Model NV-EC1701U Eo2™
Ethernet over 2-Wire Transceiver with PoE+ or High Power PoE

Complete Installation Guide

CE
c(UL)us

IMPORTANT SAFETY INSTRUCTIONS

1) Read these instructions.

2) Keep these instructions.

3) Heed all warnings.

4) Follow all instructions.

5) Do not use this apparatus near water.

6) Clean only with a dry cloth.

7) Install in accordance with the manufacturer's instructions.

8) Do not install near any heat sources such as radiators, heat registers, stoves or other apparatus (including DVRs) that produce heat.

9) Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wider blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

10) Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.

11) Only use attachments/accessories specified by the manufacturer.

12) Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as a power supply cord or plug is damaged, liquid has been spilled, or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped. This installation should be made by a qualified service person and should conform to all local codes.

13) BNC Connection: the installation shall be in accordance with the applicable provisions of the National Electrical Code ANSI/NFPA 70, Article 800.90 and Canadial Electrical Code Part 1, Section 60-504.

14) RJ45 PoE connection: to be connected only to networks or circuits that are not routed to outside plant or building.

> TO REDUCE THE RISK OF ELECTRICAL SHOCK, DO NOT REMOVE COVER OR BACK. NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

> WARNING: TO REDUCE THE RISK OF ELECTRICAL SHOCK, DO NOT EXPOSE THIS APPARATUS TO RAIN OR MOISTURE.

⚠ This installation should be made by a qualified service person and should conform to all local codes.

⚠ WARNING - Do not install the unit in an environment where the operating ambient temperature exceeds 185° F (85° C). The ventilation should not be impeded by covering the unit with items, such as newspapers, table-cloths, curtains, etc. No naked flame sources, such as lighted candles should be placed on the apparatus.

⚠ ⚡ WARNING - Do not interconnect multiple outputs. **Never use more than two 60 Watt power supplies within a network system. For safety, never exceed 120 Watts, total.**

⚠ WARNING - The apparatus shall not be exposed to dripping or splashing and no objects filled with liquids, such as vases, shall be placed on the apparatus.

⚠ WARNING - Use only a Certified power cord and plug (coupler / mains) assemblies for location installed.

⚠ WARNING - Power cord is regarded as main disconnect.

⚠ WARNING - The appliance coupler (power cord/mains) shall remain readily operable.

⚠ WARNING - For safety, never put NVT signals in the same conduit as high-voltage wiring.

This product is intended to be supplied by a certified power source marked "Class 2" or "LPS" and rated 48-56 VDC, minimum 840mA, which may or may not be provided with the product.

Power supplies, when provided, are external inline, with an IEC380-C14 power inlet and 6 ft (1.8 m) line-cord. Input Voltage is 100 ~240 VAC 50-60 Hz. A molded P1J 5.5 mm barrel connector provides a Class 2 (SELV) 48-56 VDC regulated output. Line cord UL approved type SPT-2, SVT, or SJT, 18/3 AWG Min. 300VAC, 60° C Max. 15ft (4.5m) long. One end with IEC380-C13 appliance coupler and the other end with NEMA 1015P or equivalent for country.

Model NV-EC1701U Eo2™
Ethernet over 2-Wire Transceiver
with PoE+ or High Power PoE

- Transmit 10/100 BaseT Full Duplex Ethernet up to 1,000ft (305m)* over 4-pair cat5; 750ft (228m) over 18/2 (or similar 2-wire cable); 500ft (150m) over Shielded Twisted-Pair

- Powers PoE entry stations (or other PoE, PoE+, or High Power devices), up to 60 watts*

- 56VDC is distributed over 2-wire cable to all connected IP devices

- One NVT Eo2™ transceiver at the network-end can support multiple remote Eo2™ transceivers and connected devices

- Up to four Eo2™ transceivers can be rack mounted on an NV-RMEC16U Eo2™ Rack Mount Tray Kit, connecting up to 16 entry stations or contact closures

- Easy configuration, no PC required

- Transparently supports all networking protocols (UDP, TCP/IP, HTTP, Multicast etc.)

- Advanced 128-bit AES encrypted transmission and PoE+ power technology

- Built-in transient protection; Industrial temperature range

- Available in 1-4 device Eo2™ System Kits

- Limited lifetime warranty

The NVT Model NV-EC1701U Eo2™ Ethernet over 2-Wire Transceiver is a compact media converter that allows 10/100 BaseT Ethernet and PoE power to be transmitted using UTP, STP,18/2, or similar cable. These devices are often used in legacy installations where existing wire is re-used as part of an upgrade to IP devices. 56VDC class 2 power is delivered to one transceiver, which distributes it to up to four remote transceivers, and their PoE or PoE+ devices.

These transceivers are extremely simple to use, with no PC configuration required. Status LEDs indicate power and link connectivity/activity for RJ45 and 2-wire ports. The NV-EC1701U is backed by NVT's award winning customer support and limited lifetime warranty.

*Distance and number of devices supported may be lower due to attenuation/voltage-drop on the wire. See Wire Distance charts on page 7.

CONFIGURATION INSTRUCTIONS

NV-EC1701U Eo2™ transceivers transmit high bandwidth encrypted Ethernet signals over conventional 2-wire cables. To provide utmost signal integrity and security, the NV-EC1701U transceivers **must be configured** to communicate exclusively with other transceivers within their **Network Group**. This group typically consists of one NV-EC1701U located at the control room (usually connected to an ethernet switch or router), and up to four remote NV-EC1701U transceivers (usually connected to IP cameras or other remote IP devices).

Before connecting to the network, **each NV-EC1701U must learn which other NV-EC1701U transceivers are to be part of that group**. This simple process is called **Joining**. It is recommended that transceivers in each Network Group be configured **prior to deployment** using these instructions:

Step One: Gather Materials
- NV-EC1701U transceivers
- 56VDC power supply & line-cord (NV-PS56-60W)
- Hook-up wire (not supplied)
- Small paper-clip, partially straightened
- Device labels
- IP Network Documentation Log

Step One: Gather Materials

Step Two: Connect Hardware
- Remove and discard the "Configure Before Use" labels.
- Connect two NV-EC1701U transceivers using hook-up wire.
  Observe polarity. Units will not power up if the polarity is reversed.
- Connect a 56VDC power supply to transceiver #1; Apply power.
- Verify that the blue POWER LED on each transceiver illuminates.
- After 20 seconds, verify that the green BNC LED on each transceiver is off.
  If a BNC LED is on, the transceiver has been previously joined.
 Perform the un-joining process below before proceeding.

Step Two: Remove Label

Step Three: Joining
- On transceiver #1, using the straightened paper-clip, momentarily depress the small push-button located behind and slightly above the RJ45 LED. The blue power LED will begin blinking.
- Depress the same push-button on the transceiver #2.
- Both transceivers have now entered **Join Mode**.
  They will find each other and establish encrypted communication.
  In about 10 seconds, the blue Power LEDs on both transceivers will return to a steady on condition indicating a successful **Join**.

Connect Hardware

Transceiver #2
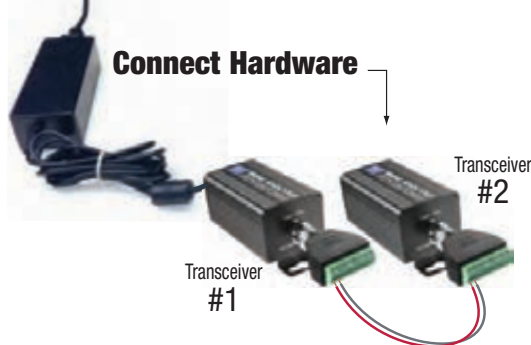
Transceiver #1

Step Four: Adding Transceivers (if required)
- Disconnect transceiver #2 and replace it with a new un-joined transceiver (#3, or #4, or #5).
- Repeat steps two and three to add additional (up to five total) transceivers to the same Network Group.

Step Five: Documentation
- Label the configured transceivers with a unique Network Group ID of your choice. This will help you identify them after they have been deployed.
- Record this Network Group information in your IP Network Documentation Log. This log may include essential documentation which will help you identify all system devices during and after deployment:
  - Camera (or other device) Number
  - Camera Position/Location
  - Camera Make & Model
  - Camera MAC & IP Address
  - Camera Login & Password
  - Camera-end NVT Transceiver MAC Address
  - NVT Transceiver Network Group Name
  - Control Room NVT Transceiver MAC Address
  - Control Room Router Port Number

Step Three: Transparent view of push-button location

Un-Joining a Transceiver
If you need to move a transceiver from one Network Group to another, it must first un-learn its previous Network Group and be returned to an un-joined state. Do this by:
- Connect a 56VDC power supply to a transceiver to be un-joined.
- Wait until its green BNC LED is lit.
- Using the straightened paper-clip, momentarily depress the small push-button located behind and slightly above the RJ45 LED until the green BNC LED goes off. The RJ45 LED should remain off.
- Release the paperclip.
- Observe that the BNC and RJ45 LEDs flash.
- Observe that the BNC and RJ45 LEDs turn off.
- Observe that the BNC goes on solid.
- Un-joining is now complete.

Step Five: Transceiver MAC address

If you are not sure that un-joining has been successful, remove and then re-apply power, and repeat.
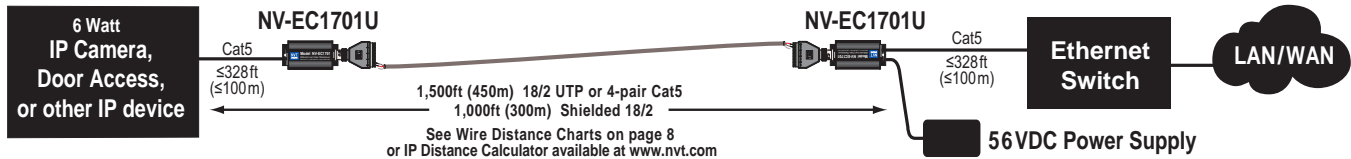
Figure 1 - Typical Installation

Most installations that use the NV-EC1701U transceiver involve the replacement of old analog equipment with new IP devices, while reusing the installed wire.

⚠ To prevent damage, disconnect all analog equipment before installing the IP equipment. The NV-EC1701U uses the wire to deliver 56VDC.

Transceiver Configuration

NV-EC1701U transceivers **must be configured** to communicate exclusively with other transceivers within their **Network Group**. The configuration process is described on page 3..

Connecting the Remote End

Install the new IP device. Mount the NV-EC1701U nearby or within 328 feet (100 meters). Connect an RJ45 cable between the network connector (PoE) of the IP device and the RJ45 jack on the NV-EC1701U.

Connect the screw-terminal adaptor to the BNC jack on the NV-EC1701U and connect one wire conductor to a terminal marked "+". Connect the other wire conductor to a terminal marked "-". **Observe polarity so that it will match that of the control-room end**.

For most installations, the IP device's power will be low enough, and the wire distance short enough, so that the IP device and its NV-EC1701U can receive power through the wire. In most cases, a power supply will not be needed at this end. For additional details, see pages 6 & 7.

Connecting the Control-room End

Install a second NV-EC1701U at the control-room end of the wire.

Connect the screw-terminal adaptor to the BNC jack on the NV-EC1701U and connect one wire conductor to a terminal marked "+". Connect the other wire conductor to a terminal marked "-". **Be sure to match the polarity of the remote-end NV-EC1701U.**

If rack-mounting is desired, use the NV-RMEC16U tray, which supports up to four NV-EC1701U transceivers.

Connect a class 2 (SELV) 56VDC power supply to the power jack on the NV-EC1701U.

This will provide power to the entire system, including the cameras. The Blue "Power" LEDs will illuminate on both transceivers.

If the LEDs do not light, check the wire polarity. If the blue LEDs blink, then the power supply is cycling on and off due to an overload condition. Check for wire faults or excessive loading.

Connect an RJ45 patch-cord between the RJ45 jack on the NV-EC1701U and your ethernet switch.

The Green LEDs will illuminate when a network link is established, and will blink when data traffic is present.

MULTIPLE CAMERAS

The NV-EC1701U transceivers communicate with each other using a bus-architecture. This means that multiple remote NV-EC1701Us may be connected together to an NV-EC1701U at the control-room. The cables are connected together using the screw-terminal adaptor. Extra screw terminals are provided to allow easy connection. Star, daisychain, or any combination of topologies, including mixing of UTP and coax media may be used.

Unlike coax-based signal distribution, the high frequency signals that are transmitted can be susceptible to very small amounts of crosstalk from other NV-EC1701U network groups. For this reason, do not transmit signals from different network groups within adjacent wire pairs..

PoE CONSIDERATIONS

The NV-EC1701U transceiver supports full PoE, PoE+, and High Power cameras, as well as non-powered legacy devices.

Unlike conventional PoE, voltage-drop and load current must be confirmed by the installer. See "High Power Extended Distance Considerations" on page 6 and use the IP Distance Calculator at www.nvt.com.

NVT's Class 2 current limiting ensures safety of the installation during fault conditions, while delivering higher power (up to 90 watts) with more efficient allocation amongst loads. **Up to two power supplies may be used within a network group.**
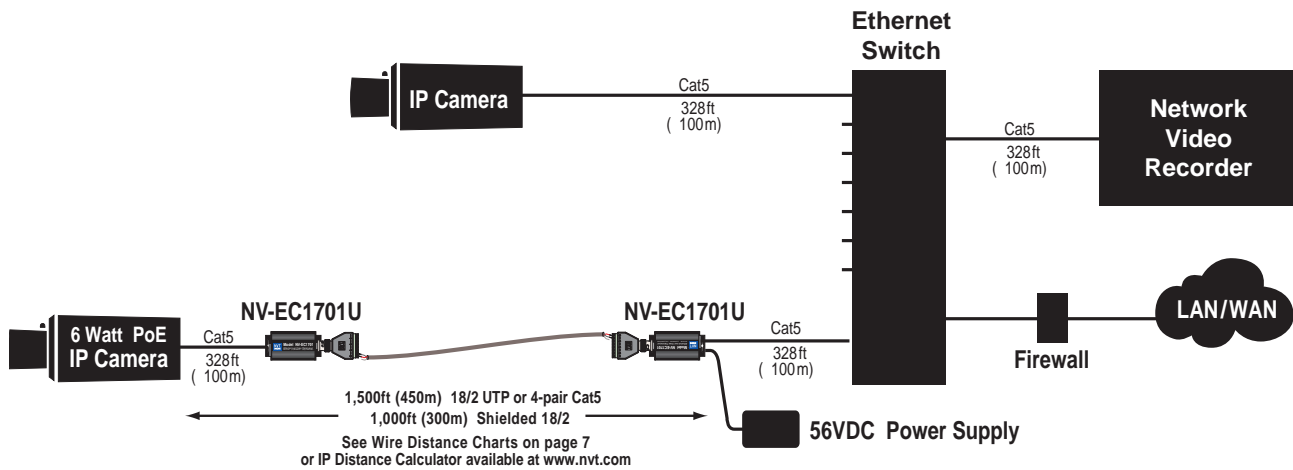
Figure 2 - IP Camera & NVR Installation

TRANSCEIVER-TO-TRANSCEIVER

The NV-EC1701U transceivers provide transparent end-to-end 10-baseT or 100-BaseT connectivity with auto detection and autocrossover. This means that IP cameras or other devices may be installed at one end, and their data is transparently delivered to the other end. Please read configuration instructions on page 3 before installing.

Wire distances up to 1,500ft (450m) are supported, although local power may be required for extended distances. See pages 6 & 7.

The NV-EC1701U supports TCP/IP, UDP, HTTP, Multi-cast, and other standard protocols. This allows for the transmission of other network traffic besides streaming video.

NETWORK ARCHITECTURE

For IP-based CCTV applications, there are some network configurations that are robust, and others that are not recommended. **In general, it is best to deploy a separate LAN exclusively for video traffic.**

Although it is possible to place IP cameras onto the end-user's "Enterprise LAN", there are several disadvantages in doing so. These include:

Traffic Management Considerations

When sharing the resources of a LAN, the nature of the traffic must be well understood for it to operate efficiently. For most end-users, the business use of their LAN is constantly changing, critical for their day-to-day operations, and not managed by the same group that manages their security. IP video can often consume large amounts of bandwidth, which may or may not be compatible with existing IT traffic.

Security Considerations

Most surveillance systems are installed specifically to protect against breaches in security. A shared LAN provides potential opportunities for unauthorized access to security assets. Sniffing IP addresses can result in the unintended disclosure of IP cameras or network vulnerabilities. Spoofing IP addresses could result in the disruption of recording.

If you must pass IP camera video through "public" LANs, ensure that video is recorded prior to leaving the secure LAN. Then encrypt it by using a Virtual Private Network (VPN) so that neither the video, nor its addressing is readable on the LAN. Many low-cost routers support VPNs.

50 Watt
IP Camera,
Door Access,
or other IP device

NV-EC1701U

Cat5
≤285ft
(≤85m)

56V 60W
Power Supply

NV-EC1701U

Cat5
≤328ft
(≤100m)

Ethernet
Switch

LAN/WAN

50 Watt
IP Camera,
Door Access,
or other IP device

NV-EC1701U

Cat5
≤285ft
(≤85m)

56V 60W
Power Supply

1,500ft (450m) Unshielded 18/2
1,000ft (300m) Shielded Twisted-pair
See Wire Distance Charts on page 8
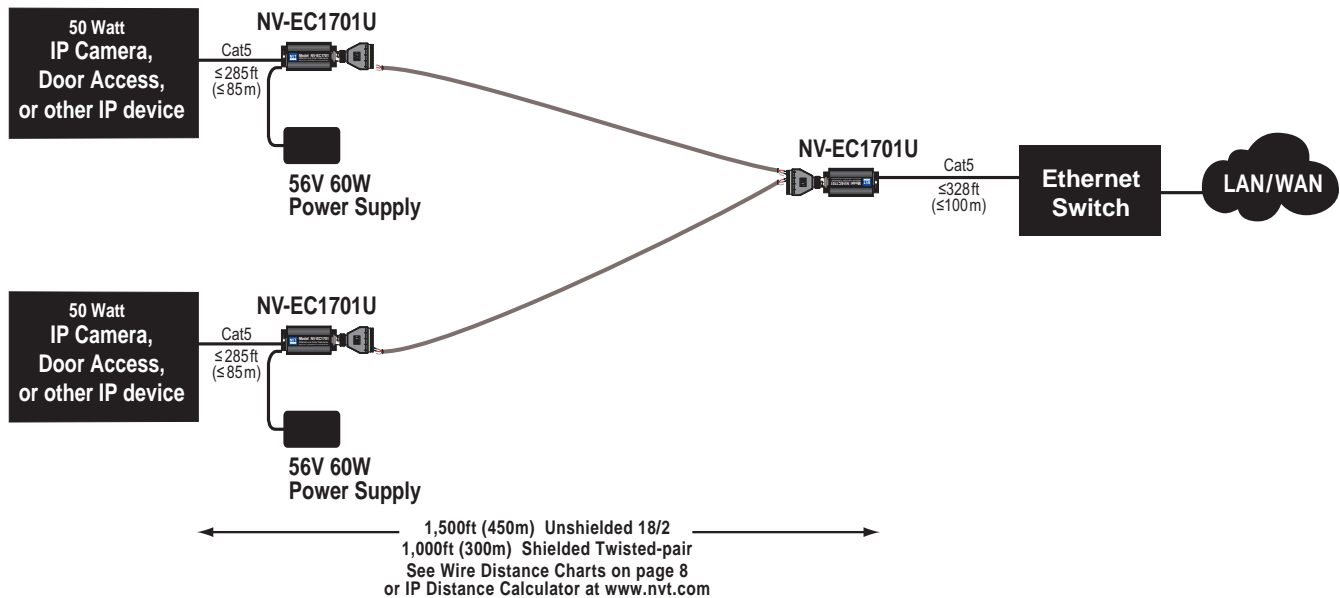**or IP Distance Calculator at www.nvt.com**

Figure 3 - Alternate Power Supply Location

The NV-EC1701U has a power inlet connector that receives 56 volts from an external Class 2 SELV desk-style power supply.

Power is distributed to:

1) the transceiver's internal electronics;

2) the RJ45, provided the connected camera or other device provides the appropriate 27K ohm PoE 'discovery signature'. 56V power is provided on pins 1&2 and 5&4, while 3&6 and 7&8 are at 0 V. The use of all four wire-pairs ensures maximum distance, even for high-power loads, such as P/T/Z cameras.

3) the coax cable, where it is used by the control-room NV-EC1701U.

⚠ **For fault/safety, never use more than two power supplies within a network.**

WIRE TYPE AND DISTANCE CAPACITY

The distance capability of wire is dependant on its ability to deliver DC power, and separately, to deliver high-frequency data signals.

The graph below shows maximum power delivery when using a 56V power supply. If you are not delivering power to your camera (or other remote device), then this graph does not apply. Figure 5 shows the maximum network data rate.

A Distance Calculator can be found at www.nvt.com.

PoE devices require a minimum of 43V to operate. With a 56V supply, we have 13V of allowable voltage drop on the wire.

The voltage will dip in proportion to the remote (camera) load. The graph below shows what distances are supported for various loads and wire types.

- The voltage will dip in proportion to the remote (camera) load. The graph below shows what distances are supported for various loads and wire types.

- Start with the Powered Device (camera) wattage at the left. Sometimes PoE devices are listed as to their PoE Class rather than wattage. If this is the case, use the colored classes instead.

- Now read over to the right until you find your kind of wire. Then look up (feet) or down (meters) to find your maximum wire distance. If your wire is not among the examples, simply measure its total resistance and find that value on the right side of the graph. The maximum supported wattage is on the left.
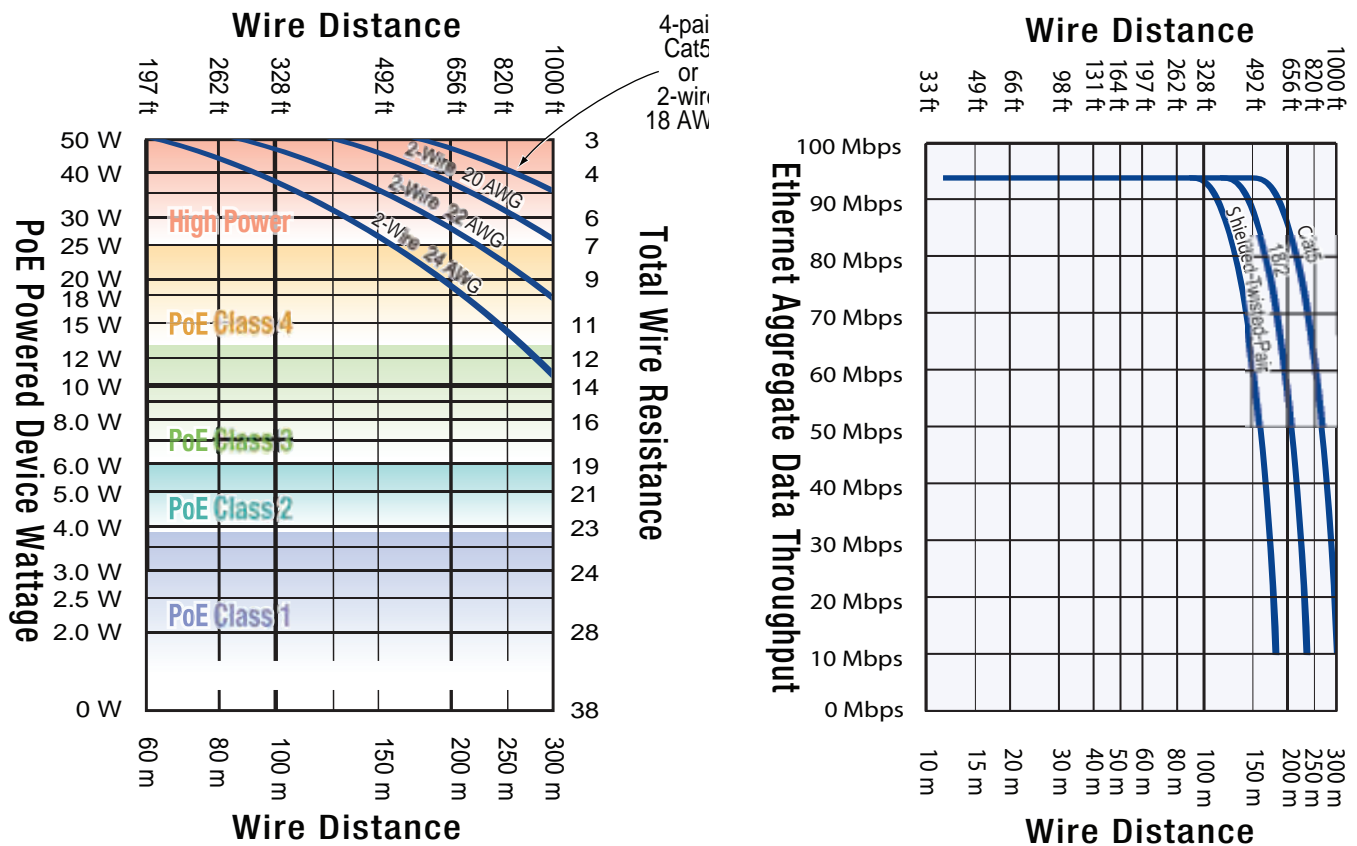
Figure 5 - Data Distance Chart

RJ45 ETHERNET INTERFACE

Connectivity:	RJ45, auto-crossover
Wire type:	4-pair Cat5 or better
Distance:	up to 328ft (100m)
Speed:	10/100 Base T, half/full duplex, auto-negotiation auto-MDI/MDIX cross-over
Latency:	3mS

Data throughput:
  85Mbps ±10% useable bandwidth per
    network Example: Four megapixel cameras,
    all sharing a 2-Wire network, each
    sending 20Mbps video stream(s).

Power output:
  This Power Sourcing Equipment (PSE) supports
  Powered Devices (PDs) that are compatible with
  IEEE 802.3af/at, or PDs that draw up to 60 watts*.
  For maximum power/distance, 56VDC appears
  on all eight RJ45 pins, and are currentprotected
  and transient-protected.

POWER CONSUMPTION

Consumption per transceiver: 3.0 W @ 10 to 56VDC
Total system consumption: = total consumption of transceivers
  + total consumption of PDs
  + total power dissipated in the wire

BUILDING WIRING INTERFACE

Connectivity:
  UTP, STP, 18/2, or similar, One control room NV-EC1701U
  transceiver may support multiple* remote NV-EC1701U
  transceivers.

Impedance:	25 to 100Ω
Distance:	See page 7
Transmission technology:	OFDM, 128 bit AES encryption

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*IMPORTANT NOTE:

Distance will often be shorter due to power supply capacity
and wire voltage-drop. See Maximum Per-Camera Wire
Distance Chart on page 7. **For fault /safety protection,
never use more than two power supplies within a
network system.**

LED STATUS INDICATORS

Power:	Blue "Power On"
BNC 2-wire Interface:	Green "Link"
RJ45 Interface:	Green "Link"

MECHANICAL / ENVIRONMENTAL

Transceiver body dimensions: (excluding connectors)	5.1 in (131mm) long 1.3 in (33mm) high 1.5 in (38mm) wide
Transceiver weight:	5.1oz (145g)
Operating & storage temperature:	-40°F to 185°F (-40°C to +85°C) 20 to 85% RH non-condensing
Transient Immunity:	5x20µS 3000A, 6000V ESD 20KV, 200pF

POWER SUPPLY

Power supplies are external inline, with an IEC380-C14 power
inlet and 6ft (1.8m) line-cord. Input voltage is 100 ~240VAC
50-60Hz. A molded P1J 5.5mm barrel connector provides
Class 2 (SELV) regulated output with one of these three ratings:

Use only the power cord provided with the
unit or equivalent UL approved type SPT-
2, SVT, or SJT, 18/3 AWG 100~240VAC,
1A 60°C Max. 15ft (4.5m) long. One end
with IEC380-C13 appliance coupler and the
other end with NEMA 1015P or equivalent
for your country.

+56VDC 60W
+56VDC 90W

60W power supply body dimensions:	4.90 in (125mm) long 1.25 in (32mm) high 2.00 in (50mm) wide
60W power supply weight:	10.6oz (300g)
90W power supply body dimensions:	5.70 in (145mm) long 1.25 in (32mm) high 2.36 in (60mm) wide
90W power supply weight:	1 lb (450g)
Power supply operating temperature:	-22°F to 122°F (-30°C to +50°C) 20 to 85% RH non-condensing
Power supply storage temperature:	-40°F to 185°F (-40°C to +85°C) 0 to 95% RH non-condensing
Transient Immunity:	5x20µS 3000A, 6000V ESD 20KV, 200pF
Power cord weight:	5.5oz (156g)

REGULATORY

UL Listed to IEC/UL 60950-1 Complies with FCC part 15B limits

c(UL)us CE [WEEE] RoHS

Specifications subject to change without notice.

Product

NV-EC1701U: Single transceiver
only, no power supply

Accessories

NV-PS56-60W: 56VDC power supply, 60 watts
with IEC line cord

NV-PS48-90W: 56V DC power supply, 90 watts
with IEC line cord

NV-PC4PR: RJ45 Patch Cord, 4-pair 3' (1m) Grey

NV-DPSC4:   Detachable Power Supply Cord Splitter 1:4 2ft

NV-RMEC16U: Rack mounting chassis, 19" x 1U
holds up to 4 NV-EC1701U transceivers
plus power supplies. Includes NV-DPSC4
Power Cord Splitter (NV-EC1701U and
NV-PS56-60W not included)

Single Entry Station Eo2™ Transmission System

NV-EC1701U-KIT1: 2 NV-EC1701U Transceivers
                  1 NV-PS56-60W Power Supply
                      with IEC line cord
                  2 NV-PC4PR patch-cord

Dual Entry Station Eo2™ Transmission System

NV-EC1701U-KIT2: 3 NV-EC1701U Transceivers
                  1 NV-PS56-60W Power Supply
                      with IEC line cord
                  3 NV-PC4PR patch-cord

Triple Entry Station Eo2™ Transmission System

NV-EC1701U-KIT3: 4 NV-EC1701U Transceivers
                  1 NV-PS56-60W Power Supply
                      with IEC line cord
                  4 NV-PC4PR patch-cord

Quadruple Entry Station Eo2™ Transmission System

NV-EC1701U-KIT4: 5 NV-EC1701U Transceivers
                  1 NV-PS56-60W Power Supply
                      with IEC line cord
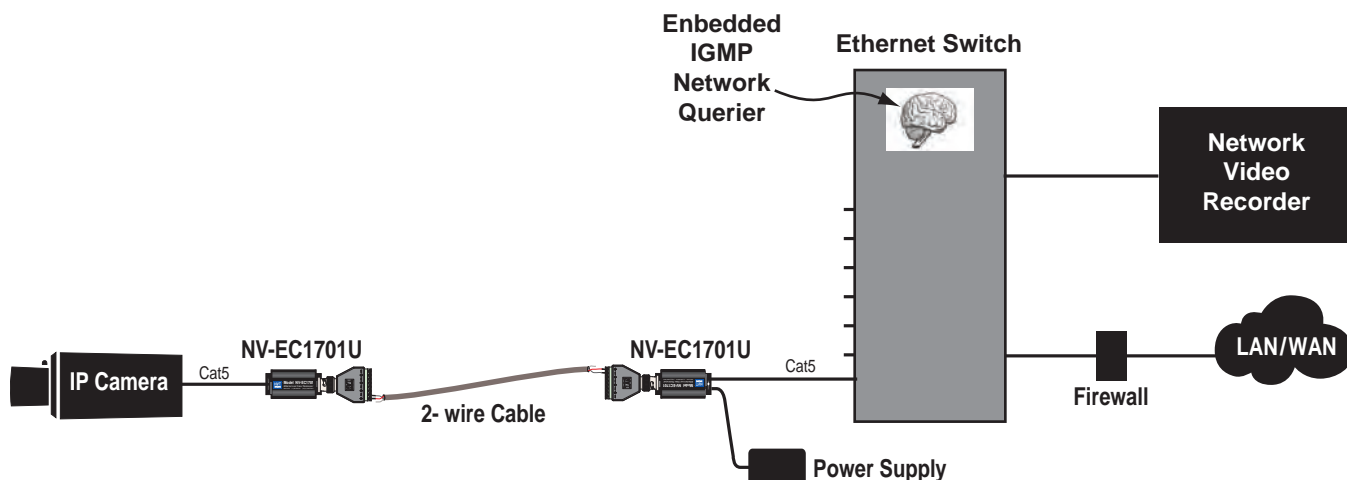   5 NV-PC4PR patch-cord

Figure 6 - Multicast Network

On rare occasions, a customer will experience a problem where a camera sending unicast packets performs flawlessly, but the NV-EC1701Us fail to deliver multicast streams.

To understand this, we need to delve a little deeper into how multicast networking works. To do this, we will first explore unicast packet transmission.

With unicast packets, there is a source (the camera) and a destination (the NVR). Packets are generated by the source and directed to a single destination. The first time a packet is sent, the switch has never heard of the destination address. So it sends a broadcast transmission to ALL destinations. The correct recipient acknowledges the packet. The switch snoops in on that response and memorizes which port is associated with that transmission. Subsequent transmissions are directed ONLY to the recipient's port, thereby reducing bandwidth on other parts of the network.

With multicast packets, the same bandwidth considerations apply. Switches and routers do not routinely deliver multicast traffic to all destinations. Instead they rely on a special control protocol to identify and report which multicast traffic should go where.

That protocol is called Internet Group Management Protocol (IGMP). IGMP is a shared "querier" control resource that is implemented on a host, such as a switch or router, within the network. Virtually all routers and most switches are equipped with an IGMP querier.

That host is responsible for sending IGMP queries to multicast devices, requesting the generation of an IGMP Report. That report is monitored by switches and routers within the network. That monitoring is called IGMP Snooping. These switches and routers keep a state table and use it to determine to which ports to deliver each multicast stream.

In practice, a multicast source (camera) sends its data not to the destination, but to a fictitious "Group IP Address." Destination devices (the NVR), in response to an IGMP querier request, send a request to the IGMP host asking to be included as a destination for that group.

Switches and routers allow these multicast packets through so they can be received by those interested devices (NVR) and block them from being delivered elsewhere. **It would be inappropriate for the switch to send a multicast stream everywhere, as it would clog the network.**

The NV-EC1701Us are not point-to-point devices. They join together to function as a switch. Like a switch, they listen for IGMP reports and block unknown multicast packets. This is particularly important in a multi-camera environment, as we do not want the stream from one camera being delivered to all other cameras. That could generate too much traffic.

On rare occasions an installation will be created without the required IGMP querier. If the switches are not equipped with IGMP snooping then they just deliver all multicast traffic everywhere. If the NV-EC1701Us do not receive IGMP reports, then they will BLOCK UNKNOWN MULTICAST PACKETS, and the video will not pass through.

An investigation can be performed as necessary using a Packet Sniffer, such as WireShark.

The bottom line is that an IGMP querier is required for a properly configured multicast network. Contact NVT for further information.

TROUBLESHOOTING

Confirm that the NVT transceivers have been configured to communicate with each-other, per instructions on page 3.

If you are experiencing problems, attempt to simplify your setup. Test each cable segment separately. For example, test the IP device (camera) directly at the ethernet switch without other equipment. Then add in the NVT transceivers, back-to-back. Test each segment of a long cable-run independently. Attempt to isolate the problem.

Most IP camera installation problems involve configuring the IP camera and the recorder to recognize each other. If in doubt, connect the camera directly to the Ethernet switch, bypassing the transceivers. Consult the IP camera and/or recorder installation manuals for configuration instructions, or contact the camera or recorder manufacturer.

NETWORK DIAGNOSTIC TOOLS

NVT has developed a Console Utility that can be downloaded from www.nvt.com. Once installed on any Windows PC, the application scours the network for NVT devices, and reports each of their MAC addresses, as well as the MAC addresses of any other NVT devices within its joined group.

Additional network tools, such as Packet Sniffers or Traffic generators are available from other sources such as LAN Shark, LANTraffic, etc.

CUSTOMER SUPPORT

NVT customer support is available for consultation from 8:00 AM to 5:30 PM PST Monday through Friday. In addition, emergency after-hours callback support is available.

USA Office: (+1) (650) 462-8100
USA Fax: (+1) (650) 326-1940
UK Office: (+44) (0)20 8977 6614
UK Fax: (+44) (0)20 8973 1855
Email USA: www.nvt.com/email/info
Email UK: www.nvt.com/email/eusales
Web home page: www.nvt.com

PRODUCT RETURNS

Please call before returning units to NVT. Returned materials must have a "Returned Materials Authorization" (RMA) number from NVT marked on the outside of the shipping carton.

LIMITED LIFETIME WARRANTY

NVT warrants that the product conforms to NVT's applicable published specifications and is free of defects for the life of the product. There shall be no other warranties, express, statuatory, or otherwise, including any implied warranty of merchantability, of fitness, or any other obligation on the part of NVT with respect to any of the products. In the event that any of the products is damaged, altered, or modified without the express written consent of NVT, any warranty for those products will cease and NVT will have no further liability as it pertains to those products.

NVT assumes no responsibility for damages or penalties incurred resulting from the use of this product in a manner or location other than for which it is intended.

NVT's liability under any warranties shall be discharged by replacing or repairing any part or parts which do not conform to the applicable warranty under normal and proper use. NVT's liability with respect to any product shall not exceed a refund of the price received by NVT for that product, and in no event shall NVT have any liability for any incidental, consequential, special, or indirect damages.

Some states do not allow the exclusion or limitation of special, incidental, or consequential damages, so the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

FCC USER INFORMATION

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

WARNING
Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.