

Required Ports

The Vivoh Zoom Webinar Multicast solution consists of three components:

- Vivoh Multicast App
- Vivoh Webinar Manager
- Vivoh Video Server

The Vivoh Multicast App uses configurable multicast group addresses and with four ports (Video RTP, Video RTCP, Audio RTP, Audio RTCP). No outbound connections are initiated by the Vivoh App for multicast video. Optionally, administrators may allow the App to make HTTP requests to third-party Messaging (Sli.do or Poll Everywhere) and captioning services. No beacons, tracking, or logging is sent from the Vivoh App. Optionally, administrators may allow logging to a local file in the user's home directory.

The Vivoh Webinar Manager uses HTTPS for inbound user and management connections. Ports 443 and 8443 are recommended. It uses RTMPS, also on port 443, to pull video for multicast rebroadcasting. Multicast sending is to four ports per concurrent active channel.

The Vivoh Video Server uses RTMPS on 443 for inbound video streaming connections and HTTPS for inbound management connections. Port 1111 is the common port for management.

The ports listed in the following table need to be opened for the Vivoh Multicast App:

Ports	Daemon	Protocol	Usage
Any (eg. 10000-3)	MULTICAST	UDP	Video stream. Add four ports per concurrent channel.

The Vivoh Video Server receives an inbound RTMPS connection from Zoom, which requires an external IP address, and then the Vivoh Webinar Manager pulls this via RTMPS and re-broadcasts it as multicast on an internal IP address. For this reason, care must be taken to ensure that any firewalls, proxies, and other security systems are configured to permit read/write access on the following ports for continuous communications. The Vivoh Zoom Webinar Multicast solution has been successfully tested with several other servers, including Wowza.

The ports listed in the following table need to be opened for the Vivoh Webinar Manager:

Port	Daemon	Protocol	Usage
443	HTTPS_PORT	TCP	End-user connections
8443	HTTPS_PORT	TCP	Administrator connections

The ports listed in the following table need to be opened for the Vivoh Video Server:

Port	Daemon	Protocol	Usage
443	HTTPS_PORT	TCP	Administrator and end-user connections
1111	HTTPS_PORT	TCP	Administrator port for Vivoh Video Server
443	RTMPS	TCP	Stream video to / from the Vivoh Video Server

System Requirements

The Vivoh Zoom Multicast solution includes the desktop Vivoh Multicast App for participants and two server products: the Vivoh Webinar Manager and the Vivoh Video Server. The Vivoh Multicast App runs on Windows, MacOS, and Linux computers that need to be powerful enough to render streaming video. The servers can run on bare metal OS installations or on Virtual

Machines. Currently, the Vivoh Video Server only runs on Linux (compatible Windows video server options are available, for example the Wowza Media Server). Separate machines or VMs are recommended for the Vivoh Video Server and Vivoh Webinar Manager.

The Vivoh Multicast App requires the following:

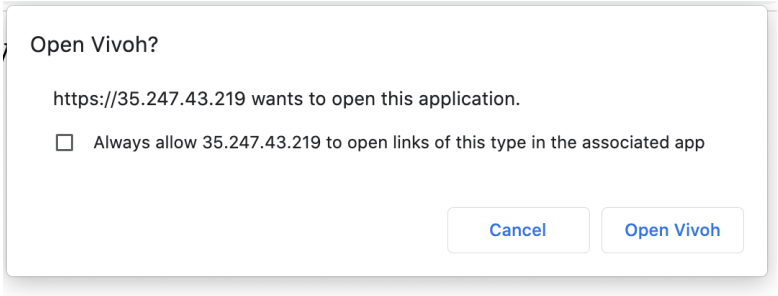
- Memory: 4GB of RAM
- Disk: 250MB
- CPU: 3.00 GHz+

The Vivoh Webinar Manager and the Vivoh Video Server require the following:

- Memory: 8GB of RAM
- Disk: 250MB
- CPU: vCPU=4

3: Installing the Vivoh Zoom Webinar Multicast Solution

The Vivoh Multicast App is deployed with an installer for each participants' target OS. The Windows installer is a Vivoh-developer-signed .exe file generated by the NSIS installation packaging tool and the MacOS installer is a Vivoh-developer-signed .dmg file. The Windows installer runs in silent mode for deployment by tools such as SCCM. The installer updates the Windows Registry or the OSX Properties List with a vivoh:// Custom URL Handler. This opens the Vivoh App as a browser helper application from any link on a web page or chat session.



The Vivoh Webinar Manager for Windows is deployed with an installer that places all required files in a target directory. For Linux, the Vivoh Webinar Manager is distributed as a .deb archive that is installed with the ***dpkg*** command. The Vivoh Webinar Manager can be run manually, via command-line, or configured to run as a service. Vivoh can provide ESXi 6.0+ virtual appliances as OVA images for the Vivoh Webinar Manager which include a secure Linux distribution.

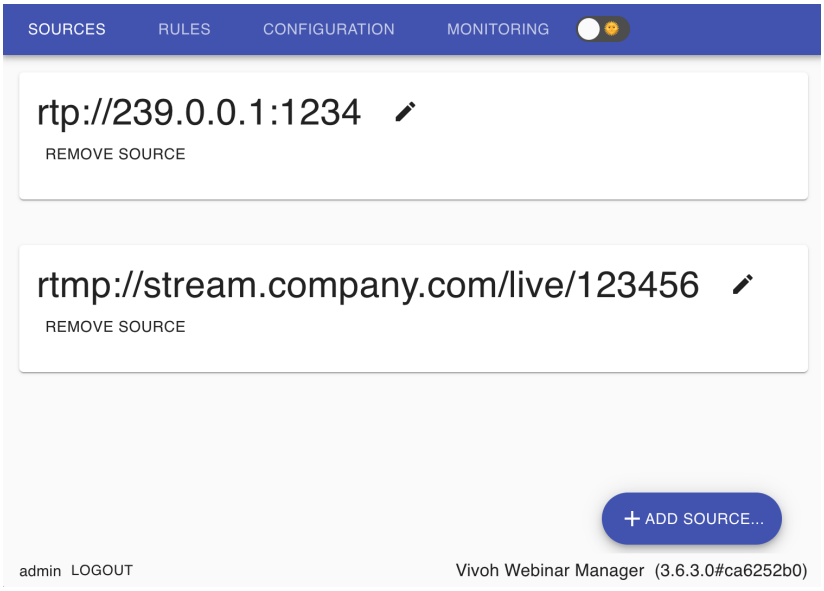
The Vivoh Video Server is a Vivoh-resold and supported instance of the Adobe Media Server for Linux. This can be purchased and supported separately by Veriskope. AMS is still the most secure and reliable way to distribute RTMPS video streams. Vivoh can provide ESXi 6.0+ virtual appliances as OVA images for the Vivoh Video Server which include a secure Linux distribution. The Vivoh Zoom Webinar Multicast solution has been successfully tested with several other servers, including Wowza.

4: Working with the Vivoh Zoom Webinar Multicast solution

The Vivoh Zoom Multicast solution enables IT Service Delivery Managers to provide a seamless way for Zoom Webinar hosts to schedule Zoom Webinars from within the native Zoom interface and have the video from the webinar stream to their users via multicast.

Users must be directed to the Vivoh Webinar Manager which will then route them appropriately. Vivoh supports the ability to host one Webinar Manager externally to first determine if the user is coming from within the corporate network or not and then redirect to another Webinar Manager internally to be able to look up the private, internal, IP addresses of the user. This is used to determine if the user will be directed to the Vivoh App or to the native Zoom App.

Most configuration is via the Vivoh Webinar Manager. IT Service Delivery Managers will use this to register the streaming sources, multicast addresses, messaging URLs, and captioning URLs. They will then create Rules for matching user IP addresses and Webinar ID combinations.



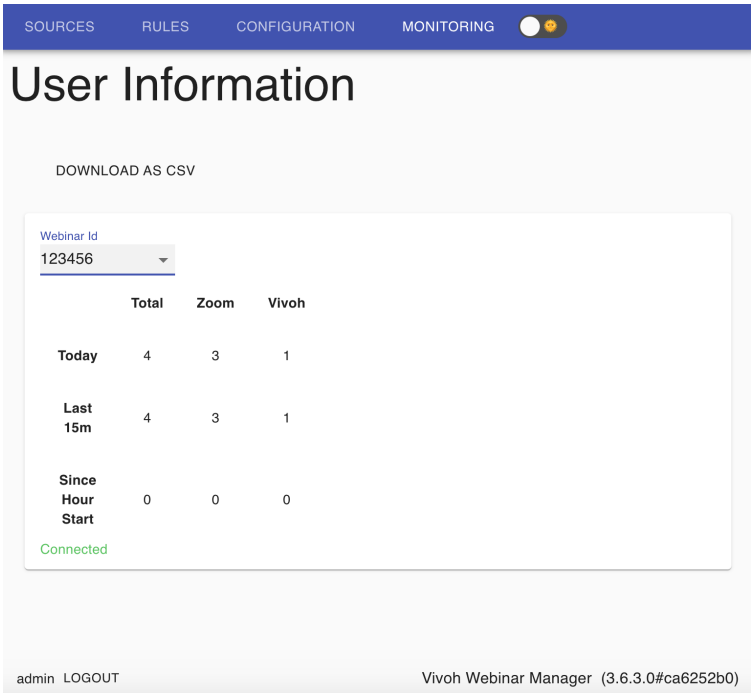
Zoom Hosts will use the Custom Live Streaming URL option to push video via RTMP or RTMPS to the Vivoh Video Server. They should use the Webinar ID as their “Stream Key” as Vivoh will redirect the user to the Vivoh App or back to the Zoom App with the same Webinar ID.

Instead of using the Zoom webinar link, users are given a link to the Vivoh Webinar Manager which will redirect them to either the Vivoh Multicast App or the standard Zoom Webinar App depending upon their IP address and corresponding matching rules in the Webinar Manager. An example of this link is: https://zoom.company.com/zoom/123456789 where 123456789 is the Webinar ID. Use the ${webinar_id} variable for the source to match the “Stream Key”.

The Vivoh Webinar Manager has several configuration options. Please see the Vivoh Webinar Manager Installation and Administration Guide for detailed configuration instructions.

5: Working with Logs and Implementing Analytics

The Vivoh Zoom Multicast solution enables real-time monitoring and logging for analytics on both the server-side and for each user’s app. Vivoh recommends Splunk for analytics processing and the use of Splunk Forwarder agents to pick up the performance log files that are generated by the Vivoh Webinar Manager and Vivoh Multicast App and push these periodically to the central Splunk server. Reports are available via the Splunk interface.



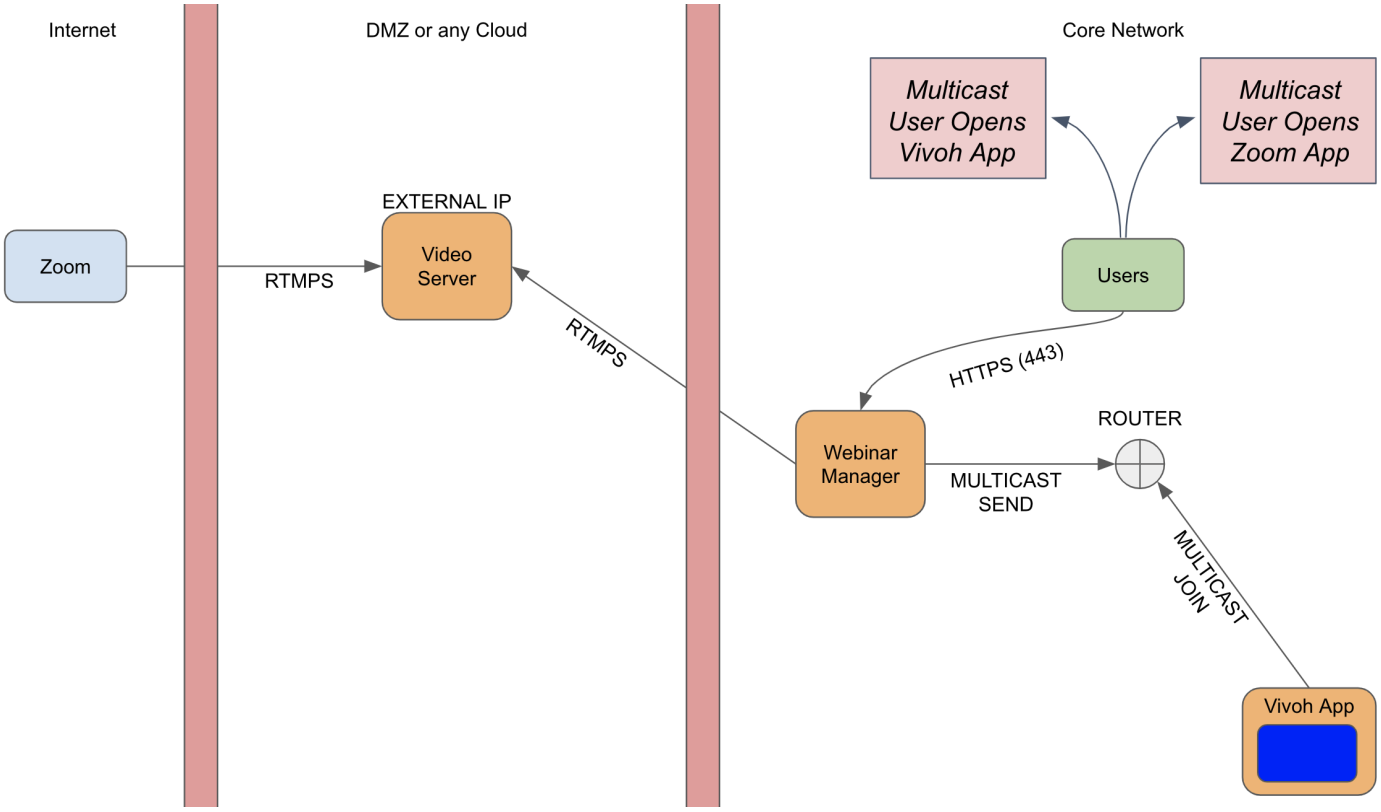
6: Working with Messaging

The Vivoh Zoom Webinar Multicast solution enables IT Service Delivery Managers to provide webinar hosts with a way to bring their audience members into existing corporate communications systems for messaging during their live events.

The Vivoh Multicast App supports any web-based messaging service via the configurable URL. IT Service Delivery Managers will configure the approved base URL for the internal messaging service for each channel or for specific webinars, and Hosts can set up “rooms" based upon the Webinar ID. For example, https://messages.company.com/rooms/${webinar_id} where ${webinar_id} will match the Webinar ID of the Zoom Webinar. A QA icon will appear on the Vivoh App interface if the QA url is provided and this URL will be displayed when the user clicks on the QA icon in the App (see Vivoh Multicast App Image on the next page).

The Vivoh Zoom Webinar Multicast solution supports third-party live captioning, for example StreamText. When configured with a StreamText URL the Vivoh Multicast App will provide the user with a CC icon which will display captioning within the App.

7: Vivoh Zoom Webinar Multicast Solution Data Flow Diagram



8: Vivoh Multicast App Image