



Emerge™ MPX HD Multipoint Extender

Installer/User Guide



USA Notification

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures: reorient or relocate the receiving antenna; increase the separation between the equipment and receiver; connect the equipment into an outlet on a circuit different from that to which the receiver is connected; consult the dealer or an experienced radio/TV technician for help. Only Avocent-supplied antennas used in a configuration recommended by Avocent are supported by this product.

FCC Radiation Exposure Statement: This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed to provide a 20 cm separation from all persons. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. Operations in the 5.15-5.25GHz band are restricted to indoor usage only.

Note: In order to maintain compliance with relevant emission standards, the MPX1000T extender analog audio cables should contain a ferrite with a value of at least 150 ohms impedance at 100 MHz. A clamp on ferrite may be used.

Canadian Notification

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Note: In order to maintain compliance with relevant emission standards, the MPX1000T extender analog audio cables should contain a ferrite with a value of at least 150 ohms impedance at 100 MHz. A clamp on ferrite may be used.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe B prescrites dans le Règlement sur le brouillage radioélectrique édicté par le Ministère des Communications du Canada.

De manière à maintenir la normes d'émission analogue, les câbles audio devraient contenir un ferrite avec une valeur d'impédance d'au moins 150 ohms à 100 MHz. Une attache sur ferrite peut être utilisée.

Safety and EMC Approvals and Markings (Compliance Model Number (CMN): 2003 Series)

IEC 60950-1:2000, IEC 60065:2001+ Amd 1:2005 EN 60950-1:2001, EN 60065:2002 UL 60950 3rd Ed. / CSA 22.2 No. 60950:2000, UL 60065:2002, EN 55103-1:1997, EN 55022:1998+A1:2000+A2:2003, EN 61000-3-2:1995 EN 61000-3-3:1995+A1:2001, EN 55103-2:1997, EN 55024:1998+A1:2001+A2:2003, FCC Part 15 Subpart B Class B, FCC Part 15 Subpart C, FCC Part 15 Subpart E, EN 50392:2004, EN 301 893 v. 1.2.3 (2003-08), EN 489-1 v. 1.4.1 (2002-08), EN 489-17 V. 1.2.1 (2002-08)



Emerge™ MPX

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Instructions

This symbol is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.



Dangerous Voltage

This symbol is intended to alert the user to the presence of uninsulated dangerous voltage within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



Power On

This symbol indicates the principal on/off switch is in the on position.



Power Off

This symbol indicates the principal on/off switch is in the off position.



Protective Grounding Terminal

This symbol indicates a terminal which must be connected to earth ground prior to making any other connections to the equipment.

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Product Overview

Introduction

Emerge™ MPX multipoint transmitters and receivers work in unison to form a managed audio video extension network able to deliver a synchronized stream of high definition computer graphics or video and associated audio from one source to as many as eight display devices in a wired or wireless manner. Device identification, device control and content protection information, in the form of IR and serial data, are passed from source to sink through the extension network, providing a fully managed solution.

Features

The Emerge MPX1000T transmitter is a modular product. Audio/Video (A/V) data, whether analog or digital, is converted to an encoded, compressed and encrypted digital stream before transmission. To ensure support for a wide range of current and future video standards, video input and output connections are provided in the form of field-installable media modules. Modular support is available for HDMI video and audio, DVI-D and analog signals, including component video, computer graphics and stereo audio. These media modules are purchased separately.

The Emerge MPX1000R receiver is a modular product similar to the MPX1000T transmitter. Modular support is available for HDMI video and audio, DVI-D and analog signals, including computer graphics and stereo audio. These media modules are purchased separately.

The Emerge MPX15000R features a single DVI-I video connector, which offers support for HDMI, DVI-D, DVI-A, VGA, composite, component and s-video display devices. The product also features connectors for external analog audio and coaxial and optical S/PDIF digital audio.

Video

MPX extenders support both progressive and interlaced video formats, however, they do not cross-convert from one to the other. MPX transmitters support a wide range of source device video formats, including: HDMI, DVI-D, VGA and component video.

The MPX1000R receiver supports the following display device video formats: HDMI, DVI-D and VGA display devices.

The MPX1500R receiver supports a wide range of display device video formats, including: HDMI, DVI-D, DVI-A, VGA, composite, component and s-video display devices.

Audio

All MPX extenders support embedded HDMI digital audio and external analog audio via female RCA jacks. In addition, the MPX1500R features connectors for optical and coaxial S/PDIF digital audio. See *Audio* on page 67 for additional information.

Control

The products allow both RS232 and infrared control of source and display devices. Every MPX extender has both IR receiver and emitter capability. IR strings are passed across the wired or wireless media LAN, making it possible to control source devices while standing at a display device, and vice-versa. A loopback function also makes it possible to control devices locally from either side of the extension network. Likewise, bi-directional transmission of RS232 signals allows device management across the extension network.

Benefits

The Emerge MPX1000 HD multipoint extender provides the following benefits:

- Multipoint wired or wireless extension of high definition content
- Low latency from input at transmitter to output at receiver, making the product suitable for live presentations or recorded media
- Ability to send HDMI audio or unbalanced analog audio
- Ability to extend A/V control signals, including serial and IR
- Synchronized media across multiple display devices
- Lip sync is maintained at each receiver
- Simple web-based configuration is provided at the transmitter
- Provides content security through HDCP digital rights management
- Passes EDID information for plug-and-play operation
- Passes CEC information for native control of HDMI devices
- Product is field upgradable to support future functionality

System Overview

The following diagram illustrates a typical configuration, including a single transmitter and three receiver units using HDMI source and display devices.

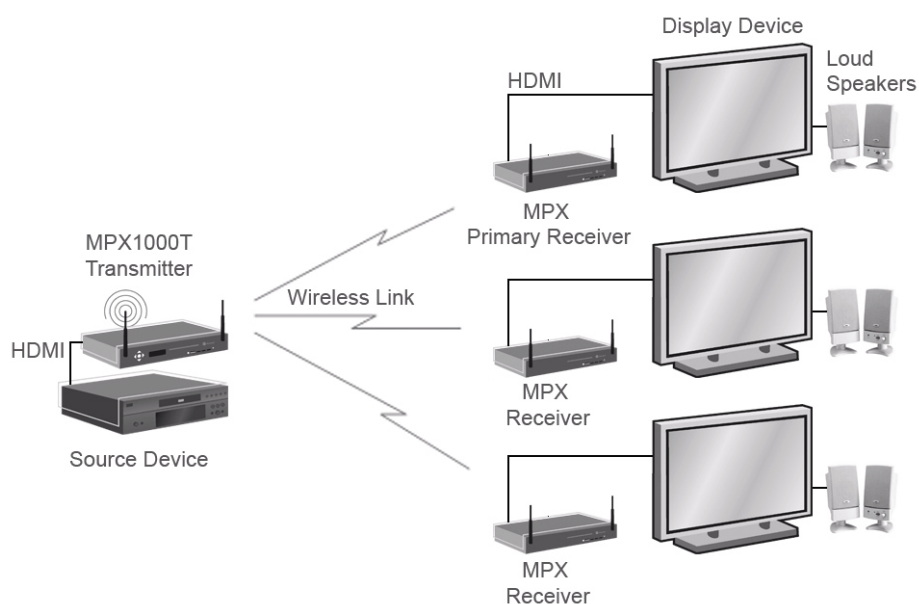


Figure 1.1: Example MPX Multipoint Extender Configuration

System definitions

The Emerge MPX1000 HD multipoint extender system consists of one transmitter and one to eight receiver units. The following terms are used in this manual to identify common components of an MPX1000 extender solution:

Table 1.1: System Definitions for an MPX1000 Extender Solution

Term	Definition
Active EDID	A merged EDID string that describes the subset of characteristics supported by the primary display device and the MPX1000 transmitter
Bound Receiver	A receiver that is actively connected to a transmitter over a wired or wireless link
Control LAN	A LAN connection to an MPX receiver or transmitter that allows access to its on-board web interface. On MPX1000 extenders, this port is labelled L1. On an MPX1500 receiver, the LAN port provides the combined functions of media LAN and control LAN.

Table 1.1: System Definitions for an MPX1000 Extender Solution (Continued)

Term	Definition
Default EDID	Factory default EDID information stored in an MPX transmitter, which describes the supported video characteristics of the transmitter
Display Device	Video projector, plasma, LCD display, or other display device
EDID	Extended Display Identification Data: A Video Electronics Standards Association (VESA) standard data format that contains basic information about a monitor and its capabilities, including vendor information, maximum image size, color characteristics, factory pre-set timings, frequency range limits and character strings for the monitor name and serial number
Extender Group	A term denoting an MPX transmitter and all of its bound receivers, whether wired or wireless
Extension Network	A term denoting a wired or wireless media LAN
HDCP	High-Bandwidth Digital Content Protection (HDCP) is a form of digital rights management used to secure digital audio and video content
Input Media Module	Input media module resides in the transmitter and accepts video input from a source device
IR Blaster	Dual IR emitter (part number IRB-100) that connects to the IR(tx) port of the transmitter or the receiver and converts electrical signals that arrive at that port to IR signals for control of source and display devices
IR Extension	Flow of IR data across the MPX extension network
IR Local Loopback	Flow of IR data from the IR(rx) receiver to the IR(tx) port on the same unit
IR Remote	Remote control that transmits device control information using an infra-red LED
IR(rx) port	An infra-red receive port. An IR receiver is located on the front panel of MPX1000 extenders. An IR receiver port is located on the front panel of an MPX1500 receiver in the form of a 2.5mm mini jack. An optional receiver may be attached to the unit via this port
IR(tx) port	An infra-red emitter port located on the front panel of all MPX transmitters and receivers
Media LAN	A LAN port on an MPX receiver or transmitter that serves as a private wired network for transmission of A/V media. This port is labelled L2 on MPX1000 extenders and indicated by a LAN symbol on MPX1500 receivers. The Media LAN and Control LAN functions share the same physical port on MPX1500 receivers.
Media Module	A modular, field-installable, component that enables an MPX transmitter to attach to various types of source devices
MPX Extender	A generic term denoting an MPX transmitter or receiver

Table 1.1: System Definitions for an MPX1000 Extender Solution (Continued)

Term	Definition
Output Media Module	Output media module that resides in MPX1000 receivers and outputs video data to a display device
Primary Display Device	A display device attached to the primary MPX receiver
Primary EDID	EDID information received from the primary display device, which describes the characteristics of the display device
Primary Receiver	<p>A single MPX receiver that you specify as the primary unit during configuration for each system.</p> <p>The primary receiver has the following characteristics:</p> <ul style="list-style-type: none"> • Only the primary receiver reports EDID information back to the transmitter, and thus, back to the source device • The primary receiver is the only receiver capable of bi-directional IR transfers with the MPX transmitter • The primary receiver is the selected unit for bi-directional RS232 serial transfers with the transmitter
Receiver	An MPX extender that inputs media from a transmitter, decrypts, uncompresses, converts and manipulates the data back into the desired format and outputs to the connected supported display devices
Source Device	Computer, HD-DVD, or other source of A/V content
Transmitter	An MPX extender that inputs media from a source device, compresses, encrypts and transmits the content to an MPX receiver. MPX transmitters also provide a back channel for transmission of control data back to a source device.
Transmitter Number	An attribute of a transmitter that enables multiple Extender Groups to co-exist on the same wired media LAN
Universal A/V Port	A DVI-I output port on an MPX1500 receiver that supports a wide range of video formats such as: HDMI, DVI-D, DVI-A, VGA, component, composite and s-video.
Wired Link	A 10/100 Mbps wired connection between a transmitter and bound receivers
Wireless Link	An 802.11a connection between an MPX transmitter and bound receivers

Understanding User Interfaces

Emerge MPX multipoint extenders are accessible through two primary user interfaces: an on-board web server that allows browser-based configuration and system-wide monitoring and a front panel display that provides push-button access to system status and initial network configuration.

Browser-based configuration

Browser-based configuration is available for both MPX transmitters and receivers. The web interface provides access to the following functions:

- Configure system settings
- Configure network settings
- Display hardware and firmware version
- Display connection status and signal strength
- Update firmware
- Reboot system
- Reset to factory defaults
- Change password

Front panel display

The front panel of the transmitter has a 5-button menu display that provides access to the following functions:

- View receiver connection status, including signal strength, data rate and frame rate. Single receiver and multi-receiver scan modes are supported.
- View receiver configuration, including receiver name and MAC address. Single receiver and multi-receiver scan modes are supported.
- View transmitter configuration, including IP (L1) and MAC address.
- Configure transmitter IP settings (L1).

Accessories

The following accessories are available for use with Emerge MPX multipoint extenders.

Table 1.2: List of Accessories

Part Number	Description
DB9-DUAL	Dual DB9 female serial adapter
DMK-04	Wall/Desk mount bracket for MPX1500 extenders
DVI-HDMI	Adapter (male) DVI-D to HDMI (female)
DVI-BNC3	Adapter for component video
DVI-HDMI/CEC	Adapter (male) DVI-D to HDMI (female) with CEC support
DVI-YCV	Adapter for composite and s-video
IRB-100	Dual IR emitter 3.5MM plug
IRB-Y	3.5mm mini jack splitter for connection of 2 IRB-100 emitters to an MPX1000 extender
MPX1000MR-HD15	MPX1000R media module - VGA
MPX1000MR-HDMI	MPX1000R media module - HDMI
MPX1000MT-HD15	MPX1000T media module - VGA
MPX1000MT-HDMI	MPX1000T media module - HDMI
HD15-BNC3	HD15 to BNC3 female adapter for component video
HGA51G-DIR30	High gain 51GHz directional antenna with 30-degree beam width
PBK-01	Power supply bracket kit for MPX1500 extenders
RMK-56	Under desk mount brackets for MPX1000R
5G-1M	5GHz antenna extension kit: two 1-meter cables and brackets
5G-2M	5GHz antenna extension kit: two 2-meter cables and brackets
5G-3M	5GHz antenna extension kit: two 3-meter cables and brackets

Compatibility with Attached Devices

The following sections provide guidelines regarding compatibility with source and display devices. For an up to date device compatibility list, refer to the MPX extender product page on the Avocent web site.

EDID compatibility

Display devices communicate with source devices using Extended Display Identification Data (EDID), a Video Electronics Standards Association (VESA) standard data format that contains basic information about a monitor and its capabilities, including vendor information, maximum image size, color characteristics, factory pre-set timings, frequency range limits and character strings for the monitor name and serial number.

EDID information stored in a display device is passed to the MPX receiver across the video cable through a digital path called the Display Data Channel (DDC). The receiver forwards this information to the transmitter across the media LAN. The transmitter, in turn, passes the EDID information to the source device, thus allowing plug-and-play functionality among display and source devices.

An MPX extender group has a single primary receiver, which has special responsibilities regarding serial, IR, and video functionality. Regarding video, only the primary receiver passes its EDID information back to the transmitter. Thus, the display device attached to the primary receiver should be representative of the devices attached to other receivers.

The MPX transmitter is pre-configured with default EDID information, which indicates support only for 640x480 resolution at 60Hz. This EDID will be passed to a source device in lieu of information received from MPX receivers. As the transmitter learns about the attached display devices through receiver bindings, it uses the information to create a more meaningful EDID string, referred to as the active EDID string. The process occurs as follows:

- Initially, the active EDID string is blank
- When a receiver binding occurs, if the receiver is not the primary and if the active EDID string is blank, then the transmitter will merge the received and default EDID strings such that the resulting string represents the common features supported by both devices. This new string will be stored as the active EDID and will be reported to the source device.
- When the primary receiver binds with the transmitter for the first time, the merge process will be repeated using the default and primary EDID strings.
- When bindings are established with subsequent receivers, no action is taken.
- If a different receiver is selected as the primary via the transmitter's web interface, then the merge process will be repeated when a new primary EDID string is received.
- If the primary display device is replaced with a different model, then the receiver will report the information to the transmitter and a merge process will take place.

NOTE: A blank screen may occur as EDID changes are being processed.

HDCP compatibility

High-Bandwidth Digital Content Protection (HDCP) protects video content as it travels across DVI-D or HDMI connections. Compliant devices do not allow users to make copies of protected content and must effectively frustrate non-compliant attempts to view protected content.

For example, protected digital video content must be restricted to DVD quality when viewed on non-HDCP display devices. Likewise, digital audio content is restricted to DAT quality on non-HDCP digital audio output devices.

The following procedures ensure security for protected high definition content:

- Authentication: To identify non-compliant display devices
- Encryption: To prevent eavesdropping of protected content
- Key revocation: To block devices manufactured by vendors in violation of license agreements from receiving HD content

MPX extenders serve as a repeater between compliant HDCP source and display devices. When all display devices and the source device are HDCP compliant, high definition content will display normally. HDCP special cases are handled as follows:

- When a new display device is added to the extension network, its key will be passed to the source device for validation. The MPX transmitter will stop transmission of protected content until the new display device is validated by the source device. The duration of this process may last up to 15 seconds. The session will continue automatically upon successful authentication.
- In the event that a revoked key is detected, the session will terminate to all display devices. In this case, the user will need to determine which display device is presenting a revoked key and remove it from the extension network. Once removed, the MPX transmitter must be rebooted to flush the key from its memory. At that point, the session should resume normally to all compliant display devices.
- In the event that a display does not support HDCP, then the MPX receiver will not send protected content to that display device. Unprotected analog audio will be processed normally by the MPX receiver.
- The MPX receiver supports connection to compliant display devices. Connection to devices such as an HDCP compliant switch, which may present multiple keys, is not supported. Should this occur, the MPX receiver will refrain from sending video content to the device. Other receivers in the extension network will not be affected.

Rack Mount Safety Considerations

Before installing the appliance and other components in the rack (if not already installed), stabilize the rack in a permanent location. Install the equipment starting at the bottom of the rack, then work to the top. Avoid uneven loading or overloading of racks.

- **Elevated ambient temperature:** In a closed rack assembly, the operation temperature of the rack environment can be greater than room ambient. Use care not to exceed the rated maximum ambient temperature of the unit.
- **Reduced air flow:** Carefully install the equipment in a rack so that an adequate amount of airflow is maintained for safe operation of the equipment.
- **Mechanical loading:** Avoid a potentially hazardous condition caused by uneven mechanical loading by carefully mounting the equipment in the rack.
- **Circuit overloading:** Consider the connection of the equipment to the supply circuit and the effect that overloading of circuits might have on overcurrent protection and supply wiring. Observe equipment nameplate ratings for maximum current.
- **Reliable earthing:** Maintain reliable earthing of rack-mounted equipment. Pay particular attention to supply connections other than direct connections to the branch circuit (for example, use of power strips).

Transmitter

The transmitter encodes, compresses and sends media signals from a source device to a group of bound receivers. Because the transmitter's media input port is provided as a field-installable module, it is able to support an expanding range of media types as additional modules are released. Table 2.1 provides an overview of the transmitter.

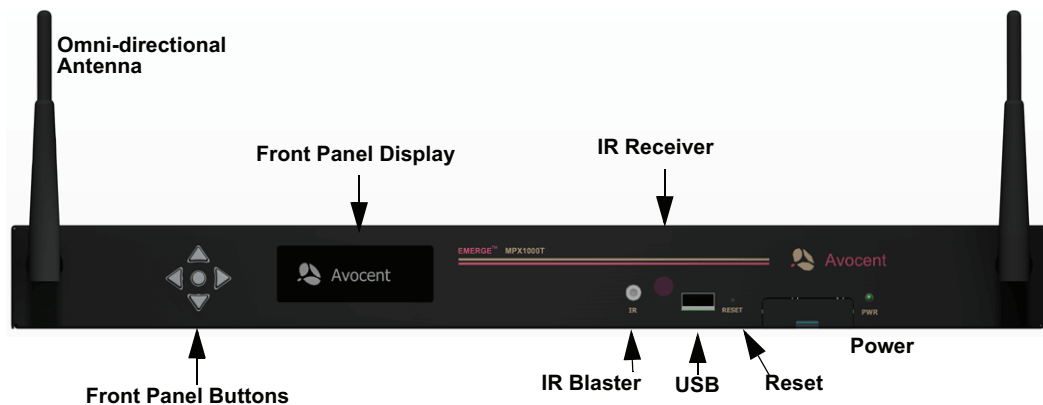


Figure 2.1: Emerge MPX1000 HD Multipoint Extender Transmitter (Front)

Table 2.1: Front Panel (Transmitter)

Item	Description
Front Panel Buttons	Up, Down, Left and Right Arrows surrounding a Select button used to view status and configuration settings and to establish initial parameters
Unit Reset	Recessed momentary button

Table 2.1: Front Panel (Transmitter) (Continued)

Item	Description
Infrared (IR) Receiver Port	Captures signals from an IR remote controller for broadcast through the extension network
Infrared (IR) Blaster Port	The dual IR(tx) emitter connects to this port via a 3.5mm jack
Omni-directional Antenna	Used to establish the wireless link between the transmitter and bound receivers; Avocent offers specialized antennas for improved distance or higher performance in certain bands. See the Avocent web site for more information.
Front Panel Display	Built into the unit; see <i>Front Panel Display</i> on page 53
Power (PWR) LED	LED built into the unit to indicate that power is connected and switched ON
USB Port	USB type A; reserved for future use

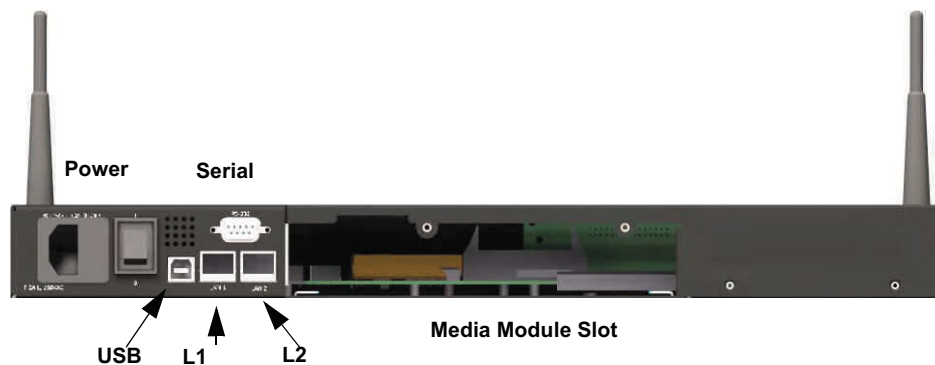


Figure 2.2: Emerge MPX1000 HD Multipoint Extender Transmitter (Rear)

Table 2.2: Rear Panel (Transmitter)

Item	Description
L1 Ethernet Port	RJ 45, 10/100 Mbps Ethernet for web-based management of the MPX1000 transmitter
L2 Ethernet Port	RJ 45, 10/100 Mbps Ethernet for transfer of A/V media from the transmitter to all bound receivers

Table 2.2: Rear Panel (Transmitter) (Continued)

Item	Description
Serial Port	RS-232, 9-pin serial port to support serial passthrough for control of display devices
Power	IEC power socket with built-in fuse and on/off switch
USB Port	USB Type B; reserved for future use
Media Module Slot	Open slot on rear; used for insertion of A/V media module

Receiver

The receiver decrypts, uncompresses and converts media signals back into the desired format and outputs the signals to the connected display device. MPX1000 receivers feature a media module, similar to the MPX1000 transmitter. MPX1500 receivers feature a universal A/V port. The following sections provide an overview of these products.

MPX1000R overview

MPX1000 receiver is a modular product that provides support for HDMI, DVI-D and VGA display devices. The following diagram illustrates the product.

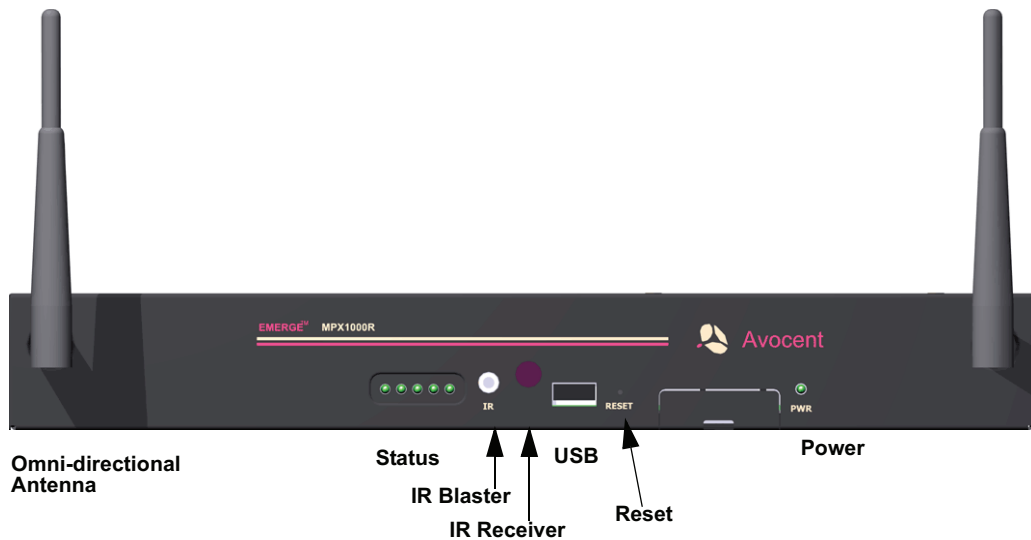


Figure 2.3: Emerge MPX1000 HD Multipoint Extender Receiver (Front)

Table 2.3: Front Panel (Receiver)

Item	Description
Unit Reset	Recessed momentary button
Infrared (IR) Receiver	Captures signals from an IR remote controller for broadcast through the extension network
Infrared (IR) Blaster	The dual IR(tx) emitter connects via the 3.5mm jack
Omni-directional Antenna	Used to establish the wireless link between the transmitter and bound receivers. Avocent offers specialized antennas for improved distance or higher performance in certain bands. See the Avocent web site for more information
Status Lights	Five colored LEDs that communicate the current state of the device. Located on the front panel in the following order (left to right): RED AMBER1 AMBER2 GREEN1 GREEN2 See <i>MPX Receiver Status LEDs</i> on page 63 for a detailed description of LED status indicators
USB Port	USB type A; reserved for future use
Power (PWR)	Indicates that power is connected and turned ON

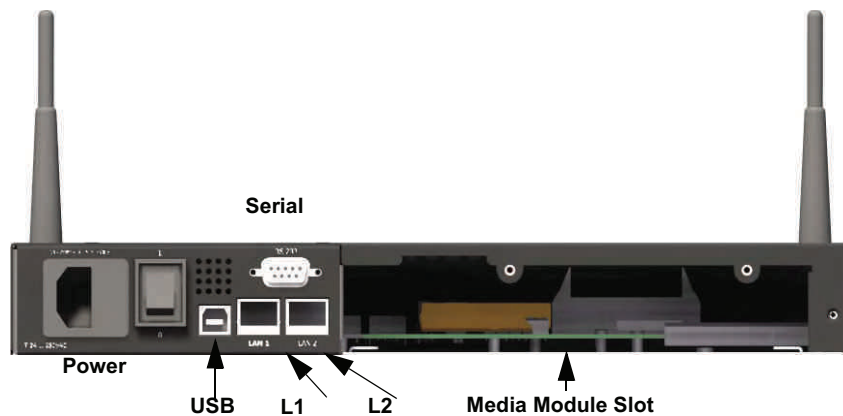


Figure 2.4: Emerge MPX1000 HD Multipoint Extender Receiver (Rear)

Table 2.4: Rear Panel (Receiver)

Item	Description
L1 Ethernet Port	RJ 45, 10/100 Ethernet for web-based management of the MPX1000 receiver.
L2 Ethernet Port	RJ 45, 10/100 Ethernet for sending video data from the transmitter to all bound receivers
Serial Port	RS-232, 9 pin serial port to support serial passthrough for control of display devices
Power	Power socket with built-in fuse and on/off switch
USB Port	USB Type B; reserved for future use
Media Module Slot	Open slot on rear; used for insertion of A/V media module

MPX1500R overview

MPX1000 receiver features a universal A/V port that provides support for HDMI, DVI-D, DVI-A, VGA, composite, component, and s-video display devices. The following diagram illustrates the product.

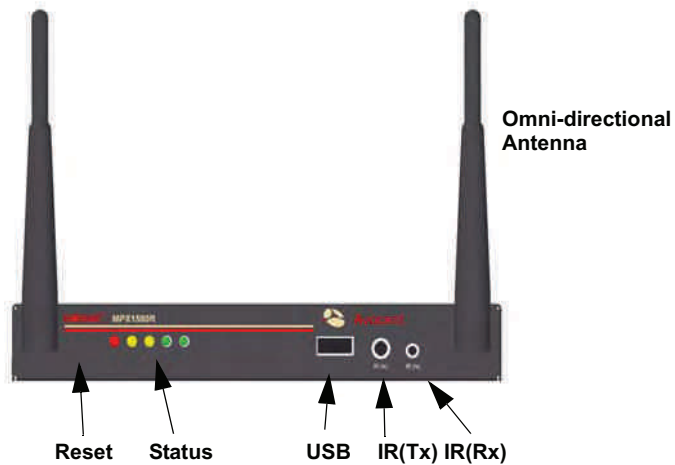


Figure 2.5: Emerge MPX1000 HD Multipoint Extender Receiver (Front)

Table 2.5: Front Panel (Receiver)

Item	Description
Unit Reset	Recessed momentary button
Infrared Receiver Port - IR(Rx)	Captures signals from an IR remote controller for transmission through the extension network. Optional IR receiver connects to the port via a 2.5mm mini jack.
Infrared Transmit Port - IR(Tx)	The dual IR(tx) emitter connects via the 3.5mm jack
Omni-directional Antenna	Used to establish the wireless link between the transmitter and bound receivers. Avocent offers specialized antennas for improved distance or higher performance in certain bands. See the Avocent web site for more information
Status Lights	Five colored LEDs that communicate the current state of the device. Located on the front panel in the following order (left to right): RED AMBER1 AMBER2 GREEN1 GREEN2 See <i>MPX Receiver Status LEDs</i> on page 63 for a detailed description of LED status indicators
USB Port	USB type A; reserved for future use

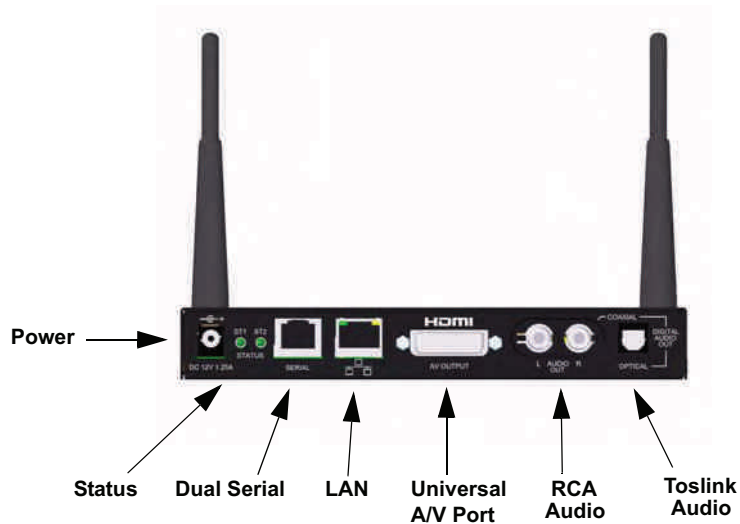


Figure 2.6: Emerge MPX1000 HD Multipoint Extender Receiver (Rear)

Table 2.6: Rear Panel (Receiver)

Item	Description
Power	DC power input port
Rear Status LEDs	Offers a subset of front panel status LED information. Rear status LEDs are useful when front panel status LEDs are not visible due to orientation of a deployed receiver.
Dual Serial Port	RJ45 connector for attachment of optional DB9-DUAL adapter, which splits into RS-232 DB9 female connectors. Supports serial passthrough for control of display devices.
Ethernet LAN Port	RJ 45, 10/100 Ethernet that provides combined media and control LAN functionality
Universal A/V Port	A DVI-I connector that provides connectivity to a wide range of display devices, including: HDMI, DVI-D, DVI-A, VGA, component, composite and s-video
RCA Audio	Provides support for unbalanced analog stereo (left and right) audio. Depending upon your firmware revision, the right channel offers support for S/PDIF coaxial digital audio.

Table 2.6: Rear Panel (Receiver) (Continued)

Item	Description
Toslink Audio	Toslink connector that, depending upon your firmware revision, provides support for optical S/PDIF digital audio

Media Modules

Two types of media modules exist, as follows:

- Input media modules for MPX1000 transmitters
- Output media modules for MPX1000 receivers (shown below)

Media received from a source device at the input module of the transmitter is processed and passed to bound receivers where it is properly converted and sent to display devices through the output media module. Media modules must be installed in all MPX1000 extenders for proper operation.

NOTE: With your MPX1000 unit you have received two snap-on ferrites. If you are using the analog audio (RCA Jacks) these ferrites should be applied to each end of the cables. Apply the ferrites approximately one inch from the cable ends. One ferrite goes around both cables.

HDMI media module

The HDMI media module supports both HDMI and DVI-D signalling. HDMI functionality includes support for HDMI video, embedded audio, EDID passing, digital rights management (HDCP) and device control (CEC). DVI-D functionality includes video, external audio, EDID passing and HDCP. DVI-D connectivity requires a DVI-HDMI adapter, which is included with the media module.

Audio is limited to a single stream. HDMI embedded digital audio, if present, takes priority over analog audio. See *Audio* on page 67 for additional information.

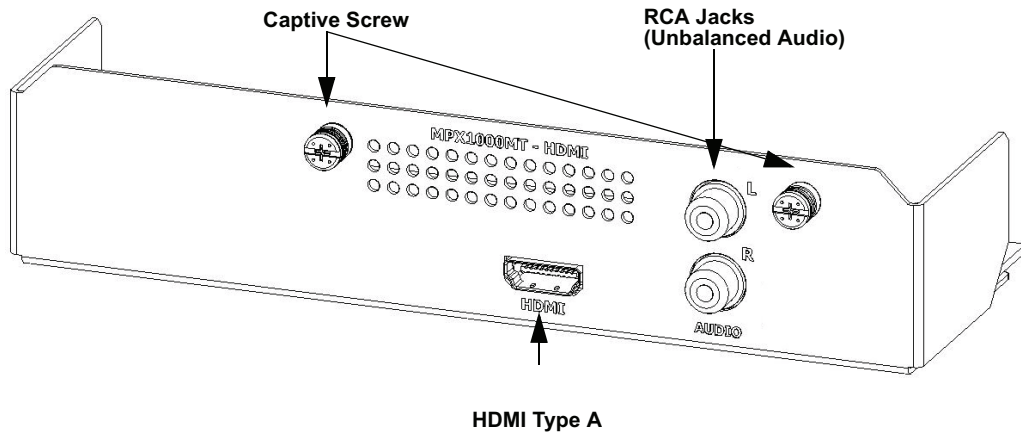


Figure 2.7: HDMI Media Module

Figure 2.7 illustrates an HDMI input media module. The HDMI output module, although reverse in function, has a similar look and feel.

Supported resolutions are defined in *MPX1000T HDMI Input Module Product Specifications* on page 80.

HD15 media module

The HD15 media module is intended for use with analog computer graphics and video. The module supports industry-standard VGA and component video devices. An optional modular adapter is required for component video: HD15-BNC3. Component video is supported only by the input (transmitter) media module. Thus, the extender system is able to input component video for output on HDMI, VGA, or DVI-D display devices.

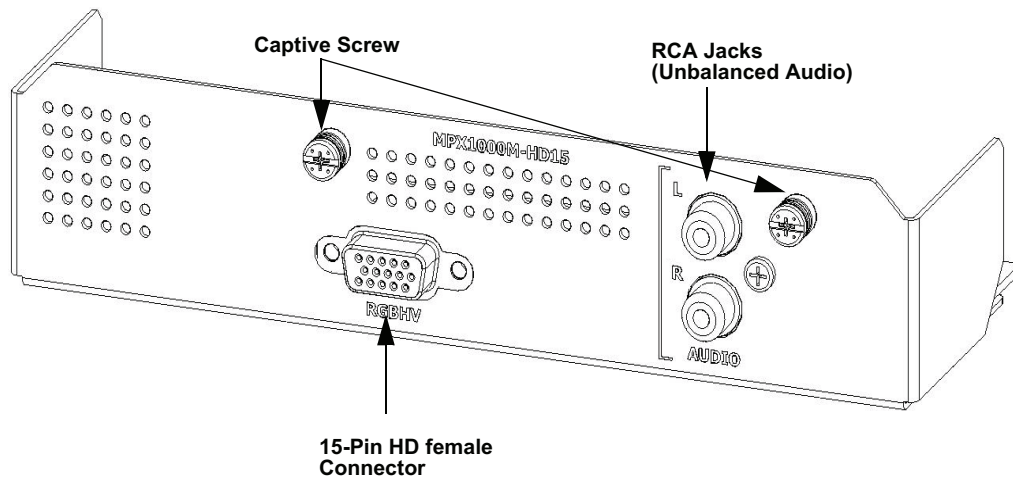


Figure 2.8: HD15 Media Module

Figure 2.8 illustrates an HD15 (VGA) input media module. The MPX1000 transmitter will sample analog audio signals received on the RCA jacks and send the data to all bound receivers. See *Audio* on page 67 for additional information.

The HD15 media module passes EDID information in addition to video signals, thus allowing plug-and-play operation among source and display devices.

Supported resolutions are defined in *MPX1000T HD15 (VGA) Input Module Product Specifications* on page 82.

Cross conversion

MPX1000 extenders are able to pass both interlaced and progressive video formats but they do not support interlacing or deinterlacing. It is possible, however, to cross-convert a signal from one video format to another through the extension network. For example, a transmitter with an HD15 media module is able to communicate with a receiver equipped with an HDMI media module. In this case, the receiver could output HDMI or DVI-D signalling as long as the resolution remained the same on both sides of the network; the system does not provide video scaling. An HDMI source, however, may not be output to a VGA display device. This is prohibited due to compliance with digital rights management.

For more information regarding audio, see *Audio* on page 67.

Getting Ready

To begin installing your Emerge MPX extenders, do the following:

- Take proper precautions against antistatic discharge.
- Remove your MPX transmitter, receivers, antennas and media modules from their boxes.
- Refer to the kit contents list to ensure that you have all the items necessary for your installation. See *Kit Contents* on page 95 for a complete list of product contents.
- Place the units on a stable working surface. To prevent radio receivers from being over-driven, allow a distance of three feet between adjacent units.
- Connect antennas to the extenders. Fold the antennas inward while the extenders are in close proximity to each other. Excessive signal strength may cause data loss and retransmission.
- Ensure that all units are turned off at this time.

Installing Media Modules

MPX1000MT media modules provide media input ports and are intended for use with MPX1000 transmitters. MPX1000MR media modules provide media output ports and are intended for use with MPX1000 receivers.

NOTE: Proper electrostatic discharge (ESD) protection should be used at all times.

To install a module into your transmitter or receiver:

1. Align the edges of the media module with the open media module slot on the rear of the unit.
2. Slide the media module into the transmitter or receiver(s), until it is fully seated.
3. Fasten the media module into the unit using the provided screws. Do not over tighten or the screw may be damaged.

Transmitter Configuration

The transmitter can be configured by using an intuitive web interface. The following steps guide you through this process.

LAN settings

To configure transmitter control LAN (L1) settings:

1. Attach the AC line cord and turn on your transmitter. The green LED should illuminate to indicate presence of power. Use only an Avocent power cord.
2. Wait for the Avocent logo to appear on the front panel display indicating that the initial power-up sequence is complete.
3. Using an Ethernet crossover cable or hub, connect a browser client to the control LAN port (labeled L1) on the rear of the transmitter.
4. The default IP address for L1 of the transmitter is 192.168.1.1 with a subnet mask of 255.255.255.0. This may be changed using either the 5-button front-panel display or the web interface. Refer to *Configure control LAN* on page 56 for detailed instructions regarding the front-panel display.
5. Change the IP address of the browser client computer so it can directly access the transmitter, for example 192.168.1.20, if necessary.
6. Launch a browser session to the IP address of the transmitter to invoke its web configuration utility via L1, the control LAN port.
7. Type the default password, which is **Admin** (case sensitive).
8. If the unit has not yet been configured, you will be prompted to enter a country code. This code is used by the product to establish allowable settings for wireless bands, channels and power limits.
9. If desired, select the password page to change the system password. See *Change Password* on page 34.
10. If you have not done so via the front panel, you may configure the IP address of the L1 control LAN port using the web interface. Figure 3.1 illustrates the network settings dialog box. To alter the settings, select the Control LAN Settings page and set the parameters as follows:
 - a. Type the IP address for L1 (control LAN) to match the network on which it will be placed. Use this address for subsequent browser connections. Do not use the following reserved IP addresses: 0.0.0.0, 192.168.1.10, 192.168.1.1, 192.168.1.2, 192.168.10.xxx or 192.168.11.xxx.
 - b. Type the subnet mask for L1.
 - c. Type the gateway address for L1, or 0.0.0.0 if there is no gateway.
11. The LAN Speed / Duplex setting allows you manually select 10 or 100Mbps LAN speed and full or half duplex operation. By default, these settings will be automatically negotiated with

your switch or hub. To ensure interoperability, compatible settings must be selected on the Ethernet switch and MPX extenders.

12. Apply the changes.

NOTE: Once you change the IP address of a unit, the browser session will terminate. Your browser session must be re-established using the new address of the unit.

Control LAN (L1) Settings

Control LAN (L1) parameters

IP Address	192	.	168	.	1	.	1
Subnet Mask	255	.	255	.	255	.	0
Gateway	0	.	0	.	0	.	0
LAN Speed / Duplex	Auto Negotiate						

Configures the wired control LAN (L1) only. [Help](#)

Apply

Figure 3.1: Control LAN Settings

To configure transmitter system settings: (Optional)

1. Within the Transmitter Menu, select the System Settings page.
2. Type a friendly name into the *Device Name* text box. This will cause the name to be displayed throughout the web interface as means to identify the transmitter.
3. The *HTTPS Required* setting allow you to explicitly set HTTPS as the transport protocol for access to the web interface. Should you do so, it will be necessary to install a certificate from the MPX extender onto your browser client. HTTPS ensures encryption of all web content. If this setting is disabled, you may obtain a secure web session with the transmitter by launching an https session rather than an http session from your browser client.
4. You may disable the ability to set the IP address of the transmitter via the front panel (five button) interface. By default, this capability is enabled.
5. The *Remote Console* feature allows for centralized control of the MPX extenders that are deployed at remote locations. Contact Avocent technical support before you enable this feature.
6. Apply the changes.

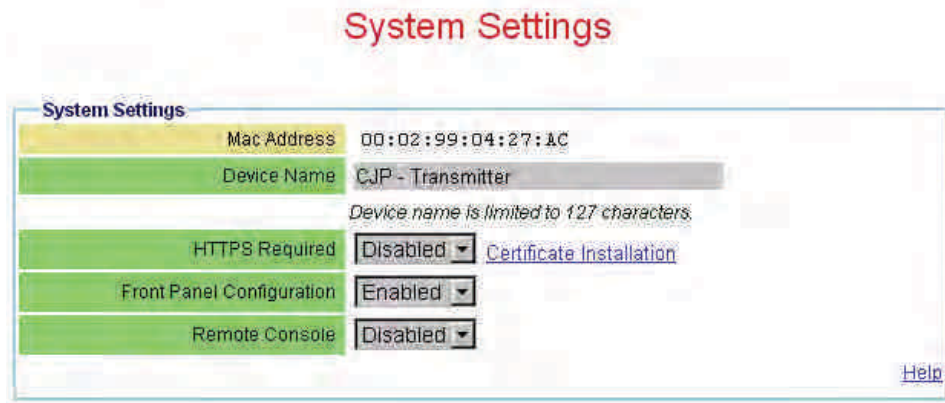


Figure 3.2: System Settings

Validating media LAN connectivity

Media session data (audio, video, and control information) is transferred from an MPX transmitter to bound receivers either through the wireless LAN interface or the L2 wired LAN interface. By default, MPX transmitters are configured for wireless operation. MPX receivers are configured neither for wired or wireless operation, rather they search for an active transmitter first on their wired and then on their wireless media LAN interfaces. The following sections will guide you through a quick test of the wireless and wired modes of operation.

Wired Media LAN (L2) setup (Optional)

Perform the following steps if you wish to use MPX extenders in a wired mode of operation.

To set up a wired media LAN:

1. Interconnect the media LAN ports of the MPX transmitter and all receivers using standard 100Mbps Ethernet hubs or switches and UTP cabling.

NOTE: Wired connection should be made to the L2 of MPX1000 transmitters to the L2 port of MPX1000 receivers and to the LAN port, as indicated by the LAN symbol, on MPX1500 receivers.

2. Using your browser client, navigate to the Media LAN Settings page on the MPX transmitter. This web page is illustrated in Figure 4.3 on page 43.
3. Select the radio button that enables wired operation.

NOTE: The IP address of MPX receiver's media LAN port is dynamically assigned by its transmitter at bind time. This process is similar to DHCP.

4. Although it is not possible to explicitly configure the IP address of the media LAN port of MPX1000 receivers or transmitters, it is possible for 4 MPX1000 transmitters and bound

receivers to share a single wired extension network. Skip to the next step if you are not planning to install multiple transmitters on the same wired media LAN.

You may place more than one transmitter on a wired media LAN. To do so, select a unique *Transmitter Number* from the pull-down menu on the media LAN Settings web page.

NOTE: To allow multiple groupings of transmitters and receivers to coexist on a shared wired media LAN, each transmitter and its group of receivers must have a unique set of IP addresses. The *Transmitter Number* setting is used to select a unique base address for a transmitter and its associated receivers.

NOTE: Media LAN traffic is timestamped and latency sensitive by nature. For this reason, media LAN IP addresses are not routable. A wired media LAN may be interconnected using industry-standard Ethernet cables, hubs and switches. VLAN capable switches may also be used. Extended distance may be accomplished via fiber-based inter-switch links. In all cases, the media LAN must comprise a single subnet. It is not recommended to share this subnet with non-MPX1000 devices.

5. Apply the change.

Dynamic binding

After power up initialization, MPX receivers begin to search both wired and wireless media LAN interfaces for an accessible MPX transmitter. By default, an MPX transmitter accepts bind requests from 8 receivers. Bound receivers are listed in the transmitter's web interface and on its front panel display.

To validate your media LAN and bindings:

1. Plug all receiver line cords into the AC mains and turn on your receivers.
2. Wait for the LEDs on all units to become locked. This indicates that the receivers have successfully initialized and detected the transmitter. Two green LEDs will alternate during the search process.
3. Launch a browser session to the transmitter's web utility and select *Bindings* in the transmitter menu.
4. Scroll to the bottom of the Bindings page and verify that all active receivers are listed (by MAC address) within the *Detected Receivers* table. Figure 3.3 on page 27 illustrates this table. If a receiver is not listed, verify proper LAN connectivity or power state of the receiver. If the receiver is not detected and your transmitter is configured for wireless operation, you may need to adjust the transmitter power setting, refer to *wireless transmission power settings* on page 42.

Setting explicit receiver bindings (Optional)

By default, a transmitter honors requests from any receiver that requests binding. You may, however, configure a transmitter to honor bind requests only from a select list of receivers. Requests from non-selected receivers will be rejected by the transmitter. This feature is referred to as explicit bindings.

Explicit bindings offer the following benefits:

- Loss of connection with dynamically bound receivers is not treated as an error condition by the transmitter. Explicitly bound receivers, however, will be flagged as non-responsive should they drop connection with the transmitter.
- Explicit bindings allow for the selection of a Primary Receiver, which is required for bi-directional serial and IR communications. Further, the Primary Receiver may be used to establish a particular display device as the source for EDID information.
- Multi-transmitter configurations require explicit pairings of receivers to transmitters.

The transmitter's Bindings page contains separate tables for detected receivers and configured receivers. In addition, there is a global setting that enables automatic binding of detected receivers.

The *Detected Receivers* table contains an entry for each receiver that has discovered the transmitter and requested binding. Each entry provides the MAC address and bind status of the receiver. A check box is provided for you to add detected receivers to the *Configured Receivers* table. The *Configured Receivers* table provides explicit controls for receiver binding. A bound receiver participates in media sessions with the transmitter. Explicitly unbound receivers may be bound by a different transmitter.

The global option, labeled *Automatically Bind Detected Receivers*, is used to indicate whether or not receiver bind requests are automatically granted.

NOTE: Automatic binding results in a dynamic extension network in which receivers bind and unbind as they are turned on and off. Although simple to establish, dynamic extension networks lack a primary receiver, which prevents the transmission of bi-directional serial and IR data.

To establish explicit receiver bindings:

1. Within the Detected Receivers table, select the *Add to Configured Receivers* checkbox next to each detected receiver. Figure 3.3 on page 27 illustrates the Detected Receivers table.
2. *Optional.* You may manually enter a receiver's MAC address. MAC address labels are affixed to the bottom of an MPX receiver.
3. *Optional.* Configure the Automatically Bind Detected Receivers setting using drop-down list. If enabled, the transmitter will automatically bind all detected receivers detected that are not explicitly disabled for binding in the Configured Receivers table.
4. Apply the changes.
5. For each receiver that is intended to receive media from this transmitter, set the *Bind Allowed* checkbox in the Configured Receivers table. The remaining receivers may be bound to a different transmitter. Figure 3.3 on page 27 illustrates the Configured Receivers table.
6. Click the *Primary* radio button to assign one unit as the Primary receiver for bi-directional exchange of IR and serial data and reception of EDID information.
7. Apply the changes.

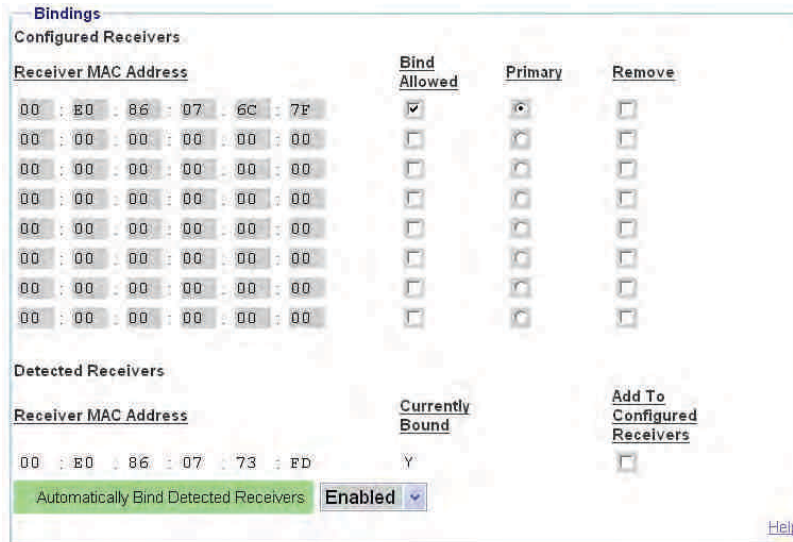


Figure 3.3: Bindings Page

Receiver Configuration

Accessing your receiver's web interface

The on-board web interface of an MPX receiver may be accessed indirectly through the control LAN port (L1) of the transmitter or directly via the control LAN port of the receiver itself.

NOTE: MPX1000 receivers feature a dedicated control LAN port, which is labelled L1. MPX1500 receivers have a single LAN port that serves the combined functions of control LAN and media LAN. There is no loss of function because the web interface of an MPX receiver is typically accessed via the control LAN (L1) of the transmitter.

By default, the transmitter forwards web traffic between its control LAN (L1) port and its media LAN (L2) port or wireless LAN interface (whichever is active). Thus, no setup of cabling is required to access the web interface of any bound MPX receiver.

Hypertext links to active receivers are displayed at the bottom of the Transmitter Menu. Receivers are identified by their MAC address; however, once configured, friendly names will be displayed. A receiver's web interface may be accessed by launching its link in the Active Receivers list. The receiver's web interface will provide a hyperlink back to the transmitter.

Should you wish to establish a dedicated wired control LAN for web access to MPX1000 transmitters and receivers, the following section will guide you through the process.

MPX1000 receiver control LAN (L1) settings (Optional)

To establish a dedicated wired control LAN for management of MPX1000 extenders, it will be necessary to establish unique IP addresses for the control LAN ports (L1) of each receiver and transmitter to be placed on the shared LAN.

NOTE: The LAN port of an MPX1500 receiver responds is programmed with different IP addresses for control LAN and media LAN functions. Although it is not possible to manually assign the IP address for media LAN functionality, it is possible to assign the IP address, subnet mask and gateway for control LAN functionality. These addresses need not reside on the same subnet.

To establish a wired control LAN for MPX1000 receivers:

1. Interconnect the control LAN ports of the MPX transmitter and all receivers using industry-standard 10/100Mbps Ethernet components.
2. Attach your browser client to the control LAN.
3. Turn on a single MPX receiver and leave all other receivers with default addresses turned off.
4. Launch a browser session to the default IP address of an MPX receiver, which is 192.168.1.2 with a subnet mask of 255.255.255.0.
5. If prompted, type the default password, which is **Admin** (case sensitive).
6. If the unit has not yet been configured, you will be prompted to enter a country code. The wireless radio is disabled until a country code is entered. In addition to enabling the radio, the country code will establish legal bands, channels, and power limits.
7. Within the receiver menu, select the Control LAN Settings page and set the parameters as follows:
 - a. Enter the IP address of the control LAN to match the subnet on which it will be placed. Use this address for subsequent browser connections. Do not use the following reserved IP addresses: 0.0.0.0, 192.168.1.10, 192.168.1.1, 192.168.1.2, 192.168.10.xxx or 192.168.11.xxx.
 - b. Enter the control LAN subnet mask.
 - c. Enter the control LAN gateway address, or 0.0.0.0 if there is no gateway.
8. For MPX1000 receivers, you may manually select the LAN speed and duplex settings. To ensure interoperability, compatible settings must be selected on the Ethernet switch and MPX1000 extenders.
9. Apply the changes.
10. Label the unit with its new IP address.
11. Return to step 3 until all MPX receivers are configured with unique IP addresses.

Configure receiver system settings (Optional)

Although optional, it is recommended to configure each receiver with a friendly name. These names will be displayed within the web interface of the transmitter. Other system settings affect diagnostic splash screens and remote diagnostics.

To configure receiver system settings:

1. Using a browser client, access the web interface of the MPX receiver either directly or via the transmitter web interface.
2. Within the Receiver Menu, launch the System Settings page.
3. Type a Device Name to associate a friendly name with the unit, such as “Aisle 4 Display.” The device name may contain any combination of printable characters but it cannot exceed 127 characters. This name will be displayed for your convenience throughout the web interface. The name will also be displayed on the front panel of an MPX1000 transmitter.
4. The *HTTPS Required* setting allow you to explicitly set HTTPS as the transport protocol for access to the web interface. Should you do so, it will be necessary to install a certificate from the MPX extender onto your browser client. HTTPS ensures encryption of all web content. If this setting is disabled, you may obtain a secure web session with the transmitter by launching an https session rather than an http session from your browser client.
5. The *Display Status Screens* setting allows you enable and disable the display of status messages on the display device. Status messages include diagnostic information that may be useful during initial installation but may not be desired once units are deployed.
6. The *Remote Console* feature allows for centralized control of the MPX extenders that are deployed at remote locations. Contact Avocent technical support before you enable this feature.
7. Apply the changes.

Multiple transmitter considerations

If there are multiple transmitters to which your receiver may bind, you may select a particular transmitter.

To select a specific receiver:

1. Browse to the Media LAN Settings of the receiver.
2. In the *MAC Address of Transmitter* field, enter the MAC address of the transmitter to which this receiver shall attempt to bind. The MAC Address may be displayed via the transmitter’s System Settings web page.
3. Apply the changes.

Configure receiver password (Optional)

Refer to *Change Password* on page 34 for detailed instructions.

Firmware Version Checking

Select the Version Information web page on the transmitter and each receiver. Make note of the firmware version. Visit the Avocent web site at www.avocent.com and review the available upgrades. Should you decide to upgrade your units, see *Upgrading MPX Firmware* on page 88 for detailed instructions.

Initiating A Media Session

Your MPX transmitter is now ready to establish a media session with its bound receivers.

The following steps allow you to verify proper operation of your media modules, establish the Active EDID string at the MPX transmitter and test compatibility of your source and display devices through the extension network.

To establish your first media session across the extension network:

1. Turn off your MPX transmitter and receivers.
2. Turn off your display devices.
3. Properly shut down off your source device if it is not already turned off at this time.
4. Attach your display device to the primary MPX receiver using an appropriate cable.

NOTE: If your display device does not support DDC2B or if a cable or video switching device prevents the normal flow of EDID information across the DDC bus, then refer to *Common Tuning Needs* on page 71 for additional information. Please do so before moving on to the next step.

5. Power on the display device.
6. Power on the primary MPX receiver.

NOTE: This power up sequence ensures that the display device is online when the MPX1000 receiver reads EDID information from the device.

7. Attach the source device to the MPX transmitter using an appropriate cable.
8. Turn on the MPX transmitter.
9. Wait for the MPX receiver to bind with the MPX transmitter, as previously described.
10. Power on your source device and activate as necessary to ensure flow of video data.

NOTE: This power up sequence ensures that proper EDID information is stored in the MPX transmitter before the source device attempts to read it. The order of power up sequencing is important only once, during initial configuration and setup. If it is necessary to replace a field-installed MPX transmitter with brand new unit, these same steps should be used to properly establish valid EDID information in the replacement unit.

11. Active video should appear on the display device attached to the MPX receiver within 30 seconds after the source device has completed initializing.
12. Additional receivers and display devices may now be added to the extension network.

Troubleshooting

If video fails to appear on your display device or if plug-and-play functionality is not functioning normally, see *Video Troubleshooting* on page 68 for detailed troubleshooting procedures.

Transmitter and Receiver Placement

To find acceptable locations for your extenders:

1. Turn off all MPX extenders.
2. Turn off your source and display devices.
3. Place the transmitters and receivers in their desired locations without firmly mounting the units.
4. Turn on the MPX extenders and raise antennas to their upright positions. Allow the units to initialize and bind.
5. Using the receiver signal strength indicator for guidance, position the units and antennas as needed to obtain optimal signal strength. If possible, seek to obtain three or more signal strength LEDs on the front of the receiver.

NOTE: Radio signals propagate outward from an omni-directional antenna in a disk-like perpendicular manner. A vertical antenna results in horizontal signal propagation. For this reason, it is best to start with transmitter and receiver antennas that are similarly oriented and aligned on the same horizontal or vertical plane. Vertical antennas result in horizontal emission. High gain antennas produce a narrowed yet stronger beam of radio waves than low gain antennas. Thus, it is more critical to position transmitters and receivers on the same plane when using high gain antennas.

NOTE: If transient obstructions, such as people, boxes or vehicles are anticipated during normal operation, then simulate these factors as best you can to observe their effect upon signal strength under real-world conditions.

If necessary, signal strength may be optimized as follows:

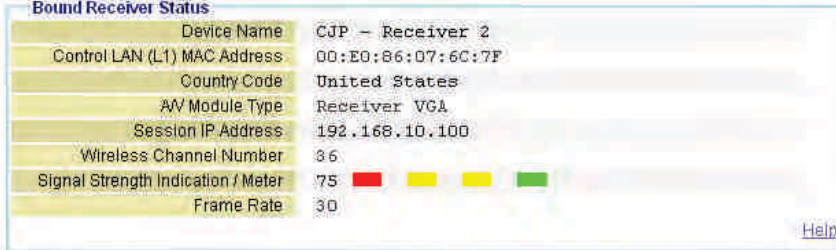
- a. Increase your transmitter power: See Table 4.3 on page 41 for more information.
- b. Use specialized directional or high gain antennas: See *Antenna Options* on page 61 for more information.
- c. Use antenna extension cables to raise antennas above obstructions or pass antennas through walls. Although extension cables allow for optimal antenna placement, they will attenuate signal strength. Thus, they should only be used when necessary and kept to a minimum length. Proper placement of your receiver, if possible, is preferable to use of extension cables. Never connect extension cables together as a means of extending antenna placement. This will result in excessive signal loss. See *Antenna Options* on page 61 for specific options and installation instructions.
- d. Reposition your extenders: See *Radio Considerations* on page 60 for additional information. A slight movement of several inches may result in a noticeable increase of signal strength.
- e. Depending upon your environment, it might be advantageous to orient the antennas on your transmitters and receivers such that one antenna on each unit is upward in a 12 O'clock position and the other antenna is perpendicular to it, in a 3 or 9 O'clock position. The vertical antenna will radiate on a horizontal plane and the horizontal antenna will radiate on a vertical plane. This may increase the benefit of antenna diversity by taking

advantage of diverse reflections off of environmental objects such as walls, floors, desks, and ceilings.

- f. Use of lower frequency channels may slightly increase transmission distance and wall penetration. For maximum wall penetration, consider use of G band channels and antennas.
 - g. As a final optimization, you might want to compare receiver signal strength across all frequencies. Starting at the lowest frequency, make note of the weakest signal strength reported by any receiver. Select the next frequency via the Media LAN Settings page on the transmitter. Allow the receivers to bind. Again, record the weakest signal strength reported by any receiver. Repeat this process until all channels have been tested. Set the transmitter for the channel that resulted in the strongest recorded signal strength. Take care to evaluate only those channels that are compatible with the antennas that you have selected. For example, do not test G band channels with UNII band antennas.
6. Once acceptable signal strength is attained, turn off the MPX transmitter and receivers.
 7. Mount your MPX extenders securely without altering their orientation. See *Appendix C, Mounting Options* on page 74.
 8. If your antennas will be subject to wind or other forces that might cause them to rotate out of position, then you might consider use of a few drops of silicon gel to lock the position of the antenna.
 9. Attach the video and audio source devices to the MPX transmitter.

NOTE: With your MPX1000 unit, you have received two snap-on ferrites. If you are using the analog audio (RCA Jacks) these ferrites should be applied to each end of the cables. Apply the ferrites approximately one inch from the cable ends. One ferrite goes around both cables.

10. Attach the video and audio sink devices to the MPX receiver(s).
11. Turn on your sink devices.
12. Turn on your MPX receivers.
13. Turn on your MPX transmitter and wait for the receivers to bind.
14. Turn on your source device.
15. Start a media stream from the source device to the MPX transmitter.
16. Using the browser client, launch to the transmitter's Connection Status page. Figure 3.4 on page 34 illustrates the *Bound Receiver Status* table. Verify frame rate and signal strength for each of the bound receivers. The Media LAN Performance web page provides additional useful information. Make final adjustments, if necessary.



Bound Receiver Status	
Device Name	CJP -- Receiver 2
Control LAN (L1) MAC Address	00:EO:86:07:6C:7F
Country Code	United States
AV Module Type	Receiver VGA
Session IP Address	192.168.10.100
Wireless Channel Number	36
Signal Strength Indication / Meter	75 ■ ■ ■ ■
Frame Rate	30

[Help](#)

Figure 3.4: Bound Receiver Status

Final Adjustments

Presentation of audio and video media should now be active at each display device, as if they were each individually attached to the source device. Inspect each display for signs of hesitation, color shift, audio loss, or other anomalies. Refer to *System Tuning* on page 37 for additional information.

Extension of IR and Serial Data

After mounting your MPX extenders, continue with the next chapter if you intend to use the extension network to pass serial or IR control signals.

Change Password

During authentication, the browser asks for your password. The Change Password page lets the administrator change the password.

NOTE: The password dialog box displays bullets or asterisks while you type information. If a secure connection is not used, the browser sends the unencrypted password to the Web server during this configuration process. Credentials are always encrypted during subsequent logons.

To change the password:

1. Type the old login password.
2. Type the new password. The length of the password must be between 0 and 31 characters. The password may contain any combination of letters, digits, and printable characters.

NOTE: When you are typing a password, the case is significant.

3. Type the new login password again. Both password parameters must match.
4. Click *Apply*.

Change Login Password

Login Password

<small>Old Login Password</small>	<input type="password"/>
<small>New Login Password</small>	<input type="password"/>
<small>New Login Password (re-enter)</small>	<input type="password"/>

Login Password length must be between 0 and 31

Help

Apply

Figure 3.5: Change Login Password Page

System Tuning

Transmitter tuning parameters

Controls provided on the Tuning Parameters web page, illustrated in Figure 4.1, allow you to fine tune the operation of your extension system.

To understand the video data rate parameters, it is useful to think of the media LAN as a pipe that is able to carry a finite amount of data. Under normal conditions, the pipe is filled primarily with video data. Audio and control packets require much less bandwidth. Video data consists of real-time data (data which is being sent for the first time) and retransmitted data. Under ideal conditions, the transmitter fills the pipe with real-time data. Under adverse conditions, as may be caused by RF interference, some packets are corrupted. In response, receivers will issue retransmission requests to the transmitter. The transmitter will respond to these requests even as real-time data continues to flow. If the demand for missed data becomes large, the transmitter will need to carefully manage the handling of retransmission requests to avoid a situation in which real-time data is unable to flow.

To ensure the continued flow of the media session, the transmitter is able to dynamically alter its processing of real-time and retransmitted data. Real-time data can be more highly compressed, if needed, within user-defined bounds. Higher compression will soften the image and allow more headroom for retransmitted data in the pipe. Retransmitted data can be metered within bounds; thus, allowing more room in the pipe for real-time data.

When wireless bandwidth is restricted for any reason, the default tuning parameter values are designed to maintain a constant frame rate. This is accomplished by increasing compression of real-time data, thereby allowing more headroom for retransmission requests. Under worst case conditions, the video data stream will be compressed down the minimum data rate. As conditions permit, the transmitter will reduce compression levels to the maximum data rate.

The transmitter offers basic and advanced settings. The basic settings are described in the following table:

Table 4.1: Transmitter Tuning Parameters - Basic Settings

Setting	Description
Wireless Video Data Rate	<p>These settings allow the MPX transmitter to dynamically adjust the degree of compression applied to real-time video data. The actual data rate at any given time will fall between the maximum and minimum data rate values, unless the image requires less than minimum data rate (such as a screen that is mostly black or white).</p> <p>High data rates consume more bandwidth and result in the sharpest possible image. Lower data rates result in a softened image that requires less bandwidth.</p> <p>During moments of interference, there may be insufficient bandwidth for the transmitter to maintain 30 frames per second at the maximum data rate while servicing requests for lost data. The minimum data rate setting determines how the transmitter responds to this condition. Setting this value high will cause the transmitter to drop frames as needed to maintain the sharpest possible image. Setting this value low will cause the transmitter to soften images as needed to maintain the highest possible frame rate. High values may be preferable for still computer graphics. High values may be preferable for motion video.</p> <p>Maximum rates for wireless media sessions include integer values up to 20 Mbps. Maximum rates for wired media sessions include integer values up to 40 Mbps.</p>
Content Type	<p>The MPX transmitter supports two compression algorithms. One algorithm is geared toward computer graphics. Office automation tools such as presentation or spreadsheet applications will benefit from this setting. The other compression algorithm is geared toward motion video. Cameras and digital video players will benefit from this algorithm. Select the algorithm that is best suited for your primary application.</p>
Luma-Chroma	<p>This parameter affects the way in which the transmitter processes luma and chroma information in the input video stream. By default, 67% of the output stream is dedicated to luma information and 33% of the output stream is dedicated to chroma information. This ratio is well suited for a combination of motion video and some computer graphics. For applications that are heavily slanted toward still graphic images with sharp edges, you may have better results by increasing luma to 80%. Experiment with the slider bar to find the settings that are best for your application.</p>
Retry Limit	<p>This parameter sets an upper bound on the percentage of available media LAN bandwidth that a transmitter will allocate for servicing of retransmitted data.</p>

Tuning Parameters

Tuning Parameters

Wireless Video Data Rate (1-20)	10 Mbps Minimum
	18 Mbps Maximum
Content Type	Motion Video
Luma/Chroma Percentages	Luma <input style="width: 50px; text-align: center;" type="text" value="76"/> <input style="width: 100px; height: 15px; margin: 0 5px;" type="range"/> <input style="width: 50px; text-align: center;" type="text" value="24"/> Chroma <small>Default values are: luma 67 (%), chroma 33 (%)</small>
Transmitter Retry Limit (0-50%)	15.0 Transmitter retry data rate limit

[Help](#)

Apply
Show Default Values
More Settings

Figure 4.1: Transmitter Tuning Parameters - Basic Settings

If you click on *Show Default Values*, the web page will be updated to display factory default values. To save these values, click on *Apply*.

If you click on *More Settings*, additional parameters will be displayed. These additional parameters allow you alter the ramp up and down rates. Under most conditions, these settings should not be required. Should the basic tuning parameters be insufficient to resolve issues in your environment, contact Avocent technical support for additional suggestions.

Receiver tuning parameters

The Tuning Parameter web page on MPX receivers, illustrated in Figure 4.2, allow fine adjustments to be made to audio and video signal timing. It is also possible to restrict the amount of retransmission data that a receiver will request.

The following table provides an overview of receiver tuning parameters:

Table 4.2: Receiver Tuning Parameters

Setting	Description
Receiver Video Latency	<p>The MPX transmitter places a timestamp on audio and video data to ensure proper lip-synch across all bound receivers. Thus audio and video output will be synchronized across all display devices as long as the devices themselves introduce equivalent latency prior to display. Introduction of scalers, converters or other active processing devices between the output of an MPX receiver and its associated display device may cause a noticeable video or audio lag when compared to other receivers. With this parameter, it is possible to mimic this delay on other receivers, thus bringing all display devices into synchronization.</p> <p>Default value for this parameter is 200ms. This delay provides an elastic buffer of roughly 7 frames, allowing receivers to remain in lock step even if lost packets need to be retransmitted. Reducing receiver latency below the default of 200ms may compromise synchronization across receivers. However, in applications consisting of one or two receivers, it may be desirable to reduce this value if the primary application involves mouse-driven presentations that are sensitive to latency. If choppy video occurs on one or more receivers, raise the value until smooth video is obtained.</p>
Receiver Audio Latency	
Receiver Retry Limit	<p>This parameter limits the amount of retransmitted data that a receiver is able to request from a transmitter.</p>



Figure 4.2: Receiver Tuning Parameters

Fine tuning suggestions

The following table provides detailed instructions for tuning your MPX extenders.

Table 4.3: Methods for Fine Tuning

If you are fine tuning...	Then choose...
choppy video for a wired or wireless connection	<p data-bbox="612 658 1303 707">The <i>Wireless Video Data Rate</i> settings on the Tuning Parameters page of the transmitter. Figure 4.1 on page 39 illustrates this web page.</p> <p data-bbox="612 736 1303 898">Choppy video is the result of lost data. The receiver to continue to output the last fully-received frame until a complete new frame is received. This is not noticeable for a still image, such as a spreadsheet. This is particularly noticeable, however, for a motion video. Audio playback requires minimal bandwidth and typically plays smoothly, even when motion video is choppy.</p> <p data-bbox="612 927 1303 1081">To restore smooth video playback, adjust the minimum data rate setting downward as needed to obtain a constant frame rate of 24 fps or greater under adverse conditions. Lowering the minimum setting allows you to maintain constant frame rate by slightly softening the image during adverse media LAN conditions. As conditions improve, the transmitter will gradually raise the video data rate.</p>
wireless channel contention resulting from other wireless devices	<p data-bbox="612 1111 1303 1240">Retransmission requests may stem from a temporary signal blockage, such as a box being placed in front of the transmitter. Wireless channel contention may also cause data interference. If interference becomes chronic, you may want to consider antenna extension cables or selection of a different wireless channel to relieve the condition.</p> <p data-bbox="612 1263 1303 1424"><i>Wireless Channel</i> from the drop-down list on the Media LAN Settings page of the transmitter. Figure 4.3 illustrates this web page.</p> <p data-bbox="612 1346 1303 1424">Channel contention arising from other devices operating in the same channel may cause excessive dropped video frames. Selection of an unused channel will resolve this issue.</p> <p data-bbox="612 1453 1303 1588">Available channels may be selected from a drop-down list. The selected channel will be used by the transmitter and bound receivers. Once changed, the media session will drop and bound receivers will enter a search mode. After the transmitter is detected, the session will continue normally.</p>

Table 4.3: Methods for Fine Tuning (Continued)

If you are fine tuning...	Then choose...
wireless transmission power settings	<p data-bbox="612 544 1302 622"><i>Maximum Transmit Power</i> field on the Media LAN Settings page. This setting may be set separately for transmitters and receivers. Figure 4.3 illustrates this web page.</p> <p data-bbox="612 651 1302 835">The range of values at the transmitter is determined by the country code and wireless channel. The range of values at the receiver may be wider than the transmitter because the receiver is not explicitly configured for country code and wireless channel settings. Nonetheless, the receiver will not exceed legal power limits at any time. The <i>Actual Antenna Power</i> field of a receiver's Connection Status page displays the receiver's true radiated power level.</p> <p data-bbox="612 864 1302 969">Lower settings allow transmitters to be placed more closely. This is useful when multiple video streams are required. Higher values allow for increased distances between transmitters and receivers. In addition, Avocent offers optional extended distance antennas for this purpose.</p> <p data-bbox="612 999 1302 1182">The default power setting may overdrive radio receivers when MPX transmitters and receivers are positioned in close proximity to each other, within ten feet or less, as might be the case during initial configuration and testing. Over-driven signals may result in lost frames or in extreme cases, in dropped connections. To avoid such errors, select the lowest setting that results in a stable, acceptable image. Remember to raise transmit power levels when extenders are placed in their final locations.</p> <p data-bbox="612 1211 1302 1312">Depending upon environmental conditions, you may find it beneficial to configure receiver transmit power settings slightly lower than the transmitter. This will reduce contention among receivers and ensure that the transmitter has the most dominant signal.</p>
Sharpness of computer graphics	<p data-bbox="612 1339 1302 1391"><i>Luma Chroma Percentages</i> and <i>Content Type</i> on the Tuning Parameters page of the transmitter. Figure 4.1 on page 39 illustrates this web page.</p> <p data-bbox="612 1420 1302 1653">The luma chroma setting affects the way in which the transmitter processes luma and chroma information in the input video stream. By default, 67% of the output stream is dedicated to luma information and 33% of the output stream is dedicated to chroma information. This ratio is well suited for a combination of motion video and some computer graphics. For applications that are heavily slanted toward still graphic images with sharp edges, you may have better results by increasing luma to 80%. Experiment with the slider bar to find the settings that are best for your application.</p> <p data-bbox="612 1682 1302 1740">The content type may be used to select an encoding algorithm that is geared toward computer graphics (still images) or motion video.</p>

Table 4.3: Methods for Fine Tuning (Continued)

If you are fine tuning...	Then choose...
Audio video synchronization across display devices	<p data-bbox="612 544 1294 622"><i>Receiver Video Latency</i> and <i>Receiver Audio Latency</i> settings on the receiver Tuning Parameters web page. Figure 4.2 on page 40 illustrates these settings.</p> <p data-bbox="612 651 1294 779">Default value for this parameter is 200ms. This delay provides an elastic buffer of roughly 7 frames, allowing receivers to remain in lock step even if lost packets need to be retransmitted. Increasing either of these parameters will allow you to adjust audio and video playback across display devices.</p> <p data-bbox="612 808 1294 965">Reducing receiver latency below the default of 200ms may compromise synchronization across receivers. However, in applications consisting of one or two receivers, it may be desirable to reduce this value if the primary application involves mouse-driven presentations that are sensitive to latency. If choppy video occurs on one or more receivers, raise the value until smooth video is obtained.</p>

Wireless and Wired Media LAN Settings

Wireless Media LAN Settings

Enable Wireless Connection Selects Wireless Connection

Antenna Extension

Antenna Type

Lightning Arrestor

Wireless Channel

Maximum Transmit Power

Above parameters only apply if Wireless connection selected.

Media LAN (L2) Settings

Enable Wired Connection Selects Wired Connection

Transmitter Number

LAN Speed / Duplex

Above parameters only apply if Wired connection selected. [Help](#)

Figure 4.3: Transmitter Media LAN Settings

Serial Control

Serial passthrough allows data to be sent from a device attached to the serial port of a transmitter to device(s) attached to the serial port of the primary receiver or all bound receivers. Conversely, data arriving at the serial port of the primary receiver will be forwarded to the transmitter and made

available to the device attached to its serial port. Serial data is passed in real-time and is not buffered for subsequent reading.

Serial passthrough modes are enabled via the web interface of an MPX transmitter. Serial port settings, such as baud rate, flow control, data size, stop bits and parity are also configurable only via the transmitter's web interface. When serial passthrough is enabled, these settings are forwarded to all receiver units within the extender network. When serial mode is disabled, there is no processing of serial data on either the transmitter or the receiver(s).

Serial settings on all serially attached devices must correspond with the serial settings established via the web interface on the transmitter.

In summary, serial operation of the product is as follows:

- If *simple passthrough* is selected, then data received at the serial port of the transmitter will be broadcast through the extension network to all bound receivers and, in turn, to all serially attached display devices.
- If *primary only* passthrough is selected, then data received at the serial port of the transmitter will be sent only to the primary receiver. This mode allows bidirectional communication with a single device. Using the *Primary* radio button provided on the Bindings page, it is possible to switch serial control from one receiver to another. In addition to serial connectivity, IR control and EDID passing are tied to the primary receiver. Thus, it is important to consider the full impact of selecting a new primary receiver.
- If serial passthrough is disabled, then serial data received at the serial port on the transmitter will be ignored.
- If any passthrough mode is enabled and a primary receiver is selected, then data received from the device attached to the serial port of the primary receiver will be forwarded across the extension network to the MPX transmitter and, in turn, to the device attached to transmitter's serial port.
- If a primary receiver is not selected and serial passthrough is enabled, then serial data will be broadcast from the transmitter to all bound receivers; however, bi-directional transfers will not be available.
- All serial settings must be made via the web interface on the transmitter. The web interface on the receiver does not offer serial configuration options.

Figure 4.4 illustrates the basic flow of serial data among MPX units and attached devices.

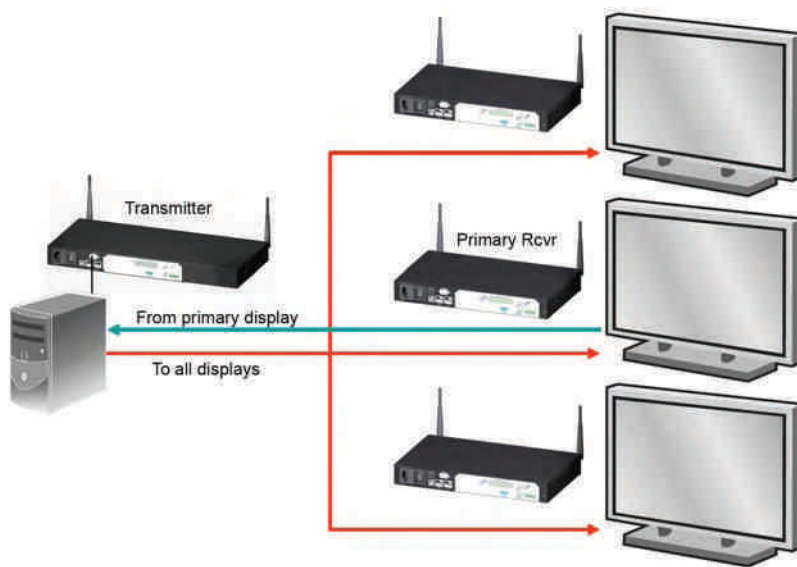


Figure 4.4: Serial Passthrough Mode

Use the Serial Passthrough parameters section on the transmitter's Serial Settings page to specify the serial mode and settings.

To configure serial passthrough modes:

1. Select Serial Settings from the Transmitter Menu, located on the left side of the web page. Figure 4.5 on page 46 illustrates these settings.
2. Choose one of the following Serial Passthrough Modes from the drop-down list:
 - a. *Disabled*: Serial port on the transmitter and receiver units is not used.
 - b. *Simple passthru*: Serial data received at the serial port of the transmitter will be broadcast to all bound receivers. Serial data will be sent only from the primary receiver to the transmitter.
 - c. *Primary only*: Serial data received at the serial port of the transmitter will be sent only to the primary receiver. Serial data will be sent only from the primary receiver to the transmitter.
3. Choose the serial baud rate for the local serial port from the Baud Rate drop-down list.

4. Choose the serial data size for the local serial port from the Data Size drop-down list.
5. Choose the number of serial stop bits for the local serial port from the Stop Bit drop-down list.
6. Choose the serial parity for the local serial port from the Parity drop-down list.
7. Choose the serial flow control for the local serial port from the Flow Control drop-down list.
8. Click *Apply* to save the changes.

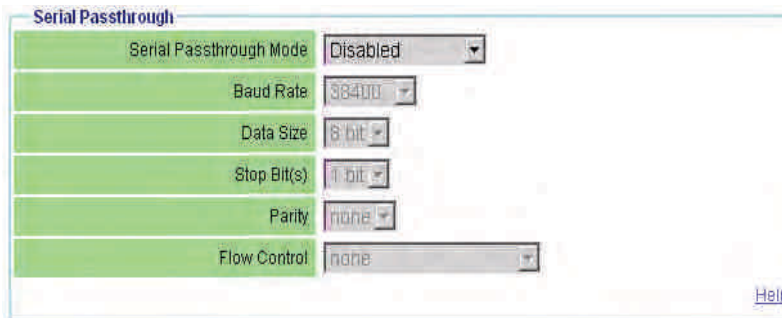


Figure 4.5: Serial Settings Page: Serial Parameters

I/R Control

Each MPX unit includes a built-in IR(rx) receiver and an IR(tx) port, which is a 3.5mm jack for connection of a dual emitter. IR control strings generated from a remote controller may be forwarded across the extension network or locally forwarded from the IR(rx) to the IR(tx) port on the same MPX unit.

IR extension permits a presenter to control a source device from the location of the display device. Local loopback of IR data permits an administrator to manage display devices from the equipment rack and/or a presenter to control a display device from the location of the display.

Similar to serial data, IR data is broadcast across the extension network from an MPX transmitter to all bound receivers. Bi-directional IR data is limited to the transmitter and the primary receiver.

For the sake of clarity, the flow of IR data from the IR(rx) receiver to the IR(tx) port on the same MPX unit shall be referred to as IR local loopback. Also for clarity, the flow of IR data across the extension network shall be called IR extension.

IR functionality works as follows:

- Upon boot up, an MPX transmitter will forward IR data detected at its IR(rx) receiver to all bound receivers across the extension network. This flow cannot be disabled.
- When an MPX receiver is selected as the primary receiver, IR data detected at its IR(rx) receiver will be forwarded across the extension network to the MPX transmitter, where it will

be emitted to the source device through the dual emitter. This IR data will not be forwarded to other MPX receivers. This flow cannot be disabled.

- The web interface of each unit offers an IR Local Loopback setting. This setting affects IR local loopback only. Altering this setting has no effect upon the flow of IR data across the extension network.

Figure 4.6 illustrates the flow of IR data from the MPX transmitter to a single MPX receiver. This data, however, will be received by all bound receivers. This functionality allows an administrator to send control strings such as on/off to display devices from the equipment rack.

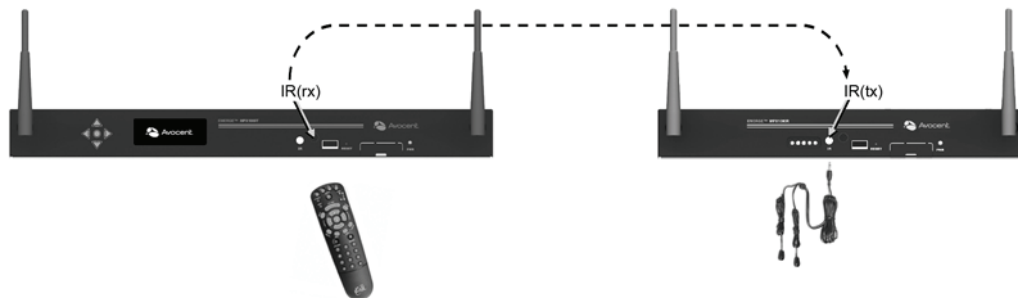


Figure 4.6: IR Flow: Transmitter to Receiver

Figure 4.7 illustrates the flow of IR data from the primary MPX receiver to the MPX transmitter. This allows a presenter to send control strings, such as play/pause, to source devices from the location of the display device. A single IRB-100 dual emitter is supplied with the MPX transmitter. Should it be necessary to control more than two source devices, Avocent offers the IRB-Y splitter, which allows two IRB-100 dual emitters to be attached to a single MPX transmitter. Additional IRB-100 emitters may also be purchased separately. The MPX transmitter, or receiver, is capable of driving up to 4 emitters (two IRB-100s).

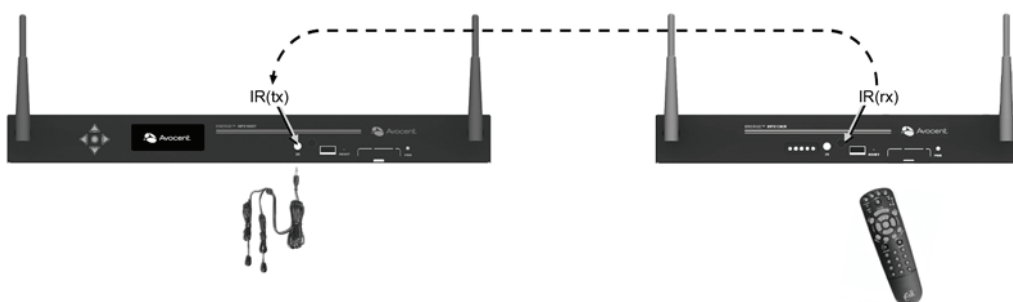


Figure 4.7: IR Flow: Primary Receiver to Transmitter

Figure 4.8 illustrates local looping of IR commands. This allows source or display devices to be controlled locally.



Figure 4.8: IR Loopback

NOTE: IR data looped locally within an MPX transmitter or the primary receiver will also be sent normally across the extension network. IR data looped locally on a receiver other than the primary receiver will not be forwarded to the extension network.

NOTE: The product provides contention handling to prevent the inadvertent mixing of IR extension data with IR loopback data. For this reason, the local IR loopback function at an MPX receiver is temporarily disabled while the unit is processing IR data received from the MPX transmitter. Similarly, if IR blaster mode is enabled on a receiver, any IR data sent from the transmitter to that receiver is ignored (and not emitted) by that receiver while the receiver is emitting IR data detected locally by its own IR receive port. Should contention occur, it will be necessary to repeat the ignored IR command via the remote.

Configuring IR control

Use the IR Blaster section on the Configuration web page to enable or disable local IR loopback, which is the flow of data from the IR(rx) receiver to the IR(tx) emitter port on the same MPX extender. IR extension, the flow of data across the extension network, is unaffected by this setting.

To configure IR control on a transmitter:

1. Select Serial Settings from the Transmitter Menu, located on the left side of the web page. Figure 4.9 on page 49 illustrates these settings.
2. Choose one of the following IR Local Loopback modes from the drop-down list:
 - a. *Disabled* – IR local loopback is disabled
 - b. *Enabled* – IR local loopback is enabled
3. Click *Apply* to save the changes.



Figure 4.9: Serial Settings Page: IR Parameters

Regardless of the IR blaster mode setting, all IR data received by the local IR receiver port on the transmitter is forwarded to all connected receivers. This IR data will be sent to the IR transmit port at each of those receivers.

To configure IR control on a receiver:

1. Select Serial Settings from the Receiver Menu, located on the left side of the web page, Figure 4.9 on page 49 illustrates these settings.
2. Choose one of the following IR Local Loopback modes from the drop-down list:
 - a. *Disabled*: IR local loopback is disabled
 - b. *Enabled*: IR local loopback is enabled
3. Click *Apply* to save the changes.

Status Monitoring

The MPX transmitter provides two web pages for system monitoring: the Connection Status web page and the Media LAN Performance web page. The Connection Status page offers a status table for transmitter and a separate table for status of each receiver. The MPX receivers provide similar web pages.

Connection status

The Connection Status page on the transmitter displays the operational status of the transmitter and all bound receivers. Figure E.3 on page 70 illustrates this web page. The content on this page dynamically refreshes every five seconds. Status table entries are largely common to both MPX transmitters and receivers; however, some functions are specific to transmitters or receivers. The following table describes the status information that is provided for MPX transmitters (Tx), MPX receivers (Rx) or both:

Table 4.4: Status Page Information

Field	Tx / Rx	Description
Device Name	Both	Provides a friendly name for an MPX transmitter or receiver for ease of identification within the web interface.

Table 4.4: Status Page Information (Continued)

Field	Tx / Rx	Description
Control LAN MAC Address	Both	L1 MAC address (control LAN) of the transmitter or receiver, also printed on an external label on the unit.
Wired Media LAN MAC Address	Tx	L2 MAC address (media LAN) of the transmitter.
Serial Number	Tx	The serial number assigned to the unit.
OEM ID	Tx	The OEM identifier assigned to the unit. This information may be required for technical support but is not required for normal use of the product.
Country Code	Both	The country code for the product. See <i>Supported ISO Country Codes</i> on page 92.
Product Type	Both	The product type for the unit: MPX1000T, MPX1000R or MPX1500R.
A/V Module Type	Both	The type of media module inserted, such as HD15 or HDMI.
Operational Status	Both	For transmitters, this field will indicate the number of bound/active receivers. For receivers, this field will indicate if the receiver is currently connected to a transmitter. For all units, this field will provide flash upgrade status.
Session IP Address	Both	The media LAN IP address.
Session Transmitter Device Name	Rx	The device name of transmitter to which this receiver is currently bound.
Wireless Channel Number	Both	The wireless channel number in use. Only displayed on wireless extension networks.
Actual Antenna Power	Both	The effective radiated power inclusive of extension attenuation and gains due to power settings and specialized antennas.
A/V Source Type	Tx	Type of source device: HDMI, DVI-D, VGA, Component.
A/V Source Resolution	Tx	Resolution, such as 1024x768 @60Hz, of the source device.
A/V Encoder Running	Tx	An indication that video is being encoded and transmitted in real-time.
A/V Source Error	Tx	Helpful diagnostic messages.
Primary Video Resolutions	Tx	A list of all resolutions that the Primary Receiver has reported to the transmitter.
Video Resolutions in Use	Tx	A list of resolutions that have been reported to the source device.

Table 4.4: Status Page Information (Continued)

Field	Tx / Rx	Description
RGB Video Resolutions Stored	Tx	Resolutions that are currently stored in the Active EDID string of the transmitter. This field is present for VGA display devices only.
Signal Strength Indication	Rx	An indication of the wireless signal strength on the receiver unit. Only displayed on wireless A/V networks. Ranges from 0 to 100, with 0 representing weak signal strength and 100 representing maximum signal strength. A graphical display is also provided as follows: <ul style="list-style-type: none"> • Poor signal – No bars or one red bar • Passable signal quality – A red bar and one or two yellow bars; signal quality should be improved • Good signal quality – A red bar, two yellow bars and one or two green bars
Frame Rate	Rx	The video frame rate on the receiver unit. With no lost frames, the frame rate will alternate between 29 and 30 frames per second. Wireless bandwidth contention and poor signal quality may result in lower frame rates. Refer to <i>Methods for Fine Tuning</i> on page 41 for tips on restoring acceptable frame rates.

Media LAN performance

Refer to section *Available Information* on page 68 for information regarding the Media LAN Performance table.

System Reboot

The System Reboot page is displayed when you select Reboot from the transmitter or receiver main menu. The page provides status updates during the reboot process and provides a Reboot Now button.

To reboot an extender:

1. Click *Reboot Now*.
2. The reboot process will begin. A message indicates that the system reboot is in progress.

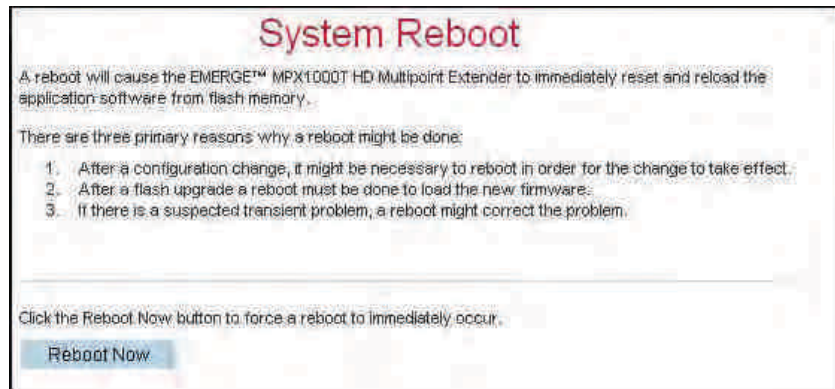


Figure 4.10: System Reboot Page

Reset to Factory Defaults

The Reset to Factory Defaults page is displayed when you select it from the transmitter or receiver main menu. The page provides an explanation about what a reset does and also provides a Re-Initialize Now button.

To re-initialization an extender:

1. Click *Re-Initialize Now*.
2. The re-initialize process will begin. A message indicates that the re-initialization is in progress.



Figure 4.11: Reset to Factory Defaults Page

Front Panel Display

The transmitter displays an *Initializing* message during power-up, followed by the Avocent logo. Press any button while the Avocent logo is displayed to enter the menu display system.

Display modes

The front panel menu system has three major display modes:

- Manual Menu Navigation
- Automatic (Timed) Menu Display
- Parameter Modification

In all display modes, the Up and Down buttons automatically repeat every 750 milliseconds if pressed continuously.

Manual Menu Navigation

While you are in Manual Menu Navigation mode, the button definitions are as follows:

Table 4.5: Buttons for Manual Menu Navigation

Button	Description
Up	Scrolls up through a set of menu items within a menu.
	NOTE: While in this mode, the ▲ symbol is displayed in the upper left character position of the display to indicate that the Up button will scroll up to the next item in the menu. (If the menu being displayed only contains a single item, scrolling is not possible. This is indicated by the absence of the ▲ symbol.)

Table 4.5: Buttons for Manual Menu Navigation (Continued)

Button	Description
Down	<p>Scrolls down through a set of items within a menu.</p> <p>NOTE: While in this mode, the ▼ symbol is displayed in the upper left character position of the display to indicate that the Down button will scroll down to the next item in the menu. (If the menu being displayed only contains a single item, scrolling is not possible. This is indicated by the absence of the ▼ symbol.)</p>
Center or Right	<p>Selects the current menu item, and causes the corresponding sub-menu to be displayed.</p> <p>NOTE: While in this mode, a ► symbol is displayed in the upper right character position of the display to indicate that selection is possible for this menu item. If no ► symbol appears in the display, this menu item is not selectable, and pressing the Center (or Right) button has no effect for this menu item</p>
Left	<p>Goes back to the previous menu. For example, pressing the Left button will undo the action previously initiated by pressing the Center (or Right) button.</p>

Automatic menu display

While you are in Automatic Menu display mode, the buttons are defined as follows:

Table 4.6: Buttons for Automatic Menu Display Mode

Button	Description
Up or Down	<p>Identical to Manual Menu Navigation mode, with the following exception:</p> <p>Before scrolling the display, the display mode is switched back to the Manual Menu Navigation mode. The automatic (timed) display updates will stop. The front panel display will show the scrolled (up or down) menu item.</p>
Left, Center or Right	<p>Switches the display mode back to the Manual Menu Navigation mode. The automatic (timed) display updates will stop. The front panel display will continue to show the current menu item.</p>

Parameter modification

While you are in Parameter Modification mode, the button definitions are as follows:

Table 4.7: Buttons for Parameter Modification Mode

Button	Description
Up	Changes the parameter value to the next valid value in the upward direction. Note: While in this mode, the ▲ symbol is displayed in the lower right character position of the display to indicate that pressing the Up button will increase the value of the parameter.
Down	Changes the parameter value to the next valid value in the downward direction. Note: While in this mode, the ▼ symbol is displayed in the lower right character position of the display to indicate that pressing the Down button will decrease the value of the parameter.
Left, Center or Right	Switches the display mode back to the Manual Menu Navigation mode. The front panel display will continue to show the current menu item. Note: While in this mode, a ► symbol is displayed in the upper right character position of the display to indicate that selection is possible for this menu item. If no ► symbol appears in the display, this menu item is not selectable, and pressing the Center (or Right) button has no effect for this menu item.
Left	Goes back to the previous menu. For example, pressing the Left button will undo the action previously initiated by pressing the Center (or Right) button.

Main menu

The top level menu selections for the front panel display are as follows:

- Display Rx Status
- Display Tx Settings
- Configure Control LAN

To scroll through these top level menu selections when the Avocent logo is present, press any of the four arrow buttons. To navigate through these items, press the **Up** or **Down** buttons. To select and display a corresponding sub-menu, press the **Center** or **Right** buttons. Press the **Left** button to return the front panel display to the Avocent logo.

Display Rx status

The sub-menu for this selection provides continually updated real-time receiver status. The following information is provided:

- Receiver identification: MAC address and friendly name

- Primary status: The primary receiver is identified by the presence of **Pri** in the name display
- Signal strength: reported by the receiver back to the transmitter
- Frame rate

Press the **Up** and **Down** buttons to manually scroll through status for all receivers. Press the **Right** button to enter into a timed scrolling mode, which displays status of all receivers in a round robin manner. If you press any button while in the timed scrolling mode, the display reverts back to the sub-menu.

Press the **Left** button to return to the main menu.

Display Tx settings

The sub-menu for this selection allows you to display the following information:

- Transmitter identification: MAC address and friendly name
- Control LAN address (L1) Settings: IP address, subnet mask and gateway
- Media LAN Settings: Wireless channel number or Wired for wired configurations
- Video quality setting: presented as a target throughput value such as 20Mbps
- IR local loopback setting: On / Off

You may press the **Up** and **Down** buttons to manually scroll through these items. Press the **Left** button to return to the main menu.

Configure control LAN

The sub-menu for this selection allows you to configure the following settings for transmitter's Control LAN (L1) port:

- IP address
- Subnet mask
- Gateway

To configure control LAN settings:

1. Press the **Right** button to select an octet for configuration. Octets are underlined when selected.
2. Press the **Up** and **Down** buttons to change the value of the selected octet as needed.
3. Press the **Right** button to select the next octet.
4. Repeat steps 2 and 3 until the IP address, the subnet mask and gateway address are all properly configured.
5. Press the **Right** button until *Save Change* is displayed.
6. Press the **Up** and **Down** buttons to alternate between *Yes* and *No*.

7. Press the **Center** button to complete the operation. The settings will be applied immediately if *Yes* was selected and the settings were valid. Otherwise, the current configuration will not be altered. In either case, you will be returned to top level of the Configure Control LAN menu.

Press the **Left** button to return to the Avocent logo or the **Up** and **Down** buttons to scroll through the top level menu.

NOTE: Front panel configuration may be disabled via the transmitter's web interface. By default, front panel configuration is enabled. This setting may be changed in the System Settings page.

Screen saver

The front panel display has a screen saver that automatically comes on if no buttons are pressed for 30 consecutive minutes. When the screen saver is active, it horizontally scrolls the current screen off the left edge of the display while scrolling in a blank screen from the right. The process repeats every four seconds.

While the screen saver is active, updates to the content of the display occur only during the four seconds that the screen stops in the center of the display. Automatic (timed) updates to the contents of the screen are delayed while the screen is actively scrolling, and will not occur until the screen reaches its center position. This lets you see every automatic status update, even if the screen saver is active while the RxStatus is in scan mode.

Press any key while the screen saver is active to immediately stop the screen saver and display the current screen in its normal (centered) position on the front panel.

Appendix A: Technical Support

Our technical support staff is ready to assist you with installation or functional issues that you may encounter with your Avocent product. If an issue should develop, follow the steps below for the fastest possible service.

To resolve an issue:

1. Check the pertinent section of the manual to see if the issue can be resolved by following the procedures outlined.
2. Check our web site at www.avocent.com/support to search the knowledge base or use the online service request.
3. Call the Avocent Technical Support location nearest you.

Appendix B: Radio Considerations

The number, thickness and location of walls, ceilings and other objects that signals pass through affect the range of MPX extenders. A typical wall has metal or wood studs covered on each side by a single layer of gypsum or plaster board. Useful transmission range will vary depending on the types of materials, obstructions and background radio frequency noise at your place of installation.

To maximize your wireless range:

1. Keep the number of walls and ceilings between the transmitter and receiver to a minimum; each wall or ceiling can reduce your wireless product's range.
2. Position a direct line between your transmitter and receiver so that the signal will travel straight through a wall or ceiling. A wall that is 1.5 feet thick (.5 meters) at a 45° angle appears to be almost 3 feet (1 meter) thick; at a 2° angle, it looks over 42 feet (14 meters) thick!
3. If possible, position your devices and extenders so that the signal passes through drywall or open doorways and not other materials. Building materials such as a solid metal door or aluminum studs can impede the wireless signal and will have a negative effect on the wireless range.
4. Keep your MPX transmitter and receivers away (at least 3 to 6 feet or 1 to 2 meters) from electrical devices or appliances that generate RF noise.
5. Antenna extension cables result in signal loss. When possible, move the transmitter or receiver into the desired position in lieu of using an extension cable. When cables are necessary, use the shortest Avocent-certified cable that allows you to properly position your antenna. Daisy-chaining of antenna extension cables is not supported. Carefully follow installation instructions provided with your cable kit and properly configure the extender when using extension cables as described in "Antenna Options" on page 61.

NOTE: Signals will not pass through concrete walls or titanium coated glass.

The MPX extender provides wireless transmission over the Unlicensed National Information Infrastructure (UNII) and on the Industrial, Scientific, and Medical (ISM) radio bands.

The product is able to operate over following bands:

- UNII 1: (4 channels) 5.15-5.25 GHz
- UNII 3: (4 channels) 5.725 to 5.825 GHz
- ISM: (11 channels) 2.412 to 2.462 GHz (Available for use within the United States)

Firmware upgrades, including Dynamic Frequency Selection (DFS), will be provided, allowing the product to transmit in the following frequencies:

- UNII 2: (4 channels) 5.25-5.35 GHz
- ETSI: (11 channels) 5.470-5.725 GHz

Antenna Options

Various antenna options are available for MPX extenders, including specialized antennas, antenna extension kits and lightning arrestors. The following sections describe these options and offer an overview of installation instructions.

NOTE: ISM band antennas and UNII band antennas are tuned for operation in their specific bands. An ISM antenna is not effective for UNII-band radio transmission and vice-versa. Take care to choose an appropriate antenna for the wireless channel that has been selected.

Installation of antenna options

Installation of antenna options have a direct impact on effective radiated power of MPX extenders.

NOTE: Because antenna options have a direct impact on the effective radiated power of MPX extenders, it is important to use only Avocent-certified options. Furthermore, antenna options should be used only as described herein. Misuse of these options could result in excessive radiated power or degraded performance.

To Install antenna options:

1. Physically install the antenna, arrestor or extender as described in the instructions provided with the option. It is acceptable to intermix antenna types within an extension network. For example, a transmitter equipped with omni-directional antennas may communicate with receivers using directional antennas. If you intermix antenna types on the same unit, then configure the unit for the highest gain antenna. For example, if you install a 3dB and 8dB gain antenna on the same extender, then configure the extender for use with your 8dB antenna.
2. Launch a browser client to the transmitter.
3. Select the System Settings page. Figure 3.2 on page 24 illustrates the System Settings page.
4. Within the *Antenna Type* pull-down menu, select the antenna installed on your extender. The following specialized antennas are available for use with MPX extenders:
 - a. LGA51G-OMN: A low gain omni-directional antenna tuned for best performance in the UNI 1 and 2 bands. This is the default antenna.
 - b. HGA51G-DIR30: A high gain, directional antenna tuned for best performance in the UNII 1 and 2 bands.
 - c. LGA55G-OMN: A low gain omni-directional antenna tuned for best performance in the UNI 3 and ETSI bands.
 - d. HGA55G-OMN: A high gain omni-directional antenna tuned for best performance in the UNI 3 and ETSI bands.
 - e. LGA24G-OMN: A low gain omni-directional antenna tuned for best performance in the ISM band.
 - f. IGA24G-OMN: An intermediate gain omni-directional antenna tuned for best performance in the ISM band.
 - g. Several generic antennas are listed in the pull-down menu. These entries represent antennas that are anticipated for future release by Avocent. Use of third-party antennas is

neither implied or supported by means of these entries. If you purchase an optional antenna from Avocent that is not specifically listed in the pull-down list, then select the generic antenna that most closely resembles the antenna that you have installed.

High gain and directional antennas act to concentrate radio waves in a narrow beam or plane in the same way that a megaphone concentrates sound waves. These antennas are appropriate when you need to maximize transmission distance. Low gain omni antennas allow radio waves to propagate in a more spherical manner. Because the radio's energy is sent equally in all directions, the effective transmission range drops off more quickly than if it were concentrated into a narrow beam. Use of these antennas allow transmitters to be placed in closer proximity. Low gain antennas allow you to take advantage of reflections that might bounce off of floors, walls and ceilings. Use of lower frequency antennas are preferable for penetration of walls or other obstructions. In multi-transmitter environments, use of high frequency antennas allows for good RF separation from extenders using low frequency antennas within the same RF envelope.

5. Within the *Lightening Arrestor* pull-down menu, indicate if an arrestor is present or not.
6. Within the *Antenna Extension* pull-down menu, indicate which extension is installed, if any. Supported antenna extenders include:
 - a. 1 Meter: Provides a 1 meter antenna extension.
 - b. 2 Meter: Provides a 2 meter antenna extension.
 - c. 3 Meter: Provides a 3 meter antenna extension.

NOTE: Although antenna extension cables allow for optimized antenna placement, they result in signal loss. When properly installed and configured, the firmware will attempt to boost the transmit power to compensate for this loss. Daisy-chaining of extension cables to increase the cable length is not supported as this will result in excessive degradation of signal strength.

7. If you have installed a custom antenna, then you will need to configure the extender for a channel in the appropriate band. Select Media LAN Settings from the main menu. From *Wireless Channel* pull-down menu, select an appropriate channel.
8. Repeat steps 3 through 7 for each active receiver.

Proper configuration allows your extenders to properly adjust radio transmit power as needed to compensate for extension cable loss. Proper configuration also allows your extenders to accurately report effective radiated power as effected by antenna gain.

Appendix C: MPX Receiver Status LEDs

The MPX receiver features five LEDs on its front panel, used to indicate the status of the receiver. The following diagram illustrates the order and color of the LEDs:

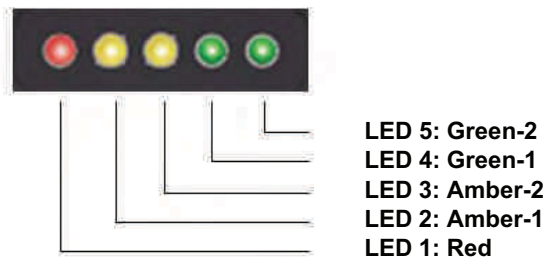


Figure C.1: MPX Receiver LED Status Indicators

LED sequences convey operational states and status of the receiver. The following sections define the key LED sequences of the product.

NOTE: When a LED is described as **Flashing**, it is flashing on and off at a rate of 4 flashes per second. When a LED is described as **Blinking**, it is blinking on and off at a slower rate of 1.5 seconds per blink. When a LED is described as **On Solid**, it is continuously illuminated and is neither blinking nor flashing.

Receiver power status

During system initialization, the LEDs will turn on from left to right until all LEDs are on. Then, the LEDs will turn off from right to left until all LEDs are off. This pattern will repeat throughout the system initialization process.

If a Power On Self Test (POST) error occurs, a specific pattern will be displayed. Please make note of the pattern prior to contacting Avocent technical support.

Wireless operation status

If no connection exists, a 2-step searching pattern sequence is displayed, as follows:

Search pattern: Green-1 and Green-2 will alternate, all other LEDs remain off.

If a connection does exist, the current signal level (0-5) is displayed by the LEDs. Higher numbers indicate stronger signals. The following table correlates LED patterns to signal strength:

Table C.1: LED Status - Wireless Connection

Signal Level	Red	Amber-1	Amber-2	Green-1	Green-2
0	OFF	OFF	OFF	OFF	OFF
1	ON	OFF	OFF	OFF	OFF
2	ON	ON	OFF	OFF	OFF
3	ON	ON	ON	OFF	OFF
4	ON	ON	ON	ON	OFF
5	ON	ON	ON	ON	ON

Wired operation status

If no connection exists, a 2-step searching pattern sequence is displayed, as follows:

Search pattern: Green-1 and Green-2 will alternate, all other LEDs remain off.

If a connection does exist, the current signal level (0-5) of the connection is displayed using one of 6 LED patterns, as follows:

Table C.2: LED Status - Wired Connection

Signal Level	Red	Amber-1	Amber-2	Green-1	Green-2
5	OFF	ON	ON	ON	ON

Reset button status

You may perform multiple levels of reset using the button on the front panel of the receiver. As you continue to hold the button the LED pattern will change, reflecting the action to be performed. The various LED patterns are described in the following table:

Table C.3: LED Status - Reset Button Press

All LEDs blinking or flashing together	Hold time	Interpretation
Rate: 2 blinks per second	.25 - 5 seconds	If the reset button is released now, the MPX receiver will reset and reboot without changing any configuration parameters.
Rate: 4 flashes per second	5 - 10 seconds	If the reset button is released now, the MPX receiver will reset its login password to factory default and then it will reset and reboot.
Rate: 10 flashes per second	>10 seconds	If the reset button is released now, the MPX receiver will reset all configuration parameters to factory defaults and then it will reset and reboot.

The same reset functions are available on the MPX transmitter; however, status is provided via the front panel display.

Flash update status

LED indicators provide the following status information during the flash update process:

Table C.4: LED Status - Flash Update

Flash update state	LED Activity
In Progress	Green-2 LED flashing indicates that the flash update is in progress and that it has not failed. While this LED is flashing, one or more of the green or amber LEDs will also either be on solid or will be blinking to indicate the progress of the flash update.
Failed	Red LED flashing indicates failure of the flash update procedure. If you are unable to identify the source of the failure, please contact technical support for assistance.

Rear status LEDs

Some MPX receivers feature two green LEDs on the rear panel. These LEDs offer a subset of status information and are most useful when an installed MPX receiver is oriented such that the front panel LEDs are not visible. The following diagram illustrates the order and color of the LEDs:

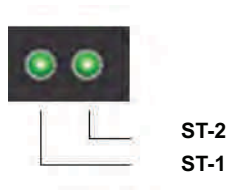


Figure C.2: MPX Receiver Rear LED Status Indicators

ST-1 operation:

- Blinking: Indicates system boot
- Solid: Media LAN established

ST-2 operation:

- Off: Connection with transmitter is not established
- Slow blink: Signal level = 1
- Fast blink: Signal level = 2 or 3
- Solid: Signal level = 4 or 5

ST-1 and ST-2 together:

- Alternating: Searching for a transmitter
- Slow blink: Firmware upgrade in progress
- Fast blink: Firmware upgrade error occurred

Appendix D: Audio

The HDMI media module for MPX1000 extenders offers support for embedded digital audio and unbalanced analog audio via left and right RCA jacks. The HD15 media module supports only unbalanced analog audio. Analog audio is sampled at 48Khz, which is CD quality audio.

NOTE: With your MPX1000 unit you have received two snap-on ferrites. If you are using the analog audio (RCA Jacks) these ferrites should be applied to each end of the cables. Apply the ferrites approximately one inch from the cable ends. One ferrite goes around both cables.

The MPX1500 receiver offers embedded HDMI digital audio as well as unbalanced analog audio via left and right RCA jacks. Snap on ferrites are not required for the use with MPX1500 receivers. Depending upon your firmware version, the MPX1500 receiver may or may not support coaxial and optical digital audio (S/PDIF).

Because transmitters and receivers can be configured for differing media types, a variety of configurations are possible. The following sections provide detailed information regarding these additional configurations.

HDMI Considerations

When an HDMI source is received, the MPX transmitter ignores the external analog audio jacks and passes the embedded digital audio signal. When a DVI-D signal is received, the transmitter will accept audio input from the RCA jacks. In both cases, audio will be output by the receiver in the form of embedded digital audio and external analog audio.

NOTE: If the primary receiver is attached to a VGA or DVI-D display, the EDID information provided by the display will disable digital audio at the source device. In this case, the transmitter will pass analog audio even if the source device connection is HDMI. Thus, if digital audio is required, be sure to select a receiver attached to an HDMI display device.

NOTE: If the digital audio embedded within the HDMI signal is 96KHz, then analog output on the receiver modules will be disabled. Digital audio will continue normally.

HD15 Considerations

A transmitter equipped with an HD15 media module will always input data on the dual RCA jacks. When passed to a receiver with an attached HDMI display device, the audio will be embedded within the HDMI signal and also available on the dual RCA jacks.

When HD15 devices are attached to both the transmitter and receiver, audio will be present only on the dual RCA jacks.

Appendix E: Video Troubleshooting

The following troubleshooting tips should help you to resolve most common setup and initialization issues. If your problem persists, please contact Avocent technical support for additional help.

Available Information

The on-board web interface of the MPX transmitter and receiver provide information that should help to diagnose and resolve video connectivity issues. The Display Device Settings page on the receiver is a good place to start.

NOTE: Using the web controls provided via the Display Device Settings page, you may override the EDID information provided by your display device. Doing so, allows you to explicitly control the resolutions offered to the end-user of the system. When you override the normal EDID function of a display device, the receiver no longer attempts to read EDID information from the device. Thus, the receiver is unable to detect whether a display device is attached or not. Normally a receiver will cease to request video data from the transmitter for a Plug-and-Play display device that is not attached or not powered on. The act of overriding the Plug-and-Play function, however, will cause the receiver to request video data regardless of whether a display device is attached or not. Thus, this setting may impact overall performance in installations where display devices are not always attached or powered on.

The Display Device Settings page for MPX1000 receivers, illustrated in Figure E.1. This page allows the receiver to generate a custom EDID, which may be needed to compensate for non Plug-and-Play display devices and to override EDID strings from Plug-and-Play devices. The following example illustrates a means to simulate a display device that offers only 640x480 and 1024x768 resolutions.

NOTE: The ability to construct an EDID string is supported only for VGA display devices.

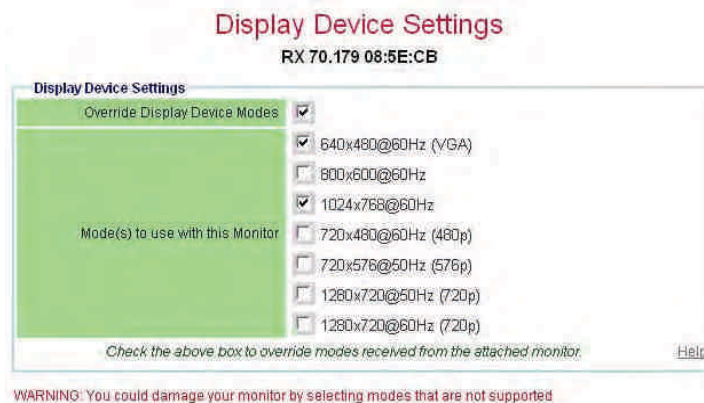


Figure E.1: Display Device Settings Page for MPX1000 Receivers

The Display Device Settings page for MPX1500 receivers, illustrated in Figure E.2. This page defaults to Plug-and-Play operation. In this mode, the receiver will read EDID information from the attached display device and pass that information along to the transmitter. Alternatively, you may manually select custom resolutions for VGA, component, s-video or composite video.

NOTE: It is not possible to select custom resolutions for HDMI or DVI-D modes of operation.

Modular adapters are optionally available from Avocent to adapt VGA, component, and composite cables for connection to the DVI-I video output port of the receiver. When using these cables, the receiver will automatically detect the selected video type. When using third-party converters, it will be necessary to configure the receiver for the appropriate video type and resolution via this page.

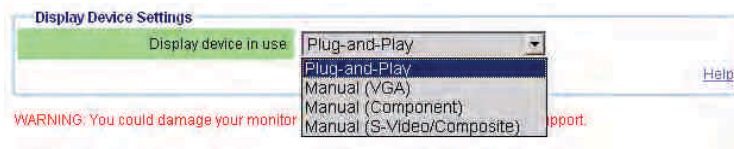


Figure E.2: Display Device Settings Page for MPX1500 Receivers

The *Transmitter Status* table, illustrated in Figure E.3, on the Connection Status page of an MPX transmitter offers additional information. If video is actively being processed by the transmitter, the *A/V Source Resolution* field indicates the current resolution.

Transmitter Status	
Device Name	CJP - Transmitter
Control LAN (L1) MAC Address	00:ED:86:08:2A:C8
Wired AV LAN (L2) MAC Address	00:ED:86:08:2A:C7
Serial Number	0000000270033434
OEM Id	0
Country Code	United States
Product Type	(0) T
AV Output	Transmitter VGA
Operational Status	Operational, 1 joined receivers
Session IP Address	192.168.10.1
Wireless Channel Number	36
Actual Antenna Power	15 dBm (32 mW)
AV Source Type	RGB
AV Source Resolution	1024x768@60Hz
AV Encoder Running	Yes
AV Source Error	No errors
Primary Video Resolutions	640x480@60Hz (VGA)
	800x600@60Hz
	1024x768@60Hz
	1280x768@60Hz
	720x480@60Hz (480p)
Video Resolutions in Use	1280x720@60Hz (720p)
	1920x1080@60Hz (1080i)
	640x480@60Hz (VGA)
	800x600@60Hz
	1024x768@60Hz
RGB Video Resolutions Stored	1280x768@60Hz
	720x480@60Hz (480p)
	1280x720@60Hz (720p)
	1920x1080@60Hz (1080i)
	640x480@60Hz (VGA)
Click Help to view supported video resolutions	

Figure E.3: Transmitter Status Table

The *Transmitter Status* table provides three additional fields, as follows:

- Primary Video Resolutions*: This field contains a list of all resolutions that the Primary Receiver has reported to the transmitter. These values would have come from the display device itself or from the Display Settings page of the receiver.
- Video Resolutions in Use*: This field indicates the list of resolutions that have been reported to the source device.
- RGB Video Resolutions Stored*: This field indicates the resolutions that are currently stored in the Active EDID string of the transmitter.

The *Transmitter Performance* and *Receiver Performance* tables on the Media LAN Performance web page of an MPX transmitter, illustrated in Figure E.4, provide real-time status of media LAN bandwidth utilization. The *Current Video Data Rate* is the target transmit data rate. This value should fall between the maximum data rate and the minimum data rate settings. The *Transmitted*

Total Bitrate is the amount of audio and video data that the transmitter has actually transmitted per second since the last page update. Bitrate status for retransmitted data is also provided. The receiver table indicates the amount of real-time data received from the media LAN as well as the amount of retransmitted, recovered and lost data. Chronic status of missing data is a symptom of an adverse condition that should diagnosed and resolved.

Media LAN Performance

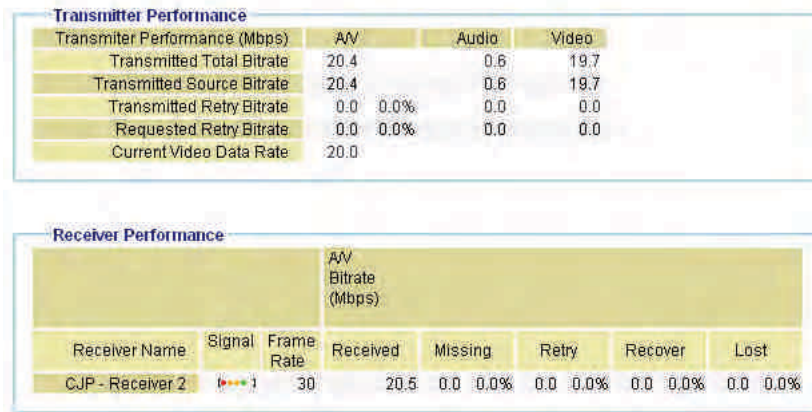


Figure E.4: Transmitter Media LAN Performance

Common Tuning Needs

Video is restricted to 640x480: This is an indication that the MPX transmitter has not received valid EDID information from the display device. The following list provides potential causes and suggests actions to remedy the situation:

- **Improper initial power sequence:** It is possible that the source device obtained EDID information from the MPX transmitter before device information was obtained from the display device. To resolve this, follow the suggested power up sequence provided in “Initiating A Media Session” on page 30.
- **The display device is not a plug-and-play ready:** It is possible that the display device does not offer EDID information. The Display Device Settings page will indicate if the display device is not plug-and-play ready. If this is the case, use the provided table to enable appropriate resolutions for the display device. Be careful not to enable resolutions that the display cannot support.
- **The display device submitted an improperly formed EDID string:** Should this happen, the transmitter will discard the entire string. Thus, the default EDID will remain in effect.

In this case, use the Display Device Settings table on the MPX receiver to enable appropriate resolutions for the display device.

- **The VGA cable is damaged or does not pass data on the DDC channel:** Pins 12 and 15: of a VGA cable represent DDC data and clock, respectively. EDID information is passed via the DDC channel. Verify proper operation of your VGA cable.

No video is visible: This is an indication that the display device is either not properly connected or is not compatible with MPX extenders. The following troubleshooting steps may help to resolve this issue.

- For all display devices:
 - Launch your browser to the Connection Status page on the transmitter. Helpful error information may be displayed in the *Transmitter Status* table.
 - Connect a display device directly to your source device. If active media is not displayed, then resolve the issue before attempting to extend the signal. If active media is present, then verify proper operation of the transmitter and receiver video cables and adapters, if any.
 - Power off all receivers other than the primary. Working with a reduced network will allow you to simplify the troubleshooting environment.
 - View the resolution and frame rate tables in the appendix of this manual to determine if your source device is operating within supported parameters.
 - If you have selected wireless operation, select a different channel in the Wireless Media LAN settings to ensure that there is not a conflict with other nearby wireless devices.
 - It might be useful to attempt using a wired media LAN to check for possible radio-related issues.
 - Make sure that you have selected a primary receiver. The primary is responsible for generation of EDID information for the source device.
- For HDMI or DVI-D display devices:
 - Initiate a video hot plug of the source and display devices to ensure that the EDID information has been read and transferred across the extension network.
 - Power cycle the transmitter to clear invalid HDCP keys, which may have been collected from a non-valid display device. An invalid key will prevent the transmitter from sending protected content.
 - Determine if you are sending protected content. If so, do all of the display devices have appropriate content protection keys?
 - If only one display is not working, try making it the primary. Perform a hotplug of the video connection (HDMI, VGA). If the problem is resolved and the displays are different models, there may be a incompatibility between the options these monitors support.

Motion video is choppy: This is an indication that frames are being dropped. “Fine tuning suggestions” on page 41 provides steps to resolve this issue.

Additional tips for VGA display devices

Display devices differ widely in their support of video resolution, refresh rates, color depth and other configurable features. To allow source and display devices to negotiate available settings in a plug-and-play manner, a display data channel standard has been adopted by the industry. The standard supported by MPX extenders is DDC2B. This standard is adhered to by most VGA, DVI, and HDMI display devices. Compliant display devices contain a PROM that can be read by a source device across a display data channel (DDC). The PROM contains formatted information about the capabilities of the display. This information is commonly referred to as extended display information data, or EDID string for short.

DVI-D and HDMI source devices will dynamically query this information when a display device hot-plug event is detected. Thus, displays are immediately available. Most VGA computer source devices such as graphics cards, however, query information only once, upon power up. For this reason it is particularly important that EDID information is passed through the extension network and assembled by the transmitter into the Active EDID string before power up of VGA source device. Therefore, the power sequence of MPX extenders, display devices, and source device is critical when using a VGA source device.

NOTE: EDID information is maintained by the MPX transmitter in non-volatile storage; thus, the order of power up sequencing is important only during initial installation.

If you followed the recommended power up procedure and no video is visible at the display device, then the following tips may help you to resolve your problem.

- The VGA source may be operating at a resolution not supported by the MPX transmitter.
 - If you are on a laptop, toggle the video back to the laptop display and check the resolution of the secondary monitor. To test the connection between the transmitter and the receiver, change the secondary monitor setting to 640 x 480 @ 60Hz resolution. Again, toggle the video to the VGA connector. Video should appear within 30 seconds.
 - If your source device is a desktop PC or server, then you must disconnect the MPX transmitter from its VGA port and connect a VGA monitor in its place. It may be necessary to reboot the computer to establish video. Change the resolution to 640 x 480 @ 60Hz. After changing the resolution on the PC, restart the PC (or power cycle your VGA source). Quickly reconnect to the MPX transmitter while the VGA source is initializing.

After you have obtained video at the 640 x 480 resolution, you may change the resolution on the VGA source to one of the other supported resolutions.

Appendix F: Mounting Options

MPX1000 mounting options

Transmitter mounting

The MPX1000 transmitter ships with rack mount brackets for installation into an equipment rack. When installed, the transmitter requires only one unit of rack height.

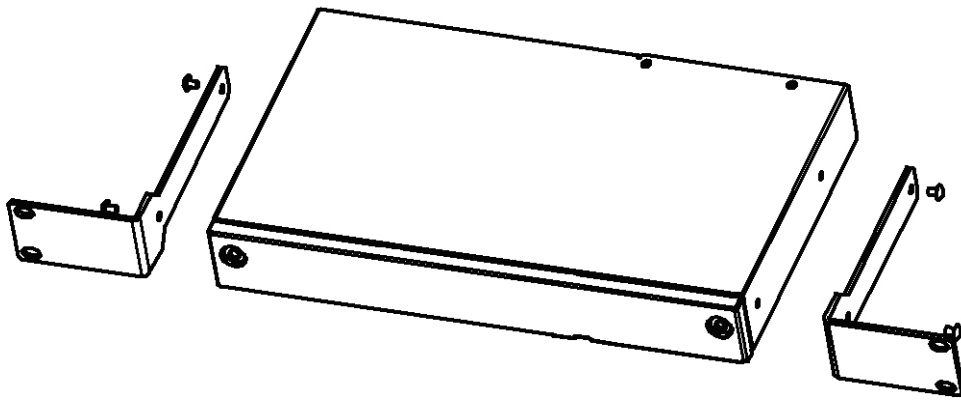


Figure F.1: Transmitter Rack Mount Brackets

The MPX1000 transmitter also supports the following mounting options:

- Table mounting via the optional RMK-56 mounting kit, described below
- VESA MIS-E compatible mounting, using third-party brackets as described below

Receiver mounting

The MPX1000 receiver features the following mounting options, allowing it to adapt to most work environments:

- Table mounting via the optional RMK-56 mounting kit, described below
- VESA MIS-E compatible mounting, using third-party brackets as described below

Table mounting

The Avocent RMK-56 table mounting bracket kit is compatible with MPX1000 transmitters and receivers. The kit contains two brackets, which are interchangeable such that either may be used as a left or right bracket. In addition, the brackets may be attached with keyholes facing up or down. This flexibility allows a device to be mounted in a table top or below table manner.

Detailed instructions are provided with the kit. The following diagram illustrates the basic components of the kit.

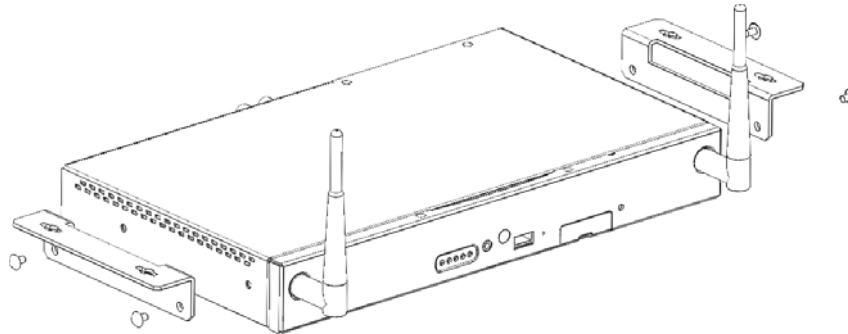


Figure F.2: Parts for Under Desk Mounting Option

The following diagram offers dimensions, in inches, of the RMK-56 horizontal mounting brackets when used in conjunction with the MPX1000R receiver.

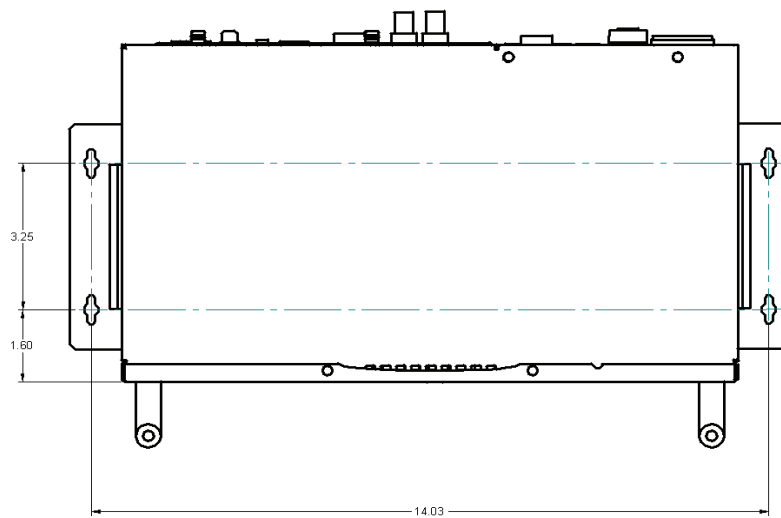


Figure F.3: Installing the Horizontal Mounting Bracket (Under Desk Option)

NOTE: Mounting accessories are ordered separately. Contact your dealer for more information.

VESA mounting

MPX1000 transmitters and receivers provide VESA MIS-E threaded holes, allowing you to choose from a wide range of third-party ceiling, wall, tilt, cabinet and desk mount products. The VESA

MIS-E standard is designed for mounting of mid-size displays that weigh under 50 pounds. Compliant products, such as the MPX1000 transmitter and receiver, are equipped with a 200 x 100mm mounting hole pattern.

Please follow the mounting instructions provided with the third-party mounting kit.

Mounting options for MPX1500 extenders

Wall and table mounting

An optional keyhole style mounting bracket (part number DMK-04) is available for use with MPX1500 extenders that allows for wall mounting. The bracket also provides screw slots for table mounting.

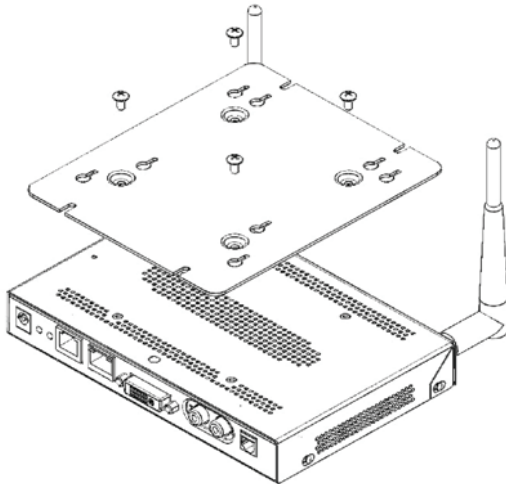


Figure F.4: MPX1500 Mounting Bracket

To install the mounting bracket:

1. Use the bracket as a template to mark desired holes on the mounting surface.
2. Insert mounting screws into the drilled holes.
3. Attach the bracket to unit using the supplied pan head machine screws.

NOTE: Take care to orient the bracket such that the narrow portion of keyhole slot will interlock with the heads of the mounting screws when the unit suspended upon them.

4. Slots on outer edge of bracket can be used after the bracket is installed to unit. Hold unit / bracket against the mounting surface and drive screws thru slots. Screws along bottom edge should be installed before plugging in cables.

Power Supply Bracket

An optional power supply bracket kit (part number PBK-01) is available for the MPX1500 receiver. This bracket may be used to affix to the external power adapter to the chassis of the MPX1500 receiver.

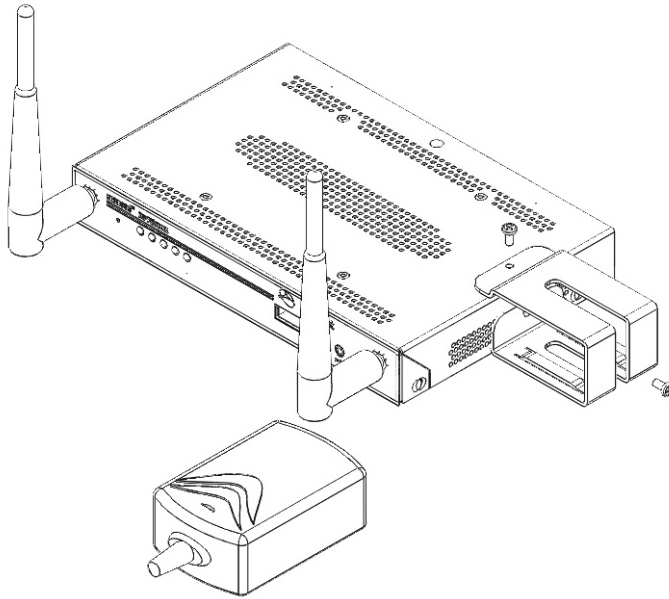


Figure F.5: MPX1500 Power Supply Bracket

To install the power supply bracket:

1. Using the screw provided, attach the bracket to the side of the MPX1500 chassis. Do not attach the top screw at this time.
2. Place the power supply into the bracket.
3. Fasten the bracket to the top of the MPX1500 chassis using the provided screw.
4. Use tie wraps if needed to neatly contain excess AC and DC line cords.

Appendix G: Technical Specifications

Table G.1: MPX1000T HD Multipoint Extender Product Specifications

Physical Attributes	
Height	1.7"
Width	17"
Depth	7.54"
Ambient Atmospheric Condition Ratings	
Operating Temperature	32F - 118.4 F (0C - 48C)
Storage Temperature	-04F - 140F (-20C- 60C)
Humidity	20% to 80% relative humidity (non-condensing) across the operating temperature range
Power Supply	
AC-input	100 - 240 VAC
AC Frequency	50 - 60 Hz
Inrush Current	.91 Amps
Connections (front)	
IR Receiver	IR input
3.5 Mini	IR Blaster output, 38KHz +/- 2KHz; the IR Blaster port supports enough drive current to handle 4 IR LEDs.
SMA Connector (2)	Antenna
USB	USB 1.1 (reserved for future use)
Connections (rear)	
L1 (RJ-45)	Ethernet Connector 10/100 IEEE 802.3, used for local network control of device
L2 (RJ-45)	Ethernet Connector 10/100 IEEE 802.3, used for streaming video
RS-232 (Female)	Serial Control input
Power	IEC
Input Module	Input Module Slot
Regulatory Compliance (Compliance Model Number (CMN): 2003 Series)	

Table G.1: MPX1000T HD Multipoint Extender Product Specifications (Continued)

Standards	FCC Class B, UL, cUL, RoHS, CE, ICES-003, WEEE
Supported Radio Bands	
UNII 1: (4 channels)	5.15-5.25 GHz
UNII 3: (4 channels)	5.725 to 5.825 GHz
ISM (11 channels)	2.412 to 2.462 GHz (supported in USA only)

Table G.2: MPX1000R HD Multipoint Extender Product Specifications

Physical Attributes	
Height	1.7"
Width	12.75"
Depth	7.54"
Ambient Atmospheric Condition Ratings	
Operating Temperature	32F - 118.4 F (0C - 48C)
Storage Temperature	-04F - 140F (-20C- 60C)
Humidity	20% to 80% relative humidity (non-condensing) across the operating temperature range
Power Supply	
AC-input	100 - 240 VAC
AC Frequency	50 - 60 Hz
Inrush Current	.91 Amps
Connections (front)	
IR Receiver	IR input
3.5 Mini	IR Blaster output, 38KHz +/- 2KHz; the IR Blaster port supports enough drive current to handle 4 IR LEDs.
SMA Connector (2)	Antenna
USB	USB 1.1 (Not Used at this time)
Connections (rear)	
L1 (RJ-45)	Ethernet Connector 10/100 IEEE 802.3, used for local network control of device
L2 (RJ-45)	Ethernet Connector 10/100 IEEE 802.3, used for streaming video

Table G.2: MPX1000R HD Multipoint Extender Product Specifications (Continued)

RS-232 (Female)	Serial Control input
Power	IEC
Input Module	Input Module Slot
Regulatory Compliance (Compliance Model Number (CMN): 2003 Series)	
Standards	FCC Class B, UL, cUL, RoHS, CE, ICES-003, WEEE
Supported Radio Bands	
UNII 1: (4 channels)	5.15-5.25 GHz
UNII 3: (4 channels)	5.725 to 5.825 GHz
ISM (11 channels)	2.412 to 2.462 GHz (supported in USA only)

Table G.3: MPX1000T HDMI Input Module Product Specifications

Connections	
RCA Female (2)	Unbalanced Audio Input
HDMI	Digital Audio/Video Control
Video	
	Supports the following HDMI and DVI-D resolutions:
	Computer resolutions: (at 30 frames per second)
	- 640 x 480 @ 60Hz
	- 800 x 600 @ 60Hz
	- 1280x720 @ 60Hz
	- 1280x768 @ 60Hz*
	- 1360x768 @ 60Hz*
HDMI A/V input Port	* Support for these resolutions may require a hardware upgrade. Contact Avocent technical support for details.
	SD video resolutions: (at 30 frames per second)
	- 480i @ 60Hz
	- 480p @ 60Hz
	- 576i @ 50Hz
	- 576p @ 50Hz
	HD video resolutions: (at 30 frames per second)
	- 720p @ 50/60Hz
	- 1080i @ 50/60Hz
Audio	

Table G.3: MPX1000T HDMI Input Module Product Specifications (Continued)

Line Audio Inputs	Less than or equal to 10K Ohm with 0-36db of headroom (Sensitivity)
Frequency Response	The Analog audio frequency response: 20Hz-20Khz with a 3dB per octave roll-off beginning at 14 kHz
Regulatory Compliance (Compliance Model Number (CMN): 2003 Series)	
Standards	FCC Class B, UL, cUL, RoHS, CE, ICES-003, WEEE

Table G.4: MPX1000R HDMI Output Module Product Specifications

Connections	
RCA Female (2)	Unbalanced Audio Input
HDMI	Digital Audio/Video Control
Video	
Video Gain	Unity ±1DB
	Supports the following HDMI and DVI-D resolutions:
	Computer resolutions: (at 30 frames per second)
	- 640 x 480 @ 60Hz
	- 800 x 600 @ 60Hz
	- 1280x720 @ 60Hz
	- 1280x768 @ 60Hz*
	- 1360x768 @ 60Hz*
HDMI A/V Output Port	* Support for these resolutions may require a hardware upgrade. Contact Avocent technical support for details.
	SD video resolutions: (at 30 frames per second)
	- 480i @ 60Hz
	- 480p @ 60Hz
	- 576i @ 50Hz
	- 576p @ 50Hz
	HD video resolutions: (at 30 frames per second)
	- 720p @ 50/60Hz
	- 1080i @ 50/60Hz
Audio	
Audio Gain	Unity

Table G.4: MPX1000R HDMI Output Module Product Specifications (Continued)

Line Audio Outputs	Line audio outputs should be 600 Ohm with a internal resistance of about 150 Ohm
Frequency Response	The Analog audio frequency response: 20Hz-20Khz with a 3dB per octave roll-off beginning at 14 kHz
Regulatory Compliance (Compliance Model Number (CMN): 2003 Series)	
Standards	FCC Class B, UL, cUL, RoHS, CE, ICES-003, WEEE

Table G.5: MPX1000T HD15 (VGA) Input Module Product Specifications

Connections	
RCA Female (2)	Unbalanced Audio Input
HD15	Analog Video Input
Video	
	Supports the following resolutions:
	Computer (VGA) resolutions: (at 30 frames per second)
	- 640 x 480 @ 60Hz
	- 800 x 600 @ 60Hz
	- 1280x720 @ 60Hz
	- 1280x768 @ 60Hz*
	- 1360x768 @ 60Hz*
	* Support for these resolutions may require a hardware upgrade. Contact Avocent technical support for details.
HD15 A/V Input Port	
	SD video (component) resolutions: (at 30 frames per second)
	- 480i @ 60Hz
	- 480p @ 60Hz
	- 576i @ 50Hz
	- 576p @ 50Hz
	HD video (component) resolutions: (at 30 frames per second)
	- 720p @ 50/60Hz
	- 1080i @ 50/60Hz
Audio	
Line Audio Inputs	Less than or equal to 10K Ohm with 0-36db of headroom (Sensitivity)
Frequency Response	The Analog audio frequency response: 20Hz-20Khz with a 3dB per octave roll-off beginning at 14 kHz
Regulatory Compliance (Compliance Model Number (CMN): 2003 Series)	
Standards	FCC Class B, UL, cUL, RoHS, CE, ICES-003, WEEE

Table G.6: MPX1000R HD15 (VGA) Output Module Product Specifications

RCA Female (2)	Unbalanced Audio Input
HD15	Analog Video Output
Video	
Video Gain	Unity ±1DB
	Supports the following VGA video resolutions:
	Computer (VGA) resolutions: (at 30 frames per second)
	- 640 x 480 @ 60Hz
	- 800 x 600 @ 60Hz
	- 1280x720 @ 60Hz
	- 1280x768 @ 60Hz
	- 1360x768 @ 60Hz
HD15 A/V Output Port	SD video (VGA) resolutions: (at 30 frames per second)
	- 480i @ 60Hz
	- 480p @ 60Hz
	- 576i @ 50Hz
	- 576p @ 50Hz
	HD video (VGA) resolutions: (at 30 frames per second)
	- 720p @ 50/60Hz
	- 1080i @ 50/60Hz
Audio	
Audio Gain	Unity
Line Audio Outputs	Line audio outputs should be 600 Ohm with a internal resistance of about 150 Ohm
Frequency Response	The Analog audio frequency response: 20Hz-20Khz with a 3dB per octave roll-off beginning at 14 kHz
Regulatory Compliance (Compliance Model Number (CMN): 2003 Series)	
Standards	FCC Class B, UL, cUL, RoHS, CE, ICES-003, WEEE

Table G.7: MPX1500R HD Multipoint Extender Product Specifications

Physical Attributes	
Height	1.0"
Width	6.92"
Depth	4.55"
Ambient Atmospheric Condition Ratings	

Table G.7: MPX1500R HD Multipoint Extender Product Specifications (Continued)

Operating Temperature	32F - 118.4 F (0C - 48C)
Storage Temperature	-04F - 140F (-20C- 60C)
Humidity	20% to 80% relative humidity (non-condensing) across the operating temperature range
Altitude	Altitude 10,000 ft across the operating temperature range, 35,000 ft across storage temperature range
Shock	140G - 3 axis
Power Supply	
AC-input	100 - 240 VAC
AC Frequency	50 - 60 Hz
Inrush Current	14.2 Amps (AC/DC adapter)
Connections (front)	
2.5mm mini-jack	IR input (optional IR-RX adapter with 1m cable is required)
3.5mm mini-jack	IR blaster output, 38KHz +/- 2KHz; the IR blaster port supports enough drive current to handle 4 IR LEDs
RP-SMA Connector (2)	Antenna connectors
USB	USB 1.1 (not used at this time)
Connections (rear)	
Power	DC barrel connector
Serial (RJ-45)	Dual serial port for control of attached display devices. Requires optional DB9-DUAL female serial cable.
LAN (RJ-45)	Ethernet connector 10/100 IEEE 802.3, used for streaming video and web access
DVI-I	AV output port that supports a wide range of digital and analog video modes
RCA jacks (2)	Left and right jacks for unbalanced analog audio.
S/PDIF	Digital audio output. Operation of this port may require a firmware upgrade.
Video	
Video Gain	Unity \pm 1DB

Table G.7: MPX1500R HD Multipoint Extender Product Specifications (Continued)

	Supports the following VGA video resolutions:
	Computer (VGA) resolutions: (at 30 frames per second)
	- 640 x 480 @ 60Hz
	- 800 x 600 @ 60Hz
	- 1280x720 @ 60Hz
	- 1280x768 @ 60Hz*
	- 1360x768 @ 60Hz*
Video Resolutions (VGA)	* Support for these resolutions may require a hardware upgrade. Contact Avocent technical support for details.
	SD video (VGA) resolutions: (at 30 frames per second)
	- 480i @ 60Hz
	- 480p @ 60Hz
	- 576i @ 50Hz
	- 576p @ 50Hz
	HD video (VGA) resolutions: (at 30 frames per second)
	- 720p @ 50/60Hz
	- 1080i @ 50/60Hz
	SD video (component) resolutions: (at 30 frames per second)
	- 480i @ 60Hz
	- 480p @ 60Hz
	- 576i @ 50Hz
	- 576p @ 50Hz
Video Resolutions (component video)	HD video (component) resolutions: (at 30 frames per second)
	- 720p @ 50/60Hz
	- 1080i @ 50/60Hz

Table G.7: MPX1500R HD Multipoint Extender Product Specifications (Continued)

	Supports the following HDMI and DVI-D resolutions:
	Computer resolutions: (at 30 frames per second)
	- 640 x 480 @ 60Hz
	- 800 x 600 @ 60Hz
	- 1280x720 @ 60Hz
	- 1280x768 @ 60Hz
	- 1360x768 @ 60Hz
Video Resolutions (HDMI)	SD video resolutions: (at 30 frames per second)
	- 480i @ 60Hz
	- 480p @ 60Hz
	- 576i @ 50Hz
	- 576p @ 50Hz
	HD video resolutions: (at 30 frames per second)
	- 720p @ 50/60Hz
	- 1080i @ 50/60Hz
Audio	
Sensitivity	Line audio inputs less than or equal to 10K Ohm with 0-36db of headroom
Frequency response	Analog audio frequency response: 20Hz-20Khz with a 3dB per octave roll-off beginning at 14 kHz
Regulatory Compliance (Compliance Model Number (CMN): 2003 Series)	
Standards	FCC Class B, UL, cUL, RoHS, CE, ICES-003, WEEE
Supported Radio Bands	
UNII 1: (4 channels)	5.15-5.25 GHz
UNII 3: (4 channels)	5.725 to 5.825 GHz
ISM (11 channels)	2.412 to 2.462 GHz (supported in USA only)

Appendix H: Displaying Firmware and Hardware Versions

The Firmware and Hardware Versions page is used to display the firmware and hardware version numbers. This page is the same for transmitters or receivers.

To display version information:

1. Select *Version Information* from the Transmitter Menu or Receiver Menu, located on the left side of the web page.
2. Check the version numbers and decide whether you want to proceed with a Flash update.

The Firmware and Hardware Versions page displays the following information:

Table H.1: Firmware and Hardware Versions Page Information

Field	Description
Device Name	Transmitter or Receiver Name
MAC Address	L1 MAC address (control LAN) of the transmitter or receiver, also printed on an external label on the unit
Main Application Firmware Version	The version number of the main application firmware
Front Panel Firmware Version	The version number of the front panel interface application firmware
Bootloader Firmware Version	The version number of the bootloader firmware
Main Board Hardware Version	The version number of the main board hardware

Appendix I: Upgrading MPX Firmware

NOTE: You must have access to a TFTP server to perform the Flash update process.

The Flash Update page is used to download and install new firmware. All of the steps in this process and the web pages are the same for a transmitter and receivers. The Flash update process goes through several different stages. The web interface displays a different page depending on its current state.

It is possible to upgrade the firmware of an MPX receiver across the wireless media extension network. Although the update process can be initiated during an active media session, it is recommended to disconnect the source device from the MPX transmitter prior to starting the upgrade process. This will allow more bandwidth for transmission of the upgrade file, thus reducing the overall time to perform the upgrade.

The upgrade will complete in the shortest possible time when initiated directly via the physical control LAN (L1) port of an MPX receiver.

To start a Flash update:

1. Select *Flash Upgrade* from the Transmitter Menu or Receiver Menu, located on the left side of the web page.
2. Type the IP address of the TFTP server from which you are downloading the new Flash image. By default, this will be the address of the server making the request.

NOTE: TFTP is used to download the image file; to do this it must be properly configured on the server.

3. Type the full path name of the image file to be downloaded.

NOTE: You may need to specify the file name relative to the server's TFTP root directory.

4. Click *Apply*. If you provided valid parameters, the Flash update process starts downloading the image file.

NOTE: Do not turn off the unit while the download is in progress.

Downloading the update

The image file is downloaded via TFTP. The web page indicates that the download is in progress. This page updates every three seconds. Press **Cancel**, if necessary, to return to the main Flash Update page.

Installing the update

After the image file has been downloaded, the web page shows version numbers for the main firmware application and the boot firmware. For each, the current version is displayed as well as the new version provided by the image file.

To install the Flash update:

1. Check the version numbers and decide whether you want to proceed with the Flash update.
2. Click *Install Image* to start the Flash update process, or click *Cancel* to return to the main Flash Update page.

NOTE: Do not turn off the unit while the download is in progress.

Flash update progress

The web page shows the update progress and a percent complete for each of the Flash update steps. The web page updates every three seconds. Press *Cancel*, if necessary, to return to the main Flash Update page. Do not turn off the unit because it may not recover.

NOTE: Flash update steps for Erase boot region and Write boot image do not occur if the current boot version and the new boot version are the same.

To continue with the Flash update steps and progress:

1. First, the boot region in Flash memory is erased.
2. Next, the boot region on Flash memory is written. The web page is the same as the Erase boot region state. It shows the update progress and a percent complete.
3. The main firmware application region on Flash memory is erased.
4. The web page shows the update progress and a percent complete while updating every three seconds. Again, do not turn off while in this state. Press *Cancel*, if necessary, to return to the main Flash Update page.
5. The main firmware application is written to Flash memory. The web page is the same as the Erase application region state; it shows the update progress and a percent complete.
6. If the Flash upgrade process successfully completes, the web page indicates this and the unit will reboot to complete the update process.

Flash update status

The receiver has five colored LEDs on the front panel that communicate the current state of the device. The LEDs are located in the following order (left to right):

RED AMBER1 AMBER2 GREEN1 GREEN2

While the receiver is upgrading Flash memory, these lights show the current state of the Flash update. Each LED has a specific meaning as follows:

- GREEN2 - Flashes to indicate that the upgrade is in progress and that it has not failed. While this LED is flashing, one or more of the GREEN1, AMBER2 or AMBER1 LEDs will also be a solid color or blinking to indicate the progress of the Flash upgrade.
- GREEN1 - Blinks while file download is in progress. On solid after download has completed.
- AMBER2 - Blinks while erase or Flash of the boot image is in progress. On solid after boot image Flash has successfully completed.
- AMBER1 - Blinks while erase or Flash of the application image is in progress. On solid after application image Flash has successfully completed.
- RED - Flashes to indicate that an error has occurred. All other LEDs are off while this LED is flashing.

NOTE: The difference between flashing and blinking of the LEDs is that flashing occurs at four flashes per second, whereas blinking occurs at a slower rate of 1.5 seconds per blink.

Flash update errors

A Flash update error may occur at any state. An error message is displayed. Click *Restart* to try again.

Appendix J: Supported ISO Country Codes

Table J.1: MPX Extender Supported ISO Country Codes

Country	ISO Code
North America	
United States	US
Canada	CA
Europe	
Austria	AT
Belgium	BE
Cyprus	CY
Czech Republic	CZ
Denmark	DK
Estonia	EE
Finland	FI
France	FR
Germany	DE
Greece	GR
Hungary	HU
Ireland	IE
Italy	IT
Latvia	LV
Lithuania	LT
Luxembourg	LU
Malta	MT
Netherlands	NL
Norway	NO
Poland	PL

Table J.1: MPX Extender Supported ISO Country Codes (Continued)

Country	ISO Code
Portugal	PT
Russia	RU
Slovakia	SK
Slovenia	SI
Spain	ES
Sweden	SE
Switzerland	CH
Turkey	TR
UK	GB
Asia / Pacific	
Australia	AU
China (PRC)	CN
Hong Kong	HK
India	IN
Indonesia	ID
Japan	JP
Korea	KR
Malaysia	MY
New Zealand	NZ
Philippines	PH
Singapore	SG
Taiwan	TW
Africa / Middle East	
Saudi Arabia	SA
Dubai / UAE	AE
Latin / South America	
Argentina	AR

Table J.1: MPX Extender Supported ISO Country Codes (Continued)

Country	ISO Code
Brazil	BR
Mexico	MX

Appendix K: Kit Contents

Table K.1: MPX1000 Transmitter Kit Contents

Part Number	Description
MPX1000T	MPX transmitter
IRB-100	Dual IR blaster
038-0208-5	2 omni-directional antennas
570-1390-501	2 rack mount brackets
Varies by region	Line cord
590-645-501x	Quick Installation Guide

Table K.2: MPX1000 Receiver Kit Contents

Part Number	Description
MPX1000R	MPX receiver
038-0208-5	2 omni-directional antennas
Varies by region	Line cord
590-645-501x	Quick Installation Guide (x = revision)

Table K.3: MPX1000 Receiver HDMI Media Module Kit Contents

Part Number	Description
MPX1000MR-HDMI	Receiver media module
DVI-HDMI	DVI-HDMI converter

Table K.4: MPX1000 Transmitter HDMI Media Module Kit Contents

Part Number	Description
MPX1000MT-HDMI	Transmitter media module
DVI-HDMI	DVI-HDMI converter

Table K.5: MPX1000 Receiver VGA Media Module Kit Contents

Part Number	Description
MPX1000MR-HD15	Receiver media module

Table K.6: MPX1000 Transmitter VGA Media Module Kit Contents

Part Number	Description
MPX1000MT-HD15	Transmitter media module

Table K.7: MPX1500 Receiver Kit Contents

Part Number	Description
MPX1500R	MPX receiver
038-0208-5	2 omni-directional antennas
Varies by region	Power supply and AC line cord
590-506-501x	Quick Installation Guide

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