Cisco Digital Media System Deployments for Digital Signage with Cisco ACNS Software

The Cisco® Digital Media System is a comprehensive suite of digital signage, Enterprise TV, and desktop video applications that allows companies to use digital media to increase sales, enhance customer experience, and facilitate learning. Support from the broad Cisco ecosystem of deployment, solution development, and content creation partners helps ensure a successful digital media implementation.

The Cisco Digital Media System is easy to install, manage, and use for scalable delivery of high-quality live and on-demand digital media in various formats to a variety of wired or wireless connected devices. You can achieve additional scalability in large deployments by deploying the Cisco Digital Media System with the Cisco Application and Content Networking System (ACNS) Software. Through the combined features of these products, Cisco provides an end-to-end, scalable video content management and distribution solution that can support environments of all sizes, no matter how large or diverse.

This document is intended to help with the configuration of the Cisco Digital Media System with the Cisco Digital Media Manager (DMM) Digital Signage Module (DSM) in instances where Cisco ACNS Software is the primary distribution method for digital media.

Summary

The distributed architecture of Cisco ACNS Software is intended to reduce WAN traffic by intercepting requests for web and video traffic and serving those requests at the network edge from the local cache or file system. This architecture allows for delivery of rich web content and high-quality digital media files to Cisco Digital Media Players (DMPs) without absorbing valuable WAN bandwidth. This document discusses these and many other features that make the Cisco Digital Media System and Cisco ACNS critical pieces to a digital signage solution.

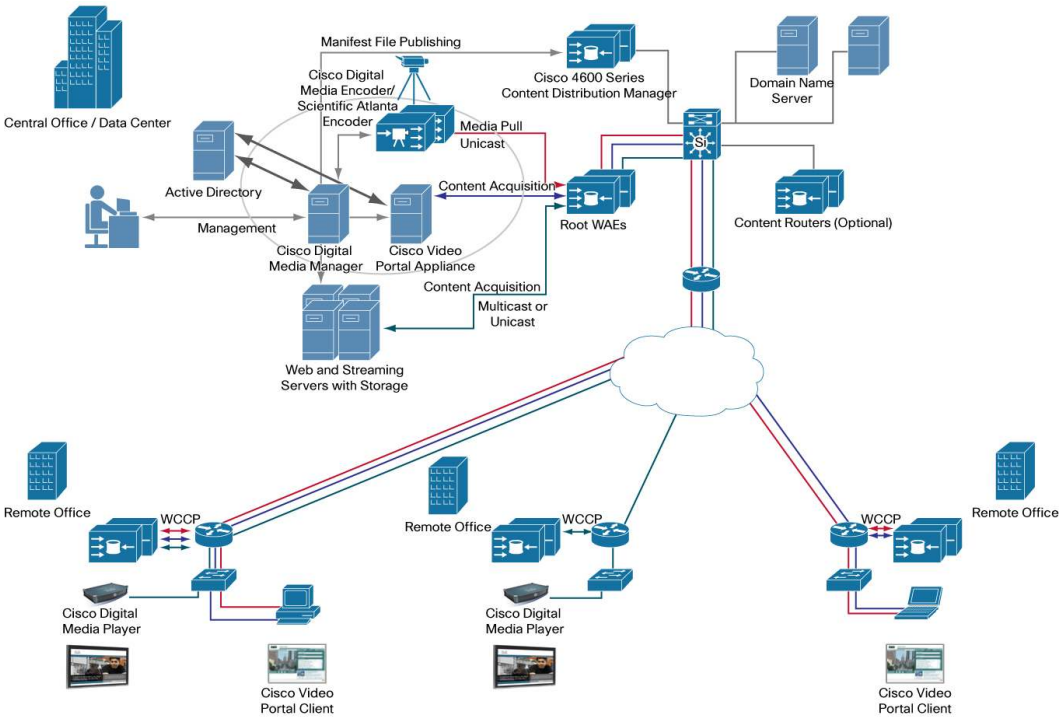
Overview

Customers are looking to integrate the Cisco ACNS and the Cisco DSM to deliver rich multimedia content, including MPEG video, Flash, and HTML graphics to the Cisco DMP. This paper focuses on how you can preposition content through Cisco ACNS to the Cisco Wide Area Application Engine (WAE) Appliances at the remote location. This content is then requested by the DMPs through HTTP playlists generated through the DMM and the Publisher Scheduler tool. All content is delivered to the DMPs by the ACNS system to address limitations that may exist on the WAN. No streaming services need to be enabled for the delivery of MPEG1, MPEG2, or MPEG4 Part 2. You can address DMPs individually or in groups, with unique content either scheduled or impromptu depending on the business needs. The DMPs can have direct proxy configurations, or their requests can be transparently redirected with the Web Cache Communication Protocol (WCCP).

The scenario shown in Figure 1 is not exclusive to Cisco Digital Signage; you can use the same ACNS architecture for Cisco Desktop Video through the Cisco Video Portal. End systems, either

desktop computers or a DMP, can access content from Cisco ACNS by direct proxy configurations, content routing, or WCCP. In this document, all Cisco configurations are based on Cisco ACNS Software Version 5.5.7 and Cisco DMS Version 5.0. Some standalone DMP configurations, typical for small deployments or demonstrations, are also illustrated in this paper. For larger deployments, the Cisco DSM is recommended and available to centrally control most DMP configurations.

Figure 1. Cisco Digital Signage and Cisco Desktop Video over Cisco ACNS



Customer Benefits

The Cisco WAEs have been available with a single-channel audio and video decoder card option for several years. Customers across many market segments including financial services, retail, and education have used this solution to deliver content to non-PC, analog video display devices such as standard television monitors and plasma screens. The DMP extends this capability and the scalability of Cisco video solutions, making it easier for customers to distribute multiple, simultaneous video channels to large displays through branded and customized screen layouts and on-screen zones.

Using the Cisco DMM Digital Signage Module and Cisco ACNS, you can now centrally manage, distribute, and provide rich multimedia digital signage using the IP network as the transport mechanism. You can take full advantage of the intelligence of a robust content distribution network, while separating the tasks related to media organization and publishing to non-IT teams that can focus on content creation and management. The Cisco DMM and Cisco ACNS Content Distribution Manager (CDM) can communicate directly through the Cisco ACNS CDM application programming interfaces (APIs) and DMM manifest file autogeneration, linking the two systems transparently to the DMM administrators.

Primary Applications

- Sales and marketing to customers in the branch office or store

- New product introductions and employee training to branch-office and store employees
- Corporate communications without a PC

The Cisco Digital Media Player

The Cisco DMP is a solid-state network device with a hardened onboard operating system that can be deployed in a standalone or large group deployment. You can manage it through a web-based management interface or through the Cisco DMM Digital Signage Module. An audio and video decoding system for customizable on-screen templates and zoning of digital signage content is installed on each DMP. The DMPs can be connected directly to the Internet (through a cable or DSL modem) or to the customer's LAN, with static or Dynamic Host Configuration Protocol (DHCP)-assigned IP network information.

For large-scale deployments (more than 5 DMPs), you should use the DMM appliance to provide central and remote management and provisioning of all the DMPs. This configuration reduces maintenance overhead and provides greater flexibility and ease of use.

The Cisco DMP supports several different multimedia protocols, including MPEG1 and MPEG2 for high-quality video content and Flash for rich multimedia graphics. For further information about encoding methodologies and formats, refer to the Cisco Digital Media System white paper "Digital Signage Content Overview" at: http://www.cisco.com/en/US/prod/collateral/video/ps9339/ps7220/prod_white_paper0900aecd805acf46_ns714_Networking_Solutions_White_Paper.html.

Cisco ACNS Version 5

The Cisco ACNS Software Version 5 features the technologies of demand-pull caching and prepositioning for accelerated delivery of web applications, objects, files, and streaming media from an intelligent edge device, the Cisco WAEs.

Content Prepositioning: Acquisition and Distribution

A critical innovation in the Cisco ACNS Software 5 is the concept of "acquisition and distribution" using manifest files, dramatically simplifying the content acquisition and delivery process while bringing more intelligence to the network. Configured through the ACNS management interface, the CDM, the manifest file holds a list of defined origin websites to be used for content acquisition. Root WAEs are defined at the data center level with close proximity to where the media source usually resides. Root WAEs acquire the content and distribute it to edge WAEs on the network for playback by DMPs, also located at the edge site. This process of prepositioning facilitates the proactive distribution of rich media for playback through DMPs in both play list and video-on-demand (VoD) modes. For scalability and redundancy, you can deploy the root and edge WAEs in a hierarchy going four levels deep. Depending on the design, typically the root WAEs are "parent" to regional WAEs, whereas branch WAEs are "children" to regional WAEs, hence forming levels of hierarchy. Based on this flexibility of design, Cisco DMM DMPs can be located anywhere within the network and can be easily integrated with Cisco ACNS.

Streaming-Media Support

Streaming-media protocols supported by Cisco ACNS Software on WAEs include Real-Time Streaming Protocol (RTP/RTSP); Microsoft Windows Media Technologies over RTSP; Microsoft Media Server Protocol; Apple QuickTime for standards-based MPEG streaming; and HTTP-streaming delivery of MPEG, Advanced Streaming Format (ASF), and QuickTime Movie (MOV) format files. RTP/RTSP-based Cisco streaming engines are used for VoD integration with the

Cisco WAE. The Cisco DMPs currently are compatible with the ability of the WAEs to deliver MPEG content over their HTTP streaming system. The Cisco Video Portal for desktop video works with the HTTP streaming of MPEG4 and Flash video files, as well as the Windows RTSP streaming services. The Cisco Video Portal and its ACNS integration are discussed in more detail in the "Cisco Digital Media System Deployments for Desktop Video with Cisco ACNS Software" white paper at: http://www.cisco.com/en/US/prod/collateral/video/ps9339/ps6681/prod_white_paper0900aecd8052f42e_ns713_Networking_Solutions_White_Paper.html.

Flexible Client Request Redirection Choices

Cisco ACNS Software 5 offers multiple methods for client requests to be intelligently directed to the most appropriate WAE. You can choose one or all of the following methods, depending on your network infrastructure and preference:

- Transparent edge intercept using WCCP: With WCCP, a router with Cisco IOS® Software transparently redirects specified traffic to local content engines. This technology enables the content engines to store and deliver content locally to users without requiring changes to the existing network architecture, websites, client browsers, or end servers.
- Nontransparent edge intercept: This method either uses a proxy-automatic-configuration (PAC) file or is set on an individual basis on the client web browsers to use the specified content engine (local content engine) as an outgoing proxy for content (such as port 80 and others).
- Content routing using HTTP redirect: Organizations or even specific locations that do not support edge intercept mechanisms can use powerful Cisco content-routing technology to intelligently redirect client requests for prepositioned content using the source IP address of the client desktops.

Integrating the Cisco Digital Media System and Cisco ACNS

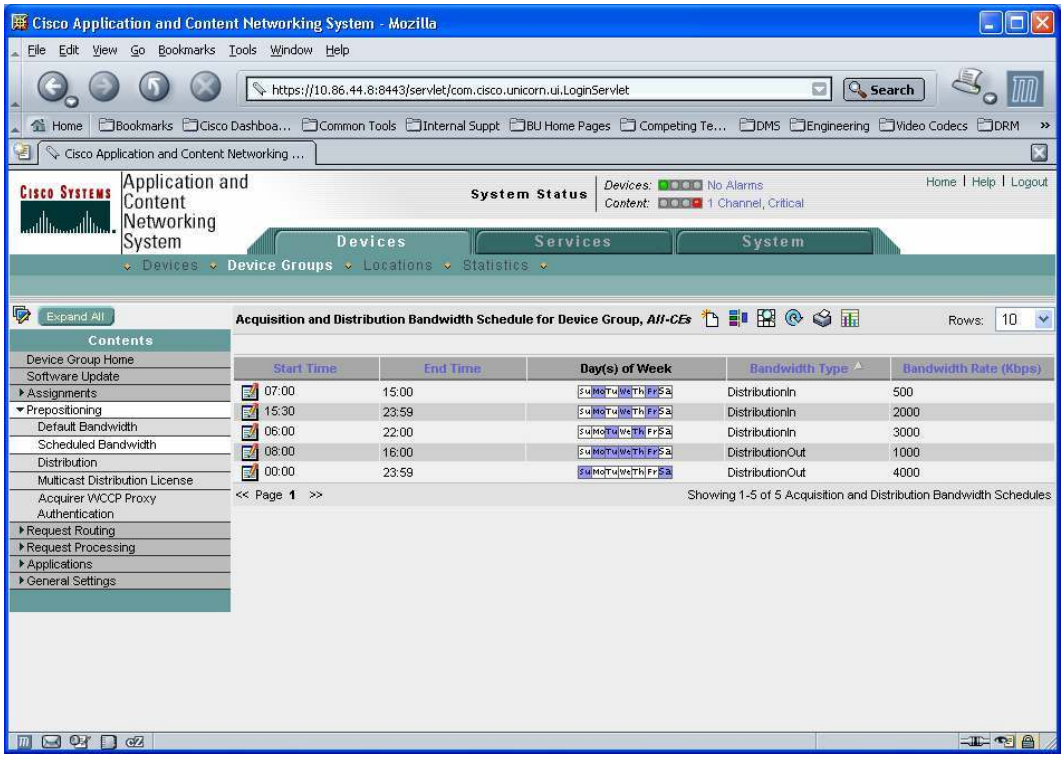
Integration Q&As

Q. How do we deliver content to a location overnight or during nonbusiness hours?

A. With the Cisco ACNS solution, network administrators can define time of day-based content distribution, allowing them to control how media is replicated between the Cisco ACNS-enabled locations. They can apply these configuration settings at either the individual WAE level, or as shown in Figure 2, at the device group level. Network administrators can strictly define how much bandwidth the content distribution system will create across their network infrastructure. The value of this service is most evident with the high-definition content used in digital signage. When content authors create and publish multiple gigabytes of digital signage content, the scheduled bandwidth settings allow the IT team to control the flow of this traffic to the edge, and protect an organization's mission-critical network traffic during normal business hours.

Additional information about this feature and its configuration settings is available in the Cisco ACNS configuration guides posted at: http://www.cisco.com/en/US/docs/app_ntwk_services/waas/acns/v54/configuration/central/guide/8091dist.html.

Figure 2. Content Distribution Bandwidth Schedule: Device Group Level



Q. Should on-demand content be streamed or multicast?

A. On-demand video content is by its own nature requested by an end user or a system such as the Cisco DMP for “right-now” viewing. The intent of on-demand delivery is to allow individual requesters to view the media from start to finish, at the specific time they choose. This type of content is always delivered over unicast streams to help ensure that the viewer is seeing the entire event from beginning to end.

IP Multicast is a network broadcast tool used to deliver scheduled programming to a large audience. IP Multicast events have a scheduled start and end time, so when users or systems join the broadcast, they start watching the event from its current play position. This position may not always be at the beginning, but where in the event the current play position is. IP Multicast broadcasts are available on the network for one or thousands of viewers, with the load on the multicast source always one stream --one of the many advantages of IP Multicast on server and network traffic.

Q. When would I want a WAE at the edge? How much content should I store at the edge? How many DMPs can a WAE support?

A. As a content distribution tool, Cisco ACNS allows IT administrators who are designing a digital signage solution to preposition the digital signage content at the network edge for local delivery to the Cisco DMPs. A Cisco WAE significantly improves the amount of media that can be played on the DMPs, and reduces the amount of WAN traffic created when multiple DMPs exist at a single location. The WAEs range in size from the 40-GB network module for integrated services routers to the 1.8-TB Cisco WAE-7326 Wide Area Application Engine typically located in the data center. You can determine the models and sizes of the WAEs with the Cisco ACNS sizing calculator.

The hard disk drive capacity needed for your edge WAEs depends on the format, duration, and number of media files you have in your DMP play list.

Q. What are the MPEG2 encoding options?

A. The Cisco DMP supports MPEG2 Transport Stream files. MPEG2 Transport Stream is a communications protocol for audio, video, and data that is specified in MPEG2 Part 1, Systems (ISO/IEC standard 13818-1). Its design goal is to allow multiplexing of digital video and audio and to synchronize the combined video and audio output. Offering features for error correction for transportation over unreliable media, Transport Stream is used in broadcast applications such as Digital Video Broadcast (DVB) and Advanced Television Systems Committee (ATSC).

MPEG Program Stream formats are specified in MPEG1 Systems and MPEG2 Part 1, Systems (ISO/IEC standard 13818-1). These formats are designed for reasonably reliable media such as disks, in contrast to Transport Stream, which is for data transmission in which loss of data is likely.

Q. What should I set the HTTP delivery options to?

A. Within the Cisco ACNS configurations, the system administrator can define a default and maximum bandwidth for HTTP traffic. When using the procedure described previously, make sure your default bandwidth is a value greater than the encoded bit rate of your MPEG files. For example, if your MPEG2 file is encoded at 12 Mbps, your default HTTP bandwidth should be set to 13 Mbps to allow for additional HTTP traffic.

Q. What is the maximum encoded bit rate for Cisco ACNS delivery?

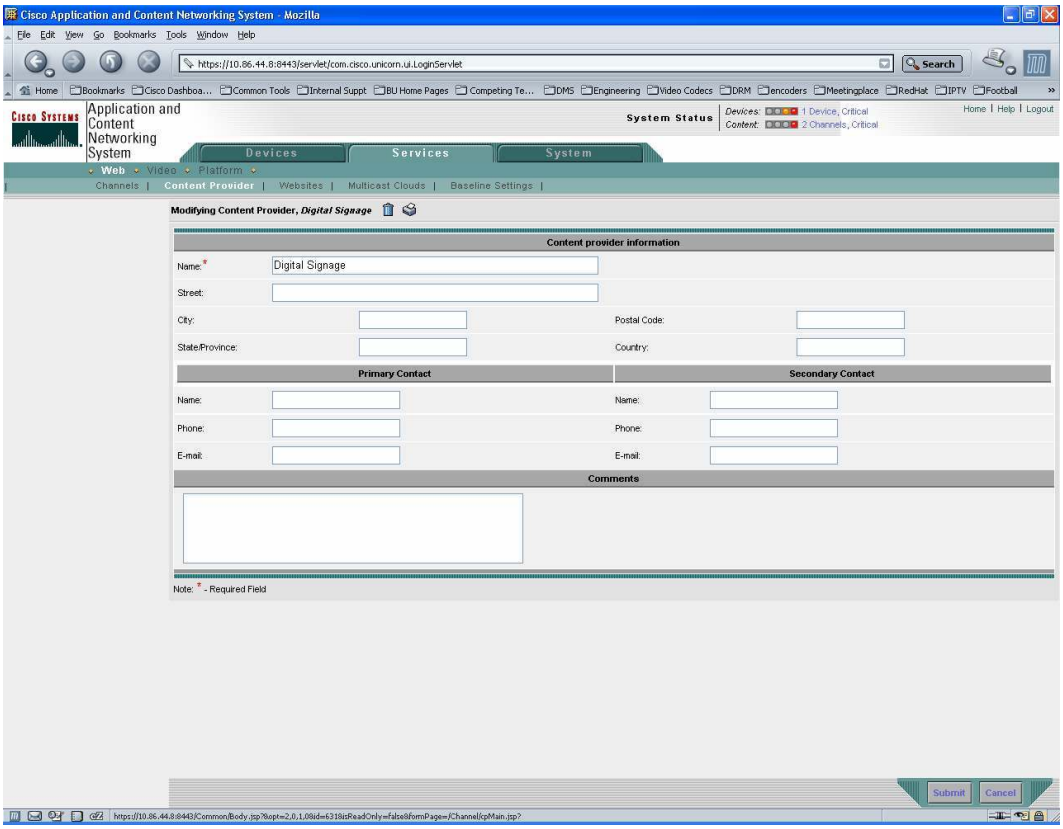
A. The Cisco WAE-612 Wide Area Application Engine has been shown to support MPEG2 Transport Stream files up to 17-Mbps encoded bit rate. DVD-quality content is typically encoded at 10–14 Mbps.

Configuring the Cisco CDM

Configuring the digital signage distribution system within Cisco ACNS starts with defining the media channel(s) within the Cisco CDM. To add a digital signage channel to an existing Cisco ACNS Software environment, follow these steps:

1. From the Cisco ACNS Software 5 CDM GUI, choose Channels > Content Provider, and follow these steps:
   a. Click the Create New Content Provider button at the top of the window.
   b. In the Content Provider Information dialog box (Figure 3), define the new content provider by providing a name and any relevant information to identify the provider.

Figure 3. Content Provider Information Dialog Box



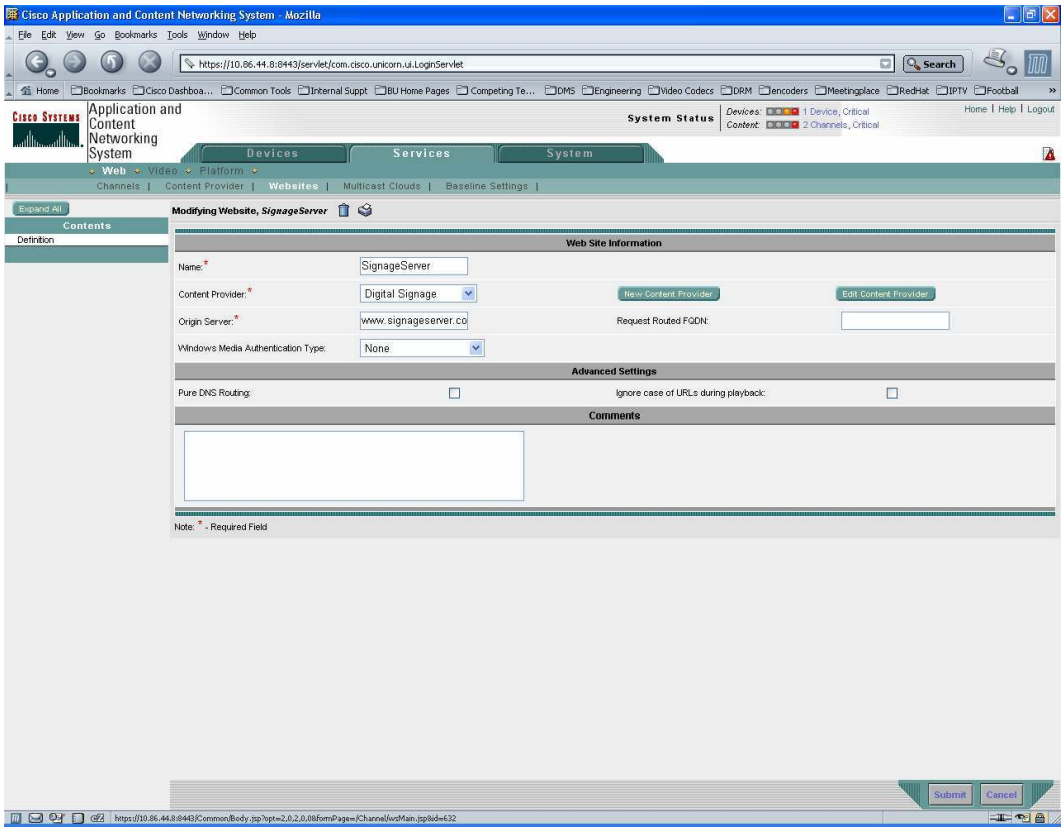
c. Click Submit.

2. From the Cisco ACNS Software 5 CDM GUI, choose Channels > Websites, and follow these steps:

   a. Click the Create New Website button at the top of the window.

   b. In the Website Information dialog box (Figure 4), define the new website name.

Figure 4. Website Information Dialog Box



c. From the Content Provider drop-down menu, choose the new content provider created in step

d. In the Origin Server field, enter the IP address or fully qualified domain name (FQDN) of the Cisco Digital Media System Digital Media Manager.

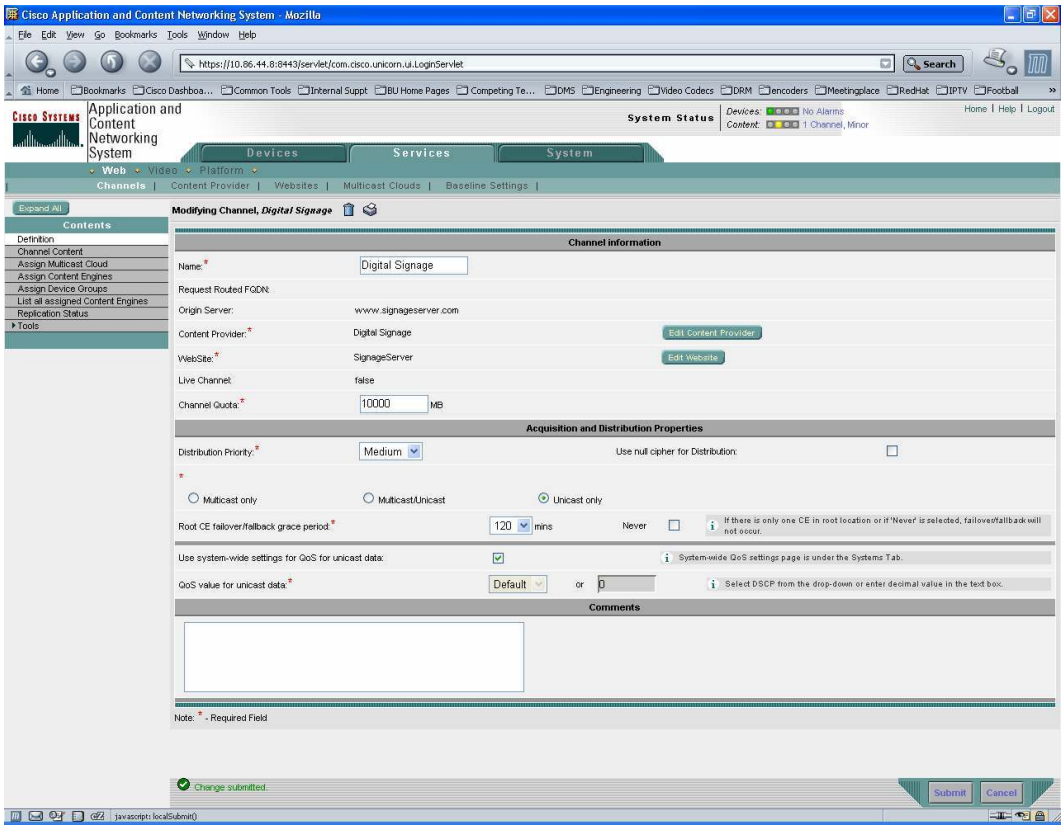
e. Click Submit.

3. From the Cisco ACNS Software 5 CDM GUI, choose Channels > Channels, and follow these steps:

   a. Click the Create New Channel button at the top of the window.

   b. In the Channel Information dialog box (Figure 5), define the new channel name.

Figure 5. Channel Information Dialog Box



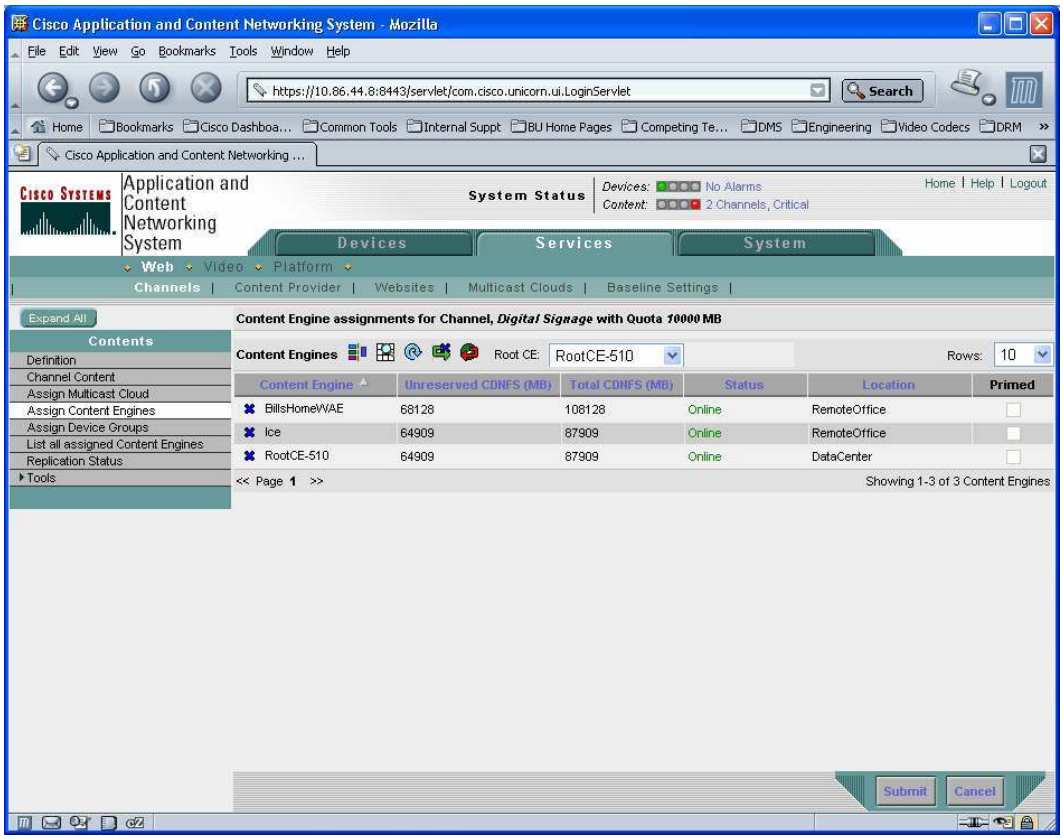
c. In the Content Provider field, choose the previously created content provider.

d. If you have defined a website associated with the new channel, choose it from the Website drop-down list.

e. Define the acquisition and distribution properties.

4. In the Content Engines or Device Groups window (Figure 6), choose the groups to participate in the new channel by doing the following:

Figure 6. Assigning Devices to Channel

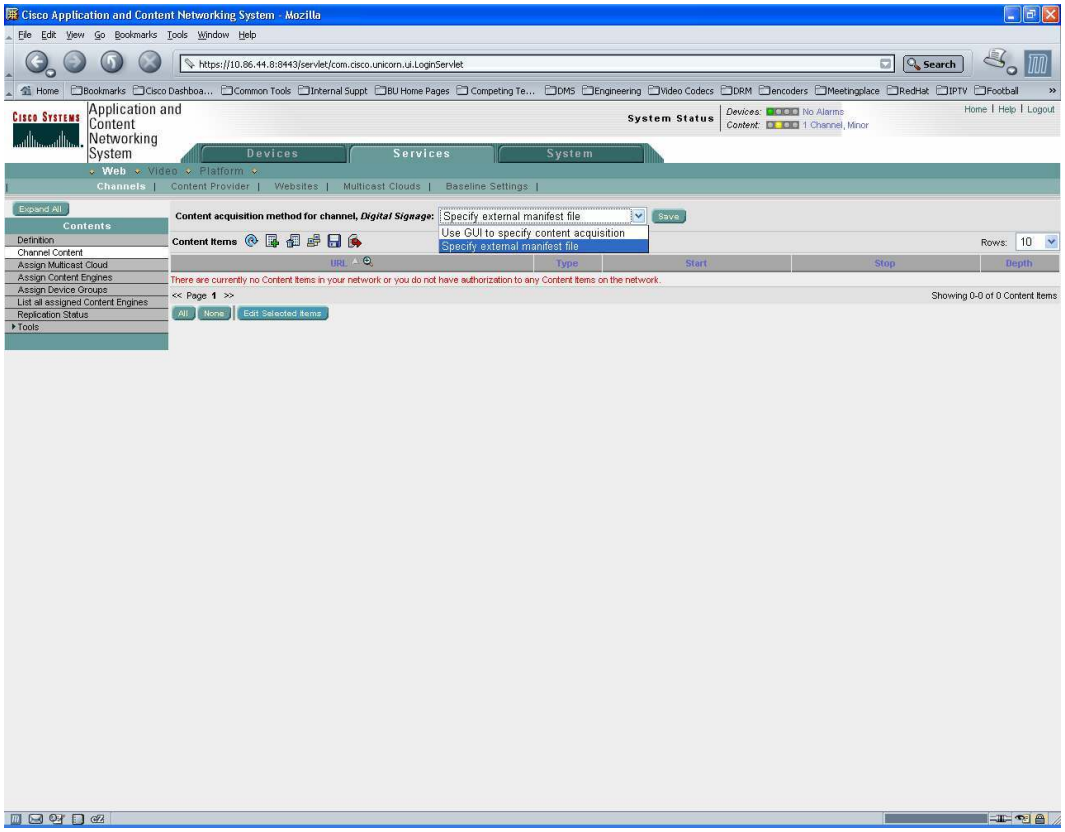


a. Click the blue X so that it changes to a green arrow for each group that you want to add.

b. After you have added all desired groups, click Submit.

5. Define the digital signage channel content. Configure the digital signage content using the CDM GUI for content acquisition (Figures 7 and 8) as follows:

Figure 7. Channel Content Acquisition Method



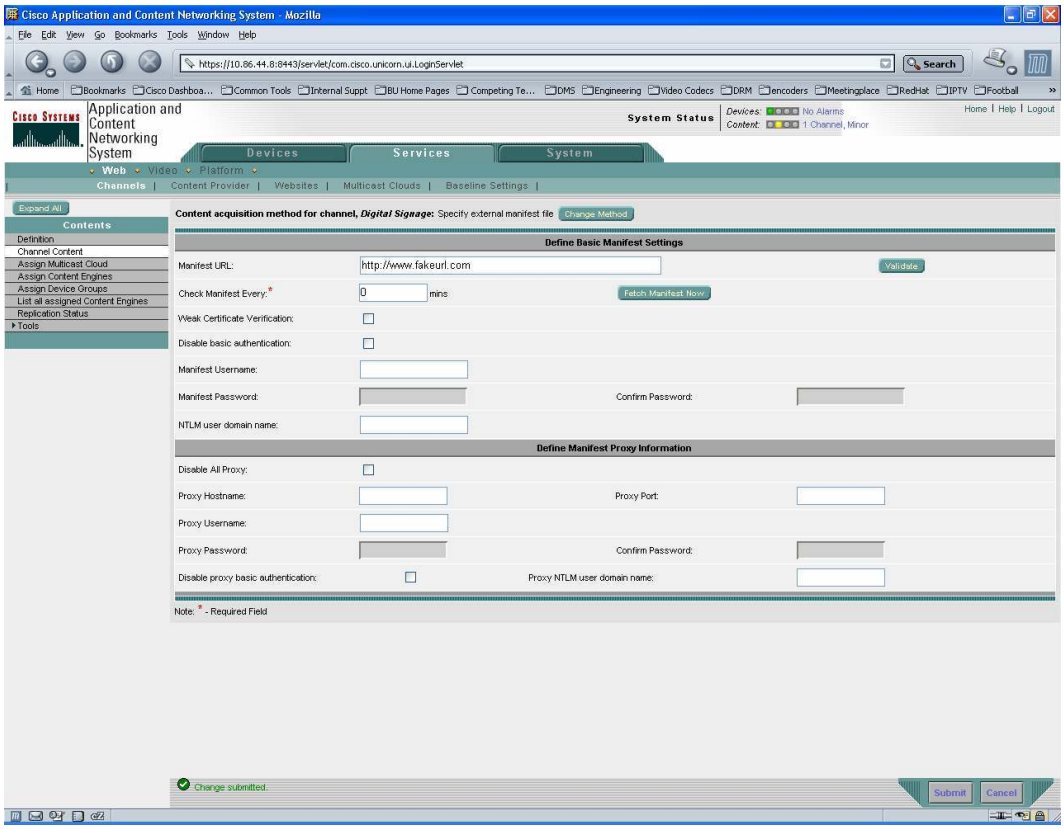
a. Click Channel Content in the Contents menu at the left.

b. From the Channel Content Acquisition Method drop-down menu, select “Specify external manifest file” and click Save.

c. The lower half of this window will change, allowing you to define the location of the manifest file. The Digital Media Manager automatically generates this file during your publishing operation covered later in this document. It is recommended that you fill the Manifest URL field with a nonexistent website.

d. In the Check Manifest Frequency field, use the value 0 (zero). The manifest files will generate dynamically, triggering the CDM to modify the channel content at that time.

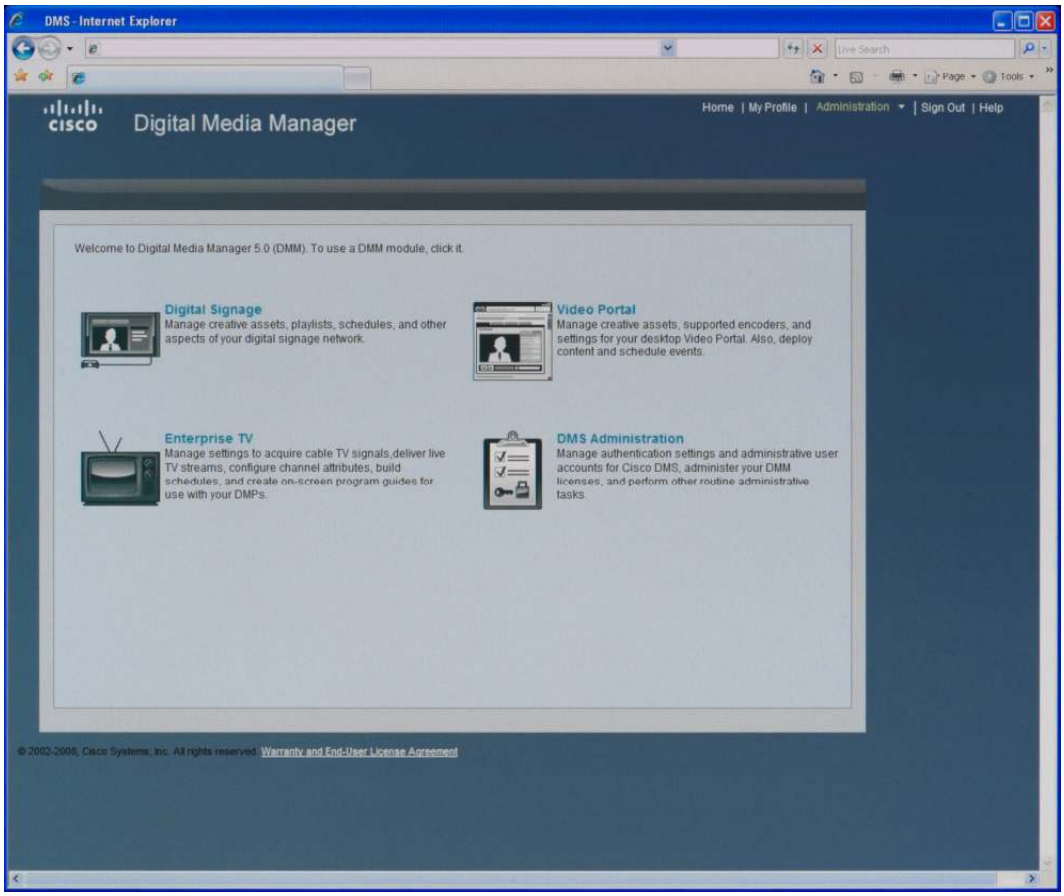
Figure 8. Defining the Manifest File Place Holder



Configuring the Cisco Digital Media Manager

6. Now launch your DMM in a new web browser at http://<youDMMaddress>:8080:
   a. Click the Digital Signage Module icon and log into the DMM-DSM system.
   b. In the top tabs click the Setup tab and find the ACNS settings option (Figure 9).

Figure 9. Cisco Digital Media Manager

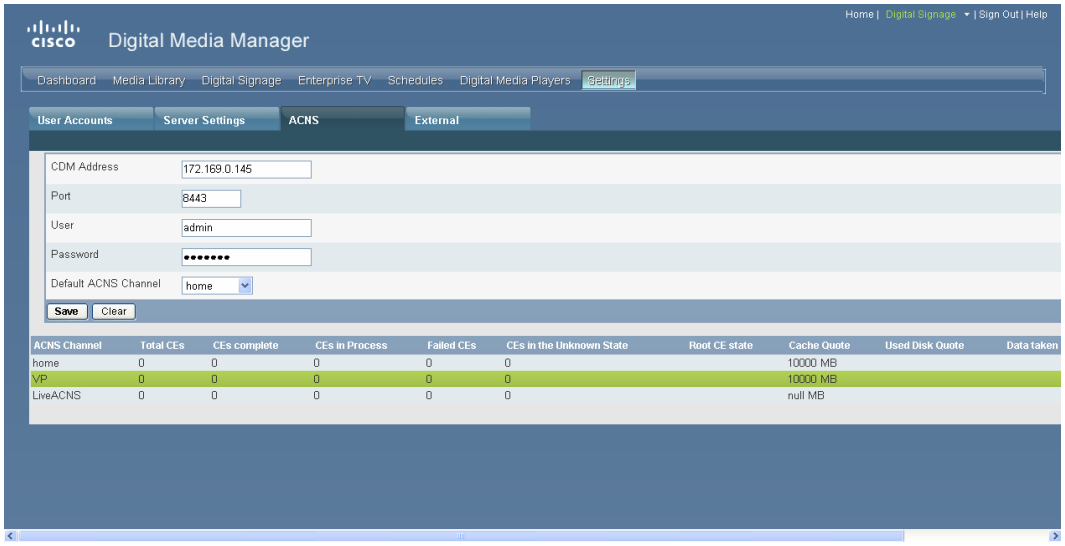


c. Fill in the location, port, and user credentials for your CDM.

d. If you have defined the digital signage channel, then select that as your default ACNS channel and click the Save button (Figure 10).

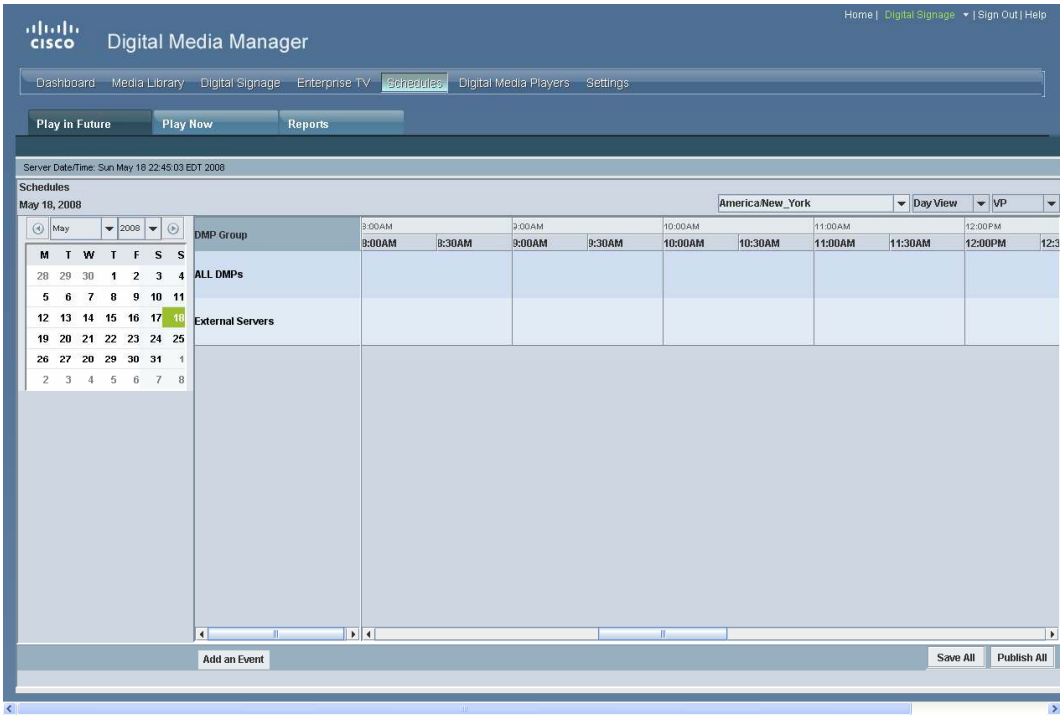
e. If you have not set up your digital signage channel, return to step 1 and follow the procedures to do so.

Figure 10. Digital Signage Channel



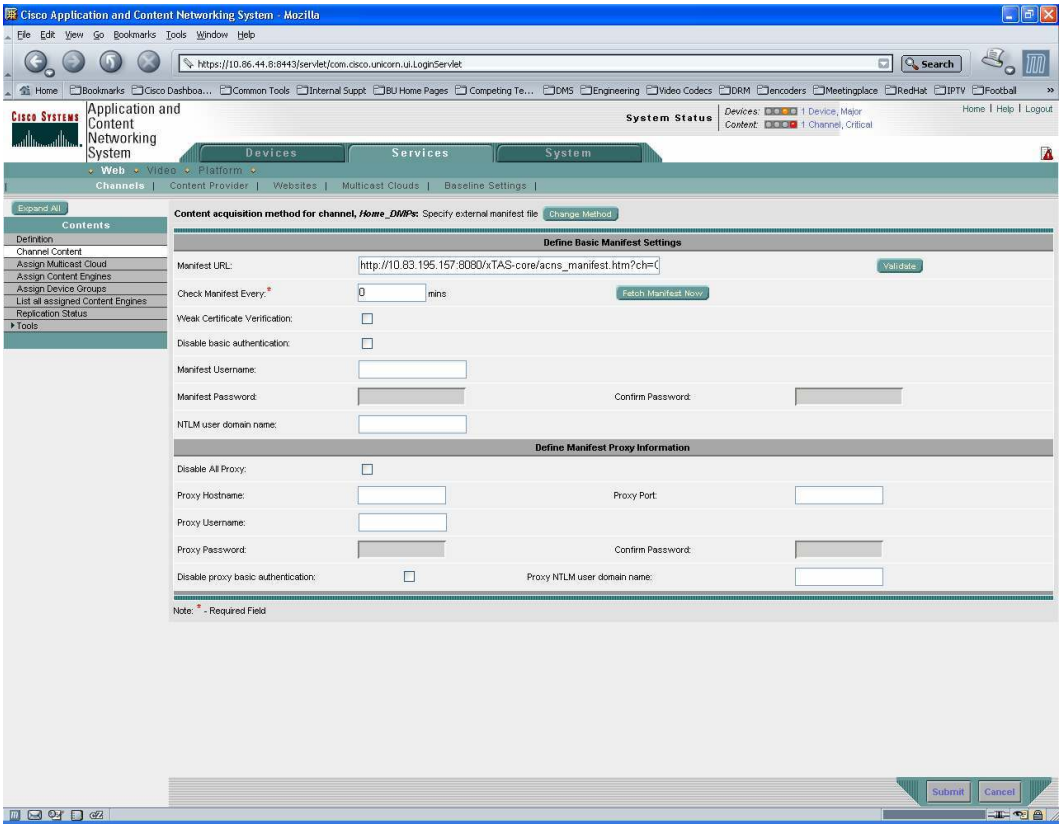
7. Now click the Publisher tab and select the Scheduler option to launch your DMM Scheduler tool (Figure 11).
   a. The DMM will automatically show your default ACNS channel for your signage content.
   b. From the Applications drop-down list, select your digital signage media play lists.
   c. From the DMP Groups select the DMP group you would like to play your digital signage play list on.
   d. Select how often you would like the play lists (or other digital signage content) to play.
   e. Finally, select your “from” and “to” times for the content to display on your DMPs.
   f. Click the Add Task button to add your created schedule to your digital signage schedule.
   g. Repeat for additional digital signage content as desired.
   h. Click the Save button to save your schedule.
   i. After you have built and saved your schedule, click the Publish button to generate your playlist and manifest files for your DMPs and CDM.

Figure 11. Scheduler Tool



8. Figure 12 shows that the DMM has automatically updated the manifest file website.

Figure 12. Manifest Configured



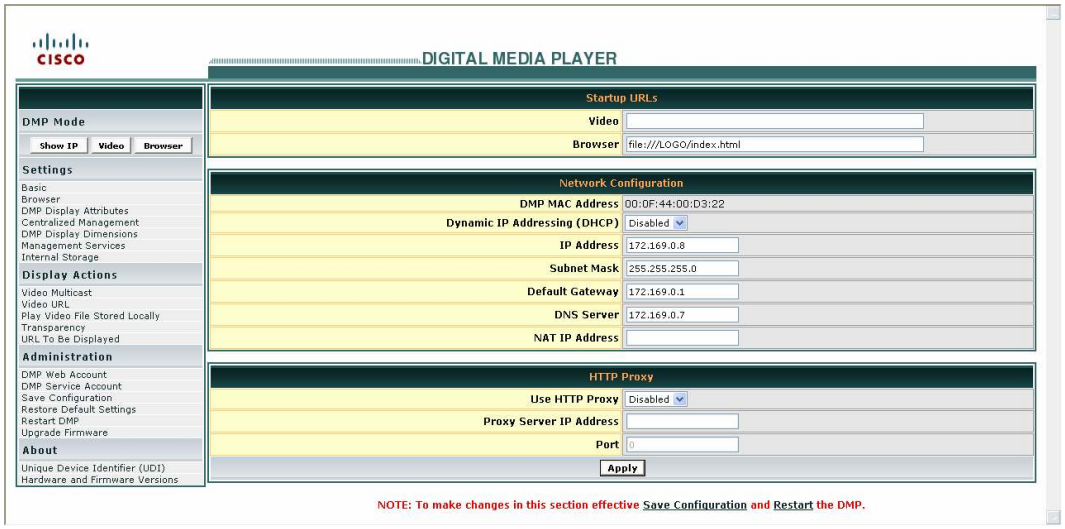
a. Clicking the Validate button will show the manifest file that the DMM created from your schedule creation process (Figure 13).

Figure 13. Manifest Validation Results

Configuring the Digital Media Player

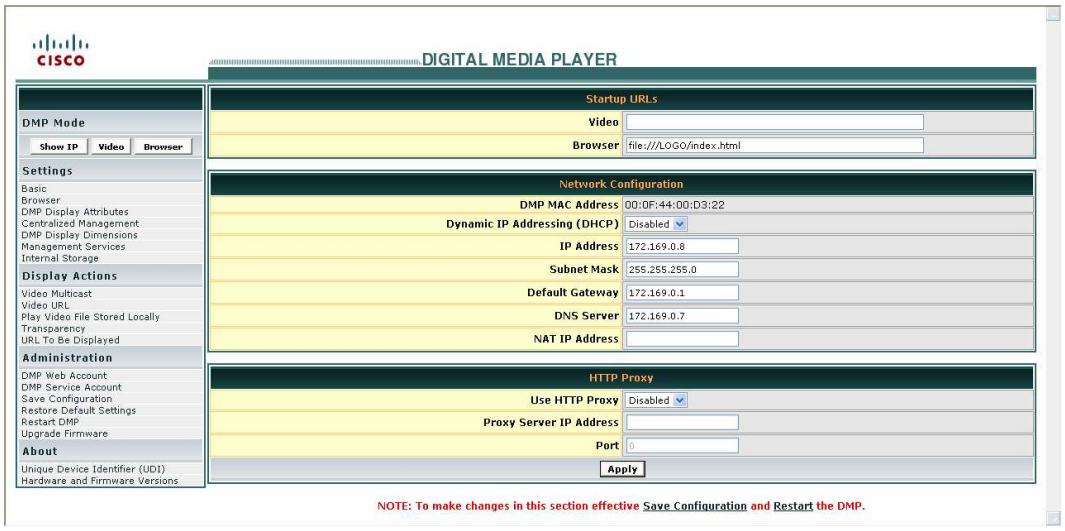
9. Logging into the DMP through its web GUI allows you to set your proxy settings:
   a. In your browser open the DMP web GUI at http ://<ipofDMP>.
   b. Under the HTTP Proxy setting you can manually configure your DMP to access the local WAE (Figure 14).

Figure 14. DMP Proxy Settings



   c. When using WCCP, leave this field blank and configure your WCCP settings on both your router and WAE (Figure 15).

Figure 15. WCCP Configuration



Americas Headquarters
Cisco Systems, Inc.
San Jose, CA

Asia Pacific Headquarters
Cisco Systems (USA) Pte. Ltd.
Singapore

Europe Headquarters
Cisco Systems International BV
Amsterdam, The Netherlands

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