
Deploying AirMedia™

for Information Technology Departments



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Introduction

AirMedia™ (AM-100) is a device which allows users to present their content to projectors and displays using the existing IT infrastructure, without the hassle of connecting wires. It is a small network device with a single 10/100 megabit Ethernet port. Windows® and OS X® users can share their desktop by running a small application (no installation required). iOS® and Android™ users can also share Excel®, Word, PowerPoint®, PDF files, photos, and other content by using the free application available in the App Store and in Google Play™.

Because of its reliance on Ethernet, AirMedia has been designed with the IT professional in mind and includes many features to ease deployment (Figure 1). This document provides background on AirMedia's operation, configuration options, user facing options and management tools.

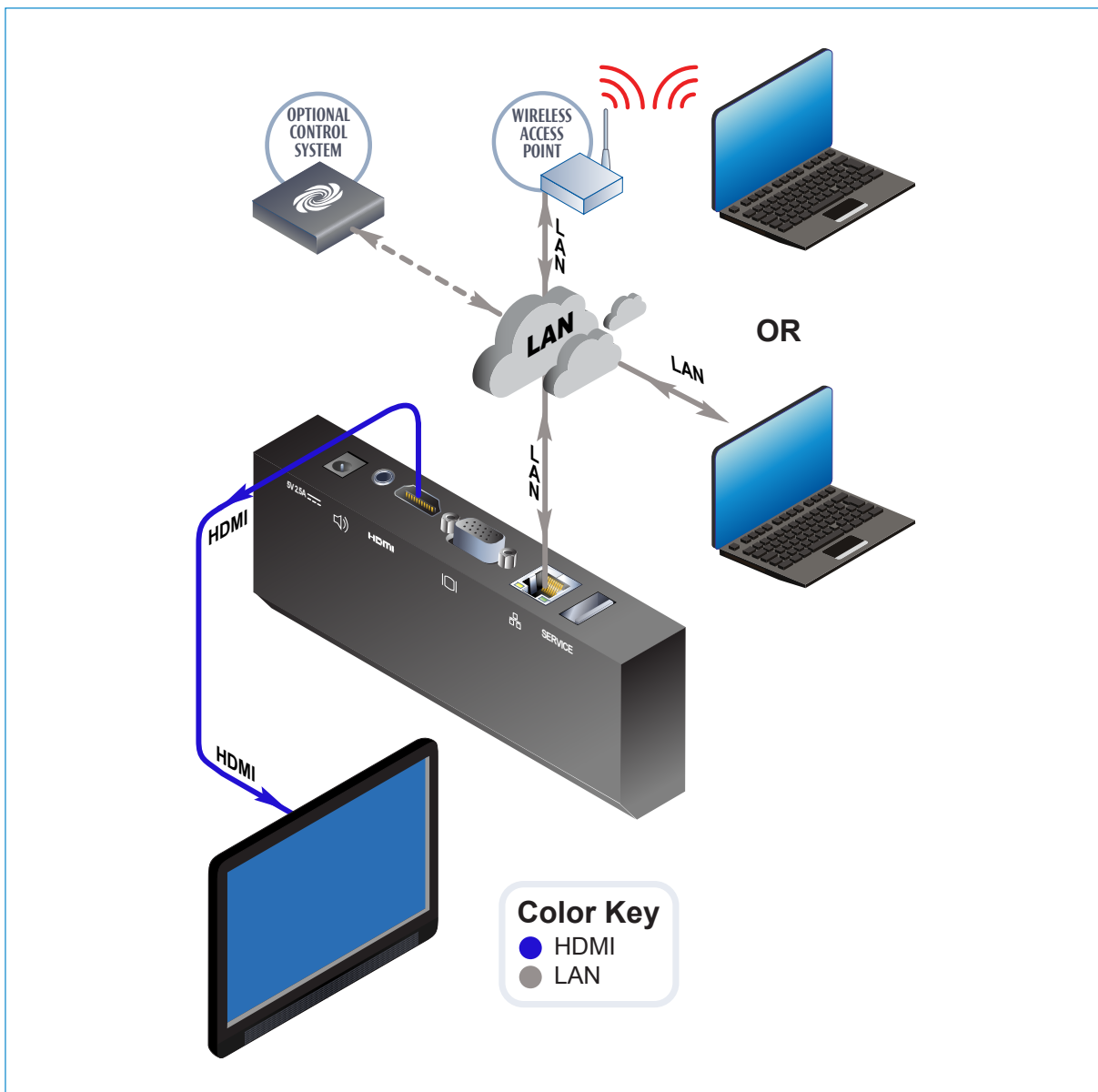


Figure 1: Simple AirMedia Deployment

User Experience

On Screen Display

AirMedia uses an on screen display to convey the basic connection instructions for guest access to the user. This display is customizable to allow for custom login instructions and branding. It provides the hostname (and optionally the IP address) as well as a login code for that specific AirMedia device (Figure 2).

Login Code

A login code is provided to help prevent users from accidentally connecting to an unintended device. The user begins the connection process and is prompted to enter a code. The code is only four digits, so it is easy for the user enter while being difficult enough to guess to prevent unwanted presentations.

There are three modes of operations:

1. Disabled (no login code required)
2. Random (generated after the last user disconnects)
3. Fixed
 - a. A fixed code can be set in two ways
 - i. Via the web pages, in which case it static
 - ii. Via a control system, in which case it can be updated programmatically

PC Clients

Crestron provides two ways of connecting to the AirMedia device when using Windows® and OS X®: a guest application (downloadable from the device) and a [deployable stand alone application](#). The guest and installed applications are compatible with the operating systems listed below.

Operating System:	Windows	Mac
Versions Supported:	8, 7, Vista, XP	10.5 – 10.8

Guest Application

The guest application is a small application that runs in place with standard user permissions. The AirMedia device's IP address is encoded in the filename of the application. The user may save the application locally, which allows them to connect directly to the device in the future.

Guest Access User Experience

1. User enters the rooms and sees the instruction on the display
 - a. The screen in Figure 2 is displayed
 - b. In the upper left hand corner the address is displayed
 - c. By default both the IP and hostname are shown
2. The user enters the address or hostname into their browser and are presented the web site shown in Figure 3
3. The user chooses their operating system and presses “download”
 - a. A small application is downloaded which the user runs
 - b. If required, they are prompted for the login code
4. Session starts and the user's desktop is shown on the display

Guest Application Executable

Alternately, the guest application can be downloaded and saved for custom deployments, such as to web sites or other media. The connection parameters for the guest application are embedded in the file name. The format is as follows <any_text>_.<ip_address>.exe

Please note the underscore and dot that precede the IP address

Example: executive_conference_room_.10.1.1.13.exe



Figure 2: AirMedia's OSD with default hostname and IP address

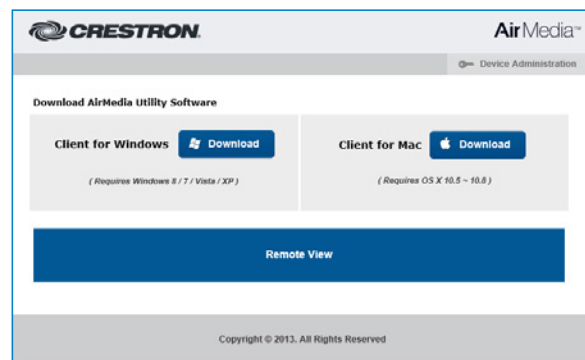


Figure 3: Guest download website.

Installed Application

A stand alone application is also available which can be deployed to users' computers across the enterprise. The application allows a number of other connection methods to simplify connecting to the AirMedia device, detailed below. This application has no registry requirements and can be silently deployed as a group of files to a folder on the user's computer. The Enterprise Application may be downloaded at www.crestron.com/airmedia.

Managing the rooms in which AirMedia is installed can be a significant task. There may be multiple campuses or rooms to which only certain employees should have access. To address the various deployment scenarios, AirMedia has four methods to get the rooms connection parameters.

1. Room lists:

The AirMedia client application can read an XML file with a list of rooms and present them in a searchable list (Figure 4).

2. File Association:

The AirMedia client application is associated with .present files. These files can be embedded in meeting invites or hosted on a corporate web site.

3. Discovery:

If the AirMedia devices and the user's computer are on the same subnet, the AirMedia client application will find these devices and present them to the user.

Note: This is recommended as a fall back if a room list or .present file is not used.

4. Manual entry:

Alternatively, AirMedia lets the user enter the hostname or IP address of the device.

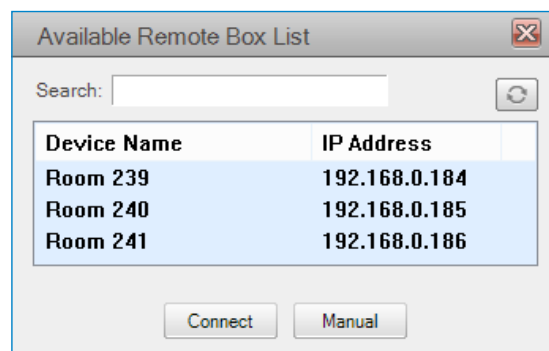


Figure 4: Application presenting a room list to a user

Reading a List of Devices from a File

The application can read a list of devices and populate its connection dialog. A search box is provided to find devices in long lists.

Room list connection experience:

1. The user launches "AirMedia"
2. User selects the room
3. User clicks connect
 - a. If required, they are prompted for the login code
 - b. If using a Crestron Connected display, the display will turn on automatically
4. Session starts

To enable this feature, two files must be created; an XML file with the list of AirMedia devices and a "config.ini" file that points to the list of rooms.

Configuration File (config.ini)

Crestron uses the common repository for user specific data on Windows® and OS X® to store its configuration files. Windows refers to this as the “Application Data” folder and it can be accessed by the environmental variable %APPDATA%. For OS X, the preferences are stored in the user’s home directory under “application support”. For both operating systems, the configuration file is located within “Crestron\AirMedia” in the common repository.

Note: AirMedia does not create the directory for its configuration file, this must be created manually. The configuration directories are usually hidden; consult the operating system documentation for the best practices for working with these directories.

Examples of typical user directory location (may vary by localization):

User name: **TestUser**

Windows 8: **C:\Users\TestUser\AppData\Roaming\Crestron\AirMedia**

OS X 10.8.6: **/Users/TestUser/Library/Application Support/Crestron/AirMedia/Configure**

After the folder is created, the configuration file itself must be created. The file’s name is “config.ini” and it contains the location of the room list file. It contains two items: the section “Crestron” is and the key “XMLPath”.

Example:

[Crestron]

XMLPath=M:\config\airmedia\engineering_management.xml

When the AirMedia application starts, it attempts to read the file at the location specified by XMLPath. Local and network paths are allowed.

Note: Do not enclose the path in quotes.

Note: Environmental variables are not supported.

Device List File

The room list file is an XML file which defines the devices and their connection parameters. The specifics of the file are defined in Table 1.

Tag	Description	Example
devices	Main container for the device list file. Each file must contain only one set of tags.	<code><?xml version="1.0"?> <devices></code>
device	Container for each device to be displayed. The file may contain one more set of tags.	<code><device> <name>Room 239</name> <address>192.168.0.184</address> <code>5885</code> </device></code>
name	The display name for the AirMedia device shown in the “Device Name” column of the application.	<code><device> <name>Room 240</name> <address>192.168.0.185</address> </device></code>
address	The IP address of the AirMedia device. This field is currently limited to IPv4 addresses only.	<code><device> <name>Room 241</name> <address>192.168.0.186</address> </device></code>
code	If filled, the application will connect to AirMedia using this login code. Useful when the login code is fixed. This field is optional.	<code></device> </devices></code>

Table 1: Device List File

File Association

Another option for starting a connection is to use “.present” files. These files have the connection parameters contained within them. These files can be hosted by a web server, or deployed to folders within the user’s computer.

Room list connection experience:

1. The user double clicks a .present file
2. Application launches
 - a.If required, application prompts for the login code (Figure 5)
 - b.If using a Crestron Connected display, the display will turn on automatically
3. Session starts

The layout of the .present file is similar to the device list, reusing the “device” structure. An example is provided below

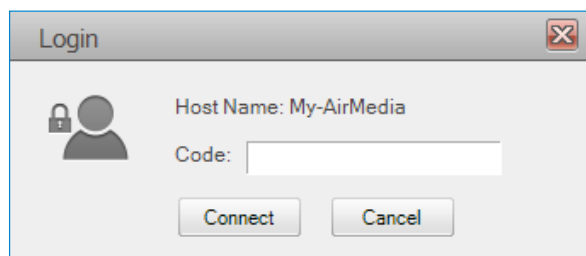


Figure 5: Connecting to the device through a .present file

```
<?xml version="1.0"?>
<device>
  <name>Room 239</name>
  <address>192.168.0.184</address>
  <code>5885</code>
</device>
```

Discovery

On start, if a room list file is not found, the application will scan the local subnet for devices to which to connect. If only one device is found, the application will try to connect to that device (Figure 5). If multiple devices are found, the application will present the user with a list of devices found (Figure 6). The user then selects the device to which they would like to connect.

Manual

If the device is unable to find any devices, the user is presented with the “manual” connection dialog box in which they can enter the IP address or hostname of the device (Figure 7).

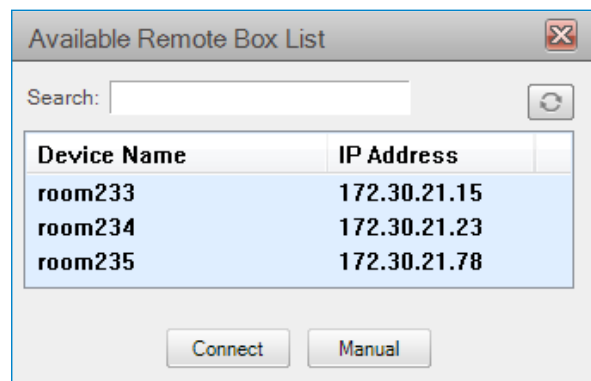


Figure 6: Multiple devices found

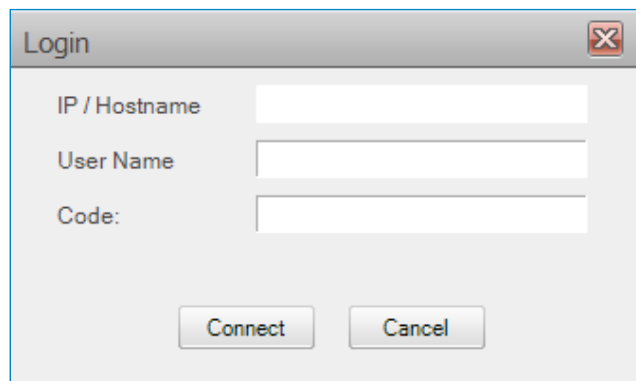


Figure 7: Manual connection

Considerations

Device Naming

Crestron has found that using IP addresses can cause confusion. Crestron recommends that each AirMedia be given a useful hostname that is easy for the user to understand and remember. In addition, the IP address can be hidden from the on screen display which limits the amount of information presented to the user and increases the likelihood of a good user experience.

Crestron has implemented a number of automatic ways of resolving the device by hostname, including: NetBIOS resolution, DHCP options 12 and 81 and NSUPDATE for dynamic DNS servers. However, Crestron recommends configuring a static IP and DNS entry for your AirMedia device. Once the host name is configured, the IP address display can be turned off in the “Device Setup” section of the AirMedia web pages (Figure 8).

Device Administration

The configuration of AirMedia is done through the device’s built-in web pages. In these menus, parameters such as the device’s IP address, the OSD which is displayed, remote view settings, and connections to control systems and Crestron Connected™ devices are set. The default password is “admin” which can also be changed in these menus.

Notes:

1. NetBIOS is only used if the host name is less fifteen (15) characters or less. NetBIOS is disabled if the host name is longer than 15 characters.
2. NSUPDATE is sent under the following conditions.
 - a. The device is using DHCP to obtain an IP address.
 - b. A static address is specified and the “Domain Name” field in “Network Setup” is not blank. If this field is blank, NSUPDATE is not sent.

Figure 8: Network Setup menu

Firewall Rules

The AirMedia application requires firewall rules to allow it to communicate with the AM-100. The simplest way to allow this is to create a rule for the application allowing all traffic to pass to the device. If the rule does not exist, the operating system will prompt the user to add a rule. This may require administrator privileges. The port map indicated in Table 2 displays the set of ports that allow for the client to communicate with the device. The port map in Table 3 displays the ports that are only used by the AM-100 itself for management functions.

Port	Type	Direction	Description	Open	Notes
80	TCP	Both	Projector Control	Optional	Used to turn on a Crestron Connected projector. If this port is blocked, the device will function normally, but automatic projector power-on will not work.
389 443 445	TCP	Both	Device	Required	For best performance, Crestron recommends that ports 389, 443 and 445 be open. However, only one of these ports need be open for the device to function properly. If only one port is open and that port is in use by another application, AirMedia will not function properly.
515	TCP	Both	Video	Required	Video data channel.
1041	TCP	Outbound	Device	Required	If not open, AirMedia will not function properly.
1047 1048 1049	UDP	Inbound	Discovery	Optional	Used for device discovery. If closed, AirMedia may not be able to find devices automatically.
1688	TCP	Both	Audio	Recommended	Audio data channel.
8080	TCP	Both	Video	Required	Video data channel. If not open, AirMedia will not function properly.
19996	TCP	Both	Future	Optional	Reserved for future use.
31865	TCP	Both	Discovery	Optional	Used for device discovery. If closed, AirMedia may not be able to find devices automatically.

Table 2: Port Map 1: Ports Used by the Client

Port	Type	Direction	Description	Open	Notes
21	TCP	Both	Recommended	Optional	Used to transfer the firmware to the device. Only used with the batch update application, not used when using the web interface to update the device.
80	TCP	Both	Required	Required	Used to access the AirMedia device configuration web site.
41794	TCP	Both	Optional	Required	Used to control Crestron Connected devices.
42891 42892	TCP	Both	Recommended	Required	Used to control firmware updates. Only used with the batch update application, not used when using the web interface to update the device.

Table 3: Port Map 2: Ports Used by the Device (AM-100)

Mobile Applications

Connecting

Crestron offers applications for both iOS and Android to allow users to present using their mobile devices. Applications are available for free in the iTunes App Store and on Google Play by searching for 'AirMedia'. The application can connect to AirMedia devices by discovering them or by directly entering the IP address. Devices to which the user has connected previously are saved, allowing the user to connect easily. A search function is also provided to allow the user to quickly navigate long lists. In addition, AirMedia devices can be marked as favorites to allow quick connections to frequently used rooms (Figure 9).

Future Development

Support of room lists and .present files is planned and will be release through a free update.

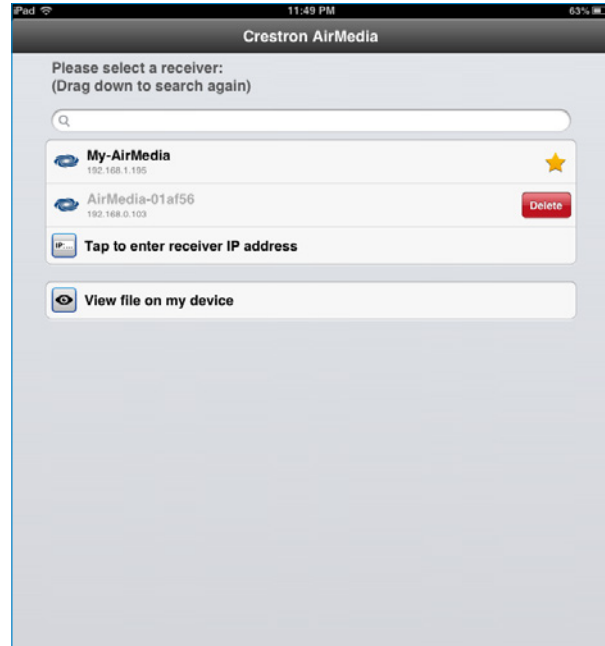


Figure 9: AirMedia for iOS

Network Infrastructure

AirMedia's bandwidth requirements are low for most applications, falling well below one megabit. However, if a user is showing a video or other applications with motion, the bandwidth required could be as much as 35 megabits. For best performance, the latency between the user's computer and AirMedia should be minimized. Best performance is realized with less than 50ms round trip time. Crestron recommends that AirMedia be on the same subnet as the user, but does not require this.

Use Case: PowerPoint Presentation

The most common use case for AirMedia is using a productivity application such as Microsoft Office. In this case, small bursts of data are sent on connection and on large screen changes, such as changing from the desktop to the full screen start menu in Windows 8. The graph below shows the bandwidth consumption associated with launch PowerPoint and giving a presentation. The PowerPoint presentation consists of mostly white slides with text, with the exception being slide one (1) which was a full screen graphic, and slide six (6) in which 1/3 of the screen was a graphic. Data are in bits per second (Figure 10).

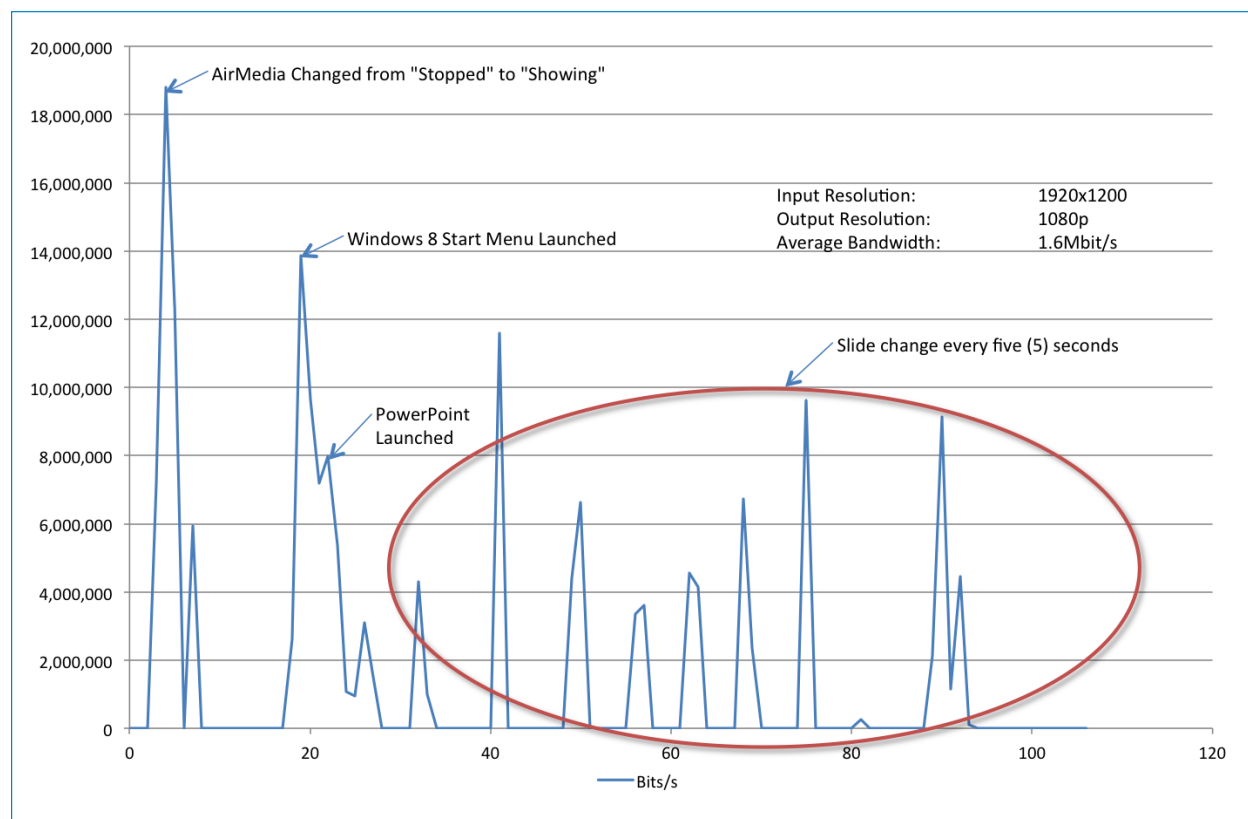


Figure 10: AirMedia PowerPoint Bandwidth

Use Case: Using Word

The graph below shows the network usage when working with a large text document in Word. In the example below, a find and replace was performed and the window was scrolled producing a moderate amount of motion. Data are in bits per second (Figure 11).

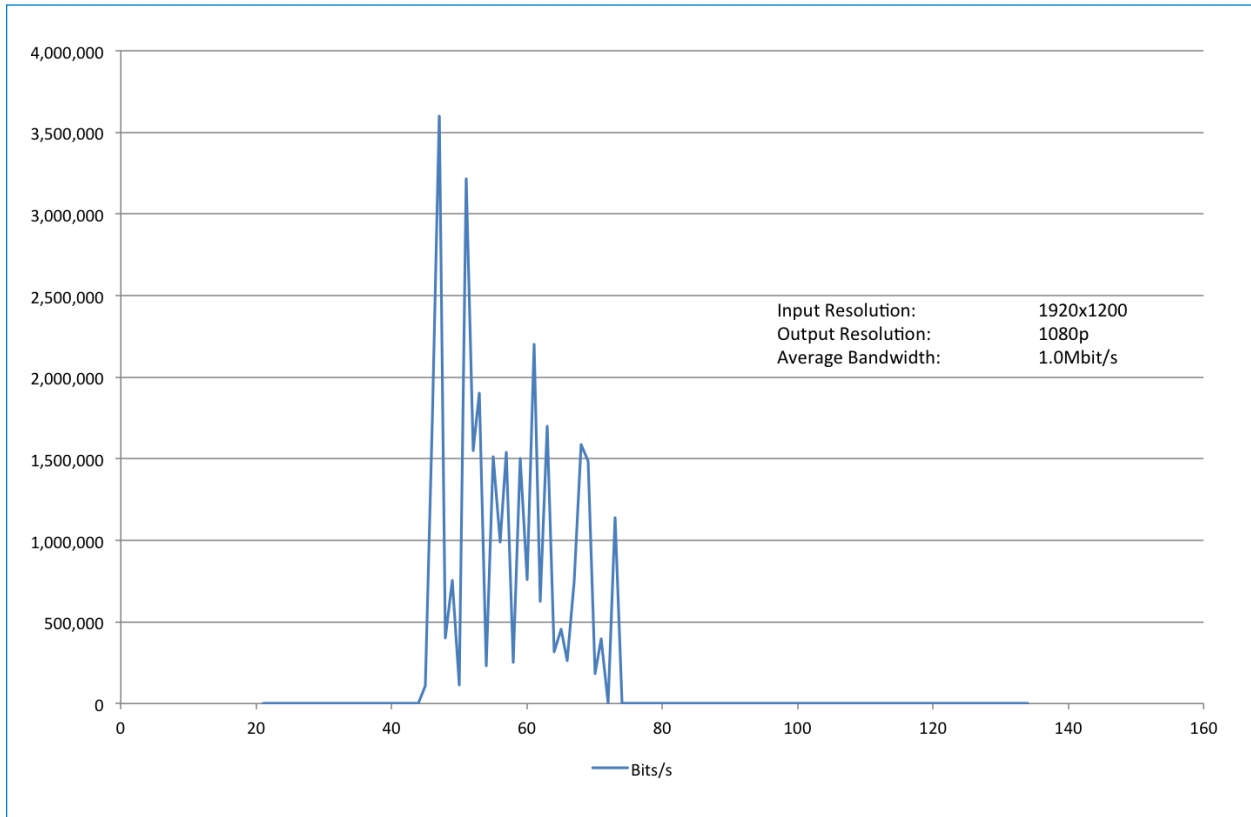


Figure 11: AirMedia Word Bandwidth

Use Case: Windowed Video

AirMedia's network requirements increase significantly when there is video being displayed. The constantly changing images require significant amount of data be transferred. The video below was in a 702x422 window. Average bandwidth used when the video was playing was 9.7 megabits per second. Data are in bits per second (Figure 12).

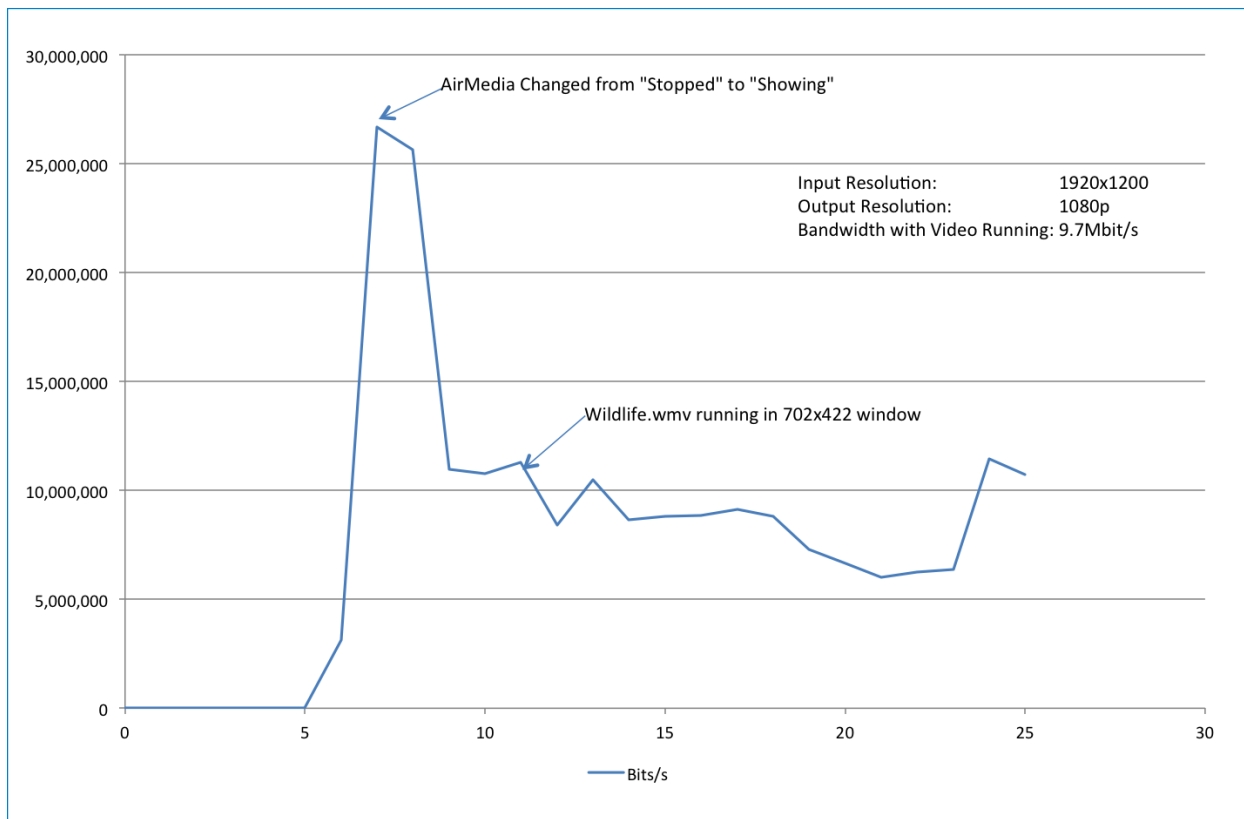


Figure 12: AirMedia PowerPoint Bandwidth

Use Case: Full Screen Video

In this case, a full screen video which is difficult to compress (waves breaking on a rock) was played full screen. This represents the worst case scenario for an AirMedia device. In this case, the device consumes 32 megabits per second. Data are in bits per second (Figure 13).

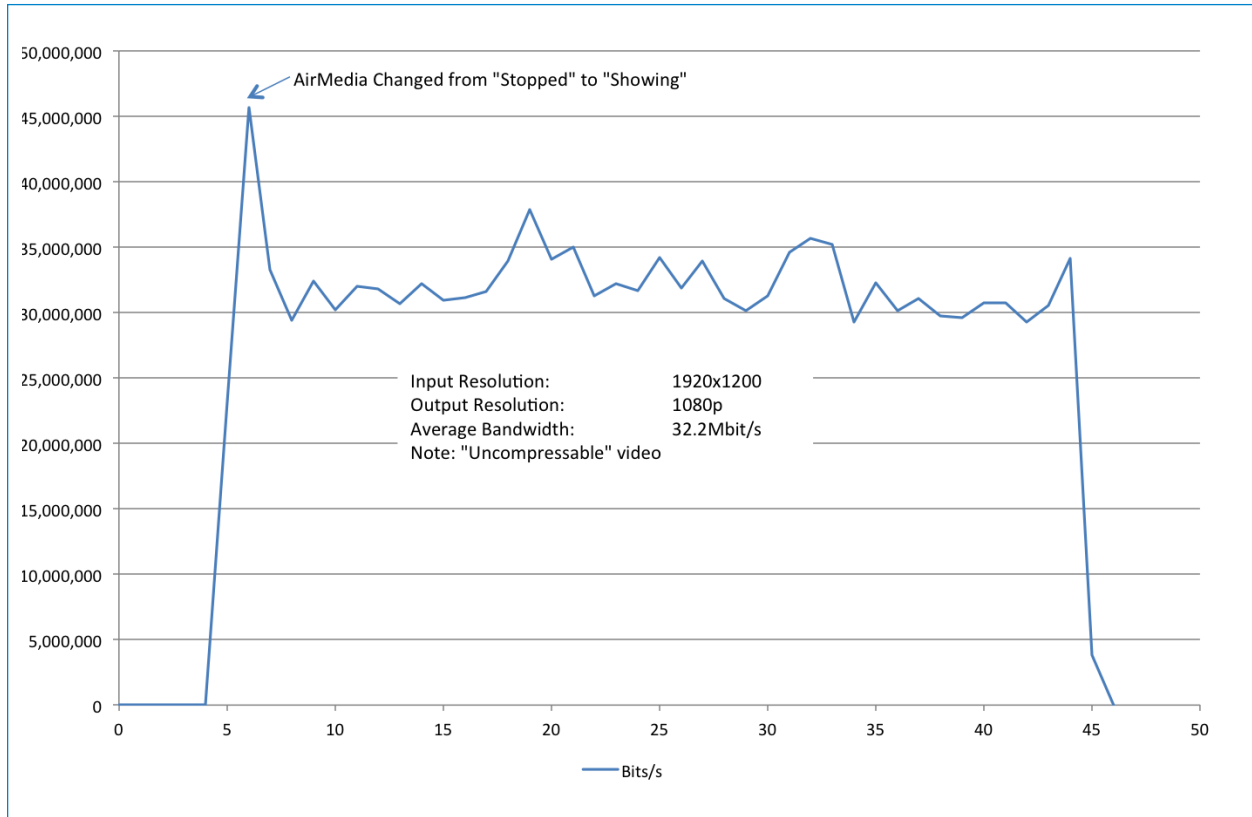


Figure 13: AirMedia Full Screen Video Bandwidth

Device Upgrades

Single Device (Web Interface)

The device supports firmware upgrades via the web interface. Upgrades are deployed as a single file which is uploaded and programmed by the device. Upgrades take between fifteen and thirty minutes.

Multiple Devices

Crestron provides an application to upgrade multiple AirMedia devices*. The application reads room list files (discussed above) to simplify management. Devices can be upgraded one at a time or in a batch operation. To upgrade, the AirMedia devices connect to an FTP server. The application provides an FTP server for convenience, or can also be configured to use an external FTP server. The application is available on the Crestron website at www.crestron.com/airmedia.

*Software will be made available when firmware update is available.

Control

Crestron Connected™

AirMedia can control any Crestron Connected display. When the user launches the application, a “power on” command is sent to the display. This means no more searching for remotes or pressing the power button. Simply give the AirMedia device the display’s IP address and AirMedia will begin controlling the display. When a user connects to AirMedia, AirMedia will issue a command to turn on the display. After the last user disconnects, AirMedia will automatically turn off the display. For more information please see the [AM-100 manual](#).

Control System

AirMedia can integrate with Crestron control systems for complete room control. When using a control system the complete room can be controlled including lights, display, HVAC, shading and anything else in the room. In addition, the control system can implement SNMP to integrate with existing IT management tools.

The following device parameters can be set and monitored using a Crestron control system (Table 4).

KEY

Crestron Type

Digital

Analog

Serial

Standard Type

Boolean

16-bit Integer

String (Max length 255 bytes)

Name	Access	Type	Description
Status	Read	Analog	Reports the status of the device.
Number of Users Connected	Read	Analog	Indicates the number of users currently connected.
Projector Connected	Read	Analog	Sets the device access code. Note: This input sets the current code. Note, this is only valid when the device code is in the "Fixed" mode. This is configured through the device's web pages.
Connected	Read Write	Analog	Reports the status of a connected projector. Valid Values: 0 = Not connected 1 = Connected
Status Text	Read	Serial	Returns the status of the device as a string for display.
IP Address	Read	Serial	Returns the IP address of the device
Hostname	Read	Serial	Returns the host name of the device

Table 4: Device Parameters

World Headquarters

15 Volvo Drive
Rockleigh, NJ 07647
800.237.2041
201.767.3400
crestron.com

EMEA Headquarters

Oude Keerbergsebaan 2
2820
Rijmenam
Belgium
Phone: +32.15.50.99.50
crestron.eu

Asia Headquarters

Room 2501, 25/F, Westin Centre
No. 26 Hung To Road
Kwun Tong
Hong Kong
+852.2341.2016
Video Ph: +852.2373.7530
crestronasia.com

Japan Headquarters

1736-3 Higashitsuda-Cho
Matsue City 690-0011
Japan
Phone: +81.852.60.5185
crestron.jp

Latin America Headquarters

Blvd. Manuel Avila Camacho No 37-1A
Col. Lomas de Chapultepec
CP 11560 México DF
Phone: +55.5093.2160
crestronlatin.com

Australia Headquarters

1 Clyde Street
Silverwater NSW 2128
Australia
Phone: 612.9737.8203
crestron.com.au



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