

# Digital Video

## IPX Series

Zero Compression/Latency

4K AV IP Distribution over 10GbE Switching



## SAFETY INSTRUCTIONS

Please review the following safety precautions. If this is the first time using this model, then read this manual before installing or using the product. If the product is not functioning properly, please contact your local dealer or Aurora for further instructions.

!! The lightning symbol in the triangle is used to alert you to the presence of dangerous voltage inside the product that may be sufficient to constitute a risk of electric shock to anyone opening the case. It is also used to indicate improper installation or handling of the product that could damage the electrical system in the product or in other equipment attached to the product.

!! The exclamation point in the triangle is used to alert you to important operating and maintenance instructions. Failure to follow these instructions could result in injury to you or damage to the product.

!! Be careful with electricity:

- Power outlet: To prevent electric shock, be sure the electrical plug used on the product power cord matches the electrical outlet used to supply power to the Aurora product. Use only the power adapter and power connection cables designed for this unit.
- Power cord: Be sure the power cord is routed so that it will not be stepped on or pinched by heavy items.
- Lightning: For protection from lightning or when the product is left unattended for a long period, disconnect it from the power source.

!! Also follow these precautions:

- Ventilation: Do not block the ventilation slots if applicable on the product or place any heavy object on top of it. Blocking the air flow could cause damage. Arrange components so that air can flow freely. Ensure that there is adequate ventilation if the product is placed in a stand or cabinet. Put the product in a properly ventilated area, away from direct sunlight or any source of heat.
  - Overheating: Avoid stacking the Aurora product on top of a hot component such as a power amplifier.
  - Risk of Fire: Do not place unit on top of any easily combustible material, such as carpet or fabric.
  - Proper Connections: Be sure all cables and equipment are connected to the unit as described in this manual.
  - Object Entry: To avoid electric shock, never stick anything in the slots on the case or remove the cover.
  - Water Exposure: To reduce the risk of fire or electric shock, do not expose to rain or moisture.
  - Cleaning: Do not use liquid or aerosol cleaners to clean this unit. Always unplug the power to the device before cleaning.
- ESD: Handle this unit with proper ESD care. Failure to do so can result in failure.

FCC

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference.

(2) This device must accept any interference received, including interference that may cause undesired operation.



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### • iPBaseT Revolutionary 4K2K AV Distribution System

iPBaseT® technology combines 4K uncompressed video with zero-latency seamless switching, video wall and multiviewer modes, digital audio, USB 2.0, Ethernet, and control. Utilizing the bandwidth of a standard 10G copper or Fiber Optic networks, iPBaseT supports a large, seamless UHD Video and audio matrix, and it does so while replacing multiple technologies and products with a single-box distributed platform. The days of needing a separate AV switcher, control system, video-wall processor, audio/DSP converter, and more are a thing of the past!

### IPX Series:

The IPX-TC1 provides one of the most advanced IP Streaming solutions on the market utilizing Aurora's iPBaseT™ technology, which synergizes various IP/AV standards to work together as one. It is the industry's first 4K2K transceiver with zero compression and latency based on BlueRiver NT™ platform. Using a transmitter (encoder) and receiver (decoder), respectively, used to be the standard – until now. The IPX-TC1 can be set up as either one to make installation, inventory, and troubleshooting easier.

Another industry first is the option slot to add other IP capabilities, like ExtremeUSB® (USB 2.0 over IP) or Dante® audio, for a more complete, distributed system.

Audio, video, data, and control can be sent securely to one or many units using off-the-shelf 10G Ethernet switches. When the IPX-TC1 is set up to be a transmitter, the 2 HDMI inputs become a source switch and the HDMI output becomes a potential loop out. When set up as a receiver, a user can select the local HDMI inputs or an IP source. Seamless switching of the sources further enhances the presentation. Regardless of how the IPX-TC1 is set up, the audio can be de-embedded at any location, break away, and/or be sent to or received from a Dante® enabled device. The USB 2.0 option is also flexible, working as a KVM and/or a high-speed data transfer (480Mbps) for memory sticks. Each IPX-TC1 USB feature can also be set as a host or a device. To keep the system friendly, a customizable OSD and web server are available to be programmed as required. For RJ-45 LAN devices, the 1G Ethernet port allows full bandwidth end-to-end over the IPX-TC1 10G fiber or copper port. Control of the IPX system.

IPX control is available via our IPX Manager Windows® software, or the QXP-2-IPX.

### AV COMPARISON CHART

	MATRIX	IP STREAMING	VLX	IPX
4K UHD with zero compression and zero latency	YES	NO	Visually Lossless Low Latency	YES
Transceiver topology for simplified inventory	NO	NO	YES	YES
Standard network switch infrastructure for easy scalability	NO	YES	YES	YES
Transceiver wall plate	NO	NO	YES	YES World's Only
Videowall processing	NO	YES	YES	YES
USB port to use as host or device	NO	NO	YES	YES
Full-bandwidth Gigabit Ethernet pass-through for data	NO	NO	NO	YES
Easy field serviceability	NO	NO	YES	YES
Integrated 2-input to 1-output HDMI® switch	NO	NO	YES	YES
Seamless switching	Premium Cost	Premium Cost	Fast Switch	YES
Configure any IPX/VLX as TX or RX on the fly	NO	NO	YES	YES
ExtremeUSB® (USB 2.0 480Mbps) option	NO	NO	Integrated USB 2.0 Not Extreme	YES
Dante® network audio option	NO	NO	YES	YES

## PACKAGE CONTENTS

Please make sure the following items are included within your package. Contact your dealer if any items are missing or damaged.

### Box Versions

#### IPX-TC1-F-MM

- 1 qty IPX-TC1-F Fiber Optic OM3 Transceiver SFP+ Module
- 2 qty Mounting Ears and screws

#### IPX-TC1-C-MM

- 1 qty IPX-TC1-C Copper 10G (Cat6A UTP) Transceiver Module
- 2 qty Mounting Ears and screws

### Wall Plate 3 Gang Versions

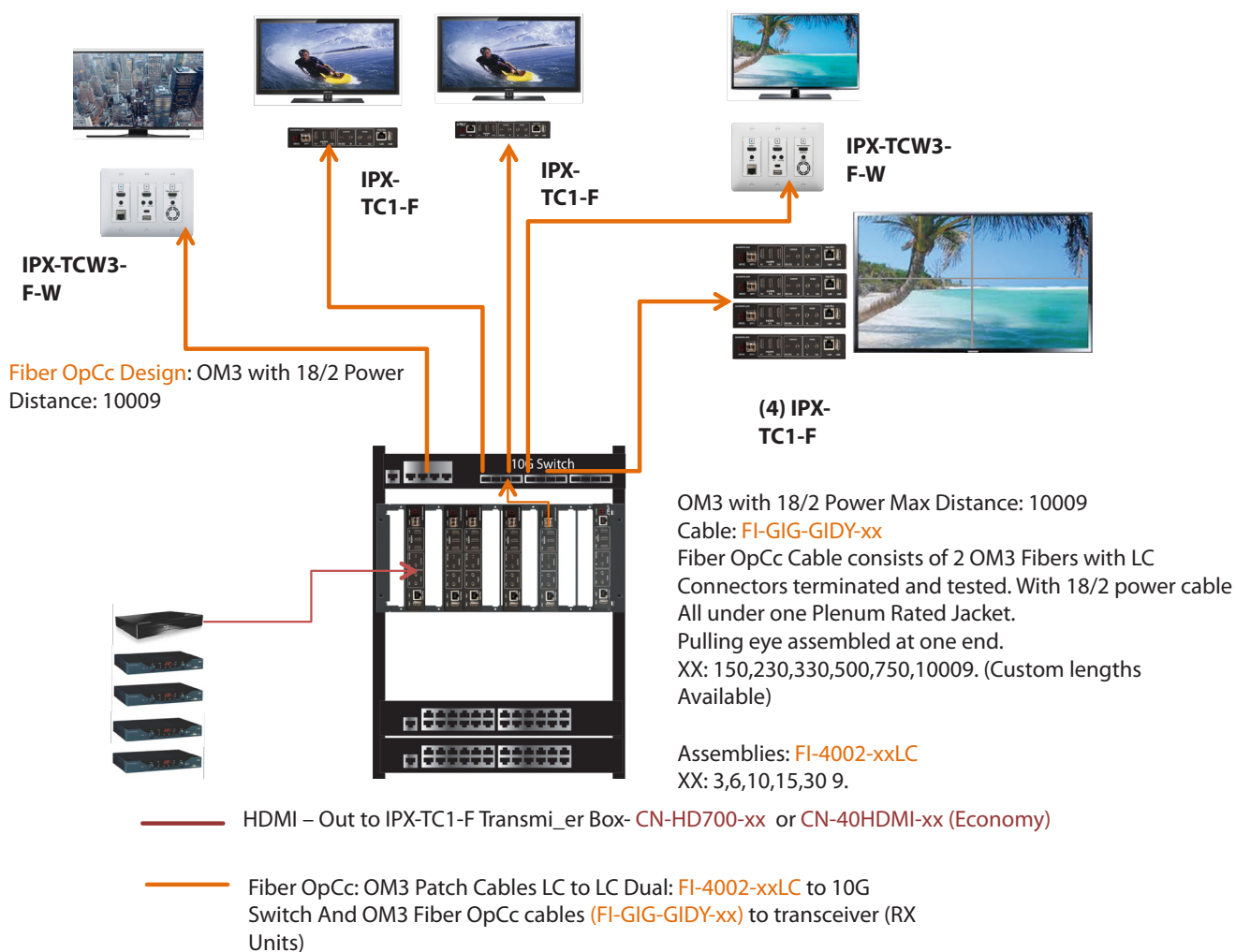
#### IPX-TCW3-F-MM

- 1 qty IPX-TCW3-F Fiber Transceiver unit with SFP+ Module (Black or White)

#### IPX-TCW3-C

- 1 qty IPX-TCW3-C Copper 10G (Cat6A UTP) Module (Black or White)s

Power supplies are sold separately.

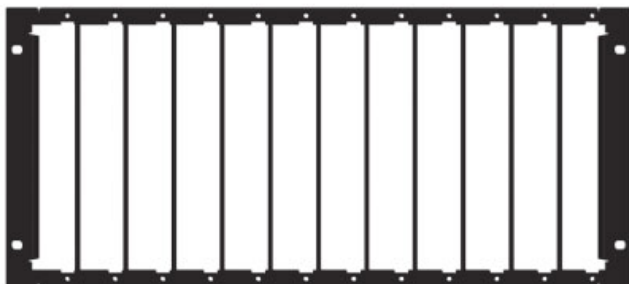


## Optional Accessories

- IPX-TC1-RK1 (1RU Rack mount holds 2 units)  
Includes 4 Rails and 1 Blank



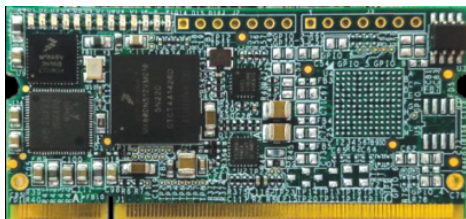
- IPX-TC1-RK5 (5RU Rack mount holds 12 units)  
Includes 24 rails and 4 Blanks



- IPX-TC1-BLK (Blank Plate for Rack Mounts)  
& VLX-TC1-RAIL (For VLX-TC1 use in rack mounts)



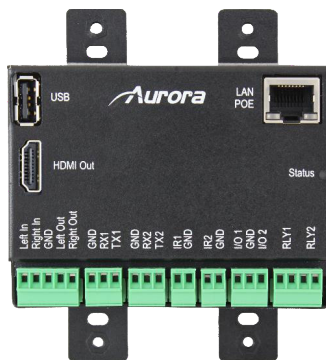
- IPX-DTE (Dante Option Card)



- IPX-USB2 (USB 2.0 Extreme USB Option Card)



- QXP-2-IPX (IPX Embedded Linux Server Version)



### *Optional Accessories*

- DXB-8 ( 8 Button Wall Plate) Available in White or Black



- PS0094-1-US (48V 24 Watt Wall Supply)



- IPX-SFP-10GMM-1 (10G SFP + MultiMode LC 50/125 Module)



- IPX-SFP-PPC-1 (SFP+ 10G Passive Patch Cable 1meter)



- FI-4002LC-xx ( OM3 Dual LC to LC Patch Cables)  
xx: Replace with Length (3, 6, 10, 15, 30 ft)





## INTRODUCTION

### About

The IPX Series provides one of the most advanced IP Streaming solutions on the market utilizing Aurora's IPBaseT™ technology, which synergizes various IP/AV standards to work together as one. It is the industry's first 4K2K transceiver with zero compression and latency based on BlueRiver NT™ platform. Using a transmitter (encoder) and receiver (decoder), respectively, used to be the standard – until now. The IPX can be set up as either one to make installation, inventory, and troubleshooting easier. Another industry first is the option slot to add other IP capabilities, like ExtremeUSB® (USB 2.0 over IP) or Dante® audio, for a more complete, distributed system.

Audio, video, data, and control can be sent securely to one or many units using off-the-shelf 10G Ethernet switches. When the IPX is set up to be a transmitter, the 2 HDMI inputs become a source switch and the HDMI output becomes a potential loop out. When set up as a receiver, a user can select the local HDMI inputs or an IP source. Seamless switching of the sources further enhances the presentation. Regardless of how the IPX is set up, the audio can be de-embedded at any location, break away, and/or be sent to or received from a Dante® enabled device. The USB 2.0 option is also flexible, working as a KVM and/or a high-speed data transfer (480Mbps) for memory sticks. Each IPX USB feature can also be set as a host or a device. To keep the system friendly, a customizable OSD and web server are available to be programmed as required. For RJ-45 LAN devices, the 1G Ethernet port allows full bandwidth end-to-end over the IPX 10G fiber or copper port. Choice is important. That's why the IPX fiber version has an SFP+ port that can use single or multi-mode fiber – making the IPX Series the ultimate AV IP product on the market today.

### Documentation

Aurora provides many documents to support the IPX series and accessories. Below is a list of the available documents that can be found on the download tab of the IPX products or the customer portal.

- IPX Series Network Switch Recommendation & Configuration
- QXP-2-IPX User Guide
- IPX Manager Users Guide
- IPX Series Protocol Guide (Available only on Customer Portal)
- IPBaseT FAQ (Frequently Asked Questions)
- IPBaseT IPX Series AV Evolution for an Industry Revolution (Features and the benefits over tradition Matrix) • IPBaseT Brochure



## Features

- Configure as Transmitter (Encoder) or Receiver (Decoder)
- 4K2K Over 10G Fiber or Copper
- Zero Compression & Zero Latency
- 128x128 Capable with HDCP, Larger for Non-Encrypted Sources
- Videowall Capability with Zero Latency\*
- Seamless & Break-away Switching for Progressive 4:4:4 Color Space
- SFP+ for Multi/Single Mode Fiber
- 10/100/1000Mbps LAN
- 2 HDMI Inputs, 1 HDMI Output
- Line In/Out Stereo
- RS-232 Serial Port & IR (Bidirectional)
- Integrated Web Server for Custom Control Pages
- ExtremeUSB® - USB 2.0 480Mbps Option (Host or Device Configurable)
- Dante® IP Audio Option
- Front Keypad & IR Remote Option
- Auto Sense Switching
- Rack & Under Table Mounting (IPX-TC1)
- 3 Gang Wall Plate Mounting in white or black (IPX-TCW3)\*\*

\* Videowall has certain limitations. Please refer to the videowall section of this manual for further details.

\*\* Wall plate versions require full 3 gang electrical box space. Some electrical boxes and mud rings do not accommodate the full size. IPX IPX-TCW3 TCW3 wall box dimensions wall box dimensions wall box dimensions wall box dimensions wall box dimensions wall box dimensions are 5.54" x 2.83" 1.404"

### IPX-TC1-F & IPX-TC1-C Front



### LEDs

- Power/Status – Power will light green when unit is on or in standby. Status will blink at a normal pace during regular operation and slower pace when in standby.
- Encoder/Decoder – Encoder (transmit) or Decoder (receiver) will be lit when set accordingly.
- SFP TX/RX – Will blink when data is being transmitted or received for fiber or copper versions.
- Link/Activity – For the 10G fiber or copper connection.
- HDMI 1/HDMI 2 – Will light accordingly based on input selection. If both are lit, then it is the remote stream when set as a decoder. If neither is lit, then no source is routed.
- 232 TX/RX – Will blink when RS-232 data is being sent or received.
- IR TX/RX – Will blink when IR signal is being sent or received
- Host/Device – For USB option. Host will be lit if set for PC to be connected to the USB. Device will be lit if

set for peripherals like keyboard or mouse is to be connected. **Buttons**

- Power Button – Press and hold for 5 seconds for power standby.
- Left/Right Button – Press and hold for 10 seconds for restore to factory default.
- Menu Button – Press and hold for 5 seconds switch between encode and decode mode.
- Up Button - Select next input source.
- Down Button - Select previous input.
- Up/Down Button – Press and hold for 5 seconds to output IP info at 9600 baud rate on RS-232 port.

### Miscellaneous

- IR Window – Future use for IR remote.

Note: Default Settings - 9600 baud rate; default IP 192.168.1.100; autosense off.

## IPX-TC1-F & IPX-TC1-C Rear



## Rear

- 48VDC – 48 Volt isolated power input.
- SFP+ – Multi-mode or single mode SFP+ 10G modules for the IPBaseT zero compression/latency connectivity.
- 10G – RJ-45 10G network connection for the IPBaseT zero compression/latency connectivity. Unit can be powered with 10G PoE or PoH injector.
- HDMI In 1/2 – HDMI inputs up to 4K UHD 30Hz.
- HDMI Out – HDMI Output to Display.
- RS-232 – Serial port pass-through and control up to 115Kbps.
- IR – Bi-directional IR input/output 30kHz-60kHz. Emitter must be mono 3.5mm TS and Photo Receiver must be stereo 3.5mm TRS. Note: It is important to use 5V only photo receiver which is with carrier and inverted.
- Audio In – Stereo audio input.
- Audio Out – Audio de-embedded output.
- Ethernet – 10/100/1000Mbps LAN. Can power the unit with PoE+ from injector or switch.
- USB – 480Mbps USB 2.0 Type A to be connected to a host (PC) or device (ex. Mouse, keyboard, etc). Extreme USB SO-DIMM option card (IPX-USB2) must be installed for USB to function.

*IPX-TC1-F or C Bottom*



*Bottom*

- SO-DIMM Option Card slot for USB 2.0 and Dante Audio Options

### IPX-TCW3-F & IPX-TCW3-C Front



### Buttons

- HDMI 1 – Selects HDMI Input 1 (Lights Red, Green, or Blue).
- HDMI 2 – Selects HDMI Input 2 (Lights Red, Green, or Blue).
- Remote Stream – Selects remote stream assigned when set as decoder (Lights Red, Green, or Blue). If held for 5 sec will switch between encode and decode modes. Stream button will light blue when in encode mode.

### Connectors

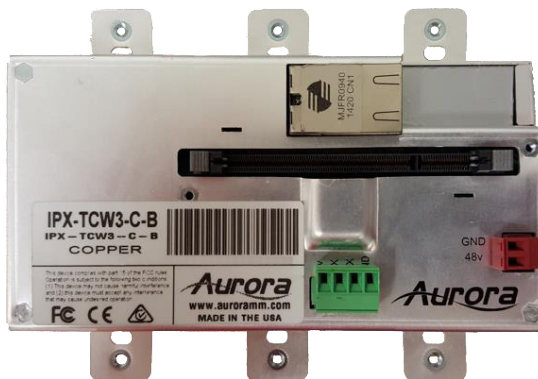
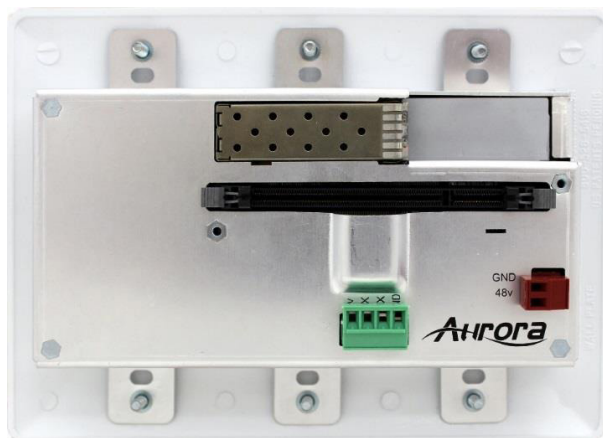
- HDMI In 1/2 – HDMI inputs up to 4K UHD 30Hz.
- HDMI Out – HDMI Output to Display.
- RS-232 – Serial port pass-through and control up to 115Kbps.
- IR – Bi-directional IR input/output 30kHz-60kHz.
- Audio In – Stereo audio input.
- Audio Out – Audio de-embedded output.
- Ethernet – 10/100/1000Mbps LAN.
- USB – 480Mbps USB 2.0 Type A to be connected to a host (PC) or device (ex. Mouse, keyboard, etc). Extreme USB SO-DIMM option card (IPX-USB2) must be installed for USB to function.
- Vent Holes – Temperature controlled low noise fan. Designed for easy cleaning and replacement if ever necessary.

### Miscellaneous

- IR Window – Future use for IR remote.

Note: Default Settings - 9600 baud rate; default IP 192.168.1.100; autosense off

### IPX-TCW3-F & IPX-TCW3-C Rear



### Rear

- 48VDC – 48 Volt isolated power input.
- SFP+ – For multi-mode or single mode SFP+ 10G modules (IPX-TCW3-F) for the IPBaseT zero compression latency connectivity.
- 10G – RJ-45 10G network connections (IPX-TCW3-C) for the IPBaseT zero compression/latency connectivity. Unit can be powered with 10G PoE or PoH injector.
- RS-232 – Serial port pass-through and control up to 115Kbps. Also, has 5V for connection to DXB-8 8 button wall controller.
- SODIMM Expansion Slot for USB and Dante options. Cover supplied for card protection.

Note: Copper RJ-45 is tab down. Do not use a boot over the connector or it will be too snug. To release the cable a flat head screw driver should be used from the side to lift tab from underneath.

Wall plate versions require full 3 gang electrical box space. Some electrical boxes and mud rings do not accommodate the full size. IPX-TCW3 wall box dimensions are 5.54" x 2.83" x 1.404". Wall box portion depth is 1.404" without option card and 2.25" with option card.

## UNDERSTANDING THE BASICS

### *Direct Connection with No Ethernet Switch*

The IPX Series is designed to automatically tunnel the video, audio, USB, RS-232, and IR if they are connected without an Ethernet switch or connected server (QXP-2-IPX).

### *10GbE Ethernet Switch*

It is important to use a non-blocking IGMP 10GbE switch with IGMP snooping. The size of the switch is based on the requirements of the project. With this in mind, consider if extra port capacity is required for future expansion. If you run out of port capacity, you can always add another 10GbE switch in the future. The IPX, when set to encoder (TX), determines the bandwidth that will be multicast across the network. 24bit 4k@30Hz will use about 6Gbps and 3Gbps for 24bit 1080p@60Hz (Data Rate in bits per second = Color Depth x Horizontal Resolution x Vertical Resolution x Frame Rate). This does not include the 1G LAN, 480Mbps, RS-232, IR over the same transmission if required. If 10 units are set as encoders, and 4K@30Hz is the desired video resolution, then 64Gbps of bandwidth will be required if uplinked to another switch. If the available bandwidth between the two 10GbE switches is less than 64Gbps, then packets will drop and information will be lost. It is also a good idea to take into account overhead and assume 15% bandwidth loss to play it safe. Since each port is bi-directional 10Gbps, it enables any port to be used as an encoder or decoder. The AV industry is used to standard distribution topology limitations of 4x4, 8x8, 16x16, etc. With networked based video distribution, a 48 port 10GbE switch as an example can be 24x24, 1x47, 47x1, 12x36, etc.

### *1GbE Ethernet Port Usage*

The 1GbE LAN port on each IPX unit is a full bandwidth independent port that is part of the 10GbE switch. For every IPX unit added to the 10GbE network, it is the same as adding another 1GbE LAN port to a switch. Every IPX 1GbE LAN port is part of a 1GbE switch, relative to the number of IPX units on the network. This allows for using the IPX in place of a secondary 1GbE Ethernet infrastructure to each location and even using it as a low bandwidth video streaming, within the high bandwidth streaming. It is important to not connect more than one IPX unit into the same 1GbE network or there will be communication issues. If more than one IPX unit is connected into the same 1GbE network, it would be the same as taking 2 Ethernet switches and connecting multiple ports to each other, as action that will totally disrupt the network (it will cause a broadcast/network storm). Connecting computers or other LAN peripherals throughout the IPX 1GbE LAN ports will work the same as any other Ethernet switch typically used. A more advanced usage would be to use the IPX 1GbE LAN port to have a local H.264 encoder send lower bandwidth content over the IPX 10GbE infrastructure. This way local AV content is sent real time uncompressed using the 10GbE IPX infrastructure and then for distant learning, computer viewing, or internet usage the H.264/H.265 compressed stream using the same 10GbE infrastructure to other low bandwidth destinations.



## *Network Infrastructure*

The raw network cabling as well as the patch cables are as important as the switch. For 10GbE networks fiber cable is preferred. If using copper, unshielded cable is preferred for optimal performance and is important to follow the standard rules for running Ethernet cables. No sharp bends, coiling, putting near power lines, grouping tightly together with other LAN cables, etc. The grade of the copper cable is important too as it will determine the distance. CAT6A will reach 100m, CAT6 55m, and CAT5e 40m. Fiber can achieve substantially greater lengths and does not have the issues of copper with running together, power line interference, etc. OM3 multimode fiber (MMF) will go almost 1000ft/300m. Single-mode fiber (SMF) can go tens of miles if required.

### *Isolated Network or Users Network*

When discussing a networked based video solution, many times it is assumed it has to be on the client's network. This is not true. The application determines the type of network to be used. For example, if it is simply being used as a typical AV matrix switch with no distribution throughout the facility, then a 10GbE switch can be used just for that room. Just because it is Ethernet based does not mean it has to be used on the main network. The Ethernet switch is simply used as the end point for all the cables and the glue that holds everything together. In other words, it takes the place of the standard AV matrix switch topology. If only remote control is required from the main network, then connect the 10GbE switch to the main network and allow the control data between the 10GbE switch VLAN and the main network. Even if the VLAN is part of the main network it does not mean you will use all the bandwidth. The purpose of IGMP is to only send the multicast data to the ports specified, which would be where the IPX units are connected to. Non-blocking switch assures full bandwidth is available for all ports as required.

### *Controlling the IPX*

To simplify control of the IPX, QXP-2-IPX is available, an embedded Linux server, which mitigates all communications to all the IPX units (devices and wall plates). The QXP-2-IPX can be controlled via Telnet with Aurora's IPX Manager, a Microsoft Windows® software. It can also be controlled from other Aurora control products or 3rd party control systems with the available API. In order to obtain the IPX Server API commands you must be dealer status otherwise an NDA is required and is at the discretion of Aurora.

### *Controlling the IPX with Multiple Servers for Redundancy*

Multiple QXP-2-IPX servers can run on the same network for redundancy. It is important only one communicates at any given time or incomplete commands may occur between units communicating simultaneously. IPX manager will only connect to one server at a time but it is important for every PC running IPX Manager they all point to the same server at the same time. If a server losses communication, then all clients should reconnect to the same backup server.

When using 3rd party control systems, this can be done automatically. Have the control system send a query to the QXP-2-IPX to receive a response through the telnet connection. If no response is received have the 3rd party control device target the backup server until the main server starts to communicate again. Do not use ping for this operation as it only confirms a network connection but does not confirm actual IPX API Server operation. Pinging will be effective for diagnostics to determine if the network connection to the server is lost or if there are significant delays in the network.

### *EDID and its Importance*

One of the most forgotten setup procedures in AV systems is the EDID. The EDID comes from the destination (display, VTC, recorder, etc.) and must be saved into the encoder and decoder HDMI input ports. This allows the source (Blu-ray, computers, etc.) to know the capabilities of the destination. This includes the audio type if any, video resolution and timing, color space, color depth, and more. If no EDID is present an HDMI device will revert to lowest resolution in DVI mode which also means no audio. If the wrong EDID is used, the image may look pink, green, or have no image at all. To make matters more complex, if different destinations/displays are in use in a matrix configuration, then it is important to use an EDID with a common denominator or only one or the other destination may work. In an ideal installation all the destinations should have the same capabilities for optimal performance. If this is not possible a scaler may have to be implemented to assist in the compatibility. For example, there are 2 displays one 1080p the other 4K UHD. If the EDID of the 4K display is used, the 1080p will not see an image if the source is capable of 4K. If the 1080p EDID is used, then both will see the image but the 4K will never benefit from 4K content. In a situation where this is unacceptable, a 4K scaler can be used on the 1080p screen to down scale the 4K content so the 4K EDID can be used and the better screen can have a benefit. Note scalers do add frame latency and can effect image quality based on the quality of the scaler. This is why it is always ideal to use destinations with similar capabilities for optimal performance.

Audio can be impacted just as easily. If a destination is 6-channel surround sound capable and the other destination is not, then the EDID from the 5.1 destination cannot be used, or there will be no audio on the other destination. In most commercial installations it should not be an issue to choose the lowest common

denominator, which is 2-channel audio, but in cases where you must have surround sound then a down-mixer for the 2-channel destination must be used.

In some cases, a custom EDID could be created, as the audio and video are mismatched between the destinations. This can occur for example, when one destination has 4K 2-channel audio and the other 1080p with multichannel surround sound. If the EDID of the 1080p destination is used, audio will not be present on the 4K destination. If the 4K EDID is used, there will be no video present on the 1080p destination. The only way to solve this issue, is a new EDID combining the common features. In this case an EDID which is set at 1080p with 2-channel audio is the solution.

### *Videowall Capabilities*

The IPX-TC1 & IPX-TCW3 videowall mode has the ability to take in a 4K UHD signal and create a low latency high quality videowall. It is important to note it does this without the use of the scaler as it relies on the scaler and capabilities of the display. The way the mode works is by dividing the input resolution by the amount of displays. For example, a 2x2 videowall will become four 1080p signals from a 4K UHD signal. It is highly recommended before selecting the IPX as a videowall controller to test it with the display model to be used to make certain the scaler capabilities of the display have a wide enough range to handle the resolution variances that may be sent. In the case of a 4x4 (max configuration) a 4K UHD input will be divided by 4 making a resolution of 960 x 540. Some displays may not accept that resolution. The IPX also has bezel compensation and some displays do not fare well with the changes to the signal when using this feature. While we would love to make a list of compatible displays unfortunately there are too many to test with and it is best advised if using this feature to request a demo to test with your specific display.

## HARDWARE INSTALLATION

### Network Setup

1. Connect a 10GbE network switch and make certain IGMP Snooping features are enabled.
2. Connect fiber or UTP CAT cable accordingly to the network switch and to the IPX units.
3. Connect a QXP-2-IPX Server to the network switch and power on. Follow instructions for the QXP-2-IPX to set the IP address for remote control.

### Encoder Setup

1. Plug HDMI source(s) into the inputs. Local display should be connected to the HDMI output. Connect any other RS-232, IR, or audio accordingly. If USB is to be connected, make certain the IPX-USB2 option is installed.
2. Connect power via 48v red euro connector; PoE of 10G if copper version, or PoE of 1G Ethernet port (box version only). If using 10G PoE make certain it is a 10G PoE or PoH injector. Unit will take about 20-30 seconds to initialize.
3. Make certain the unit's LED is set to Encode. If not, for box version use the front menu button by holding for 5 seconds or the stream button on the wall plate version. Encoder/decoder mode can also be changed with the internal web server or IPX Manager.
4. For the box version select the input to be streamed using the front up or down buttons to choose HDMI 1 or 2. The HDMI 1/2 LED will light accordingly. For the wall plate use the labeled buttons accordingly. This can also be done with the web server or IPX Manager.
5. Every IPX unit has 2 MAC and 2 IP addresses. One is for the IPBaseT video engine. The other is for the internal web server. The internal web server has a default IP address of 192.168.1.100 and must be changed or it will conflict with other units. It can be changed using IPX Manager or through the built in setup pages at 192.168.1.100. If using the web server to change the IP settings of the IPX unit, you must isolate the unit from a production network (i.e. do not connect the IPX unit on a production network, until you have changed its IP address to suit your network). We highly recommend you change the IP address of all the IPX units by connecting them one after the other to a local PC system using the 1GbE port. Future versions of IPX manager will allow the changing of web server IP address and functionality without having to isolate making setup faster and easier. Then you can safely deploy them on the production network.

### Decoder Setup

1. Plug the display into the HDMI output. If local sources will also be connected to the decoder, use the HDMI inputs 1 and/or 2. Connect any RS-232, IR, or audio accordingly. If USB is to be connected, make certain the IPX-USB2 option is installed.
2. Connect power via either 48VDC red euro connector port or the 1GbE PoE port of the IPX unit. If using IPX-TC1-C and want to power the unit through the 10GbE PoE port, make certain it is a 10GbE PoE or PoH injector. Unit will take about 20-30 seconds to initialize.
3. Make certain the unit's LED is set to Decode. If not, for device version, use the front menu button by holding for 5 seconds or the stream button on the wall plate version. Encoder/Decoder can also be changed with the internal web server or IPX Manager.
4. For the box version select the input to be streamed using the front up or down buttons to choose HDMI 1, 2, or stream. The HDMI 1/2 LED will light accordingly. If both are lit, then stream is selected. For the wall plate use the labeled buttons accordingly. This can also be done with the web server or IPX Manager.

## HARDWARE INSTALLATION

5. Every IPX unit has 2 MAC and 2 IP addresses. One is for the IPBaseT video engine. The other is for the internal web server. The internal web server has a default IP address of 192.168.1.100 and must be changed or it will conflict with other units. It can be changed using IPX Manager or through the built in setup pages at 192.168.1.100. If using the web server to change the IP settings of the IPX unit, you must isolate the unit from a production network (i.e. do not connect the IPX unit on a production network, until you have changed its IP address to suit your network). We highly recommend you change the IP address of all the IPX units by connecting them one after the other to a local PC system using the 1GbE port. Future versions of IPX manager will allow the changing of web server IP address and functionality without having to isolate making setup faster and easier. Then you can safely deploy them on the production network.

### QXP-2-IPX Control Server Setup

1. Connect the QXP-2-IPX USB to a USB Hub for Keyboard and mouse Use. Plug the HDMI into a monitor capable of 720p or higher
2. Connect the LAN to a PoE Switch or PoE Injector with LAN Connection
3. Unit will boot in about 45 seconds
4. In the lower right, use the mouse to right click on the network connection
5. Under the IPV4 Tab add a fixed IP unless you are using the MAC address from the switch to control the IP Address through DHCP. It is highly recommended to have an IP address that won't change. If a static IP is added, delete the Auto or boot time will be very long as it searches.

### Control Setup

1. Launch IPX Manager and connect to the QXP-2-IPX Server IP Address. The units on the network will populate into the encoder and decoder fields accordingly. You will then be able to change settings, save EDID, route, and more. If a control system is to be used, make certain it is connected to the same network and follows the Aurora IPX API protocol.

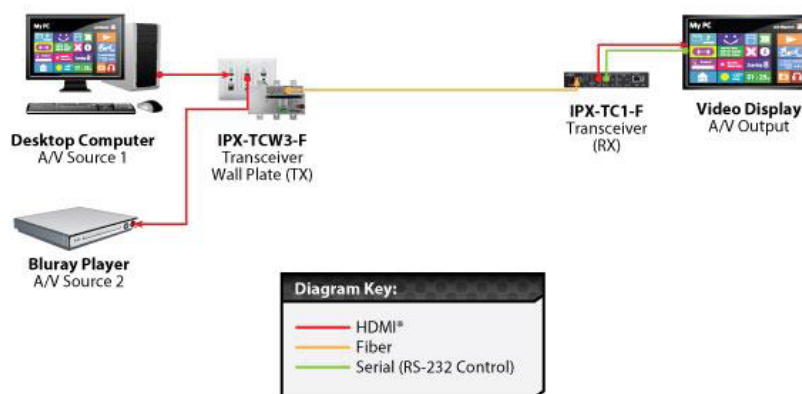
### Important:

- \* Take note of the MAC Address of every unit. It can be found on the underside or rear of the unit. The MAC Address is how you will identify the unit relative to its location.
- Make certain all units are using the latest firmware.
- Remember to setup EDID for proper operation.

## APPLICATIONS

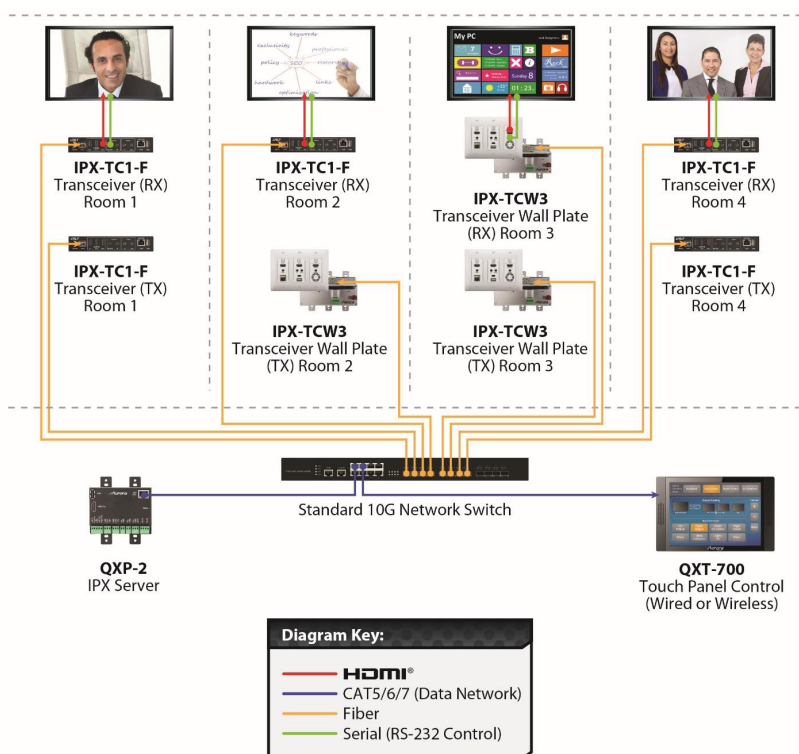
### Example 1: IPX-TCW3 Configured as Transmitter to IPX-TC1 Configured Receiver

When the IPX Series is connecto point to point, no configuration is required, as the units will auto identify and make a tunnel between both ends for the video, audio, RS-232, IR, USB and Ethernet. With copper version a maximum distance of 100m (328ft) can be achieved. With fiber cable depends on MM or SM fibers and can extend for miles, depends on the SFP+ module used. The most common, OM3 MM Fiber, will travel approx. 984ft.



### Example 2: IPX Multi-Room

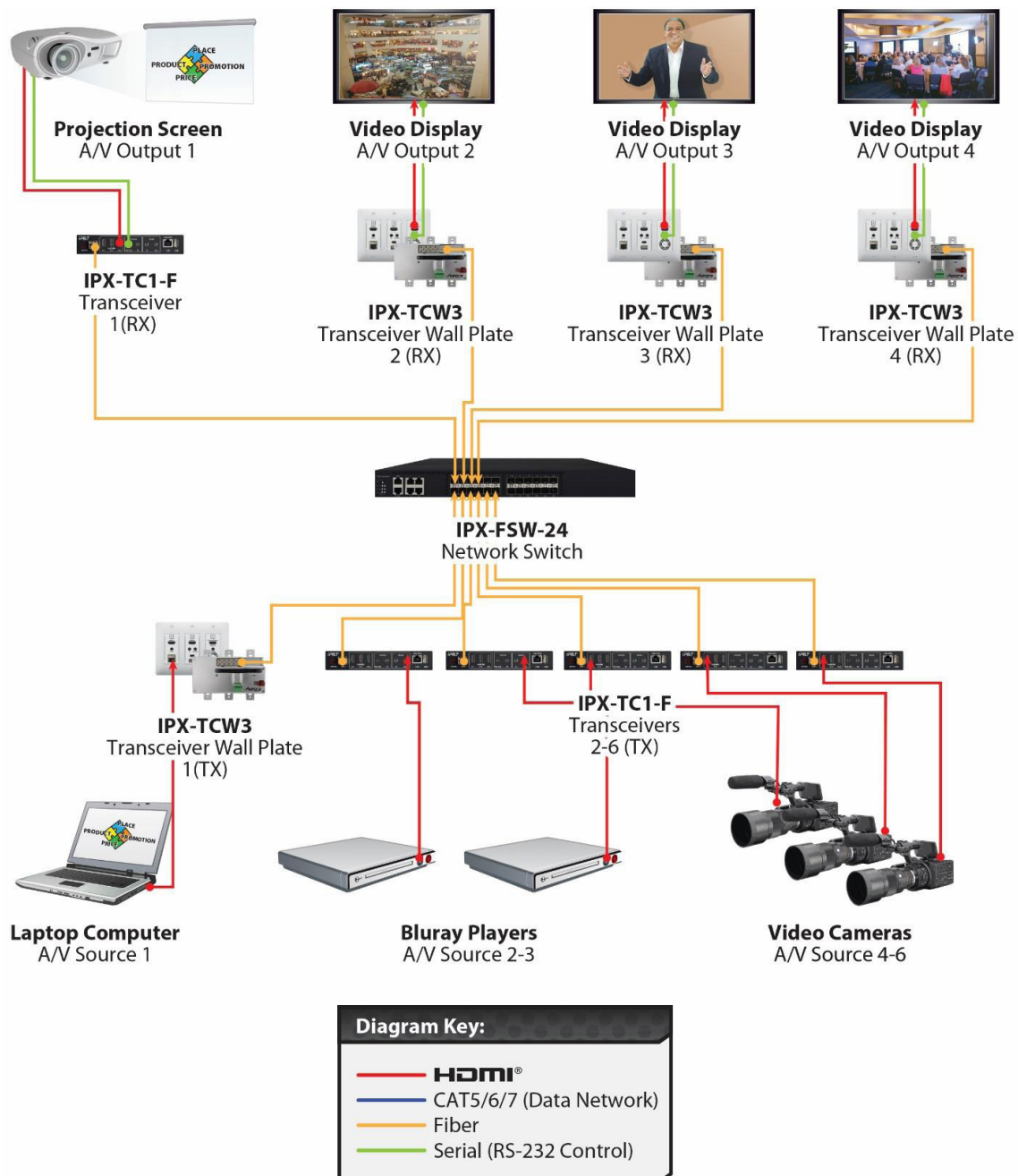
The IPX Series is perfect for multi-room applications with its flexibility. A nearly unlimited number of rooms can share video, audio, data, and control in real time. The scalability is only limited by the size of the network switch and infrastructure.





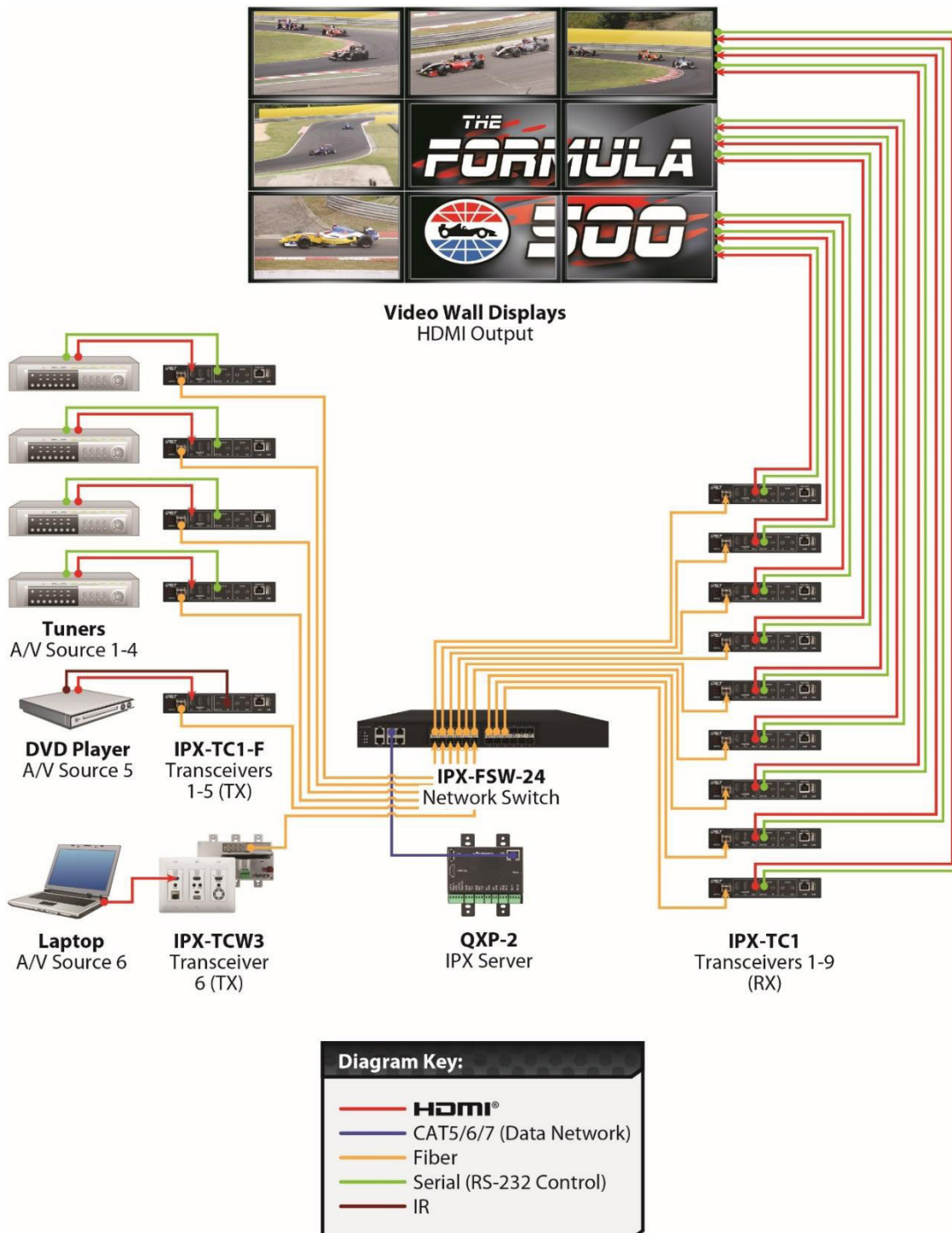
### Example 3: Matrix - Multiple IPX to Multiple IPX

The IPX can take the place of any typical card cage matrix system, adding flexibility and performance never seen before. Even features like seamless switching is no longer a premium.



#### Example 4: Matrix - Video Wall

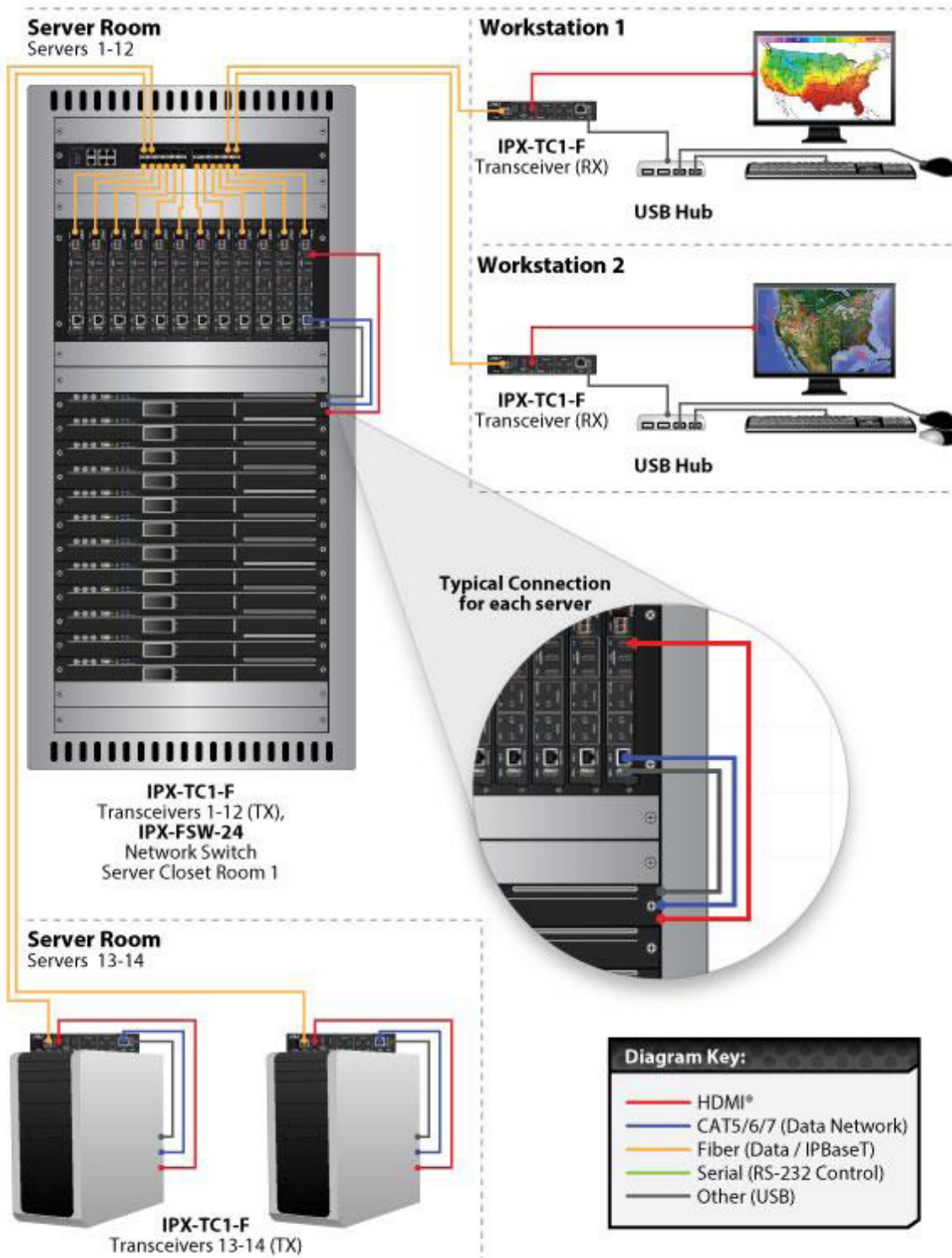
The IPX series is capable of 4K video-walls. Up to 5x5 size can be created with 4K input and all with no compression and zero latency. It is important to read Understanding the Basics Section.





### Example 5: KVM utilizing USB 2.0

Command & Control and NOC centers are perfect for the IPX series, especially with the USB 2.0 running at a full 480Mbps. With the VIX it is no longer just keyboard and mouse but full USB peripheral routing as well.



## Recommended Cabling and Connectivity

### Bulk Cable | Category 6A UTP

#### Category 6A | UTP



##### Features:

- TIA-EIA Category 6A Cable
- NEC Type CMR and CMP
- (UL) Listed: UL1666 and NFPA262
- Meets 300V requirements as specified in the NEC

##### Applications:

- Indoor for:**
- 10/1GBaseT, 10/100Mb Data
  - Horizontal Cabling
  - Voice Backbone
  - AV Digital Video
  - Digital Integration

Standard Spool Size: 1000ft

Catalog No.	No. of Conductors	Cond. Type & Nom. DCR	Insulation Type & Thickness	Shielding	Jacket Type & Thickness	Nom. O.D	NEC Type	Nom. Capacitance & Impedance	Jacket Colors
			Inches		Inches	Inches			
4246A	4 Pair	23 AWG Solid 24Ω/Mft	Polyolefin	None UTP	PVC	.306	CMR	13pf/ft 100Ω	GN, BK, BU
254246A	4 Pair	23 AWG Solid 24Ω/Mft	FR Polyolefin/FEP	None UTP	Plenum Thermo Plastic	.302	CMP	13pf/ft 100Ω	GN, BK, BU

### Cable Accessories | AV

#### Category 6A | Modular Plugs

Catalog No.	Description
90170-BI	CAT6A Connector Kit: 100 Plugs, 100 Boots + Tools
CN-CAPFMUL-S1	Cat6A UTP Modular Plug
TL-CAT6A-CRIMP	Parallel Crimp Tool for CN-CAPFMUL-S1

90170-BI



CN-CAPFMUL-S1

#### Category 6A | UTP RJ45 Jacks

Catalog No.	Description
KJ458MT-C6A-XX	8 Position Cat6A RJ45 JACK - XX: WH,BK,GY,GN,OR,RD,YE
KJMT-8600	Multipair Punchdown tool
15010C	Cat6 and Cat6A Stripping tool
TL-CAT WIREST	Cat Cable Pair Separation Tool



## Cable Assemblies | AV - CAT 6A UTP

### Category 6A | UTP Assemblies- Snag Proof

Catalog No.	Length	Jacket Colors
C6A-114CC-3FB	3 Foot Cat6	Replace CC:  BK, BU, GY, RD, GN, WH, YE, OR
C6A-114CC-7FB	7 Foot Cat6	
C6A-114CC-10FB	10 Foot Cat6	
C6A-114CC-15FB	15 Foot Cat6	
C6A-114CC-20FB	20 foot Cat6	
C6A-114CC-25FB	25 Foot Cat6	



C6C-114BU-XX

BK-BLACK   BU-BLUE   GY-GRAY   RD-RED   GN-GREEN   WH-WHITE   YE-YELLOW   OR-ORANGE

## Patch Panels | AV

### Category 6A | UTP Patch Panels

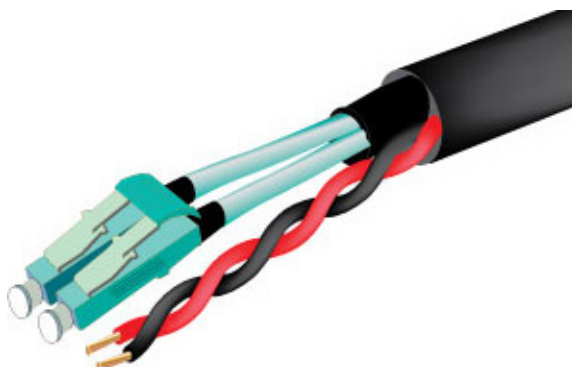
Catalog No.	Description
24458-C6A	24 Port Cat6A Panel 1.75- 1RU
48458-C6A	48 Port Cat6A Panel 3.50- 2RU
48458HD-C6A	48 Port Cat6A High Density: 1.75 - 1RU



24458-C6A

## Assembled Fiber Cable | OM3 + 18/2 Plenum

### Giggidy Cable



#### Features:

- OM3 50/125 Fiber with 18/2 Power Cable
- NEC Type Plenum
- (UL) Listed: UL1666 and NFPA262

#### Applications:

- Indoor for:
- 10/1GBaseT, 10/100Mb Data
  - IPX Fiber Optic Transceivers

Catalog No.	No. of Conductors	Cond. Type & Nom. DCR	Insulation Type & Thickness	Shielding	Jacket Type & Thickness	Nom. O.D	NEC Type	Jacket Colors
			Inches		Inches	Inches		
FI-GIG-GIDY-xx	2 - OM3 Fiber + 18/2	18AWG	FR Polyolefin + Plenum PVC	None UTP	Plenum PVC	.306	Plenum	Black

#### Features:

- 2 - OM3 Fiber Terminated on each end with Dual LC OM3 Connectors •
- Custom Cut Lengths: Replace xx: with any length required up to 984ft. •
- Comes with a Pulling Eye on one end. ( PN: 17507)

### CABLE PULLING SOCK



**ASSEMBLED AND READY TO USE!**

## APPENDIX 1 Troubleshooting

It is advisable to make certain all units are using the latest firmware before troubleshooting.

### Why IPX Manager cannot find any devices?

- Check the IP Address of the QXP-2-IPX server and make certain it is connected on the same network.
- Check the IP Address of the PC is set properly to work with the QXP-2-IPX server.
- Make certain the connection IP Address and port is set correctly in IPX Manager.
- Check the IGMP Snooping status in Switch. This function should be enabled.
- Multiple servers are communicating at the same time. Only one server can communicate at a time to the IP units.

### IPX Web Server is not responding

- Make certain every IPX unit has a unique IP Address set for the webserver. Disconnect unit from 10G network and connect PC directly to 1G LAN and check to see if webserver appears in browser. If not trying restoring defaults and try again. Repeat this for every unit. Another method is using the server to issue commands to change the webserver IP settings over the 10G.

### IPX 1GbE LAN not working

- Make certain the 1GbE ports of different IPX units are not connect into the same Network/Ethernet switch.  
Display will not show a picture
- All devices are powered on.
- Unit is set properly for Decoder. LED status will show this.
- Check routing with IPX Manager.
- A picture is achieved when connecting the source directly to the display.
- Display is set to the correct signal source input mode using display's remote. Example, switching to HDMI 1 if HDMI 1 interface is connected to the RX via a HDMI cable.
- All the cables are qualified.
- The Switch supports IGMP snooping and this function is enabled.

### Display has image with wrong color

- Make certain to learn the EDID from the display and save into each units HDMI input ports.
- If different displays are used with the same source an EDID with a common denominator must be used.  
For example, if on destination is 4K UHD and the other is 1080p and the 4K EDID is utilized, the 1080p screen will not get an image if the source is 4K capable. In this case it would be better to use a 1080p EDID.

### Audio not working

- Make certain correct audio path is selected. The IPX can choose between analog input and HDMI.
- Verify correct EDID usage. If EDID has 5.1 surround sound listed and display cannot do 5.1 there will be no audio. Lack of EDID will also cause a source to output DVI which lacks audio.
- Check volume on display or amplifier

### IPX RS-232 control is not working

- Check wiring for RX, TX, and Ground. (IPX 3.5mm Tip is TX, Ring is RX, Sleeve is GND)
- Check the baud rate of the unit.
- Confirm the protocol being utilized with a terminal program.

### Routing a source to multiple displays is tearing

- Check network switch is properly configured for IGMP

### IPX Server is responding poorly

- Check network switch is properly configured for IGMP with snooping

### Seamless Switching not working properly

- Seamless switching will only work if switching between two sources with the same resolution and refresh rate.
- Seamless switching will not work between inputs on the same unit only between units.
- Seamless will only work with RGB/YCrCb 4:4:4. The EDID will determine the color space the source will put out so changing the EDID could correct this issue.
- Seamless switching only works on progressive signals not interlaced.
- Ethernet switch does not support fast switching. This will cause a glitch when switching especially with 4K.

Netgear XS708E copper 10G switch does not support this mode. The switch will still be instant but not as clean.

### Displays not showing same video frame as others

- If displays are different brands this can happen as depending on the scaler circuitry utilized inside the display and the amount of buffering used.
- If displays are different brands trying using same native resolution of the displays. Some displays will not scale or use memory and just sync to the native signal.

### Audio is different between displays or the analog output

- If displays are different brands this can happen based on the design. It is always ideal to use same models for consistency or a central source for audio to keep in sync.

### Videowall mode not working correctly

- As per the Understanding the Basics videowall section, some displays will not work well with the IPX based on bezel compensation or input resolution relative to the videowall size. Please refer to that section.

## Recommended Networking Switches: 10G

### Ethernet Switch Models

The following is a list of 10G Ethernet switch models that have been verified to date. Check with Aurora to see if any others may have been added at a later time relative to the manual revision date.

### Aurora IPX-FSW Series Fiber 10G

IPX-FSW-8 8 Port Switch Layer 3 with 8 1G RJ-45 ports

IPX-FSW-12 12 Port Switch Layer 3 with 8 1G RJ-45 Ports

IPX-FSW-24 24 Port Switch Layer 3 with 4 1G RJ-45 Ports

### Arista Networks

7050SX-72 72 Port SFP+ 10G Fiber Switch

7050SX-96 96 Port SFP+ 10G Fiber Switch

7050SX-128 128 Port SFP+ 10G Fiber Switch

7050TX-64 64 Port 10G Copper Switch

7050TX-72 72 Port 10G Copper Switch

7050TX-96 96 Port 10G Copper Switch

7050TX-128 128 Port 10G Copper Switch

### Extreme Networks

X670-48T 48 Port Copper Switch

X670-48X 48 Port SFP+ Fiber Switch

### Netgear Copper 10G

XS708E 8 Port ProSAFE Plus Switch (Note: This is a layer 2 switch and does not have fast switching. IPX Seamless switch mode will work however at times you may see a slight glitch in the image.) One port is a shared 10G SFP+ Fiber Ports.

XS712T 12 Port ProSAFE Smart Managed Switch with 2 shared 10G SFP+ Fiber Ports.

XS728T 28 Port ProSAFE Smart Managed Switch 24 Copper and 4 non-shared 10G SFP+ Fiber Ports





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