

IBT Series

IBT-1-BX • IBT-1-WP1

4K60 4:4:4 IPBaseT Distribution



iPBT[®]_{ASE}

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 an extended 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 the 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 the product 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 (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

All trademarks in this document are the properties of their respective owners.

TABLE OF CONTENTS

PACKAGE CONTENTS	5
OPTIONAL ACCESSORIES	6
INTRODUCTION	9
About	9
Documentation	9
IBT-1-BX Features	10
IBT-1-WP1 Features	10
IBT-1-BX Front	11
IBT-1-BX Rear.....	12
IBT-1-WP1 Front	13
IBT-1-WP1 Rear.....	14
INSTALLATION	15
Point to Point.....	15
One to Many (Distribution Amplifier)	15
Matrix or Switch.....	16
IBT MATRIX SWITCH SOFTWARE	17
UNDERSTANDING THE BASICS	19
Direct Connection with No Ethernet Switch (Point to Point)	19
IBT Network Switch Requirements (DA, Switch, or Matrix Operation)	19
Multiple Network Switches for Larger Matrix or Switch.....	19
Controlling the IBT	19
EDID and its Importance	19
HDCP Interoperability	20
APPLICATIONS	21
Point-to-Point Operation.....	21
Distribution Amplifier – One IBT to Many.....	21
Switch or Matrix – Many IBT to One or Multiple IBT to Multiple IBT	22
CONNECTOR PIN DEFINITION	23
HDMI	23
CAT5e/6/6A.....	24
RS-232	24
IR (Infrared).....	24
APPENDIX 1	25
Troubleshooting	25
IBT Not Working Properly on End Clients Network.....	25
IBT Web Server is Not Responding	25
Display Will Not Show Transmitter Video or the No Signal Image	25

Display Will Not Show Transmitter Video but Does Show the No Signal Image	25
Switching Speed Between Encoders is Slow	25
Switching Time Between Local HDMI Inputs Takes Longer	25
Display Has Image with Wrong Color	26
Audio Not Working	26
IBT RS-232 Control is Not Working	26
Displays Not Showing Same Video Frame as Others	26
Audio Latency is Different Between Displays	26
Displays are Blinking When in Matrix Use Case	26
Units are Rebooting	26
APPENDIX 2	27
Firmware Update	27
APPENDIX 3	28
Protocol	28
APPENDIX 4	29
Recommended Network Switches	29
APPENDIX 5	30
Technical Specifications	30
APPENDIX 6	32
Warranty	32

PACKAGE CONTENTS

Please make sure the following items are included within your package.

Box Versions

IBT-1-BX

- 1 QTY IBT-1-BX 4K60 4:4:4 1G RJ-45
- 2 QTY Mounting Ears and screws.

Wall Plate 1 Gang Version

IBT-1-WP1

- 1 QTY IBT-1-WP1 (-W for White, -B for Black) 1G RJ-45 Copper Transceiver Unit with 1 HDMI & USB-C Inputs, HDMI Output

Power supplies are sold separately.

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

OPTIONAL ACCESSORIES

- **RK8-1-K**
(1RU Rack Mount Holds 2 Units)
Includes 4 rails and 1 blank



- **RK8-4-K**
(4RU Rack Mount Holds 14 Units)
Includes 28 rails and 7 blanks



- **RK8-BP-K**
(Blank Plate for Rack Mounts)
RK8-RL-K
(For IBT-1-BX Use in Rack Mounts)



- **IPA-SFP-RJ45-1**
(1G RJ-45 LAN SFP Module)



- **IPA-SFP-1GMM-1**
(1G Multi-Mode Fiber SFP Module)



- **IPA-SFP-1G20**
(1G Single-Mode Duplex Fiber SFP Module)



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



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



- **IR Receiver CA0062-1**



- IR Emitter CA0061-2



INTRODUCTION

About

The IBT-1-BX (box) and IBT-1-WP1 (1 gang wall unit) are the building blocks to create up to a 255x255 low cost 4K60 4:4:4 matrix using a network switch. This is not your typical AV over IP solution. The IBT Series has the simplicity of HDBaseT with the scalability of AVoIP. We refer to this as IPBaseT®.

Here is how it works. Each unit can be set as a transmitter or receiver and can be addressed from 0 to 255. If it is point to point, set one to transmitter and another to receiver, set it to address zero and connect with CAT cabling or Fiber accordingly. If it is to be used as a distribution amplifier, set one as a transmitter and the amount required for receivers at address zero, and connect to the appropriate network switch brand and size we recommend in the documentation. To make a switch or matrix, set the devices accordingly to be transmitters and receivers, and then set the transmitters address starting at 1 and same for receivers. Now with a simple broadcast or RS-232 command that is no different than an off-the-shelf matrix, the units will route accordingly. Yes, it is that simple.

The IBT Series is meant to only use a network switch as a matrix to “glue” the IBT devices together that is on our list of recommended switches so it will work out of the box with little setup for plug and play operation.

Documentation

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

- IBT Series Control API (Available only on Customer Portal)

Important! – Aurora ONLY currently recommends the NETGEAR 1G M4250 and M4350 Series switches. If they are bought through Aurora, the switches will be preloaded with the proper firmware and preconfigured to work as an IPBaseT matrix for out of the box plug and play operation. In addition, the 3-year warranty will be extended to a 5-year warranty (see Warranty Section). We do not recommend connecting the IBT Series products to the customers' network other than for control and monitoring. If the IBT units are connected to any other brand/model, Aurora will not support the configuration, nor will we make any adaptations. Support calls and emails will be rejected if this requirement is ignored. If it is required to connect to a customer's network, we recommend using the Aurora VPX or IPX AV over IP Series for that use case.

NETGEAR Switch Firmware Required for Matrix Operation:

M4250 13.0.5.16 or Higher

M4350 14.0.6.9 or Higher

IBT-1-BX Features

- Transceiver (Encoder or Decoder Selectable)
- 4K60 4:4:4 with Zero Frame Latency
- HDMI In/Out
- PoE LAN
- IPBaseT LAN Port
- SFP for Single or Multi-mode Fiber
- RS-232, IR, CEC
- USB 2.0 Extension
- Front Display with Buttons
- Analog Audio Line In/Out
- Auto Sense
- Rack Mount 4 in 1RU or 16 in 4RU
- Consumes as Little as 3 Watts

IBT-1-WP1 Features

- Transceiver (Encoder or Decoder Selectable)
- 4K60 4:4:4 with Zero Frame Latency
- HDMI In/Out
- PoE LAN
- CEC
- USB-C 2.0 Extension
- Rear Dip Switch for Configuration
- Auto Sense
- Consumes as Little as 3 Watts
- Single Gang Available in White or Black

IBT-1-BX Front



LEDs

- **Power:** Power will light up green when the unit is on or in standby.
- **Status:** Status will blink at a normal pace during regular operation.

OLED Display

Using the buttons as described below, the OLED display will show firmware version, mode (encoder/decoder), address, serial number, and more.

Buttons

- **Menu Button:** Navigate through different options.
- **Select Button:** Confirms selection.

Miscellaneous

- **IR Window:** IR remote and IR pass through.
- **IR Input:** For use with external IR Receiver. If utilized, front IR window will become disabled.

****Note: It is important to use 5V only photo receiver which is with carrier and inverted. Use a stereo 3.5mm TRS connector.***

- **Control IR Out:** Infrared control output 30kHz-60kHz. IR emitter must be mono 3.5mm TS.
- **USB 2.0:** Type A USB 2.0 Connector for peripherals (Camera, Bluetooth, Memory, etc.) & keyboard/mouse for HID functionality. This port has up to 200Mbps throughput.

Special Functions

- **Factory Default:** Press and hold MENU and SELECT for 6 seconds. The OLED display will show "FACTORY RESET" while the device is resetting, followed by an automatic reboot. This will not change the current set device mode.

Default Settings

- **Baud Rate:** 115200

IBT-1-BX Rear



Rear

From left to right:

- **48VDC:** 48 Volt isolated power input
- **LAN Connectors**

There are two RJ-45 LAN connectors. The left one is a PoE PD (receives power) and the other is a PoE PSE (supplies power). The IBT-1-BX uses 8 watts of power at 4K60 4:4:4. Standard PoE is 12.9 watts. If being used for point to point it is recommended to use a 48vDC 25 watt or higher or a PoE+ to power the remote side. If powering locally on each side for fiber use, then a 15watt supply will be sufficient. When connecting to an Ethernet switch standard PoE can be used. In point-to-point mode, both units should be set to address 0, one as a TX the other as a RX, and the side receiving the power should be to the left connector, use the PSE output connector to the left connector of the receiving unit.

- **LAN Connectors LED's:**
 - Left LED Green = 1G Link Speed (1G Link speed is required for operation)
 - Left LED Orange = 10/100 Mbps Link Speed (Device will NOT operate at 10/100 speeds)
 - Right LED is Orange, for general LAN Activity
- **SFP:** SFP Cage for Multi-mode or Single-mode Fiber LAN with optional modules available from Aurora. This can be used for point-to-point or with fiber switches.
- **HDMI In:** HDMI input up to 4K60 4:4:4.
- **HDMI Out:** HDMI Output to Display up to 4K60 4:4:4. The output can auto downscale to 1080p if it detects a 1080p display with a 4K60 signal present. When in transmit mode the HDMI output is a loop out of the HDMI input. When in a receiver mode the HDMI output will show the remote signal as well as loop out the local HDMI input.
- **Audio In:** Analog stereo audio input.
- **Audio Out:** Analog stereo audio output. De-embedded audio output from HDMI stream.
- **Control RS-232:** Serial port pass-through and control up to 115Kbps. 3.5mm Euro Connector.
- **USB 2.0:** 200Mbps USB 2.0 Type C to be connected to a host (PC) for peripherals from routed decoder.

IBT-1-WP1 Front



Connectors

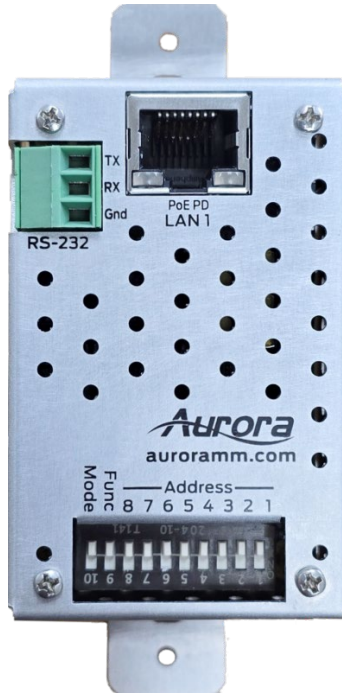
- **HDMI In:** HDMI inputs up to 4K60 4:4:4
- **HDMI Out:** HDMI Output to Display up to 4K60 4:4:4. The output can auto downscale to 1080p if it detects a 1080p display with a 4K60 signal present. When in transmit mode the HDMI output is a loop out of the HDMI input. When in a receiver mode the HDMI output will show the remote signal as well as loop out the local HDMI input.
- **USB-C:** USB Type C to be connected to a host (PC) for USB 2.0 Data only.

LED Indications

- **Source Indication:** Red LED if in receive mode and Green is in transmit mode.

Note: When using the USB-C port make certain it is a properly rated cable for data. Although most USB-C cables look similar, many are not rated for the data capability.

IBT-1-WP1 Rear



Rear

- **48VDC:** 48 Volt DC isolated power input
- **LAN:** 10/100/1000Mbps LAN. Can power the unit with PoE from injector or switch.
- **RS-232:** Serial port pass-through and control up to 115Kbps.
- **Dip Switch:** Down is On (1), Up Off (0)

FUNCTIONALITY	SWITCH	SWITCH COMBINATION
Unit Address	Switches 1 to 8	8-bit value of DIP switch for unit Address
Serial Control	Switch 9	OFF - Command Mode ON - SOIP
Device Mode (Tx/Rx)	Switch 10	OFF - Rx ON - Tx
Factory Reset	Switch 10	Toggle switch number 10 up and down four times. The time interval between consecutive toggle should be within 3 seconds.
Firmware Update Mode	Switch 9	To put the device into firmware update mode toggle switch number 9 on and off four times. The time interval b/w consecutive toggle should be within 3 seconds.

INSTALLATION

For all use cases below, make certain to check and install the latest firmware after setting up the system using the IBT Firmware update tool as per Appendix 2.

Point to Point

Make certain both units are set to address zero and one is a transmitter and the other a receiver. For the box version use the front menu to set these parameters. For the wall plate use the DIP switch on the rear.

Connect the HDMI IN of the transmitter unit to the source and the HDMI of the receiver to the display.

Connect the power using a 48v DC 25-Watt power supply or a PoE+ injector. Connect the PSE LAN 2 port to deliver the power and communications over CAT 5e or better to the other unit's PD LAN1 port.

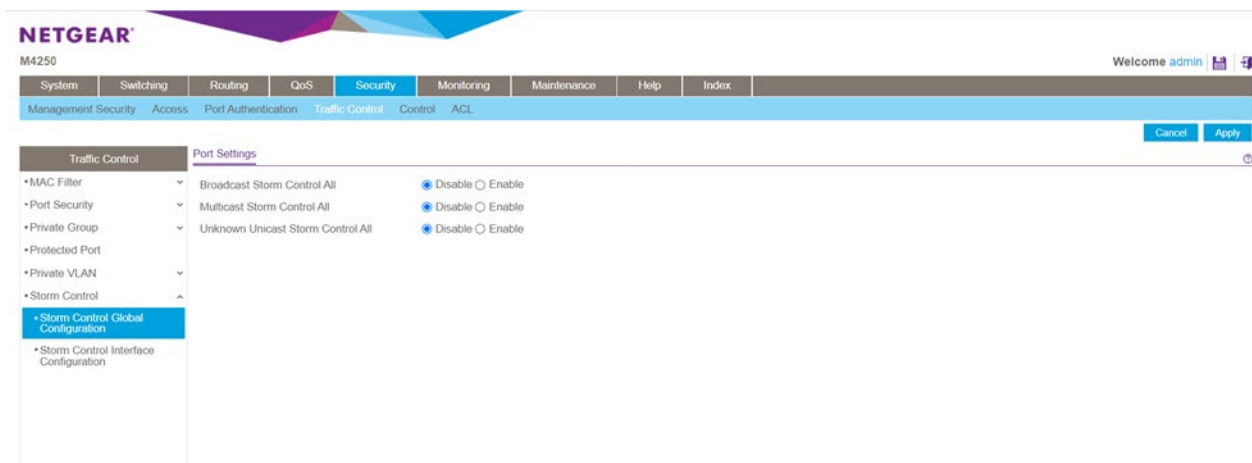
The content should now be present on the display.

One to Many (Distribution Amplifier)

For this application many different brand switches can be used but it is important you can disable the Broadcast Storm Control. If the switch cannot do this it will not work properly with the IBT Series. Low cost switches like the NETGEAR GS308EP can be used for example.

It is important Broadcast is disabled on the switch. For NETGEAR it is the following:

1. Login to the switch using the OOB port and its associated IP address, or through the main user interface via a web browser and the switch's IP address.
2. In the web interface, click on the "Security" tab or section.
3. Click on "Traffic Control" subtab.
4. Left side menu, select "Storm Control" followed by "Storm Control Global Configuration".
5. Now disable broadcast storm control, possibly under "Port Settings".



Make certain both units are set to address zero and one is a transmitter and the other a receiver. For the box version use the front menu to set these parameters. For the wall plate use the DIP switch on the rear.

Connect the HDMI IN of the transmitter unit to the source and the HDMI of the receiver to the display.

Connect the power using a 48v DC 25-Watt power supply or a PoE+ injector. Connect the PSE LAN 2 port to deliver the power and communications over CAT 5e or better to the other unit's PD LAN1 port.

The content should now be present on the displays.

Matrix or Switch

For Matrix or Switch applications, the IBT Series will only work with the NETGEAR M4250 or M4350 Series. If you do not use this switch series, Aurora will not support or warranty the IBT product. If the switches are purchased from Aurora, they will ship preconfigured and the warranty of the IBT Series will increase by 2 years for a full 5-year warranty.

Make certain the NETGEAR switch has the latest firmware.

NETGEAR Switch Firmware Required for Matrix Operation:

M4250 13.0.5.16 or Higher

M4350 14.0.6.9 or Higher

Download the Aurora IBT Matrix Switcher Software from the Aurora website and install it on your PC. The tool will guide you through and set the NETGEAR switch up for you, you will need your switch's login. Once the switch is setup, continue with the next steps.

Connect one unit at a time to the PoE switch and set the unit to be TX or RX and the address accordingly. Each TX unit must have a unique address and same for the RX. It is recommended to start at address 1 for both TX and RX. When using as a matrix, only standard PoE is required. If you use fiber, then you will need an external power supply or PoE injector at each end.

Connect a HDMI IN source to the transmitter unit and the receiver unit's HDMI OUT to a display.

No content will show until a command is sent to make a route. This can be done with a control system or Aurora's free IBT Matrix switcher application (download from portal). You may need to learn the EDID as the default EDID may not be adequate for some displays. If there is a mix of displays, example, 1080p and 4K, it is recommended to send the 4K EDID as the RX units will automatically downscale to 1080p if it detects the display is not capable of 4K.

EDID can either be sent from the Aurora IBT Matrix Switcher or from the Box receiver's OLED. The Wallplate has no physical option to send EDID, only from the switcher is possible.

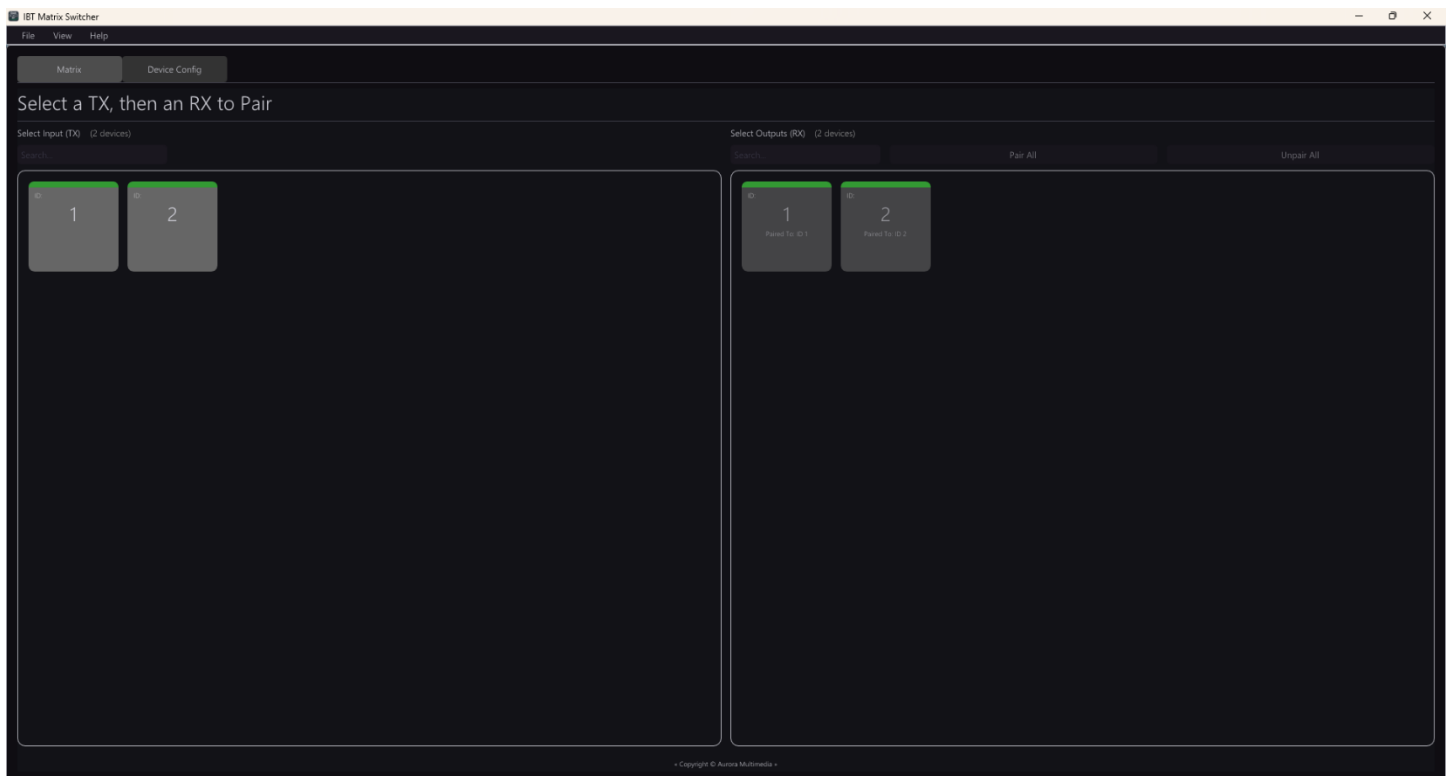
The content should now be present on the display.

IBT MATRIX SWITCH SOFTWARE

The IBT Matrix Switcher Software is a free tool to make routing and setup easy when using the IBT for switch or matrix applications. The tool will allow you to configure your network switch and boxes from one place. From there, you can also do channel routing, set the EDID, HDCP type, Labeling, Auto Sense, and auto address box units.

It also helps to prove the operation of the system when a control system is being utilized as well. If the tool works, then there would be no reason the control system should not work. For control operations refer to the protocol guide on our website.

IBT Matrix Switcher Software's Matrix View:



IBT Matrix Switcher Software's configuration View:

The screenshot shows the 'Device Config' tab in the IBT Matrix Switcher software. At the top, there are buttons for 'Apply All Changes', 'Auto Allocate UIDs', and 'Reset All'. On the right, it indicates 'Configured Devices: 4 / 4'. Below this is a table with the following columns: IP, MAC, Name, UID, Mode, and Status. The table contains four rows of device configurations.

IP	MAC	Name	UID	Mode	Status
169.254.107.0	00:11:02:74:00:6A	IBT-(2)	2	- + TX	Unchanged
169.254.23.1	00:11:02:74:01:16	IBT-(1)	1	- + TX	Unchanged
169.254.33.1	00:11:02:74:01:20	IBT-(2)	2	- + RX	Unchanged
169.254.60.67	00:11:02:C7:57:38	IBT-Decoder (1)	1	- + RX	Unchanged

Copyright © Aurora Multimedia

UNDERSTANDING THE BASICS

Direct Connection with No Ethernet Switch (Point to Point)

The IBT Series is designed to automatically tunnel the video, audio, USB, RS-232, and IR if they are point to point. The power can be passed from one unit to the other using the RJ-45 PSE to the other units PD port. Power can be injected into the PD port as PoE+ or the 48v DC supply. The unit transferring the power will be the one to use the PSE port as the link to the other units PD port. If fiber is being used, a power supply at both ends will be required.

IBT Network Switch Requirements (DA, Switch, or Matrix Operation)

The IBT Series is currently designed to work specifically with the 1G NETGEAR 4250 and 4350 series switches when used as a switch or matrix. If used as a distribution amplifier, while the NETGEAR 4250 and 4350 series are highly recommended, other brands can be used if they support broadcast modes and should be tested first for operation before deployment. Also, the NETGEAR models do require an IPBaseT version of firmware. It is recommended for out of the box plug and play operation to purchase the NETGEAR from Aurora for the complete solution ready to go.

If it is another brand or model other than the recommended, Aurora will not support or guarantee proper operation. The IBT Series was designed to treat the network switch as a matrix that can be isolated from the corporate network. We do not recommend connecting the IBT products to the corporate network switch unless it is to VLAN 1 for control only. Otherwise, Aurora will not support the video distribution on a customers' network as this is not the intended purpose. If it is required to be on the customer's network for video distribution, it is highly recommended to use the Aurora VPX or IPX Series instead.

Note: More detailed network switch requirements can be found in Appendix 4.

Multiple Network Switches for Larger Matrix or Switch

If multiple network switches are required to make a larger matrix or switch, the LAGS must be non-blocking. Also, check with Aurora first to make certain the NETGEAR firmware is available to support more than one switch.

Controlling the IBT

The IBT can be controlled by RS-232 or Ethernet. For RS-232 control, the unit must be put into controller mode. Only one unit is required to be in this RS-232 mode as it will communicate to the other units over the Ethernet. This way a single RS-232 connection is required same as a typical matrix.

EDID and its Importance

One of the most forgotten setup procedures in AV systems is EDID management. 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 its 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 compatibility.

For example, there are 2 displays, one is 1080p and the other is 4k UHD. If the EDID of the 4K display is used, the 1080p display will not see an image if it receives a 4K signal. If the EDID of the 1080p display is used, then both will see the image. However, signals will be limited to 1080p causing the 4K display to need to upscale the content. In a situation where this is

unacceptable, a scaler can be implemented to down-scale the 4K signal to 1080p. This will allow the 4K display to receive an optimal signal, however it can potentially degrade image quality on the 1080P display. Therefore, it is always ideal to use destinations with similar capabilities for optimal performance.

Audio can be impacted just as easily. The most common mismatch is an audio format mismatch. For example, if a destination is 5.1-channel Dolby/DTS surround sound capable and the other destination is only LPCM, then the EDID from the 5.1 Dolby/DTS destination cannot be used, or there will be no audio on the other destination. Also, channel count can also cause issues. For example, if you have a 5.1-channel capable destination and the other destination can only support 2-channel audio, then there may be limited or incorrect audio at the 2-channel destination. In most commercial installations, it should not be an issue to choose the lowest common denominator, which is 2-channel LPCM 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 LPCM audio and the other 1080p with multichannel Dolby/DTS 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 LPCM audio is the solution.

HDCCP Interoperability

HDCCP is critical to proper operation in any system. 4K typically requires HDCCP 2.2 or above while lower resolutions will work at 2.2 or 1.4. If a source device utilizes HDCCP 2.2 the destination must be HDCCP 2.2 or higher to properly receive the signal or it will not work. If the device is a VTC (Video Teleconference) it will not be compatible with any HDCCP source. The IBT does have the ability to force a source to No HDCCP, HDCCP 1.4, or HDCCP 2.2 with its API. Not all source devices have to comply so it is not a guarantee it will work. Ideally when doing a new installation, it is always best to make certain all the displays and other destinations can all handle HDCCP 2.2 and 4K if possible, for the best chances of interoperability.

APPLICATIONS

Point-to-Point Operation

For point-to-point operation one unit will be required to be set as a transmitter (TX) and the other a receiver (RX). Both units must be set to address 0. If RJ-45 is to be used, the unit supplying the power to the other side will use its PSE LAN port to the PD of the other unit. PoE+ or 48v DC 25-watt power can be used at the unit supplying the power. If the SFP is used for fiber, power will need to be supplied to both ends.

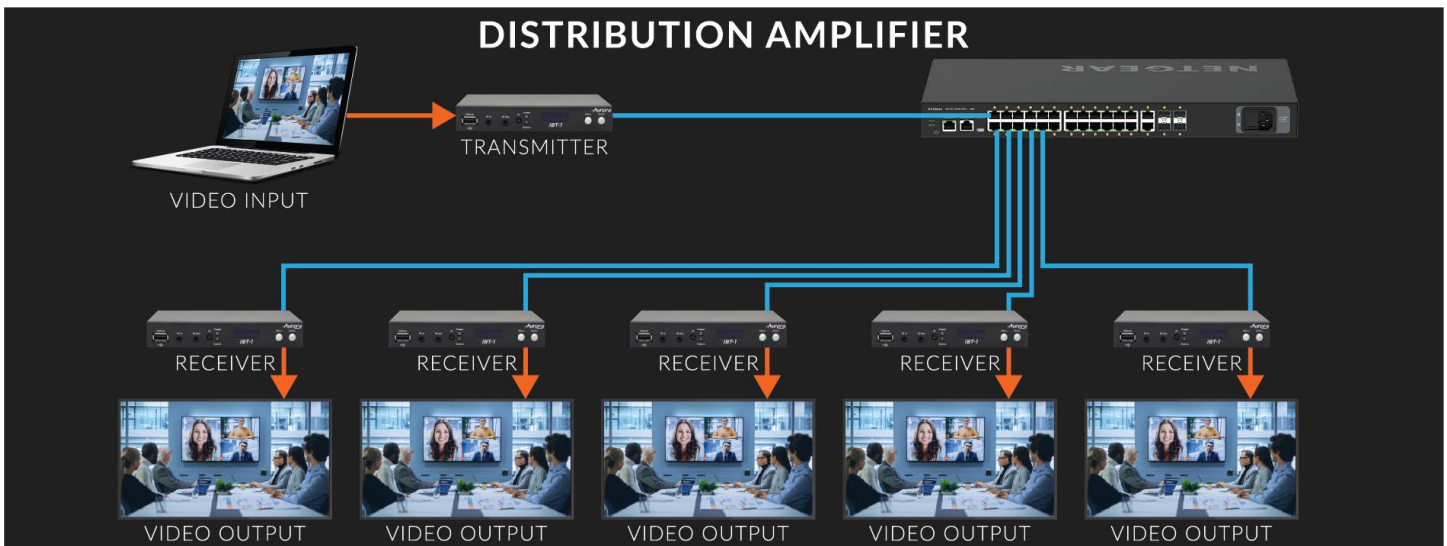
Plug the source into the HDMI In of the unit set as the TX and the HDMI Out of the RX to the Display.

Once connected and powered the units will pass video, audio, USB, IR, and RS-232.



Distribution Amplifier – One IBT to Many

The IBT Series can easily be used as a scalable DA. All units will be set to address 0. Make one unit a TX and the others an RX. Depending on how many total units will determine the size of the Ethernet switch to be used. For example, a 1x6 DA should use an 8-port switch, while a 1x40 DA should use a 48-port switch. The switch must support broadcast modes and be non-blocking. In this mode, it is recommended to not connect to another switch as the video traffic will be broadcast to all ports and may cause flooding into the other switch. We recommend the NETGEAR 1G 4250 and 4350 Series. If another brand is to be used, we highly recommend you test prior to deployment.



Switch or Matrix – Many IBT to One or Multiple IBT to Multiple IBT

The IBT Series can take the place of any typical matrix system, adding flexibility and performance never seen before. Even features like fast switch are no longer a premium. For this type of operation address numbers will be used just like a switch or a matrix location. In the diagram below, it shows a 2 x 5 matrix. To achieve set 2 units as TX and 5 units as RX. Next, set the two TX units as address 1 and 2 and the five RX units as address 1-5. Plug the units into a NETGEAR 1G PoE 4250 or 4350 Series switch loaded with IPBaseT capable firmware (check with Aurora if the switch is not bought through Aurora). If RS-232 control is required, set one unit up as the master controller unit and then its RS-232 control will be used for matrix controlling of all the units. Ethernet control is available too through VLAN1 as a broadcast command that units will respond to accordingly. In the case of this 2x5 matrix an 8-port switch at a minimum would be required.

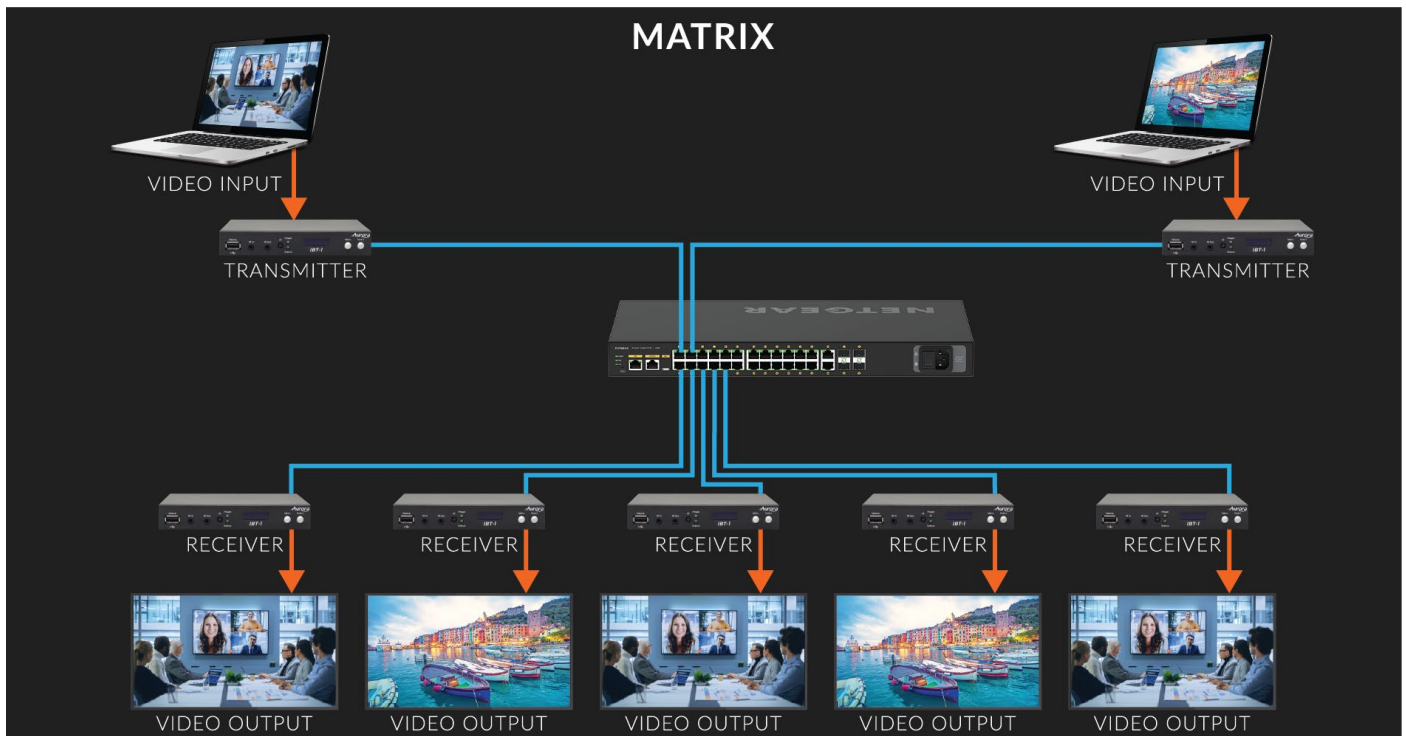
Switching time between the same resolution, refresh rate, and color space will be around 1 sec. Otherwise it could take up to 5 seconds based on display resyncing.

Important! – Aurora ONLY currently recommends the NETGEAR 1G M4250 and M4350 Series switches. If they are bought through Aurora, the switches will be preloaded with the proper firmware and preconfigured to work as an IPBaseT matrix for out of the box plug and play operation. In addition, the 3-year warranty will be extended to a 5-year warranty (see Warranty Section). We do not recommend connecting the IBT Series products to the customers' network other than for control and monitoring. If the IBT units are connected to any other brand/model, Aurora will not support the configuration, nor will we make any adaptations. Support calls and emails will be rejected if this requirement is ignored. If it is required to connect to a customer's network, we recommend using the Aurora VPX or IPX AV over IP Series for that use case.

NETGEAR Switch Firmware Required for Matrix Operation:

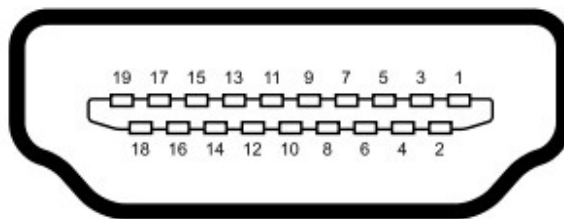
M4250 13.0.5.16 or Higher

M4350 14.0.6.9 or Higher



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.

IR (Infrared)

The IR receiver must be with carrier inverted to work. The tip is signal, ring is 5V, and sleeve is ground.

IR Receiver CA0062-1 (30kHz – 60kHz)



The IR emitter is a 3.5mm TS connector (tip is signal and sleeve is ground).

IR Emitter CA0061-2 (30kHz – 60kHz)



APPENDIX 1

Troubleshooting

It is advisable to make certain all units are using the latest firmware before troubleshooting. Also make sure all network connections are operating on 1G.

IBT Not Working Properly on End Clients Network

- This is because we did not design it to work on an end user's network. As per our warnings, this was designed to use the NETGEAR switch as a matrix for plug and play operation. Only connect to the end client's network for remote control operation not for video distribution. Our VPX or IPX Series is meant for this requirement.

IBT Web Server is Not Responding

- There is no webserver in the IBT Series. It was designed to be out of the box simple setup using commands and front panel.

Display Will Not Show Transmitter Video or the No Signal Image

- All devices are powered on.
- Unit is set properly for TX or RX accordingly. OLED status will show this or dip switch position on wall plate.
- Check routing using RS-232 commands or Ethernet commands.
- 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.
- Verifying the cables are good or rated for the distance. Also, check the switch to see there is a 1G link. If not, that would indicate a bad cable.
- Look at the status LED and make certain unit is linked.

Display Will Not Show Transmitter Video but Does Show the No Signal Image

- Check if the switch is correct model.
- Make sure all units have the same firmware.
- Make sure no units are set to address zero if using as a matrix

Switching Speed Between Encoders is Slow

- Switching time between the same resolution, refresh rate, and color space will be around 1 sec. Otherwise it could take up to 5 seconds based on display resyncing.

Switching Time Between Local HDMI Inputs Takes Longer

- The IBT can only fast switch between encoders. Locally on an encoder or decoder it can take up to 5 sec depending on the destination.

Display Has Image with Wrong Color

- Make certain to learn the EDID from the display and save into each unit HDMI input ports.
- If different displays are used with the same source, an EDID with a common denominator must be used. For example, if one 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 paths are selected. The IBT 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 the volume on the display or amplifier.

IBT RS-232 Control is Not Working

- Check wiring for RX, TX, and Ground
- Check the baud rate of the unit.
- Confirm the protocol being utilized with a terminal program.
- Ensure the unit is set as a master controller unit.

Displays Not Showing Same Video Frame as Others

- If displays are different brands this can happen 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 or set to game mode. Some displays will not scale or use memory and just sync to the native signal.

Audio Latency is Different Between Displays

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

Displays are Blinking When in Matrix Use Case

- One of the units is set to address zero. All units must be set to address 1 or higher in matrix use case.

Units are Rebooting

- If a computer is connected, make certain there are no extra applications trying to communicate other than the Aurora IPBaseT IBT Series related programs. This would be the firmware update tool and the IBT Matrix Switcher application.

APPENDIX 2

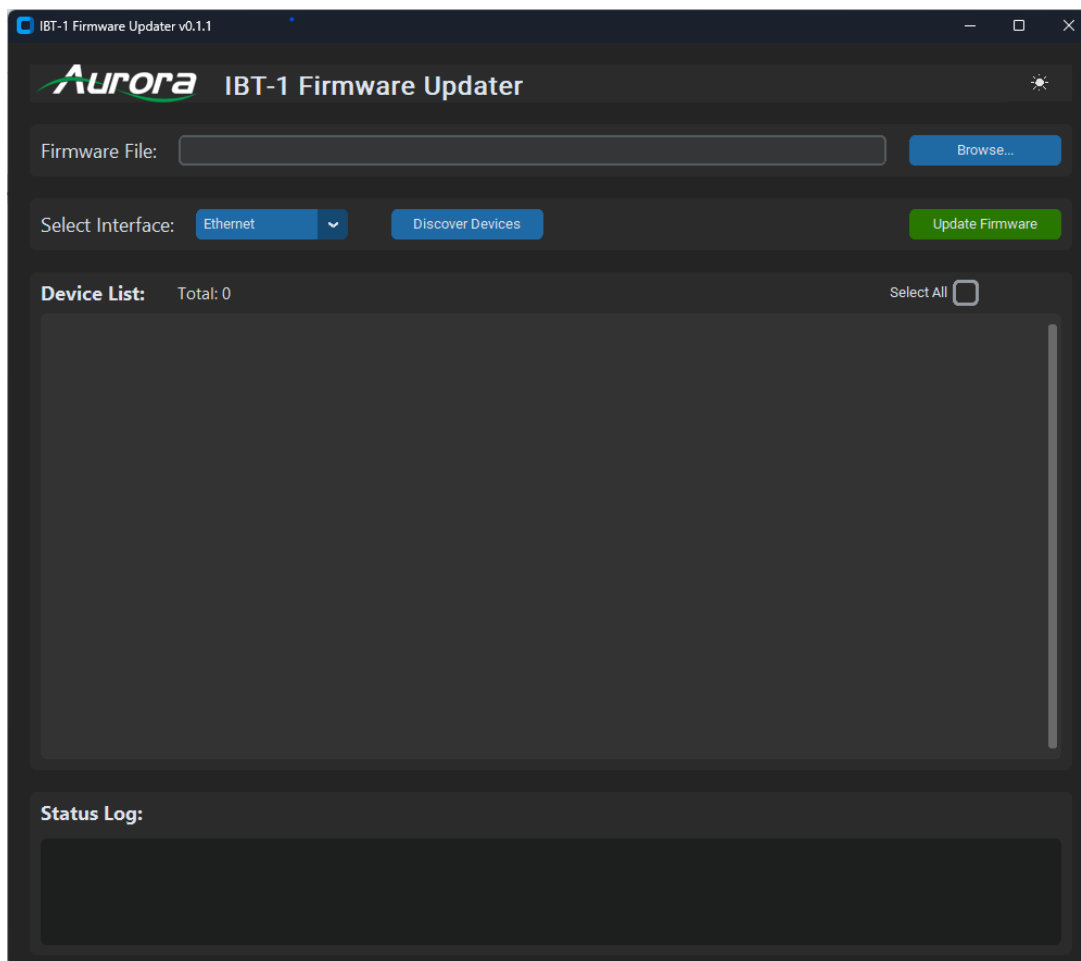
Firmware Update

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

You must sign up to the Aurora Customer Portal to download the IBT-1 Firmware Update Tool and firmware.

The IBT-1 Firmware Update tool will only work with version 1.1.0 and above. If your unit has a firmware revision below v1.1.0 you will need to do a TFTP method update directly to each unit, for this method please contact Aurora support. The tool will let you select one or many units to easily upgrade the firmware in the unit(s).

Note: The IBT Boxes and Wallplates share the same FW Version



APPENDIX 3

Protocol

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

You must sign up to the Aurora Customer Portal to download the IBT protocol. The protocol is only available to authorized Aurora dealers.

Note: Control of the IBT units is with broadcast commands (UDP) not TCP. For serial control, only 1 unit's serial port is required for communication to all.

APPENDIX 4

Recommended Network Switches

Important! – Aurora ONLY currently recommends the NETGEAR 1G M4250 and M4350 Series switches. If they are bought through Aurora, the switches will be preloaded with the proper firmware and preconfigured to work as an IPBaseT matrix for out of the box plug and play operation. In addition, the 3-year warranty will be extended to a 5-year warranty (see Warranty Section). We do not recommend connecting the IBT Series products to the customers' network other than for control and monitoring. If the IBT units are connected to any other brand/model, Aurora will not support the configuration, nor will we make any adaptations. Support calls and emails will be rejected if this requirement is ignored. If it is required to connect to a customer's network, we recommend using the Aurora VPX or IPX AV over IP Series for that use case.

NETGEAR Switch Firmware Required for Matrix Operation:

M4250 13.0.5.16 or Higher

M4350 14.0.6.9 or Higher

PoE/PoE+ (Power over Ethernet)

The IBT Series uses around 8 watts of power at 4K60 4:4:4 (standard PoE 12.9 Watts), however, the PoE can supply up to 20 watts with PoE+ as the USB ports on the IBT can supply up to 5 watts. When selecting a PoE switch always make certain the power supply of the PoE switch is proper to the port count (15.4W x qty of ports). For example, a 24 port PoE switch must have at least 369.6 Watts (24 at 15.4W) for it to properly supply all 24 IBT devices. Some switches can only supply a certain number of ports with PoE. If it is necessary to use a particular switch, then PoE injectors for the remaining ports can be used or the local power supply for the IBT but you may need to disable the detection of the PoE for those ports in the Ethernet switch.

APPENDIX 5

Technical Specifications

Model Name	IBT-1-BX
Technical	
Compression	Mimix™ 14:1
Latency	Zero Frames (1.78ms)
HDMI Input	HDMI 2.0b, HDCP 2.2
HDMI Output	HDMI 2.0b, HDCP 2.2
Encryption	AES 256
Audio Analog	Stereo Line In/Out Euro Style 3.5mm
1G Ethernet	RJ-45 and SFP
LAN	RJ-45 10/100/1000M PoE
Video Bandwidth	600MHz
Video Support	Up to 4K2K 4:4:4 @ 60Hz
Audio Support	Up to 12 Channels
Video Stream Bandwidth	93Mbps – 800Mbps (4K60 4:4:4) Packet Size Under 1600 1Gbps with USB and Audio
USB Bandwidth	200Mbps (Camera), 170Mbps (HID/Mass Storage Devices)
RS-232	Up to 115k Baud (3 pin Euro Style)
IR In	3.5mm TRS (Tip Signal, Ring – 5V, Sleeve – Ground)
IR Out	3.5mm TS (Tip Signal, Sleeve – Ground)
USB Connector	1 USB Type C USB 2.0 Data (Host) Two USB 2.0 Type A for Camera/HID/Mass Storage Devices (Devices)
Interface	IR or Keyboard via OSD, Web Server
Mechanical	
Housing	Black Aluminum Enclosure
Dimensions (L x W x H)	177.04 x 150.7 x 26.42mm [6.97" x 5.93" x 1.04"]
Weight	.453kg [1lbs]
Mounting	Optional: Rack Mount Vertical, Rack Mount Horizontal, Under Table Mount
Power Supply	48v DC (2 Pin Euro) or PoE+ (LAN)
Power Consumption	3 Watts Minimum, 7 Watts (Typical with 4K60), up to 20 Watts allowable with USB & PoE+
Operation Temperature	0~40° C [32~104° F]
Storage Temperature	-20~60° C [-4~140° F]
Relative Humidity	20~90% RH [No Condensation]
Package Contents	1x IBT-1-BX, 2x Mounting Ears

***Note: Specifications subject to change without notice.**

Model Name	IBT-1-WP1
Technical	
Compression	Mimix™ 14:1
Latency	Zero Frames (1.78ms)
HDMI Input	HDMI 2.0b, HDCP 2.2
HDMI Output	HDMI 2.0b, HDCP 2.2
Analog Audio	Euro Connector Stereo Line In/Line Out
Encryption	AES 256
1G Ethernet	RJ-45 and SFP
LAN	RJ-45 10/100/1000M PoE
Video Bandwidth	600MHz
Video Support	Up to 4K2K 4:4:4 @ 60Hz
Audio Support	Up to 12 Channels
Video Stream Bandwidth	93Mbps – 800Mbps (4K60 4:4:4) Packet Size Under 1600 1Gbps with USB and Audio
USB Bandwidth	200Mbps
RS-232	Up to 115k Baud (Euro 4 Pin)
USB Connector	1 USB Type C for Video and USB 2.0 Data (Host) 1 USB 2.0 Type A (Devices)
Interface	IR or Keyboard via OSD, Web Server
Mechanical	
Housing	Aluminum
Dimensions [L x W x H]	2 Gang 3.728" x 2.83" (4.331" with tabs) x 1.404"
Weight	1.13g [2.5lbs]
Mounting	Wall-mounting Decora® 2 Gang
Power supply	48V DC (2 pin Euro) or PoE (LAN)
Power consumption	3 Watts Minimum, 7 Watts (Typical with 4K60), USB will add more power based on the connected device requirements.
Operation temperature	0~40°C [32~104°F]
Storage temperature	-20~60°C [-4~140°F]
Relative humidity	20~90% RH [no condensation]
Package Contents	1x IBT-TC1-WP2

***Note: Specifications subject to change without notice.**

APPENDIX 6

Warranty

Limited 3 or 5 Year Warranty

Aurora Multimedia Corporation (“Manufacturer”) warrants that this product is free of defects in both materials and workmanship for a period of 3 years as defined herein for parts and labor from date of purchase. If the NETGEAR Switch is furnished through Aurora (Platinum Partner), Aurora will extend the warranty by 2 years for a total of 5 years. This Limited Warranty covers products purchased in the year of 2025 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 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 Multimedia Corporation

205 Commercial Court | Morganville, NJ 07751

Phone: 732-591-5800 | Fax: 732-591-5801