Deployment Model Concepts for Cisco Show and Share

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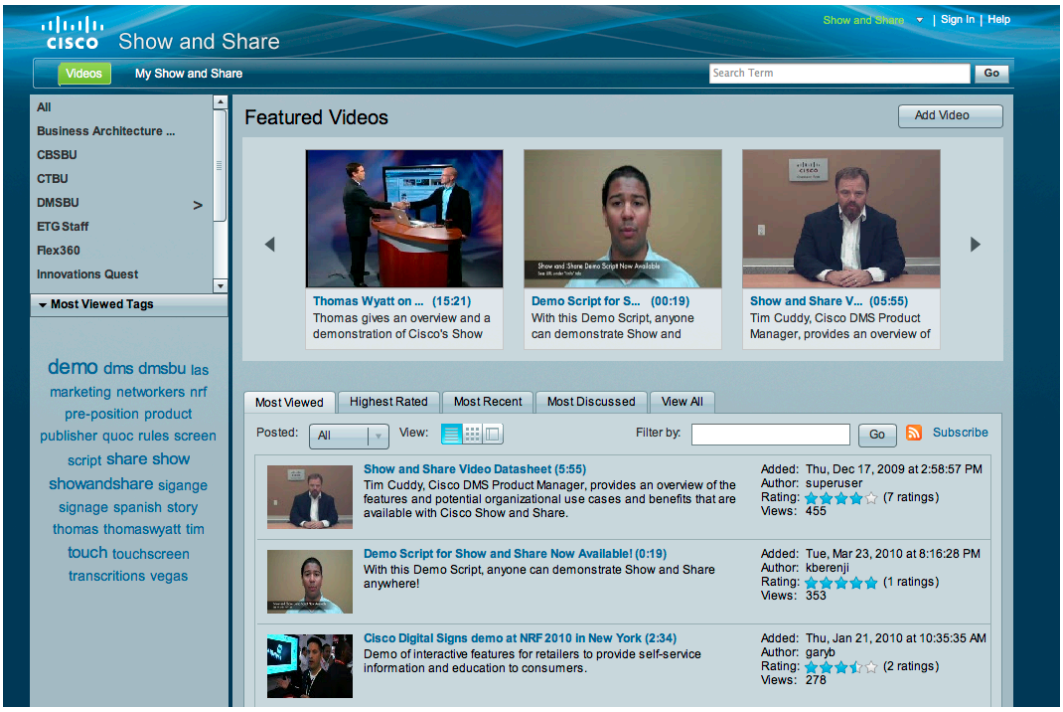

Introduction

This guide describes deployment models for Cisco Show and Share. In addition, it notes performance test results for the web server and streaming server that we include in Show and Share.

This guide also helps you to understand how the streaming server operates, and summarizes key points to consider when you plan whether to obtain and use an optional, external streaming server.

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1. Show and Share Deployment Models

Show and Share is a social software system that delivers reliable, secure, usable tools to create and share video content in the Enterprise. Show and Share supports two models for content storage and streaming.

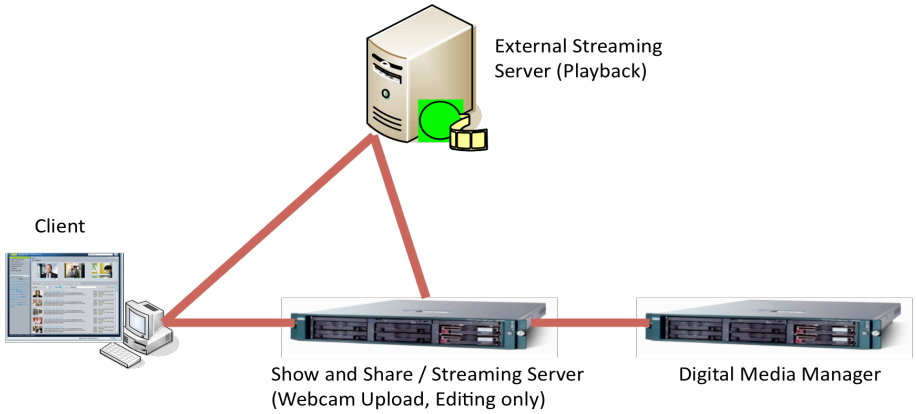
- In the *co-hosted* model, your Show and Share appliance stores and streams you're content.
- In the *distributed* model, an external server stores and streams the playback of your content.

Co-Hosted

Each Show and Share appliance is equipped with a native streaming server, which we invoke when you edit video or capture video from a webcam. However, Show and Share scalability and performance are both impacted when you routinely rely upon this streaming server for playback. We do not generally recommend the co-hosted model for Show and Share deployments in production networks.

Distributed

We recommend that you use an external content and streaming server. In this case, we continue to invoke the native streaming server in Show and Share when you edit video or capture video from a webcam, but we offload playback to the external server after the content is published. You can use multiple external content and streaming servers with Show and Share.



1.1 Native Show and Share Streaming Server

Show and Share site visitors use the Adobe Flash plug-in to play .flv, .mp4, m4v, mp4v (H.264), and .mp3 files. They use Windows Media Player for .wmv playback. These media formats all support both streaming playback and progressive download to the desktop. Whether a media file is downloaded or streamed depends on the type of server that stores it. The native streaming server in Show and Share supports the streaming of Flash and MPEG-4 content only.

**Note: Files edited within Show and Share require a flash enabled streaming server, and can not be progressively downloaded. This is explained below in the "Show and Share Streaming Server Functions" section.*

Progressive Downloading vs. Streaming

You can use various methods and server types to serve digital video to Show and Share site visitors. For example, you might serve a video file from a mounted CIFS share, or use a web server, such as IIS or Apache for this purpose. Another method is to use a video-streaming server.

Suppose that one of your site visitors starts to watch a .wmv file on Show and Share and the video is stored on any host **except** a Windows Media streaming server. His or her browser begins an HTTP progressive download to the local buffer. As the file buffers, playback begins. It is not possible to skip forward until the whole file is buffered. When the time to buffer is longer than the video's actual duration, playback might be interrupted or choppy. The Windows Media plug-in controls this behavior through its methods to decode and play video.

Now suppose that you serve this same .wmv file from a streaming server, which can deliver media more intelligently to its clients. The video bitrate constrains the download rate. This method is more scalable than the alternative because the streaming server is less strained and can serve more clients.

Streaming a video also allows the user skip through the video easily. When a user selects a part of the video that has not finished downloading, the video player notifies the streaming server to skip over to that segment of the video, and continue the file streaming from there.

See the URL below for more information on the differences between streaming and progressively downloading:
http://www.microsoft.com/windows/windowsmedia/compare/WebServVStreamServ.asp

Show and Share Streaming Server Formats and Protocols

Show and Share supports two video plug-in for browsers: Windows Media Player plug-in and Adobe Flash Player plug-in. Show and Share streams content using the **Real Time Messaging Protocol** (RTMP) developed by Adobe Systems.

RTMP is used to stream .mp4, .m4v, .mp4v, .mp3, .flv file formats.

For .wmv playback, Show and Share will natively use HTTP to progressively download the video to the user. For .wmv streaming support (multicast or unicast), an external .wmv streaming server is required (ie. Windows Media Services).

Show and Share Streaming Server Functions

The built in Show and Share Flash streaming server performs necessary functions in both co-hosted and distributed deployments.

- **Webcam uploading**

  When a user records a video within Show and Share using their local web camera, the video is streamed directly to the Show and Share server and remains there even after the video is published. Once the video is published, a copy is sent to the external streaming server if there is one present.

  **Show and Share will keep a copy of this file for re-editing purposes in the current release, 5.2.0.20. System administrators need to monitor disk space and manually remove old or seldom accessed files.*

- **Video Editing**

  For a video to be given the "edit" option (thumbnails, chapters, slide synch, transitions, split, etc), it must reside on the Show and Share streaming server. After editing, the video can be re-published and the edited video will be copied onto the external streaming server (or copied to Show and Share server's local hard drive for co-hosted deployments).

  Video editing in Show and Share is non-destructive. Edits are done by creating pointers in the video, using the internal streaming server. For example, if you delete the first 10 seconds of your video, Show and Share will leave a mark 10 seconds into your video, and begin playback from there. Likewise for the other edits such as creating chapters and slide synchronization.

  Therefore, when playing back edited videos in Show and Share, a Flash streaming server is required to interpret the pointers created by the Show and Share video editor. If you don not use a Flash streaming server, you will not see any edits done using Show and Share.

  **Show and Share supports editing of all supported formats except for Windows Media (.wmv).*

- **Streaming Video Playback**

  In a co-hosted deployment, streaming video playback will utilize the native Flash streaming server. As stated earlier, it is recommended that an external streaming/storage server be deployed for published content. If the video is deployed to an external streaming/storage server, the Show and Share server will not be used for production playback thus offering more overall scalability and system performance.

1.2 Show and Share Performance Tests

The performance tests results below will give you a good understanding of the scalability of the current Show and Share release, and all of the factors that go into defining the capacities Show and Share.

Testing was performed on the MCS 7835-H3 & WAVE 574. These are the current servers that are shipped with new deployments of Show and Share. The MCS 7835-H3 is positioned for Enterprise deployments, while the Wave 575 is positioned for smaller Workgroup deployments. The test results show performance comparisons and limitations between the different platforms.

Note:
These are "pure" results, and assume no other functions are being performed by Show and Share. If Show and Share is performing multiple tasks concurrently (i.e. uploading, editing, and playback streaming), the performance results may be impacted.

Streaming Server Test Cases and Results

Streaming Video Playback
For these test results, FLV and MP4 content is played back using the Show and Share Flash streaming server under the following test conditions:

Server Connectivity ----------1Gbps
Format ---------- FLV & MP4
Video Bit-Rate ---------- 495kbps*

**495kbps is the bit rate used by the "Record a Video" feature in Show and Share*

Server	Concurrent Playback Streams (Staggered)	Concurrent Playback Streams (Burst)
MCS 7835-H3	1200	1100
WAVE 574	1200	1100

Staggered – Playbacks requested asynchronously. These results mimic typical use, where multiple users are viewing content over a small period of time versus all at the exact same time.
Burst – Synchronous playback requests.

These test show the same results on both the Enterprise and Workgroup Show and Share servers. As with any streaming server, there are limits in software that ensure performance quality and consistency. For streaming playback of 495kbps files, hardware advantages of the MCS 7835-H3 aren't obvious because of the current streaming software limits.

Webcam Upload

When webcam videos are recorded using the Show and Share "Record a Video" function, they are streamed to the Show and Share server and saved as a Flash video file (.flv) in both distributed and co-hosted deployment models. Results below were gathered using the following test conditions:

Server Connectivity ----------1Gbps
Format ---------- FLV & MP4
Video Bit-Rate ---------- 495kbps*
Video Duration ---------- 10 Minutes

**495kbps is the bit rate used by the "Record a Video" feature in Show and Share*

Server	Concurrent Uploads (Staggered)	Concurrent Uploads (Burst)
MCS 7835-H3	200	200
WAVE 574	180	40

Staggered –Uploads requested asynchronously. These results mimic typical user interaction where there are multiple authors uploading content within a small period of time versus at the same exact time.
Burst – Synchronous upload requests with multiple authors uploading at the same time.

The MCS 7835-H3 outperforms the WAVE 574 in both upload tests. In addition to higher CPU and memory capacities, the MCS 7835-H3 has more local storage for these webcam uploads. In this release of Show and Share, webcam uploads remain on the Show and Share server for editing capabilities. Additional content management functions are being considered in a future release of Show and Share.

Progressive Downloads
WMV playback is supported with Show and Share, but the files are not streamed natively. These files are progressively downloaded from the Show and Share internal web server. To stream WMV files, an external WMV streaming server is required. (See Progressive Downloading vs. Streaming section).

Server Connectivity ----------1Gbps
Format ---------- WMV
Video Bit-Rate ---------- 495kbps*
File Size ---------- 37 MB

**495kbps is the bit rate used by the "Record a Video" feature in Show and Share*

Server	Concurrent Progressive Downloads (Staggered)
MCS 7835-H3	180
WAVE 574	120

Staggered – Progressive downloads requested asynchronously. These results mimic typical use, where multiple users are requesting the content over a small period of time versus all at the exact same time.

Web Server Test Cases and Results

Page loads (including content listing and user authentication) and file uploads are impacted by the Show and Share internal web server performance. These results are the same for both distributed and co-hosted deployments.

Page Loads
When the Show and Share main page is first loaded, many of the elements are cached onto the client's computer, so that when categories or custom listings are requested, the entire page does not need reload. This improves the responsiveness of Show and Share. However, functions that do affect Show and Share's responsiveness are:

- Number of users in database
- Number of videos in database
- Hardware performance

These test results reflect the time it took Show and Share to load the main page. Show and Share organizes and parses through user credentials and video metadata, which provide features such as content security, customized listings, favorites, comments, etc. All of these are affected by hardware performance. Because of these factors, the test results reflect **pre-login** page loads, and **post-login** page loads.

Case 1

Show and Share Server ---------- MCS-7835-H3
Digital Media Manager Server ---------- MCS-7835-H3
Number of Users ---------- 6,000
Number of Videos ---------- 3,000

Total Requests	Test Method	Time to load all page requests (Pre-Login)	Time to load all page requests (Post-Login)
200	10 bursts of 20 requests	19sec	31sec
1,000	25 bursts of 40 requests	48sec	2min 9sec
2,000	20 bursts of 100 requests	1min 34sec	4min 20sec
10,000	100 bursts of 100 requests	6min 15sec	16min 51sec

Test Method – a number of requests were sent at the exact same time and repeated over and over to test the Show and Share ability to handle spikes in page load requests. Example: "10 bursts of 20 requests" means 20 requests were sent to Show and Share concurrently, and was repeated 10 times.

Case 2

Show and Share Server ---------- MCS-7835-H3
Digital Media Manager Server ---------- MCS-7835-H3
Number of Users ---------- 6,5000
Number of Videos ---------- 3,000

Total Requests	Test Method	Time to load all page requests (Pre-Login)	Time to load all page requests (Post-Login)
2000	20 bursts of 100 requests	2 min 40sec	6min 54sec
10,000	100 bursts of 100 requests	14min 6sec	39min 30sec
10,000	200 bursts of 50 requests	15min 3sec	34min 6sec

Test Method – a number of requests were sent at the exact same time and repeated over and over to test Show and Share's ability to handle spikes in video requests. Example: "10 bursts of 20 requests" means 20 requests were sent to Show and Share concurrently, and was repeated 10 times.

Case 3 (WAVE 574)
Show and Share Server ---------- WAVE 574
Digital Media Manager Server ---------- MCS-7835-H3
Number of Users ---------- 10,000
Number of Videos ---------- 300

Total Requests	**Test Method**	**Time to load all page requests (Pre-Login)**	**Time to load all page requests (Post-Login)**
2000	20 bursts of 100 requests	1min 16sec	7min 0sec
10,000	100 bursts of 100 requests	5min 36sec	35min 35sec
10,000	200 bursts of 50 requests	5min 34sec	35min 31sec

Test Method – a number of requests were sent at the exact same time and repeated over and over to test Show and Share's ability to handle spikes in video requests. Example: "10 bursts of 20 requests" means 20 requests were sent to Show and Share concurrently, and was repeated 10 times.

1.3 Cisco Internal Usage Benchmark

Cisco has been using a similar, internally developed application for user-generated video creation and publishing for the past 2 years. This application, known as C-Vision, is in the process of being migrated to Cisco Show and Share. This application and the deployment experiences were used as a benchmark for user features and performance guidelines for Cisco Show and Share. The following table provides some of the current usage and performance of the C-Vision application and a comparison to the Show and Share supported performance recommendations.

Current Cisco Usage and Equivalent Show and Share Support

Statistic	Internal C-Vision	Show and Share Support
Current Number of Unique Users	**71,000+**	**100,000+**
Current Number of Videos	**20,000+**	**Variable, dependent on encoding settings.**
Average Number of Simultaneous Authors - Staggered	**8-10**	**180 – 200** **Dependent on underlying server appliance.**
Average Number of Simultaneous Authors - Burst	**20 maximum reported to-date**	**40-200** **Dependent on underlying server appliance.**

2. External Streaming Server Considerations / Recommendations

For Enterprise deployments of Show and Share, an external streaming server is recommended for video playback. This will preserve server resources for the Show and Share application.

If a web server such, as IIS or Apache is used serve the content, the content will be *progressively* downloaded during video playback. If the content server has a streaming server running, such as Window Media Services or Adobe Flash Media Server, the video will be *streamed* during video playback.

**A Flash streaming server is recommended for flash/mpeg-4 content.*

2.1 Supported Playback Options

Flash
Show and Share can playback .mp4, .m4v, .mp4v, .mp3, and .flv using the Real Time Messaging Protocol, RTMP, the flash streaming protocol. (Currently unicast only)

Note:
MPEG-4/H.264 files must first be encapsulated into one of the above video containers before it can be played back in the Show and Share flash video player

Windows Media Services
Show and Share can support Windows Media Streams (WMV and WMA) using the following protocols:

MMS: Microsoft Media Server
RTSP: Real Time Streaming Protocol (unicast or multicast)

Depending on the organizational needs, external streaming server software can be chosen by the customer, as long as the above requirements are met for streaming content to Show and Share.

IIS or Apache Web Server
If the content is served from a web server, it is progressively downloaded using HTTP. Content that is served with HTTP does not download as intelligently as a streaming download (ie RTMP, MMS) and limits the scalability of Show and Share. (see **Progressive Downloading vs. Streaming** above).

2.2 Hardware Considerations

The most important considerations when sizing the hardware of your external streaming server are CPU, Memory, and Disk Capacity.

- Memory on a streaming server can impact the number of clients that can be served. For Enterprise deployments, the maximum RAM supported by your streaming server is recommended (specifications provided by your streaming server vendor).

- CPU can also impact the number of clients that can be served. If memory or CPU on your server reached 95%+, your server will bottleneck. Estimated simultaneous video playbacks, number of Show and Share **publishers** (users who have the credentials to add content), and volume of stored videos, will need to be taken into account when sizing your streaming server processor. (See **Show and Share Application Performance Results** to understand what is considered high or low usage)

- Optimal disk capacity can be determined by considering the number of Show and Share **publishers**, video quality (bit rate), video length, and frequency of use. Much of this information can be well-predicted by discovering the organizational needs that Show and Share is addressing.

  Use the following file size calculator to assist in sizing your disk capacity requirements:

  http://wwwin.cisco.com/etg/digitalmedia/files/bandwidth_time_calculator.xlsx

2.3 Example Server Specifications

For a good idea of the minimum and recommended hardware specifications for external streaming servers, see below for a list of a few popular options.

Note:
Show and Share is <u>NOT</u> limited to only working with the below streaming servers. These are only examples. Cisco does not provide hardware or software support for external streaming servers used with Show and Share. The customer must contact the vendor for any support needs.

Adobe Flash Streaming Server 3.5
http://www.adobe.com/products/flashmediainteractive/systemreqs/

Wowza Media Server
http://www.wowzamedia.com/specs.html

Windows Media Services
http://technet.microsoft.com/en-us/library/bb676138.aspx