

Crestron Electronics, Inc.

# AirMedia

## Deployment Guide



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# Contents

Introduction .....	1
User Experience .....	2
On-Screen Display .....	2
Login Code.....	2
Connecting to AirMedia .....	2
Guest Application.....	3
Deployable (Installed) Application .....	4
Device Considerations .....	8
Device Naming .....	8
Device Administration.....	8
Mobile Applications .....	10
Connecting.....	10
Future Development. ....	10
AirMedia Security.....	11
Deployment Options for Guest Network Access.....	11
Data Transport.....	13
Network Infrastructure .....	14
PowerPoint Presentation Use Case.....	14
Word Document Use Case.....	15
Windowed Video Use Case .....	16
Full Screen Video Use Case. ....	17
Device Upgrades .....	18
Single Device (Web Interface) .....	18
Multiple Devices.....	18
Control .....	18
Crestron Connected .....	18
Control System .....	18



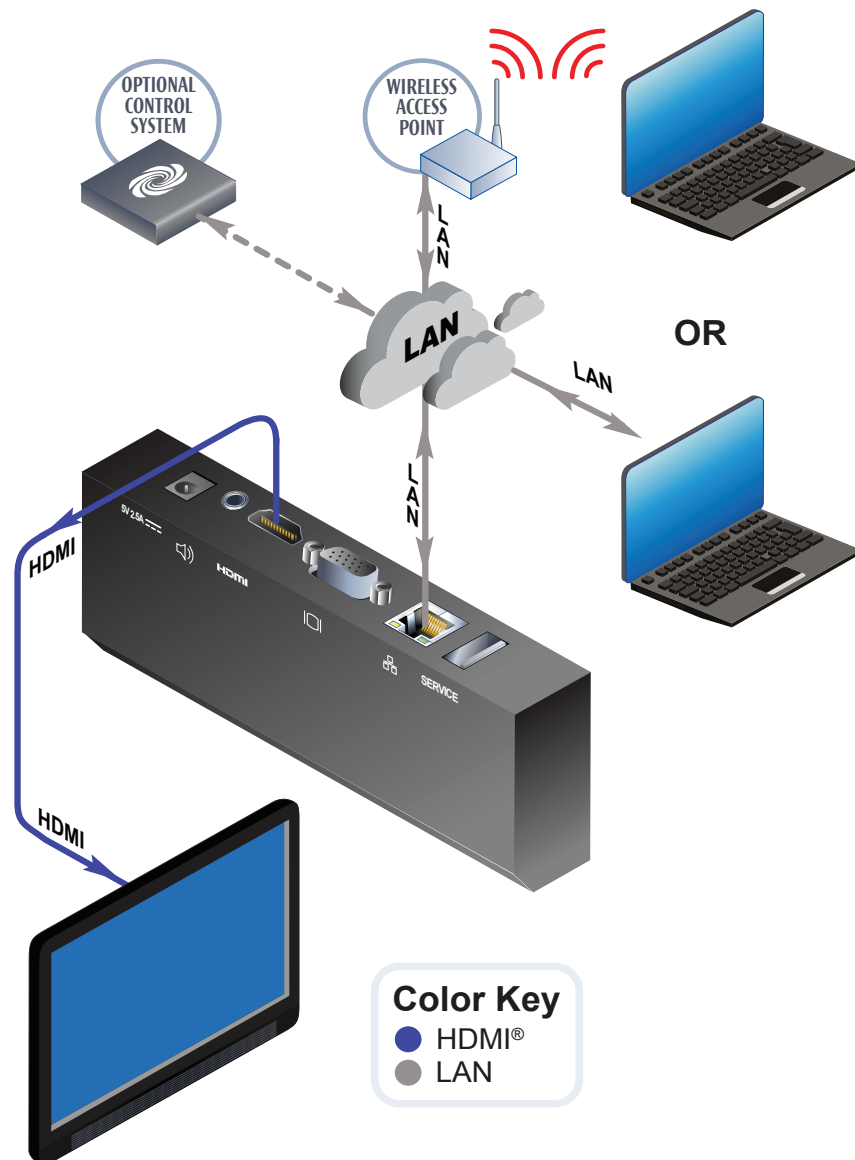
## Introduction

The AirMedia™ (AM-100) Presentation Gateway allows users to present their content via projectors and displays using the existing IT infrastructure without connecting wires. It is a small network device with a single 10/100 mbps Ethernet port. Windows® and OS X® users can share their desktop by running a small application (no installation required). iOS® and Android™ users can share Excel®, Word, PowerPoint®, PDF files, photos, and other content by using the free application available from 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.

This document provides information on AirMedia operation, user access, security, and control systems.

For more information, refer to the AirMedia Quickstart Guide (Doc 7464) and AirMedia Operations Guide (Doc 7483) at [www.crestron.com/manuals](http://www.crestron.com/manuals).

### Simple AirMedia Deployment Example



## User Experience

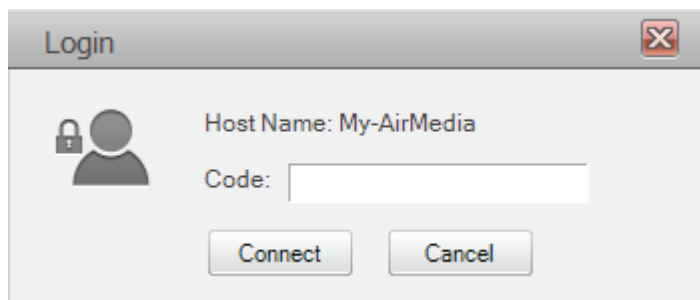
### On-Screen Display

AirMedia uses an on-screen display to convey the basic connection instructions for guest access. The display can be personalized to allow custom login instructions and branding. It provides the hostname, IP address (optional), and login code for the specific AirMedia device.

### 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 in the **Login** window. The code is only four digits, so it is easy for the user to enter while still preventing unwanted presentations.

#### Login Window



There are three modes of operation:

1. **Disabled:** Login code not required
2. **Random:** Generated after the last user disconnects
3. **Fixed:** Set using the web administration pages (static) or using a control system to update programmatically

## Connecting to AirMedia

Crestron® provides two ways to connect to the AirMedia device using a PC:

1. **Guest Application:** Connect to AirMedia using either the Windows or OS X guest application that is downloadable from the AirMedia device.
2. **Deployable Application:** Access the deployable standalone application at [www.crestron.com/airmedia](http://www.crestron.com/airmedia).

The guest and installed applications are compatible with the operating systems shown in the table below.

Operating System	Versions Supported
Windows	Windows 8, Windows 7, Windows Vista®, and Windows XP® operating systems
OS X	10.5 and newer

## Guest Application

The guest application is a small downloadable application that runs with standard user permissions. The IP address of the AirMedia device is encoded in the filename of the application. The user may save the application locally, which allows for direct connection to the device the next time the application is accessed.

### Accessing the Guest Application

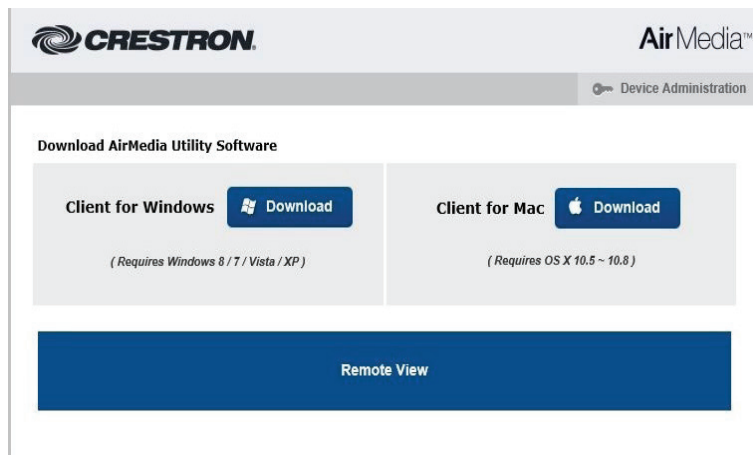
To access the guest application from the **AirMedia Welcome** window, perform the following steps:

#### AirMedia Welcome Window



1. Open a web browser and enter the user's IP address or hostname into the browser. The **AirMedia Guest Download** window is displayed.

#### AirMedia Guest Download Window



2. Click **Download** for **Client for Windows** or **Client for Mac®**.
  - A small application is downloaded; the user runs the application.
  - If required, the user is prompted for the login code.

The session begins. The user's desktop is shown on the on-screen display.

## Guest Application Executable

The guest application can be downloaded and saved for custom deployments, such as to websites 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`

**NOTE:** The underscore and dot must be precede the IP address. Refer to the following example:  
`executive_conference_room_.10.1.1.13.exe`

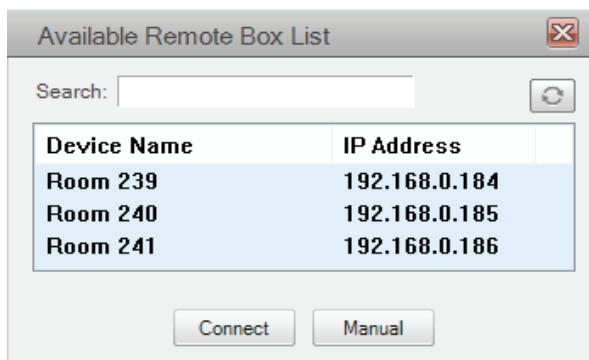
## Deployable (Installed) Application

A deployable standalone application is also available and can be deployed to users' computers across the enterprise. This application allows other types of connections to the AirMedia device. This application has no registry requirements and can be silently deployed as a group of files to a folder on the users' computers. The enterprise application can be downloaded at [www.crestron.com/airmedia](http://www.crestron.com/airmedia).

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

- **Room Lists:** The AirMedia client application reads the XML file containing a list of rooms and presents them in a searchable list as shown below.

### Available Remote Box List Window



- **File Association:** The AirMedia client application is associated with .present files. These files can be embedded in meeting invites or hosted on a corporate website.
- **Discovery:** If the AirMedia devices and the user's computer are on the same subnet, the AirMedia client application locates these devices and presents them to the user.

**NOTE:** This method is recommended if a room list or .present file is not used.

- **Manual Entry:** AirMedia allows the user to enter the hostname or IP address of the device.

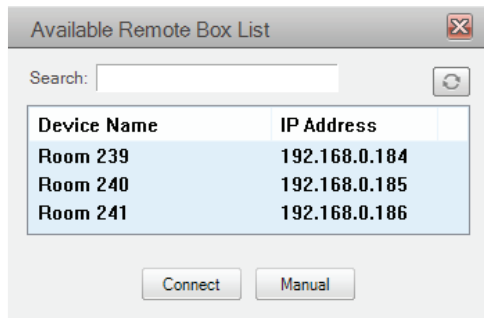


## Room Lists

The application reads a list of devices and populates the connection dialog. A search box is provided to locate devices in long room lists. To connect using a room list, do the following:

1. Launch AirMedia.
2. From the **Available Remote Box List** window, select the room from the list of devices.

### Available Remote Box List Window



3. Click **Connect**.
  - If required, the user is prompted for the login code.
  - If using a Crestron Connected® display, the display turns on automatically.
  - The session begins.
4. Create two files: config.ini and XML.
  - The config.ini file provides the location of the list of rooms (XML file) to the AirMedia application. This file must be in a fixed location. For more information, refer to the "Configuration File (config.ini)" section.
  - The XML file should contain the list of AirMedia devices. For more information, refer to the "Device List File (XML file)" section.

### Configuration File (config.ini)

Crestron uses the common repository for user specific data on Windows and OS X to store its config.ini file. 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 must be located within Crestron\AirMedia in the common repository.

Examples of typical user directory locations (which vary) for Windows 8 and OS X are shown below:

**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 must be created. The config.ini file contains the location of the room list file. The file contains two items: the section Crestron and the key XMLPath. An example of a config.ini file is shown below.

```
[Crestron]
XMLPath=M:\config\airmedia\room_list.xml
```

When the AirMedia application starts, it attempts to read the file at the location specified by the XMLPath. Local and network paths are allowed. Do not enclose the path in quotes. Environmental variables are not supported.

## Device List File (XML file)

The room list file is an XML file that defines the devices and their connection parameters. The specifics of the file are defined in table below.

Tag	Description	Example
devices	This is the main container for the device list file. Each file must contain only one set of tags.	<pre>&lt;?xml version="1.0"?&gt; &lt;devices&gt;   &lt;device&gt;     &lt;name&gt;Room 239&lt;/name&gt;     &lt;address&gt;192.168.0.184&lt;/address&gt;     &lt;code&gt;5885&lt;/code&gt;   &lt;/device&gt;   &lt;device&gt;     &lt;name&gt;Room 240&lt;/name&gt;     &lt;address&gt;192.168.0.185&lt;/address&gt;   &lt;/device&gt;   &lt;device&gt;     &lt;name&gt;Room 241&lt;/name&gt;     &lt;address&gt;192.168.0.186&lt;/address&gt;   &lt;/device&gt; &lt;/devices&gt;</pre>
device	This is the container for each device to be displayed. The file may contain one more set of tags.	
name	This is the display name for the AirMedia device that is shown in the <b>Device Name</b> column of the application.	
address	This is the IP address of the AirMedia device. This field is currently limited to IPv4 addresses only.	
code	This tag is used to limit access to AirMedia and can be disabled, randomly generated, or fixed to a specific value. In fixed mode, the code tag may be used to specify the access code.	

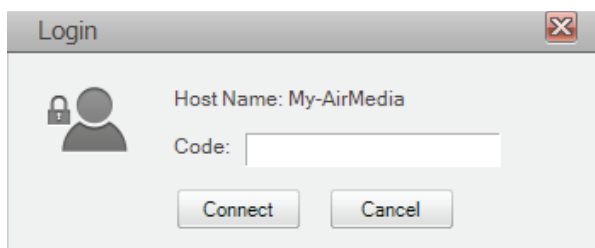
## File Association

Another option for starting a connection is to use .present files. The .present files contain the connection parameters. These files can be hosted by a web server or deployed to folders within the user's computer. The association is made by the installer.

To connect using file association, do the following:

1. Double-click a .present file. The application launches.
2. If prompted, enter the login code in the **Login** window and click **Connect**. The session starts.

## Login Window



**NOTE:** If using a Crestron Connected display, the display turns on automatically.

A .present file is a set of connection parameters to a single AirMedia device. It uses the same format as the device section of the room list file. An example of the .present file is shown below.

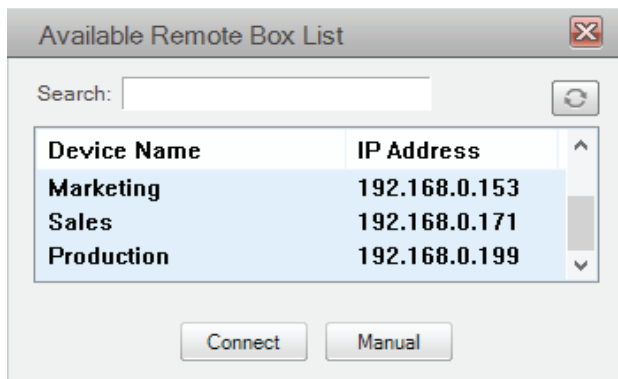
```
<?xml version="1.0"?>
<device>
  <name>Room 239</name>
  <address>192.168.0.184</address>
  <code>5885</code>
</device>
```

## Discovery

If a room list file is not found when AirMedia is started, the application scans the local subnet for connection devices.

- If only one device is found, the application tries to connect to that device.
- If multiple devices are found, the application displays a list of connection devices. From the **Available Remote Box List** window, select the device name and IP address.

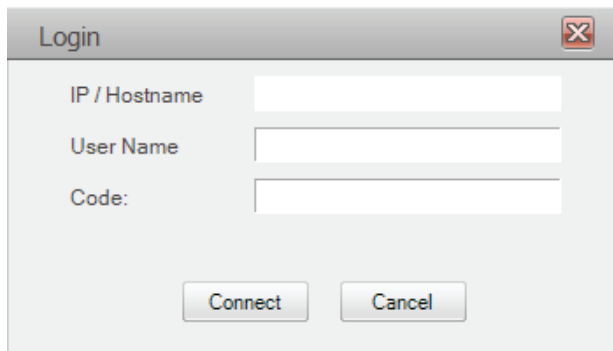
### Available Remote Box List Window



## Manual Entry

If the application is unable to find any devices, the Login window (for manual connection) is displayed. Enter the IP address or hostname of the device.

### Login Window



## Device Considerations

### Device Naming

The use of IP addresses can cause confusion; therefore, Crestron recommends that each AirMedia device be given a hostname that is easy for the user to remember. The IP address can be hidden from the on-screen display, which limits the amount of information presented to the user. Crestron has implemented the following automated ways of resolving the device by hostname:

- NetBIOS resolution
- DHCP options 12 and 81
- NSUPDATE for dynamic DNS servers

Crestron recommends configuring a static IP and DNS entry for the AirMedia device. Once the hostname is configured, the IP address display can be turned off in the **Device Setup** section of the AirMedia web pages.

**NOTE:** NetBIOS is only used if the hostname is 15 characters or less. NetBIOS is disabled if the hostname is longer than 15 characters.

**NOTE:** NSUPDATE is sent under the following conditions:

- If the device is using a static address and the DNS field is populated
- If the device is using DHCP to obtain an IP address and the **Domain Name** field in the **Network Setup** screen is not blank

If the domain name field is blank, NSUPDATE is not sent.

### Device Administration

AirMedia is configured through the built-in web pages of the device. Parameters such as the device IP address, remote view settings, connections to control systems, and Crestron Connected devices are set in the **Device Administration** window. The default password is **admin**, which can be changed.

#### Device Administration Window with Network Setup Selected

The screenshot displays the AirMedia web interface. The top navigation bar includes the Crestron logo, the title 'AirMedia™', and a 'Logout' button. Below this, a secondary bar shows 'Device Administration' and 'Network Setup' tabs, with 'Network Setup' being the active tab. A left-hand sidebar contains a menu with options: System Status, Device Setup, Network Setup (highlighted), OSD Setup, Change Password, Firmware Upgrade, Remote View Setup, Reset to Default, and a Reboot System button. The main content area is titled 'Host Name and Domain Name' and contains several configuration fields. The 'Host Name' field is set to 'My-AirMedia'. The 'Domain Name' field is empty. A note states: 'Note: For maximum compatibility, host names less than 15 characters are recommended allow char: [0-9], [a-z], [a-d], [-], [.]'. Below this, there are two radio buttons: 'Obtain an IP address automatically' (selected) and 'Use the following IP address'. The 'IP Setup' section includes fields for IP Address (192.168.100.10), Subnet Mask (255.255.255.0), Default Gateway (192.168.100.10), and DNS Server (192.168.100.10). The 'Crestron Control System' section has a dropdown for IPID set to '05', a 'Communication Status' of 'Offline', and an 'IP Address or Hostname' field. The 'Crestron Connected™ Device' section includes 'Automatic Power On' (radio buttons for 'Immediately' and 'After Code Entry', with 'Immediately' selected), 'Power Off Time Out' (0 minutes), 'Power Control' (Power On / Power Off buttons), 'Power Status' (Unknown), 'Lamp Hours' (0 hours), and 'Device Status' (No Error). 'Apply' and 'Cancel' buttons are at the bottom right.

## Firewall Rules

The AirMedia application requires firewall rules to allow it to communicate with the AM-100 device. Crestron recommends creating a rule for the application that allows all traffic to pass to the device. If the rule does not exist, the operating system prompts the user to add a rule. This may require administrator privileges.

Refer to the Port Map 1: Ports Used by the Client table below for the set of ports that allow the client to communicate with the device. Refer to the Port Map 2: Ports Used by the Device (AM-100) table below for the ports that the AM-100 only uses for management functions.

**Port Map 1: Ports Used by the Client**

Port	Type	Direction	Function	Open	Notes
80	TCP	Both	Projector Control	Optional	This port is used to turn on a Crestron Connected projector. If this port is blocked, the device functions normally, but automatic projector power on does not work.
389 443 445	TCP	Both	Control Channel	Required	For best performance, Crestron recommends that ports 389, 443, and 445 are open. At a minimum, one port needs to be open for the device to function properly. If only one port is open and that port is used by another application, AirMedia will not function properly.
515	TCP	Both	Video	Required	This port is for the video data channel.
1041	TCP	Outbound	Control Channel	Required	If this port is not open, AirMedia does not function properly.
1047 1048 1049	UDP	Inbound	Discovery	Optional	These ports are used for device discovery. If closed, AirMedia may not be able to find devices automatically.
1688	TCP	Both	Audio	Recommended	This port is for the audio data channel.
8080	TCP	Both	Video	Required	This port is for the video data channel. If not open, AirMedia does not function properly.
19996	TCP	Both	Future	Optional	This port is reserved for future use.
31865	TCP	Both	Discovery	Optional	This port is used for device discovery. If closed, AirMedia may not be able to find devices automatically.

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

Port	Type	Direction	Function	Open	Notes
21	TCP	Both	Update utility	Optional	This port is used to transfer the firmware to the device and is only used with the batch update application. This port is not used when updating the device with the web interface.
80	TCP	Both	Web services	Required	This port is used to access the AirMedia device configuration website.
41794	TCP	Both	Control system	Required	This port is used to control Crestron Connected devices.
42891 42892	TCP	Both	Update utility	Required	These ports are used to control firmware updates and is only used with the batch update application. These ports are not used when updating the device with the web interface.

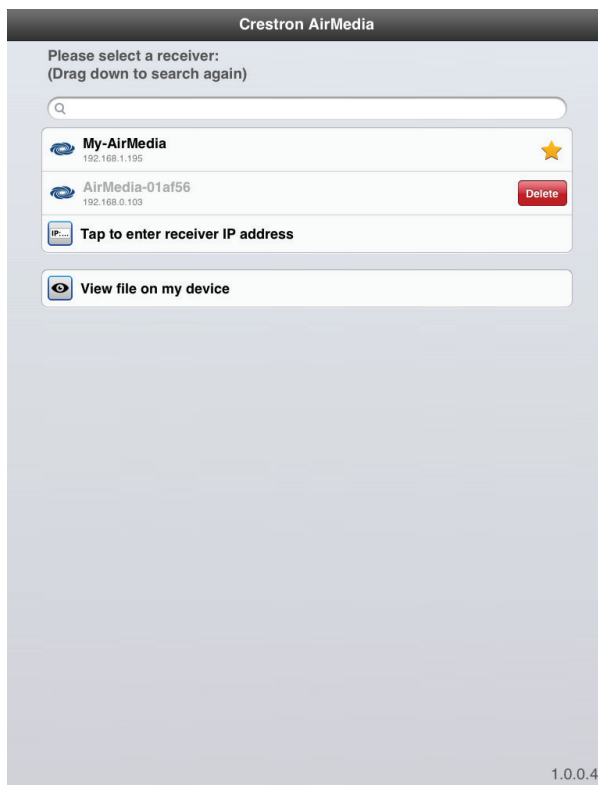
## Mobile Applications

### Connecting

Crestron offers applications for both iOS and Android to allow users to give presentations using their mobile devices. Applications are available at no cost from the iTunes® App Store and on Google Play (search for AirMedia). The application connects to AirMedia devices by discovering them or by directly entering in the IP address or hostname of the device.

Connected devices are saved to allow for easier connection in the future. A search function is provided to quickly navigate long lists. AirMedia devices can be marked as favorites for quick connections to frequently used rooms. The Crestron AirMedia for iOS window is shown below.

#### Crestron AirMedia for iOS Window



### Future Development

The user support of room lists and .present files is planned and will be released through a free update.

## AirMedia Security

AirMedia has been designed to leverage existing IT policies. AirMedia contains a single wired network interface with no wireless interfaces or bridges in the device. It becomes a wireless solution by utilizing the existing wireless network. All policies, encryptions, and other security measures implemented carry over to AirMedia because it creates standard Ethernet traffic. Once on the corporate network, the traffic generated by AirMedia is treated like any other network traffic. All existing policies that apply to physical network devices (switches, routers, etc.) also apply to AirMedia. AirMedia can be treated as a standard network appliance (like a printer) and is as secure as the supporting network. AirMedia employs a proprietary protocol to transport the screen data to the device.

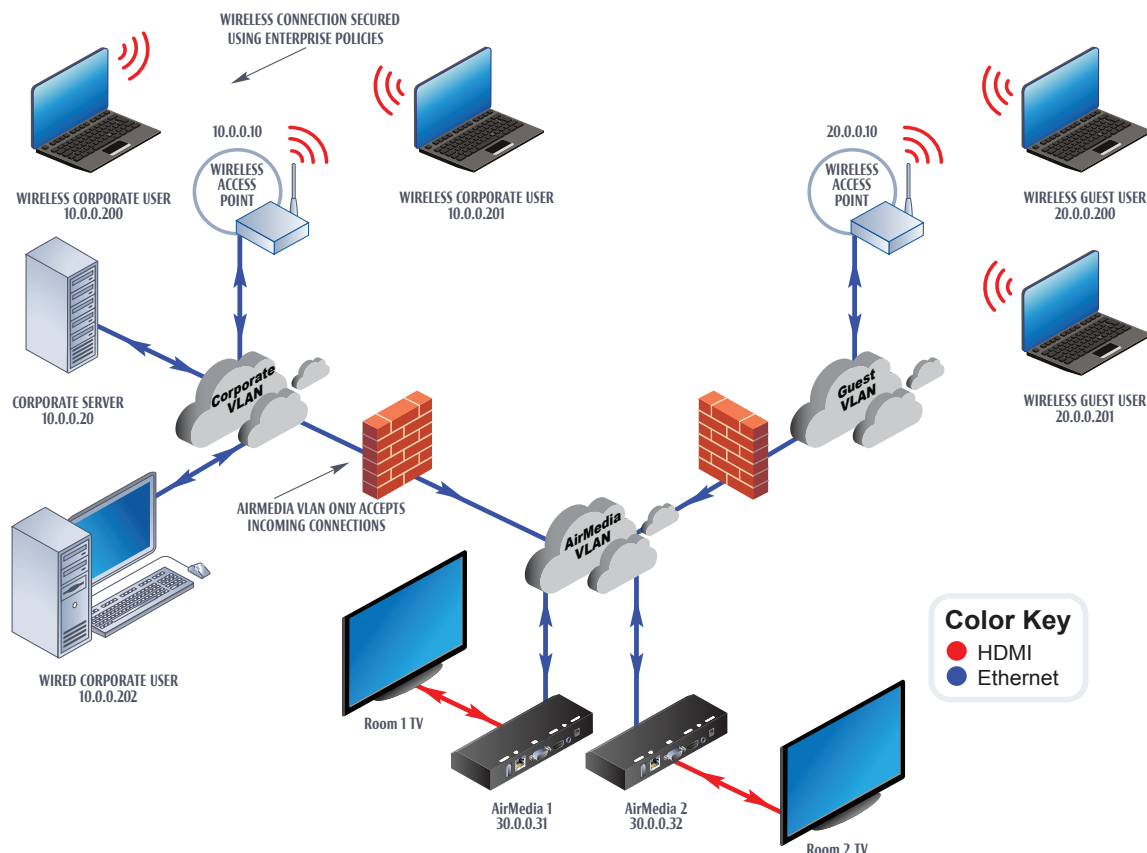
## Deployment Options for Guest Network Access

In meeting rooms, guests may want to present to corporate users. Keeping the guest networks and corporate networks separate while allowing the users to share a display presents a challenge. As a standard network device, AirMedia solves this problem by using standard networking practices. There are two suggested methods: VLAN based method and physical air gap method.

### VLAN Based Method

In this method, AirMedia devices are placed in their own VLAN. This VLAN is configured to only allow incoming connections. Outbound traffic is not allowed. The guest and corporate networks exist in separate VLANs. Since outbound connections are not allowed, the guest VLAN cannot access the corporate VLAN through the AirMedia VLAN.

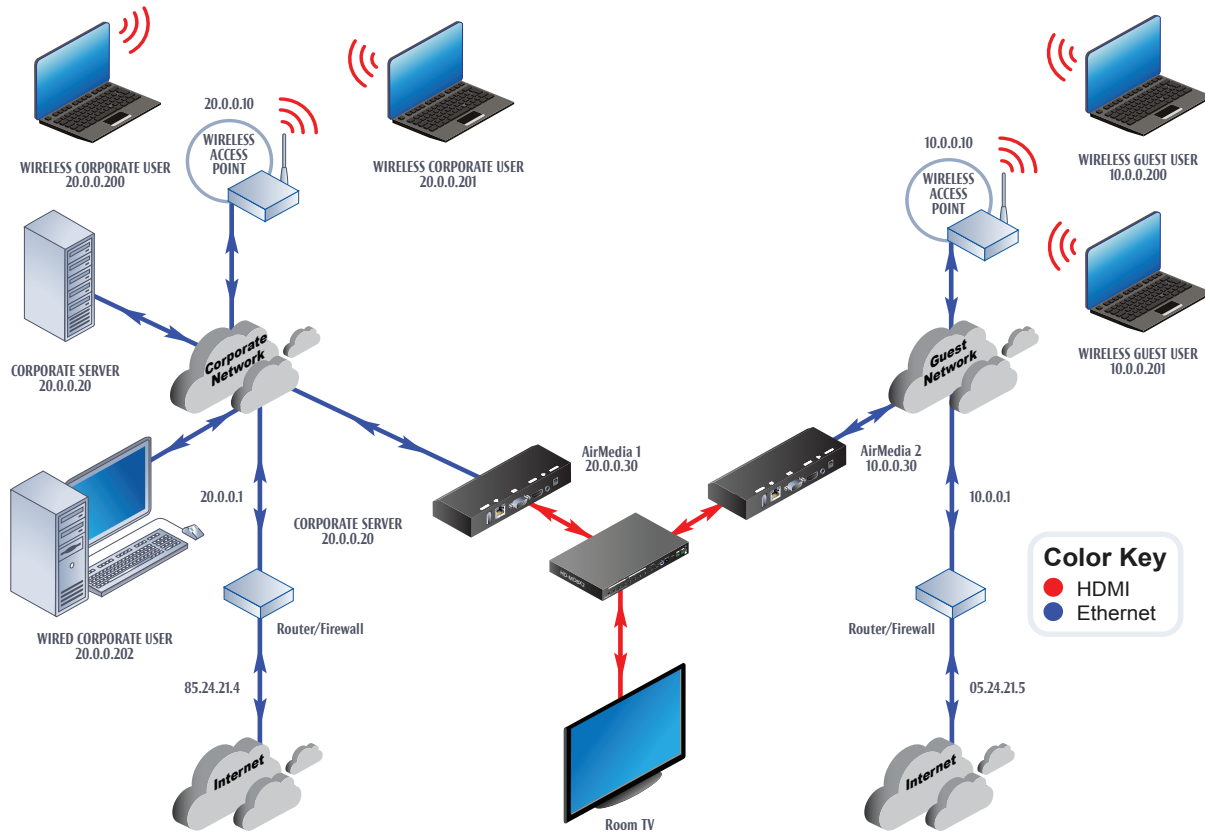
#### AirMedia VLAN Based Method Example



## Physical Air Gap Method

In this method, the corporate and guest networks are separated by a physical air gap. Two AirMedia devices are used: one for corporate users and one for guest users. Switching presentations is done in the HDMI® domain by a 2 x 1 matrix switch. While extremely secure, this approach requires more hardware.

## AirMedia Physical Air Gap Method Example

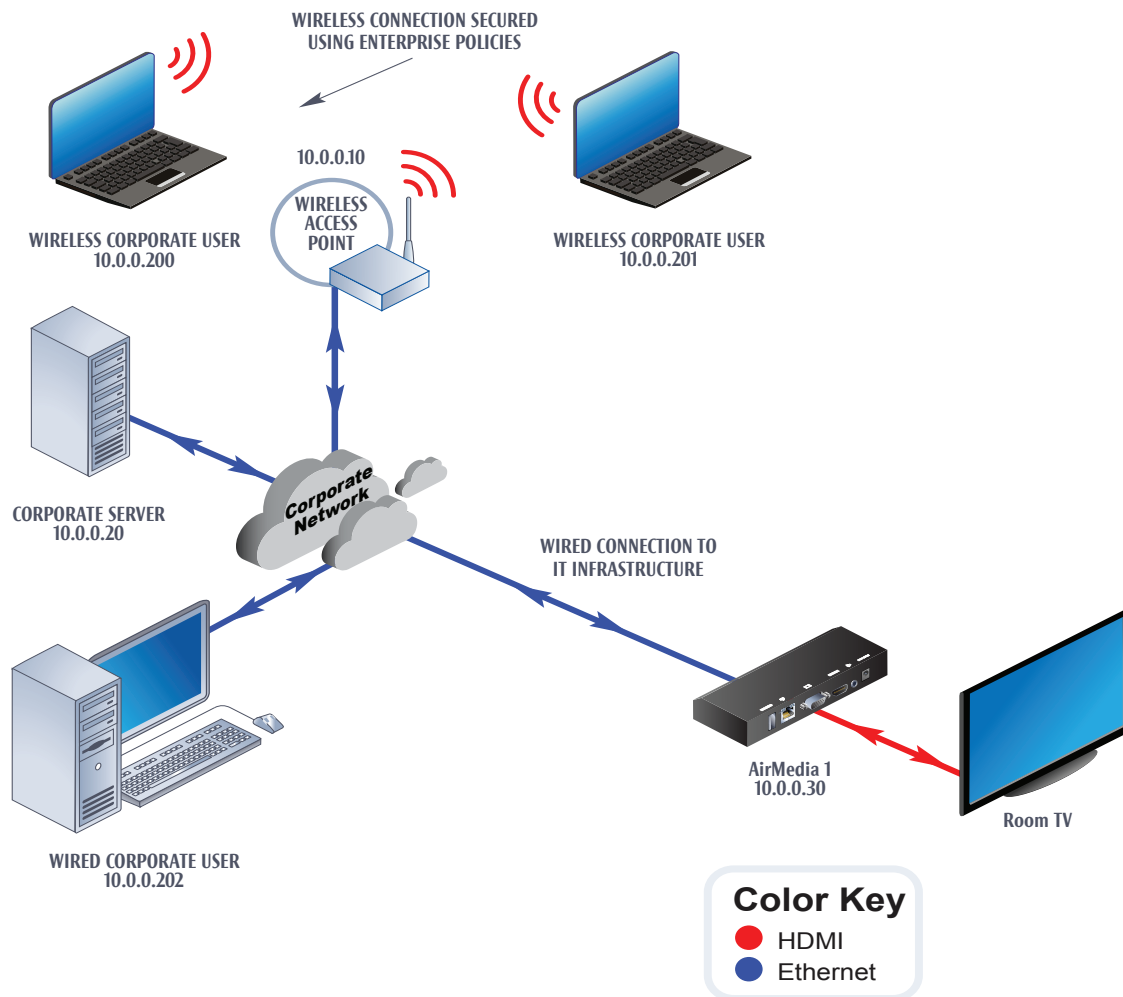




## Data Transport

AirMedia employs a proprietary protocol to transport the screen data to the AirMedia device. The data is encrypted based on the four-digit code displayed on the on-screen device (OSD).

### AirMedia Data Transport Example



## Network Infrastructure

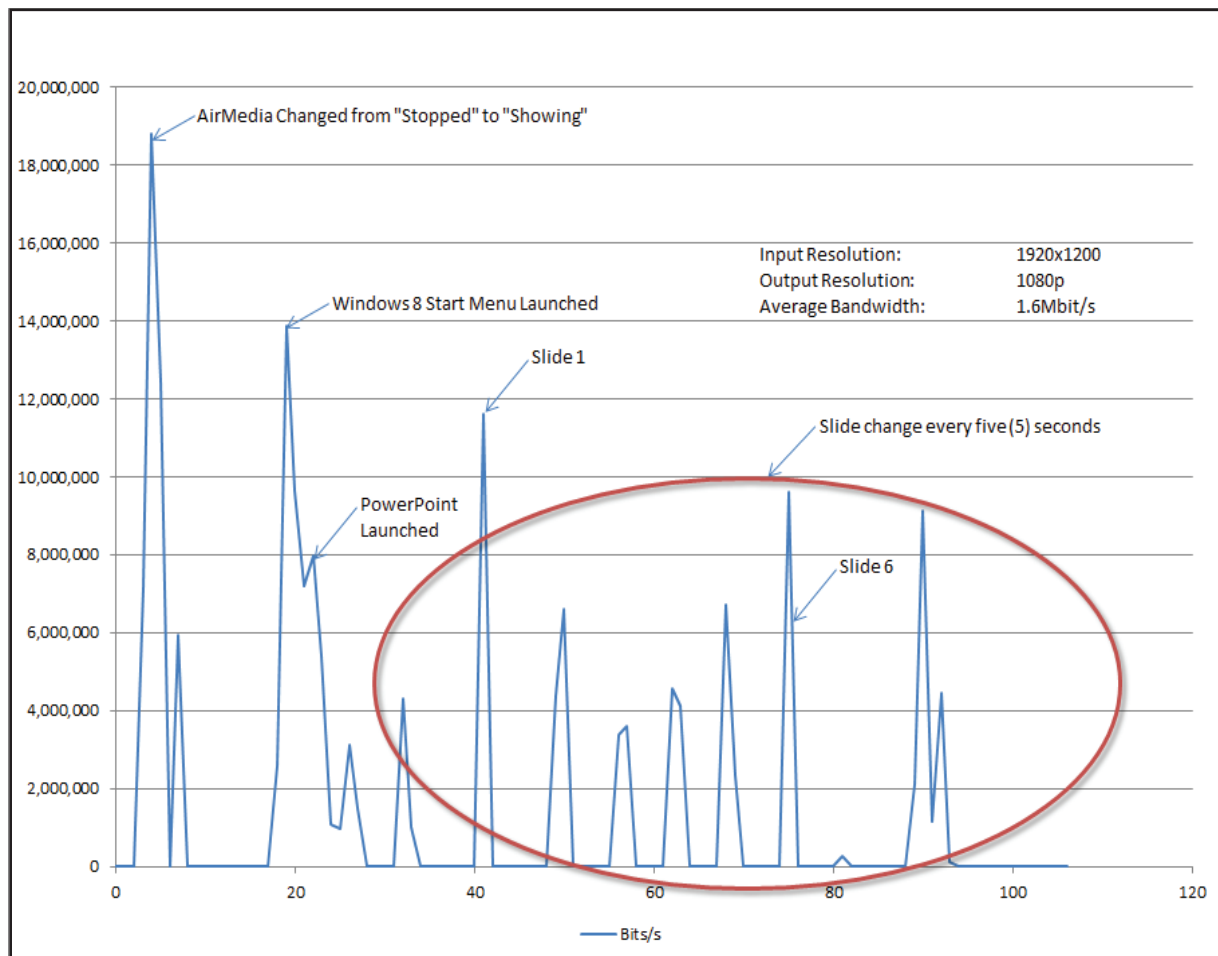
AirMedia's bandwidth requirements are low for most applications, falling well below 1 mbps. However, if a user is showing a video or other application with motion, the bandwidth required could be as much as 35 mbps. For the best performance, the latency between the user's computer and AirMedia should be minimized. The best performance is realized with less than 50 ms round-trip time. Four different use cases are described in this section.

### PowerPoint Presentation Use Case

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 large screen changes, such as changing from the desktop to the full screen **Start** menu in Windows 8.

The illustration below shows the bandwidth consumption associated with launching the PowerPoint application and delivering a presentation. The PowerPoint presentation consists of mostly white slides with text. The exceptions are slide 1 (a full screen graphic) and slide 6 (one-third of the screen is a graphic). Data are in bits per second.

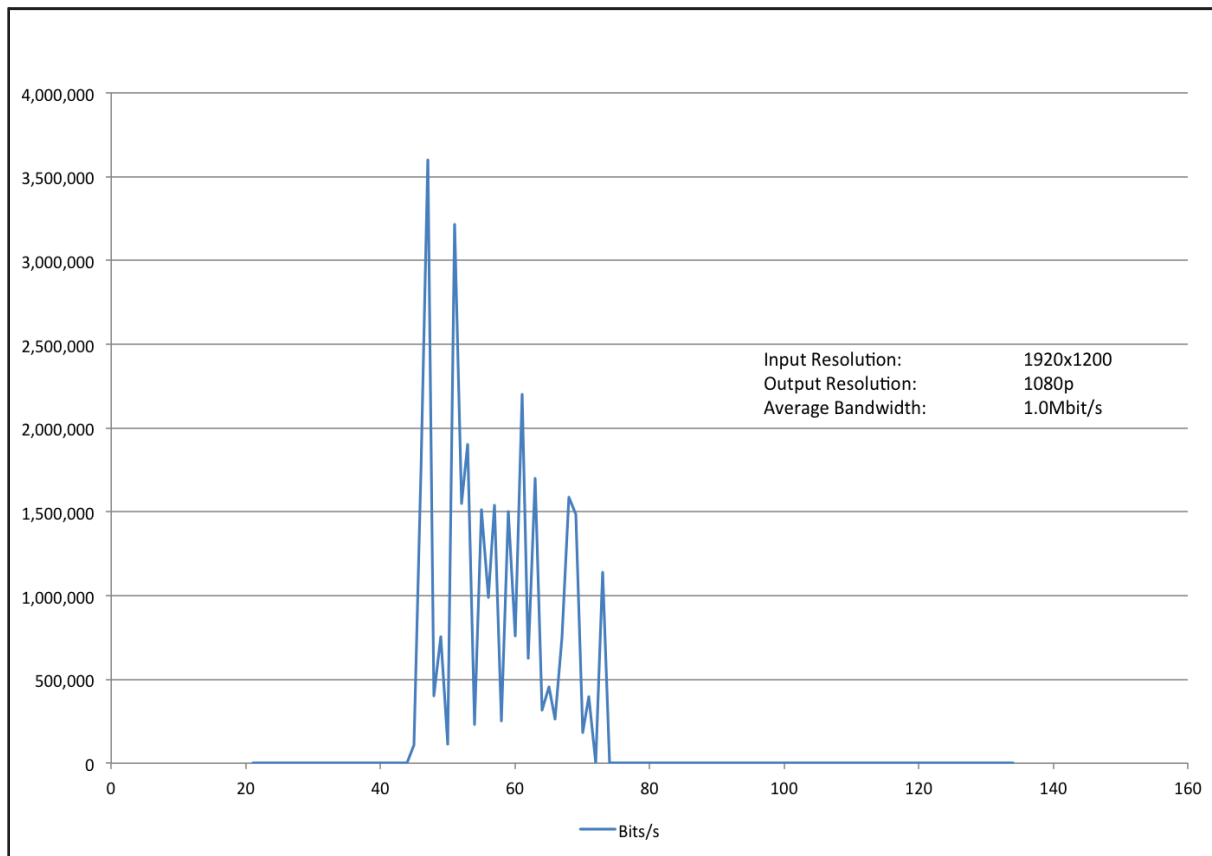
#### PowerPoint Bandwidth Example



## Word Document Use Case

The illustration below shows the network usage when working with a large text document in Word. A Find and Replace was performed and the user scrolled through the window producing a moderate amount of motion. Data are in bits per second.

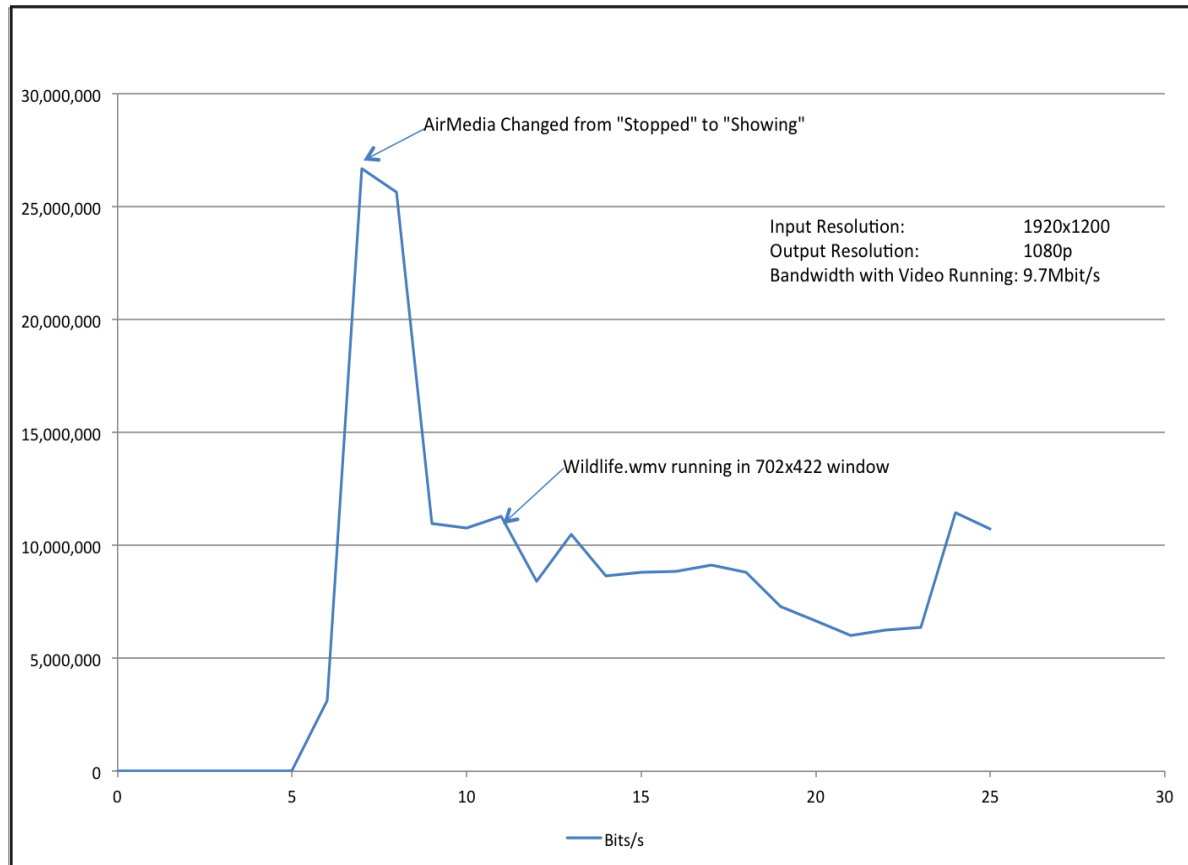
### Word Bandwidth Example



## Windowed Video Use Case

The illustration below shows how AirMedia's network requirements increase significantly when there is video displayed. The constantly changing images require a significant amount of data to be transferred. The video below is in a 702 X 422 window. The average bandwidth used when the video was playing was 9.7 mgb per second. Data are in bits per second.

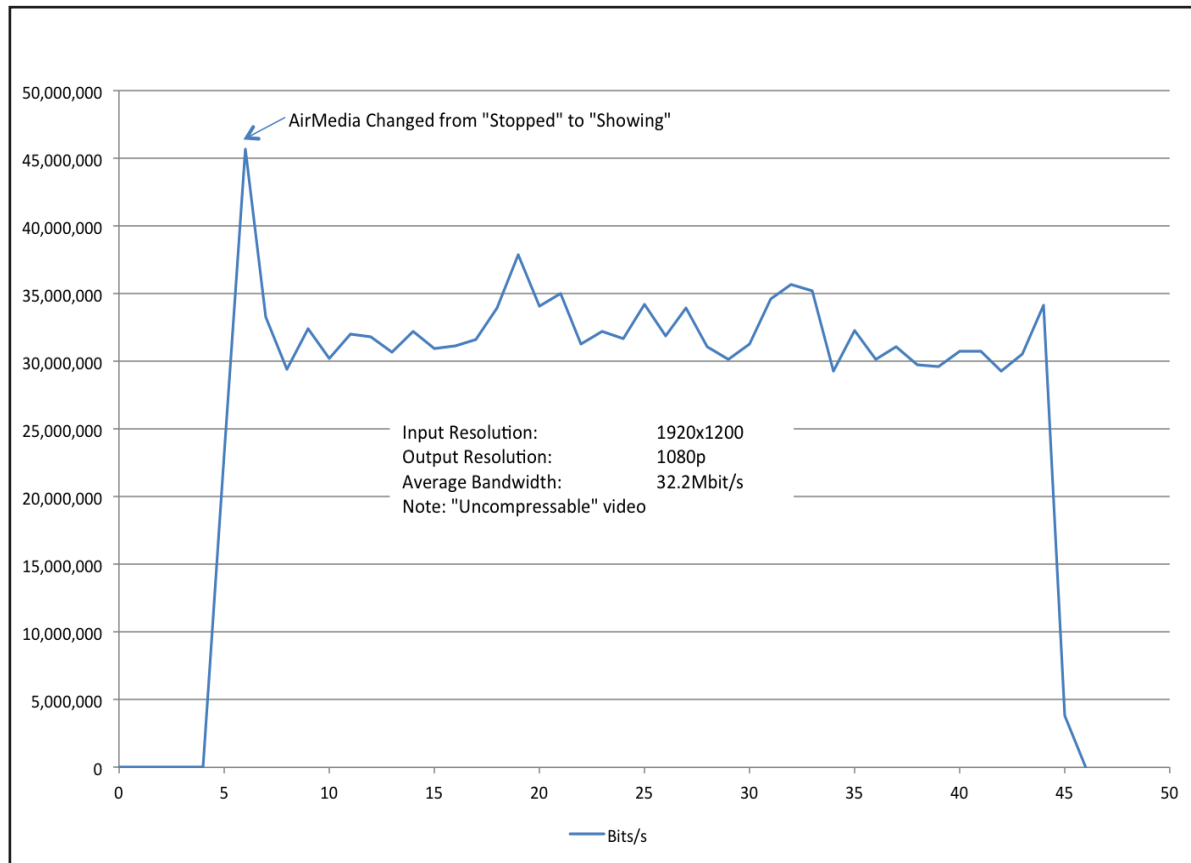
### Windowed Video Bandwidth Example



## Full Screen Video Use Case

The illustration below shows a full screen video. The video (waves breaking on a rock) is difficult to compress. This represents the worst-case scenario for an AirMedia device. In this case, the device consumes 32 mgb per second. Data are in bits per second.

### Full Screen Video Bandwidth Example



## Device Upgrades

### Single Device (Web Interface)

The AirMedia 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 15 to 30 minutes to load.

### Multiple Devices

Crestron provides an application to upgrade multiple AirMedia devices. The application reads room list files to simplify management. Devices can be upgraded one at a time or in a batch operation.

To upgrade the AirMedia devices, the user needs to connect to an FTP server. The application provides an FTP server for convenience, or AirMedia can also be configured to use an external FTP server. The application is available on the Crestron website at [www.crestron.com/airmedia](http://www.crestron.com/airmedia).

## Control

### Crestron Connected

AirMedia can control any Crestron Connected display. When the application is launched, a power on command is sent to the display. This means no more searching for remote control devices or pressing the power button. The user provides the AirMedia device with the display's IP address and AirMedia begins controlling the display. When connecting to AirMedia, a command is issued to turn on the display. After the last user disconnects, AirMedia automatically turns off the display.

For more information on [Crestron Connected](http://www.crestron.com/crestron-connected) devices, refer to the Crestron website.

### Control System

AirMedia can integrate with Crestron control systems for complete room control. When using a control system, the complete room can be controlled to include lights, display, HVAC, shading, and anything else in the room.

In addition, the control system can implement Simple Network Management Protocol (SNMP) to integrate with existing IT management tools. The device parameters can be set and monitored using a Crestron control system shown in the "Device Parameters" table on the following page.

**Device Parameters**

Name	Access	Type	Function
Status	Read	Analog	Reports the status of the device
Number of Users Connected	Read	Analog	Indicates the number of users currently connected
Device Access Code	Read	Analog	Sets the device access code <b>NOTE:</b> The input sets the current code and is only valid when the device code is in Fixed mode (configured through the device's web pages).
Projector 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

**Device Parameters Table (Type Column) Key**

Creston Type	Standard Type
Digital	Boolean
Analog	16-bit integer
Serial	String (maximum length 255 bytes)

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