IPX-TC3A Series

IPX-TC3A-C ● IPX-TC3A-CF Pro ● IPX-TC3A-DF Pro

IPX-TC3A-WP3-C/F Pro

SDVoE 10G 4K60 4:4:4 IP Distribution

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 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 ventilation slots, if applicable, on the product, or place any heavy object on top of it. Blocking airflow 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 ESC 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 (2) conditions:

1. This device may not cause harmful interference.

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

Trademarks

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TABLE OF CONTENTS

PACKAGE CONTENTS

Please make sure the following items are included within your package. Contact your dealer if any items are missing or damaged. Go to www.auroramm.com for latest manual and firmware.

Box Versions

IPX-TC3A-C

● 1 QTY IPX-TC3A-C 10G RJ-45 Copper Transceiver Unit.

● 2 QTY Mounting Ears and screws

IPX-TC3A-CF-PRO (Scaling, Video Wall, Windowing, Seamless Switching)

● 1 QTY IPX-TC3A-CF-PRO 10G RJ-45 Copper/Fiber Transceiver Unit. SFP+ module sole separately.

● 2 QTY Mounting Ears and screws

IPX-TC3A-DF-PRO (Scaling, Video Wall, Windowing, Seamless Switching)

● 1 QTY IPX-TC3A-DF-PRO 10G Dual Fiber Transceiver Unit. SFP+ module sold separately.

● 2 QTY Mounting Ears and screws

Wall Plate Versions

IPX-TC3A-WP3-F-Pro (3 Gang, Scaling, Video Wall, Windowing, Seamless Switching)

● 1 QTY IPX-TC3A-WP3-F 10G Fiber Transceiver Unit in white (IPX-TC3A-W3P-F-W) or black (IPX-TC3A-WP3-F-B). SFP+ module sold separately.

IPX-TC3A-WP3-C-PRO (3 Gang, Scaling, Video Wall, Windowing, Seamless Switching)

● 1 QTY IPX-TC3A-WP3-C 10G RJ-45 Copper Transceiver Unit in white (IPX-TC3A-WP3-C-W) or black (IPX-TC3A-WP3-C-B).

Power supplies are sold separately.

*Note: Go to www.auroramm.com for latest manual and firmware.

OPTIONAL ACCESSORIES

- **RK2-1-K**
  (1RU Rack Mount Holds 2 Units)
  Includes 4 Rails and 1 Blank

- **RK2-5-K**
  (5RU Rack Mount Holds 12 Units)
  Includes 24 Rails and 4 Blanks
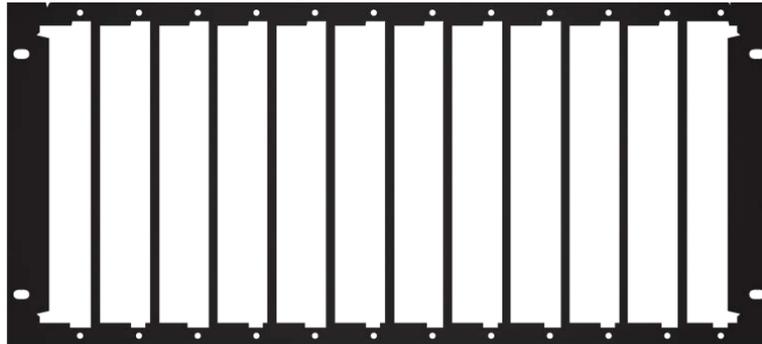
- **RK2-BP-K**
  (Blank Plate for Rack Mounts)
  RK2-RL-K
  (Rails for IPX-TC3A Use in Rack Mounts)

- **IPE-USB-2**
  (USB 2.0 Extreme USB Option Card)

- **IPE-USB-2VH**
  (USB 2.0 Extreme USB Option Card with Virtual Hub)

5

- **IPE-DTE-1**
  (2 Channel Dante®/AES67 Option Card)

- **IPE-DTE-2**
  (8 Channel Dante®/AES67 Option Card)

- **IPE-ReAX-1**
  (ReAX Control System Option Card)

- **IPE-LCVR-(W/B)**
  (IPX Wall Plate LAN Port Cover)

- **RXS-1**
  (ReAX Linux Server with IPBaseT Manager Pro)

6

- **DXB-8/DXB-8i**
  (8 Button Wall Plate)

- **PS0081-1**
  (48V 24-Watt PoE Injector)
  Available in –US, -AU, -EU, and –UK worldwide models

- **PS0094-3**
  (48V 25-Watt Wall Supply for Wall Plates)
  Comes with US, AU, EU, and UK interchangeable blades

- **IR Receiver CA0026-1**

- **IR Emitter CA0061-1**

- **IR Blaster CA0049-1**

- **RS-232 Adaptor CA0052-F2T3R**
  (3.5mm TRS to FEMALE DB89 2-TX 3-RX)
  RS-232 Adaptor CA0052-F3T2R
  (3.5mm TRS to FEMALE DB89 3-TX 3-RX)
  RS-232 Adaptor CA0052-M2T3R
  (3.5mm TRS to MALE DB9 2-TX 3-RX)
  RS-232 Adaptor CA0052-M3T2R
  (3.5mm TRS to MALE DB9 3-TX 2-RX)

- **LVR-3G Gang Electrical Ring**

- **IPA-SFP-10GMM-1**
  (10G SFP+ Multi-Model LC 50/125 Module)

- **IPA-SFP-10G32C1**
  (10G SFP+ BIDI Single Mode 1330/1270nm Module 10KM)

8
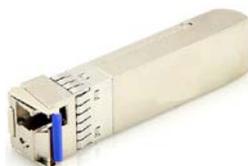
- **IPA-SFP-10G23C1**
  (10G SFP+ BIDI Single Mode 1270/1330 Module 10KM)

- **IPA-SFP-10G20**
  (10G SFP+ Single Mode Dual Module 1310nm 20KM)

- **IPA-SFP-PPC-1**
  (SFP+ 10G Passive Patch Cable 1M (3ft)

- **IPA-SFP-OM3DXLC-1**
  (OM3 Fiber 50/125 Multi-Mode LC Patch Cable 1M)

INTRODUCTION

About

The IPX Series provides one of the most advanced IP Streaming solutions on the market utilizing SDVoE technology. It is the industry's first 4K2K transceiver with zero compression (4K60 4:2:0, 4K30 4:4:4), lossless compression (4K60 4:4:4), and zero frame 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 and Configuration

- RXS-1 User Guide

- IPBaseT 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)

◆ 4K60 4:4:4 Over 10G Fiber or Copper

◆ Zero Compression/Frame Latency (22us) for 4K60 4:2:0 and below

◆ 1.3:1 Lossless Compression and Zero Frame Latency (100us) for 4K60 4:4:4

◆ Network Redundant operation (IPX-TC3A-DF)

◆ Secure Content Encryption

◆ 128x128 Capable with HDCP, Larger for Non-Encrypted Sources

◆ Video Wall Capability 8x8 (Pro Version)

◆ Windowing/Multi-viewer up to 32 windows (Pro Version)

◆ 3ms Scaling (Pro Version)

◆ Seamless Switching (Pro Version)

◆ Break-away Switching

◆ Audio DSP

◆ SFP+ for Multi/Single Mode Fiber

◆ 10/100/1000Mbps LAN PoE (PD)

◆ 2 HDMI Inputs, 1 HDMI Output

◆ Line In/Out Stereo

◆ RS-232 Serial Port and IR (Bidirectional)

◆ Integrated Web Server for Custom Control Pages

◆ USB 1.1 (HID) or USB 2.0 480Mbps with Option Card

◆ Dante®/AES67 IP 2Ch and 8Ch Audio Option

◆ ReAX IP Control Option

◆ Front Keypad with OLED Display

◆ Auto Sense Switching

◆ Rack and Under Table Mounting

◆ Wall Plate Versions in white or black

IPX-TC3A

IPX-TC3A-WP3-W

IPX-TC3A-WP3-B

Note: Wall plate versions require full 3 gang electrical box space. Some electrical boxes and mud rings do not accommodate the full size. IPX-TC3A-WP3 wall box dimensions are 5.54" x 2.83" x 1.404". Wall box portion depth is 1.404" without option card and 1.5" with option card.

IPX-TC3A and IPX-TC3A Pro 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.

- **OLED:** 128x64 pixel OLED. Will display status of the following in addition to IP Address and Serial number.

  1. **Encoder/Decoder:** Encoder (transmit) or Decoder (receiver) will be lit when set accordingly.

  2. **SFP TX/RX:** Will blink when data is being transmitted or received for fiber or copper versions.

  3. **Link/Activity:** Link will blink when a USB module is detected and will be lit solid when it is connected to another IPE-USB-2 or UPE-USB-2VH. Activity will blink when USB data is being transferred.

  4. **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.

  5. **232 TX/RX:** Will blink when RS-232 data is being sent or received.

  6. **IR TX/RX:** Will blink when IR signal is being sent or received.

  7. **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

- **Menu Button:** Press and hold for 5 seconds switch between encode and decode mode. Also, cycles through the OLED Menu.

- **Enter Button:** Selects the current menu option.

- **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

- **USB Dual Type A:** 480Mbps USB 2.0 for device (ex. Mouse, keyboard, etc.). Extreme USB option card (IPE-USB-2) must be installed for USB to function as 2.0. If option card is not installed the USB will work at USB 1.1

- **IR Input:** IR input 30kHz-60kHz. Photo Receiver must be stereo 3.5mm TRS.

  Note: It is important to use 5V only photo receiver which is with carrier and inverted.

12

- **IR Window:** Future use for IR remote.

Special Functions

- **Factory Default:** Press and hold Select and Up together for 4 seconds.

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

IPX-TC3A-C, IPX-TC3A-CF-Pro, IPX-TC3A-DF-Pro Rear

<u>Rear</u>

- **10G:** RJ-45 10G network connection for the IPBaseT connectivity. Unit can be powered with 10G PoE or PoH injector.

- **10G SFP+:** Multi-mode or single mode SFP+ 10G modules for the IPBaseT connectivity.

- **HDMI 2.0 In 1/2:** HDMI inputs.

- **HDMI 2.0 Out:** HDMI Output to Display.

- **RS-232:** Serial port pass-through and control up to 115Kbps.

- **IR Out:** IR output 30kHz-60kHz. Emitter must be mono 3.5mm TS.

- **Audio Line In/Out:** Stereo audio input/Stereo de-embedded output.

- **Ethernet:** 10/100/1000Mbps LAN. Can power the unit with PoE from injector or switch.

- **USB:** 480Mbps USB 2.0 Micro to be connected to a host PC. Extreme USB SO-DIMM option card (IPE-USB-2) must be installed for USB to function.

<u>Inside</u>

- Option Card Slot for USB 2.0 and ReAX or Dante®.

Note: The MAC address for the Dante or USB option will be on the card label.

14

IPX-TC3A-WP3-C and IPX-TC3A-WP3-F 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 seconds will switch between encode and decode modes. Stream button will light blue when in encode mode.

Connectors

- **HDMI In 1/2:** HDMI inputs.

- **HDMI Out:** HDMI Output to Display.

- **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 (i.e., Mouse, keyboard, etc.). Extreme USB option card (IPE-USB-2) must be installed for USB to function.

Miscellaneous

- **IR Window:** Future use for IR remote.

Special Functions

- **Streaming Factory Default:** Press and hold HDMI 1 for 5 seconds. This will only restore default for the mode the unit is currently set to.

- **Web Server Factory Default:** Press and hold HDMI 2 for 5 seconds.

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

IPX-TC3A-WP3-C and IPX-TC3A-WP3-F Rear

Rear

- **48VDC:** 48 Volt isolated power input.

- **SFP+:** For multi-mode or single mode SFP+ 10G modules (IPX-TC3A-WP3) for the IPBaseT zero compression/latency connectivity.

- **10G:** RJ-45 10G network connections ((IPX-TC3A-WP3) 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, a 5V for connection to DXB-8 8 button wall controller.

- Expansion Slot for USB, ReAX, 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 screwdriver 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 1.5" 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 (RXS-1).

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. Keep this in mind 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). If the bandwidth is higher the 1.3:1 compression will be utilized so a 4K60 4:4:4 will be around 9Gbps. The IPX also can enable the 1.3:1 lossless compression for any resolution allowing 1080p60Hz to be about 1.5Gbps. 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 2 10GbE switches is less than 64Gbps, then packets will drop, and information will be lost. It is also a good idea to consider 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.

10GbE 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 multi-mode 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, the RXS-1 ReAX Server is available. It is a fanless i5 processor industrial grade Linux server, which mitigates all communications to all the IPX units (devices and wall plates). The RXS-1 serves up Aurora's IPBaseT Manager Pro to any regular or mobile web browser. ReAX is a Javascript based IP control system as well allowing full room/building automation or if desired a third-party control systems can be utilized 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 RXS-1 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. IPBaseT Manager will only connect to one server at a time but it is important for every PC running IPBaseT 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 third party control systems, this can be done automatically. Have the control system send a query to the RXS-1 to receive a response through the telnet connection. If no response is received, have the third-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. I 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 affect 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.

Video Wall Capabilities IPX-TC3A Pro

The IPX-TC3A Pro video wall mode has the ability to take in a 4K60 UHD signal and create a low latency high quality video wall. With its internal low latency 3ms scaler, video walls can be created up to 8x8 for basic video wall configuration and 16x16 with additional bridging technique.

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 the RXS-1 Server to the network switch and power on. Follow instructions for the RXS-1 to set the IP address for remote control. The IPBaseT Manager Windows® server version can be used in place of the RXS-1 for use on any PC.

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 10G PoE 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 to 30 seconds to initialize.

3. Make certain the unit's OLED states Encoder. 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 IPBaseT 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 selection will display on the front screen. For the wall plate use the labeled buttons accordingly. This can also be down with the web server or IPBaseT 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 set to DHCP by default in the 169.x.x.x so it will not conflict with other units. It can be changed using IPBaseT Manager.

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 10G PoE 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 to 30 seconds to initialize.

3. Make certain the unit's OLED states Decoder. 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 IPBaseT 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 selection will display on the front screen. For the wall plate use the labeled buttons accordingly. This can also be down with the web server or IPBaseT 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 set to DHCP by default in the 169.x.x.x so it will not conflict with other units. It can be changed using IPBaseT Manager.

RXS-1 Control Server Setup

1. Connect the RXS-1 USB to a USB Hub for keyboard and mouse use. Plug the HDMI into a monitor capable of 720p or higher.

2. Connect power brick to the RXS-1 and into the wall.

3. Unit will boot in about 45 seconds.

4. In the lower right, use the mouse to right click on the network settings.

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 will not change. If a static IP is added, delete the Auto or boot time will be very long as it searches.

Control Setup

1. In a web browser, connect to the RXS-1 Server IP Address/port number. 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-TC3A-WP Configured as Transmitter to IPX-TC3A Configured Receiver

When the IPX Series is connected 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 the copper version a maximum distance of 100m (328') can be achieved. With fiber cable depends on multi-mode or single mode and can extend for miles, depending on the SFP+ module used. The most common, OM3 multimode fiber, will travel about 300m (984').

Desktop Computer
A/V Source 1

IPX-TC3-WP
Transceiver
Wall Plate (TX)

IPX-TC3 Pro
Transceiver
(RX)

Video Display
A/V Output

Bluray Player
A/V Source 2

Diagram Key:

— HDMI™

— Fiber

— Serial (RS-232 Control)
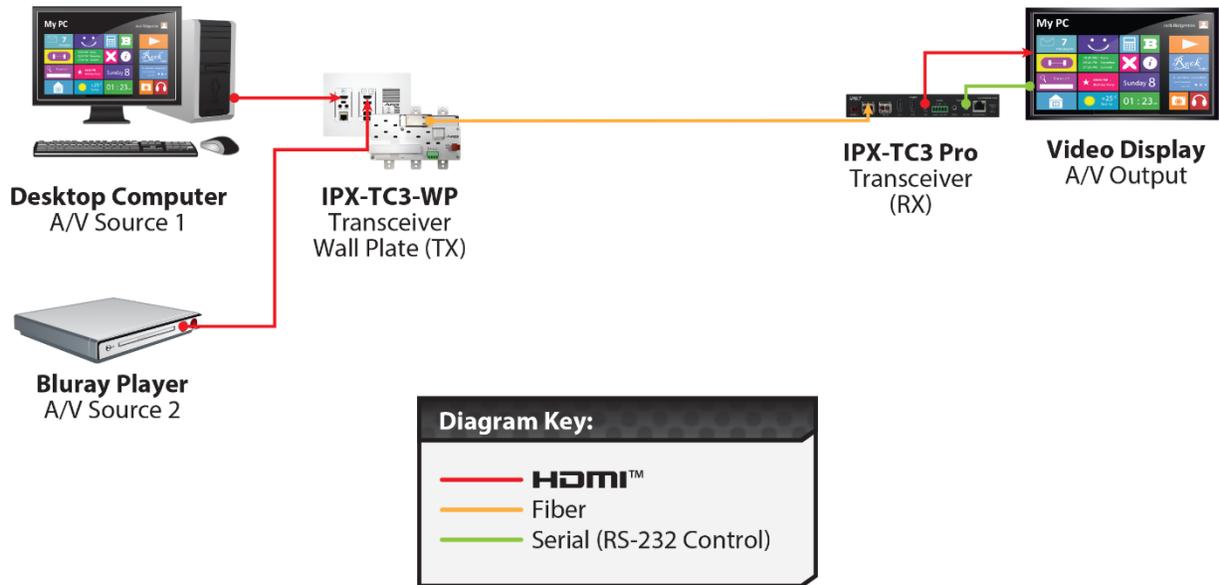
Example 2: IPX Multi-Room

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.
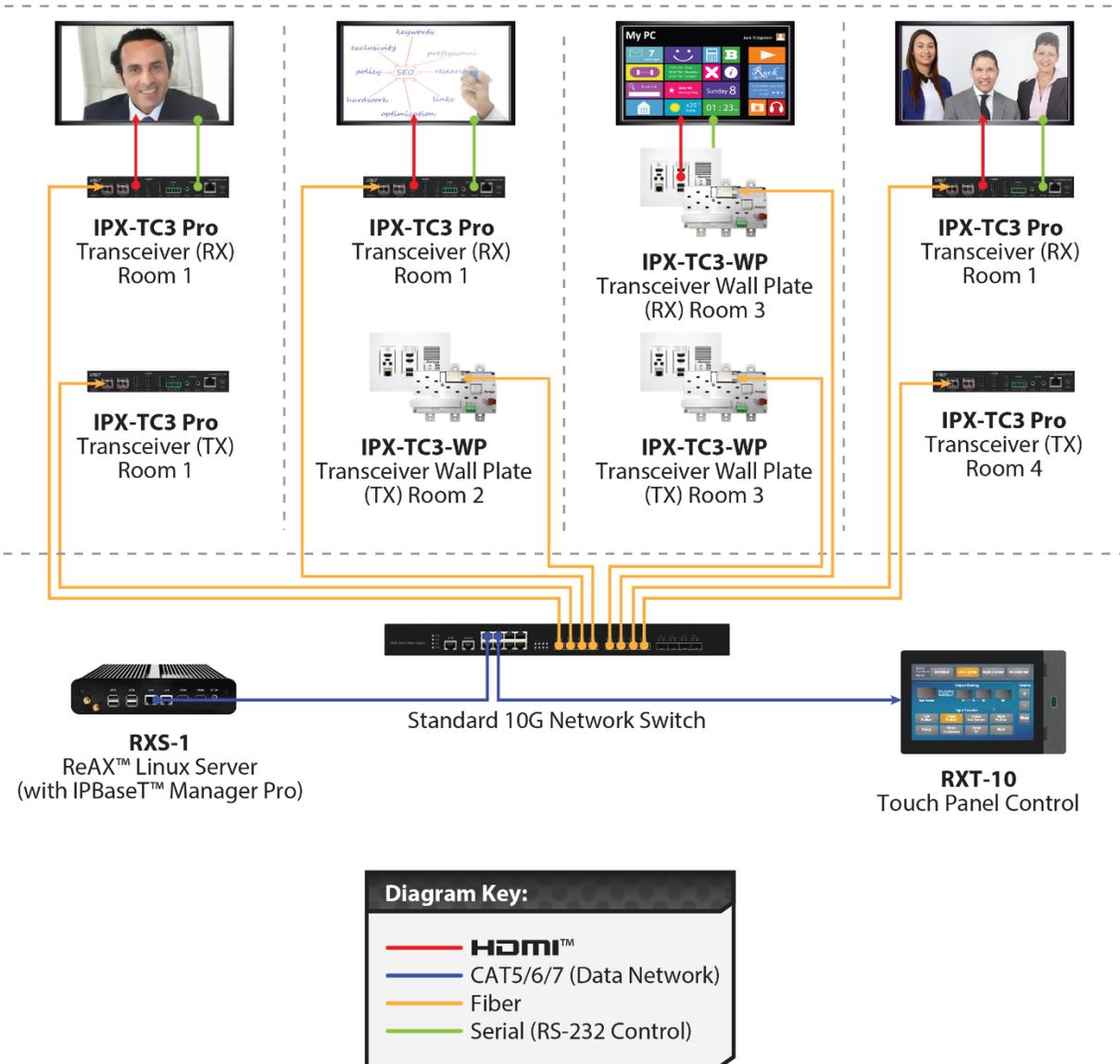
Example 3: Matrix – Multiple IPX to Multiple IPX

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.

Projection Screen
A/V Output 1

Video Display
A/V Output 2

Video Display
A/V Output 3

Video Display
A/V Output 4

IPX-TC3 Pro
Transceiver
1(RX)

IPX-TC3-WP
Transceiver Wall Plate
2 (RX)

IPX-TC3-WP
Transceiver Wall Plate
3 (RX)

IPX-TC3-WP
Transceiver Wall Plate
4 (RX)

IPX-FSW-24
Network Switch

IPX-TC3-WP
Transceiver Wall Plate
1(TX)

IPX-TC3 Pro
Transceivers
2-6 (TX)

Laptop Computer
A/V Source 1

Bluray Players
A/V Source 2-3

Video Cameras
A/V Source 4-6

Diagram Key:

- HDMI®
- CAT5/6/7 (Data Network)
- Fiber
- Serial (RS-232 Control)

24

Example 4: Video Wall

The IPX-TC3A-PRO is capable of 4K 8x8 video walls. It is important to read Understanding the Basics section of this manual when specifying video wall usage.

Video Wall Displays
HDMI Output

Tuners
A/V Source 1-4

DVD Player
A/V Source 5

IPX-TC3 Pro
Transceivers
1-5 (TX)

Laptop
A/V Source 6

IPX-TC3-WP
Transceiver
6 (TX)

IPX-FSW-24
Network Switch

RXS-1
ReAX™ Linux Server
(with IPBaseT™ Manager Pro)

IPX-TC3 Pro
Transceivers 1-9
(RX)

Diagram Key:

HDMI®	
CAT5/6/7 (Data Network)	
Fiber	
Serial (RS-232 Control)	
IR	
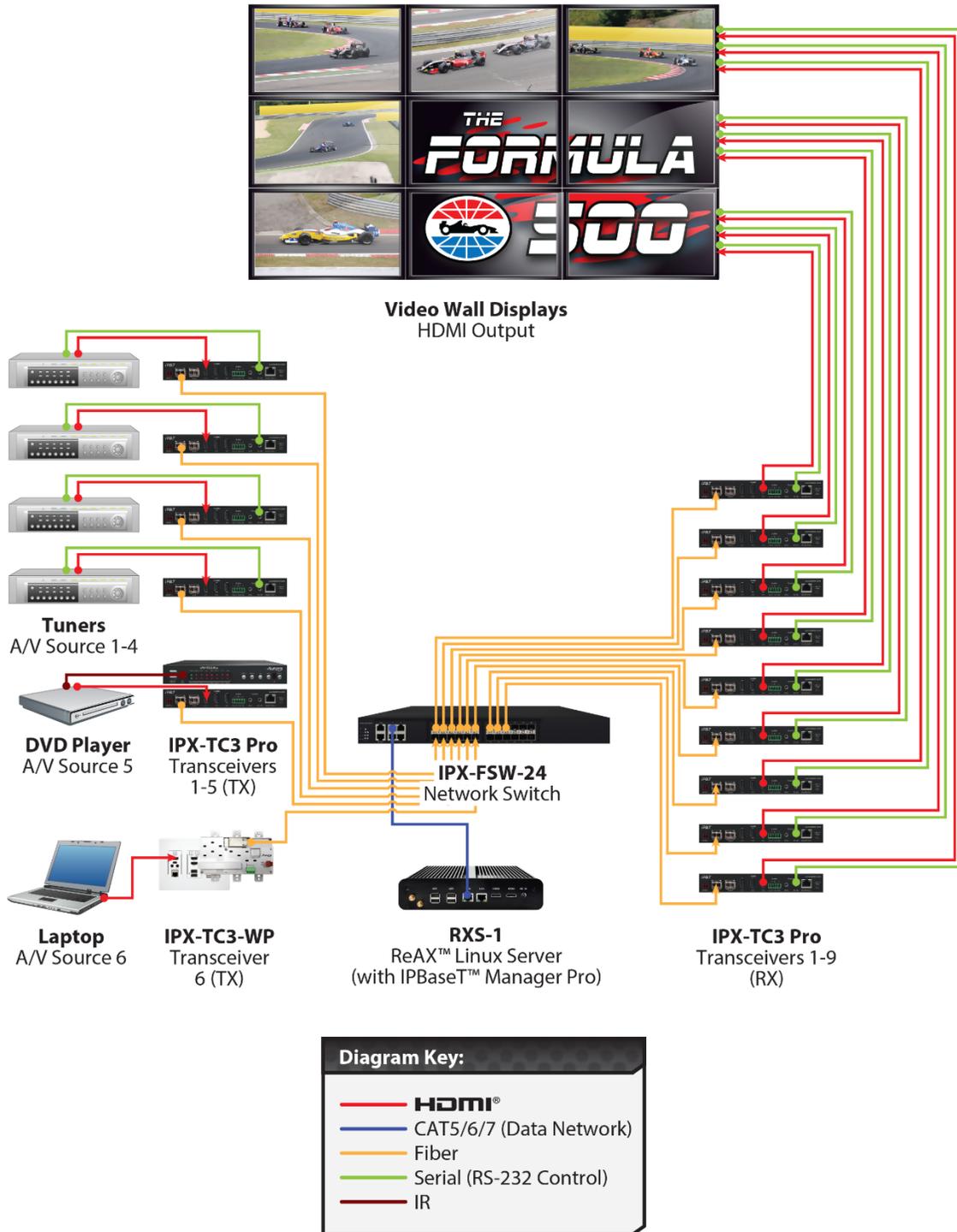
Example 5: KVM Utilizing USB 2.0

Command and Control and NOC centers are perfect for the IPX Series, especially with the advanced break-away switching and USB 2.0 running at a full 480Mbps. With the IPX it is no longer just keyboard and mouse, but full USB peripheral routing as well.

Server Room
Servers 1-12

Workstation 1

**IPX-TC3 Pro**
Transceiver (RX)

Workstation 2

IPX-TC3 Pro
Transceiver (RX)

IPX-TC3 Pro
Transceivers 1-12 (TX),
IPX-FSW-24
Network Switch
Server Closet Room 1

**Typical Connection
for each server**

Server Room
Servers 13-14

IPX-TC3 Pro
Transceivers 13-14 (TX)

Diagram Key:
— HDMI®
— CAT5/6/7 (Data Network)
— Fiber (Data / IPBaseT)
— Serial (RS-232 Control)
— Other (USB)

26

SOFTWARE

IPBaseT Manager/IPBaseT Manager Pro

The IPBaseT Manager is a Windows® web server-based software, while the IPBaseT Manager Pro is a Linux web server based software preloaded onto the RXS-1 ReAX server. The Pro version is enterprise class and has additional features like statistics, alerts, multi-user log-on and more. IPBaseT Manager is available at the Aurora customer portal for free on www.auroramm.com. The IPBaseT Manager Pro is available through an authorized dealer as the RXS-1.
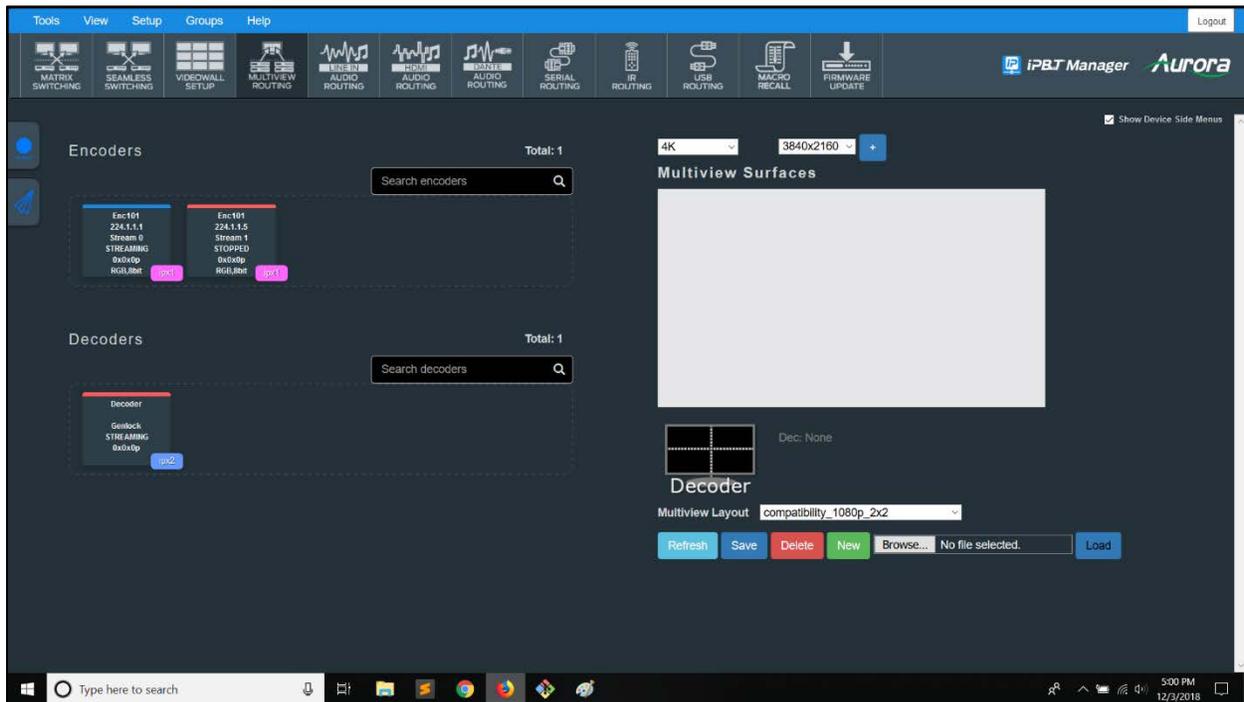
Features

- Matrix Switching

- Seamless Matrix Switching

- Multi-view

- Video Wall Setup and Control

- Audio Break-away Routing

- RS-232 Routing and Control

- IR (Infrared) Remote Control Routing

- USB Routing

- Horizontal and Vertical Viewing

- Preset Store and Recall

- Connection Manager

- Advanced Debug Logging

- Touch Screen Friendly Layout

- Configuration File for Cloning Presets and Connections on Other PCs

- Multi-Server connections

- Mobile Friendly

- Firmware Update

<u>**Pro Version**</u>

- Linux Based ReAX RXS-1 Server

- Unlimited Users

- Statistics

- Email Alerts

- Video Wall Multiview Configurations

For full detail of the IPBaseT Manager Software tool and setup, the manual can be found at the Aurora website www.auroramm.com.

CONNECTOR PIN DEFINITION

HDMI
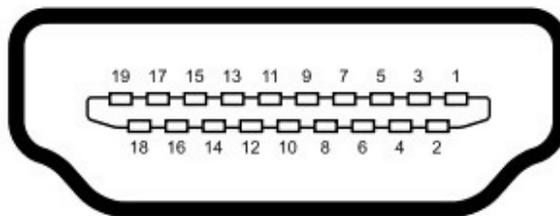
Type A (Receptacle) HDMI

Pin 1	TMDS Data2+	Pin 8	TMDS Data0 Shield	Pin 15	SCL
Pin 2	TMDS Data2 Shield	Pin 9	TMDS Data0–	Pin 16	SDA
Pin 3	TMDS Data2–	Pin 10	TMDS Clock+	Pin 17	DDC/CEC Ground
Pin 4	TMDS Data1+	Pin 11	TMDS Clock Shield	Pin 18	+5 V Power
Pin 5	TMDS Data1 Shield	Pin 12	TMDS Clock–	Pin 19	Hot Plug Detect
Pin 6	TMDS Data1–	Pin 13	CEC		
Pin 7	TMDS Data0+	Pin 14	Reserved (N.C. on device)		

CAT5e/6/6A

T568A and T568B Wiring

| Pin	T568A Pair	T568B Pair	Wire	T568A Color	T568B Color	Pins on plug face (socket is reversed)
1	3	2	tip	white/green stripe	white/orange stripe	
2	3	2	ring	green solid	orange solid	
3	2	3	tip	white/orange stripe	white/green stripe	
4	1	1	ring	blue solid	blue solid	
5	1	1	tip	white/blue stripe	white/blue stripe	
6	2	3	ring	orange solid	green solid	
7	4	4	tip	white/brown stripe	white/brown stripe	
8	4	4	ring	brown solid	brown solid	

RS-232

The RS-232 is a 3.5mm TRS connector. Tip is TX (output), ring is RX (input), and Sleeve is ground. To simplify connections Aurora offers pre-molded RS-232 cables in null and none nulled in male and female DB9.

CA0052 Selection Guide

CA0052 (all versions)
TRS Male

Sleeve (GND) Ring (RX) Tip (TX)

CA0052-F2T3R
DB9 Female (Crossover)

Pin 5 (GND) Pin 3 (RX) Pin 2 (TX)
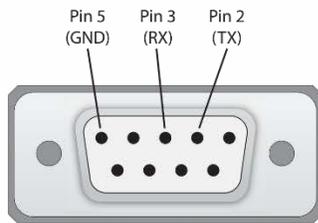
CA0052-F3T2R
DB9 Female (Straight)

Pin 5 (GND) Pin 3 (TX) Pin 2 (RX)
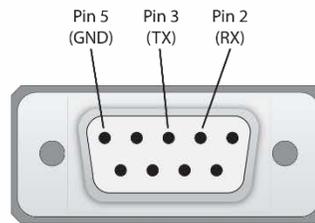
CA0052-M2T3R
DB9 Male (Crossover)

Pin 2 (TX) Pin 3 (RX) Pin 5 (GND)
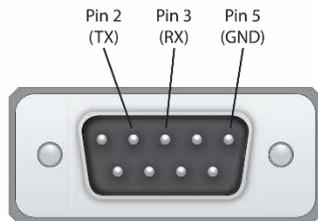
CA0052-M3T2R
DB9 Male (Straight)

Pin 2 (RX) Pin 3 (TX) Pin 5 (GND)
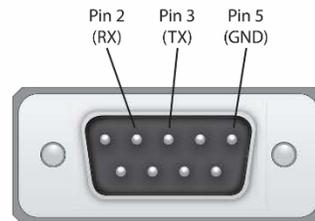
IR (Infrared)

It will autosense a TS or a TRS connector to determine if an IR emitter (TS) or IR receiver (TRS) is inserted. The IR receiver must be with carrier inverted to work. The tip is signal, ring is 5V, and sleeve is ground.

<u>IR Receiver CA0026-1 (30kHz – 60kHz)</u>

<u>IR Receiver CA0026-1 (30kHz – 60kHz)</u>

APPENDIX 1

Troubleshooting

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

Why IPBaseT Manager Cannot Find Any Devices?

- Check the IP Address of the RXS-1 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 RXS-1 server.

- Make certain the connection IP Address and port is set correctly in IPBaseT 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 IPX 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, try 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 IPBaseT 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 when a non-Pro unit.

● Seamless switching will not work between inputs on the same unit only between units.

● 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.

APPENDIX 2

Firmware Update

For the latest firmware updates please go www.auroramm.com.

You must be signed up to the Customer Portal to download firmware with instructions on how to update.

APPENDIX 3

Protocol

For the latest protocol please go www.auroramm.com.

You must be signed up to the Customer Portal to download IPX protocol. The protocol is only available to authorized Aurora dealers.

APPENDIX 4

Recommended Cabling

The IPX series uses industry standard cabling for both fiber and copper and should abide by network infrastructure standards. For the copper, unshielded cable is preferred for optimal performance. While any properly made cable will work with the IPX series the models below have been tested by Aurora with the IPX at full bandwidth and distance.

Fiber with Copper for Remote Power

Manufacturer: West Penn Wire

FI-GIG-GIDY-xx (Dual OM3 Multi-Mode Terminated Fiber with LC Connectors + 18/2 Power Cable) Giggidy Fiber Cables are pre-terminated with LC Connectors and have a Pulling Eye for easy pull and connectivity. Plenum Rated.

*Note: Replace xx:75,100,125,165,230,330'). Comes with Pulling Eye!

Copper

When using copper, you should not have any tight bends and make certain excess is spooled as a figure 8. CAT6A will achieve a distance of 100m (330') with CAT6A, 55m with CAT6, and 40m with CAT5e.

Manufacturer: West Penn Wire

4246A (4 Pair 23AWG Cat6A 10G Rated (UTP) Unshielded Twisted Pair .309" O.D CMR Rated.

254246A (4 Pair 23AWG Cat6A 10G Rated (UTP) Unshielded Twisted Pair .308" O.D CMP Rated.

APPENDIX 5

Recommended Network Switches

The IPX will work with most non-blocking, IGMP 10G network switch. Layer 3 will allow more control; however, Layer 2 will work as well. It is highly recommended to communicate with the representative of the desired network switch brand to confirm configuration and capabilities. Below are some models that have been tested with the IPX Series. For a more complete listing, the IPX Series Network Switch Recommendations and Configuration guide can be found on the Aurora website. www.auroramm.com.

Switch Speed

The IPX Series requires the switch to be a 10GbE.

IPX Series technology is used to transmit uncompressed video up to 4K along with other AV signals such as audio, USB, and control signals. For video alone, it means raw bandwidth of about 4 Gb/sec for HD and 8 Gb/sec for 4K mean a bandwidth of around 6 GB/s, and that just for video. It is therefore easy to understand why the IPX requires 10GbE network switches.

Packets Routing

To enable the transmission of a source to multiple destinations, IPX devices make use of Multicast. The default behavior of layer 2 Ethernet switch is to broadcast those packets which mean that every packet will be transmitted to all possible destinations. Therefore, any network switch used with IPX Series has to support IGMP Snooping. IPX end points use IGMP protocol to assign the end points into multicast groups and the router uses IGMP snooping to efficiently route multicast packets only to receivers that want to receive them.

Many switches have the IGMP Snooping feature disabled by default and manual configuration is required. Often, a simple check mark near "Enable IGMP Snooping" is the only thing needed to enable IGMP Snooping. However, the implementation of IGMP Snooping is vendor specific and additional configuration is often needed.

An Ethernet switch can be informed that a device wants to leave a multicast channel by sending it an IGMP LEAVE GROUP packet. Once received, the time it takes for the switch to apply the new configuration may vary from one switch to the other. Most switches implement and include FASTLEAVE configuration option. When enabled, it takes much less time for a particular port to leave a multicast group to assign the port to a different multicast group. The end results are a noticeably shorter video switching time. Aurora recommends to always enable the FASTLEAVE option when available. With FASTLEAVE option, seamless switching is possible for 4K video sources. Without FASTLEAVE option, 'seamless' switching is limited to 1080P 60 Hz video signals.

Ethernet Switch Configuration

The following list includes all network switch configuration options that Aurora Engineers have come across so far. Look for these or similar options when configuring your switch.

1. Enable IGMP Snooping

    a. Must be enabled.

2. Enable IGMP Snooping on VLAN 1

    a. Must be enabled when all ports default to VLAN1.

3. Filter/Drop Unregistered Multicast Traffic

   a. If not applied, the behavior of the switch will be to broadcast multicast packets if the switch has no known destination for that packet.

   b. Must be enabled if found.

4. Unregistered Multicast Flooding

   a. Must be disabled if found.

5. Filter Unregistered Multicast (different wording than number 4 above)

   a. Must be enabled if found.

6. Enable IGMP Query

7. Enable IGMP Query on VLAN1

8. Set IGMP Version to IGMP V2

   a. Must be set if found.

9. Enable FASTLEAVE on Port X

   a. This is optional. Should be enabled, if found.

10. Enable FASTLEAVE for VLAN1

    a. This is optional. Should be enabled if found.

Ethernet Switch Models

The IPX Series Network Switch Recommendations and Configuration guide can be found on the Aurora website www.auroramm.com.

APPENDIX 6

Technical Specifications

Model Name	IPX-TC3A & IPX-TC3A-WP
Technical	
Compression	Zero (4K30 4:4:4/4K60 4:2:0), 1.3:1(4K60 4:4:4)
Latency	Zero Frame Latency (100us without Scaling, 3ms with Scaling)
HDMI Inputs	2
HDMI Outputs	1
Audio Analog	Stereo Line In/Out (3.5mm TRS Tip is Left, Ring is Right, Sleeve is Ground)
10G Fiber Ethernet	SFP+ (Single Mode or Multi-Mode)
10G Copper Ethernet	RJ-45 330ft with CAT 6A PoE
LAN	RJ-45 10/100/1000M PoE (PSE)
Video Bandwidth	600MHz
Video support	Up to 4K2K 4:4:4 @60Hz
Audio support	Up to 32 channels & Break-away Capable
RS-232	Up to 115k Baud (3.5mm TRS Tip is TX, Ring is RX, Sleeve is GND)
IR	Bi-Directional (3.5mm TRS Tip is TX, Ring is 5V, Sleeve is GND)
USB Function	USB 1.1 Standard 10Mbps or USB 2.0 480Mbps with IPE-USB option
USB Connectors	2 x USB 2.0 Type A, 1 x USB 2.0 Micro
Expansion Ports	ExtermeUSB® & Dante®, or ReAX Options
Interface	IR or Keypad, Webserver, IPBaseT Manager
Mechanical	
Housing	Black Aluminum Enclosure
Dimensions [L x W x H]	Box Versions: 175 x 102 x 27.7mm [6.875" x 4" x 1.09"] Wall Versions: 3 Gang 5.54″ x 2.83″ (4.331″ with mounting tabs) x 1.404″. Wall box portion depth 1.404″ without option card and 1.5" with option card.
Weight	.453kg [1.0lbs]
Mounting	Optional: Rack mount vertical, Rack mount horizontal, Under table mount Wall-mounting Decora® 3 Gang
Power supply	48V DC (2 pin Euro) or PoE 15.4W (LAN)
Max Power consumption	12.9 Watts
Operation temperature	0~40°C [32~100°F]
Storage temperature	-20~60°C [-4~140°F]
Relative humidity	20~90% RH [no condensation]

*Note: Specifications subject to change without notice.

APPENDIX 7

Warranty

Limited 5 Year Warranty

Aurora Multimedia Corporation ("Manufacturer") warrants that this product is free of defects in both materials and workmanship for a period of 5 years as defined herein for parts and labor from date of purchase. This Limited Warranty covers products purchased in the year of 2019 and after. Motorized mechanical parts (Hard Drives, DVD, etc.), mechanical parts (buttons, doors, etc.), remotes and cables are covered for a period of 1 year. Touch screen displays are covered for 1 year; touch screen overlay components are covered for 90 days. Supplied batteries are not covered by this warranty. During the warranty period, and upon proof of purchase, the product will be repaired or replaced (with same or similar model) at our option without charge for parts or labor for the specified product lifetime warranty period.

This warranty shall not apply if any of the following:

A. The product has been damaged by negligence, accident, lightning, water, act-of-God or mishandling; or,

B. The product has not been operated in accordance with procedures specified in operating instructions: or,

C. The product has been repaired and or altered by other than manufacturer or authorized service center; or,

D. The product's original serial number has been modified or removed; or,

E. External equipment other than supplied by manufacturer, in determination of manufacturer, shall have affected the performance, safety or reliability of the product; or,

F. Part(s) are no longer available for product.

In the event that the product needs repair or replacement during the specified warranty period, product should be shipped back to Manufacturer at Purchaser's expense. Repaired or replaced product shall be returned to Purchaser by standard shipping methods at Manufacturer's discretion. Express shipping will be at the expense of the Purchaser. If Purchaser resides outside the contiguous US, return shipping shall be at Purchaser's expense.

No other warranty, express or implied other than Manufacturer's shall apply.

Manufacturer does not assume any responsibility for consequential damages, expenses or loss of revenue or property, inconvenience or interruption in operation experienced by the customer due to a malfunction of the purchased equipment. No warranty service performed on any product shall extend the applicable warranty period. This warranty does not cover damage to the equipment during shipping and Manufacturer assumes no responsibility for such damage. This product warranty extends to the original purchaser only and will be null and void upon any assignment or transfer.

Aurora

iPX-TC3A
FW: 1.0.3
Encoder
10.1.1.93

USB 2.0   IR Input   IR   Power   Status   Menu   Enter   Up   Down

Aurora Multimedia Corporation

205 Commercial Court | Morganville, NJ 07751

Phone: 732-591-5800 | Fax: 732-591-6801