ASSESSING
NETWORKS
PERFORMANCE

DESIGN

INSTALL

VERIFY

Background:

- Your customer wants to install an IP/PoE based security system that requires interfacing to an existing network.
- Your customer wants to convert an analog system IP/PoE system using existing coax cables.

Do these existing networks have capacity to provide the necessary bandwidth and PoE power required to support your connected devices?

What is the problem?

With assessing existing network performance you start with your installation only to find your connected devices will either not power up or not transmit video correctly. What is the reason for the problem?

Is it due to a defective product?
Is it due to miss specified product?
Is it due to network problems?

Regardless of the reasons why you cannot complete the installation.
You have not determined the problem.
It will require an additional trip once you think your know and have solved the problem.

What If ...

- What if you could determine existing network performance prior to the installation.
- What if you could determine and solve problems prior to the installation.
- What if you could determine if the specified connected products would work or what network changes will be required.

Assessing existing network performance prior to an installation and even prior to specifying connected devices can increase reliability of installations and their operation.

What are some of the problems that I can encounter?

The most common problem is PoE, which is not just a question of power level. PoE is a complex process requiring compatibility between a PoE source (PSE) and the connected device (PD). With the advent of 802.3at there are down 8 different PoE classes. Compatibility is a matter of Power level, the number of wire pairs transmitting power, and the ability of the connected device to respond properly to the PoE source. This latter function is called the PoE signature.

Class	Usage	Classification current (mA)	Power range at PD (W)	Max power from PSE (W)	Class description
0	Default	0–5	0.44–12.94	15.4	Classification unimplemented
1	Optional	8–13	0.44–3.84	4.00	Very Low power
2	Optional	16–21	3.84–6.49	7.00	Low power
3	Optional	25–31	6.49–12.95	15.4	Mid power
4	Valid for Type 2 (802.3at) devices, not allowed for 802.3af devices	35–45	12.95–25.50	30	High power
5	Valid for Type 3 (802.3bt) devices	36–44 & 1–4	40 (4-pair)	45	
6		36-44 & 9–12	51 (4-pair)	60	
7	Valid for Type 4 (802.3bt) devices	36–44 & 17–20	62 (4-pair)	75	
8		36–44 & 26–30	71.3 (4-pair)	99	

Note the additional classes over 802.3at (Class 4) and potential to compatibility issues.

Prior to the adaption of 802.3at and the establishment of these 4 additional classes many security manufacturers introduced devices, many of these cameras, required PoE power greater than 30W. This led to terms such as PoE+, PoE++ and UPoE. All of these have no standard IEEE definitions.

The important point is these devices are not guaranteed to be compatible with IEEE 802.3bt compliant devices.

A source providing UPoE may not power a device requiring IEEE 802.3bt even if the PoE source provides the same or more power required by the connected device.

How can I predict existing network performance?

As most connected devices require PoE, we can start there.

Vi00027

How can you figure out the Source PoE type?

Category wiring has power limitations. The amount of power depends on the number of pairs used and cables' category. Compatibility also depends on PoE standard. The UPoE and IEEE 802.3bt transmit over 4 pairs while IEEE 802.3af and IEEE 802.3at use only 2 pairs.

Vigitron's Vi00027 can be used at the end of the cable to show you the specific type of PoE the source is providing

Vi00024

How to measure the maximum available PoE power at the receiving end?

The amount of PoE received by the connected device is a function of the PoE source, cable type and cable distance especially where cable distances are greater than 290' and include extenders or repeaters.

Vigitron's Vi00024 is used at the end of the cable and measures the maximum amount of PoE that is available at the connected device. In Auto mode, in a few seconds measure the maximum available PoE, while in manual mode the operator sets the power level and the Vi00024 will show if that power level is possible or not.

The Bandwidth, Transmission Delay and Packet Size

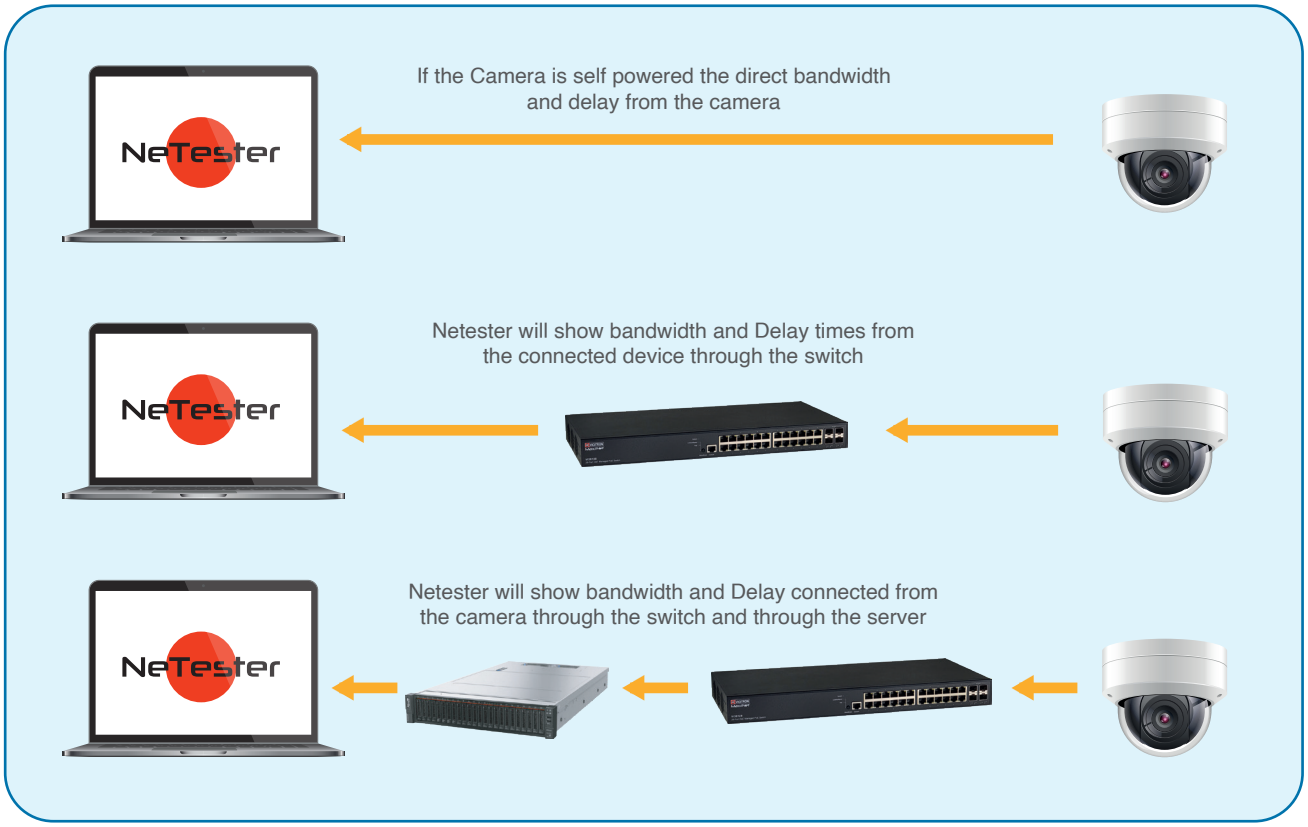
While providing the correct PoE is some what black and white in determining if a device is on or off, the Bandwidth, Delay and Packet Size issues are not as clear cuts.

Packet Size: Many multisensor and high megapixel cameras require packet sizes greater than 1518bytes which are called “Jumbo frames”. Many network switches and other network components limit packet sizes to 1518 bytes and will either block their transmission or distort video. The latter can take the form of pixelation.

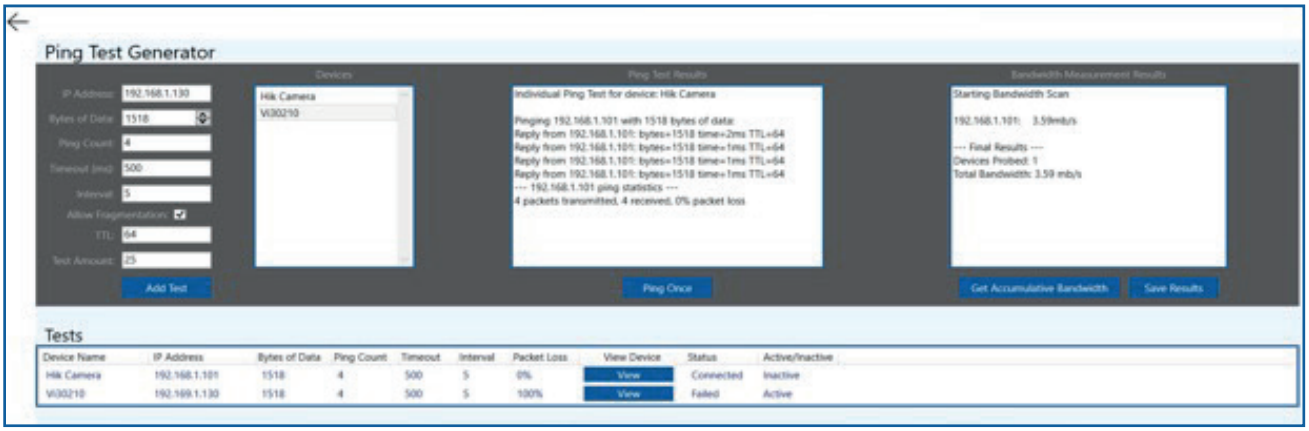
Bandwidth: The method of the connected device must be matched to the receiving device. Otherwise packets can be dropped or distorted. While many security devices, such as cameras, only use 100Mbps a growing number of multisensor and high megapixel cameras are using 1000Mbps (1G) ports.

Delay: Networks use two primary different methods of communications between connected devices:
UDP is one way communications that data is continuously sent from the source to the transmission which is generally used with IP cameras.
TCP is a bi-directional communication method that requires the device receiving data, for example from a server, to acknowledge the receipt of data prior to receive more data. This is generally the communication method between recording NVR, Servers and switches. If the acknowledgement is not received within the required time total communication can stop.

Vigitron’s NeTester™ software can be used to determine individual connected device and complete network, bandwidth, packet size and delay



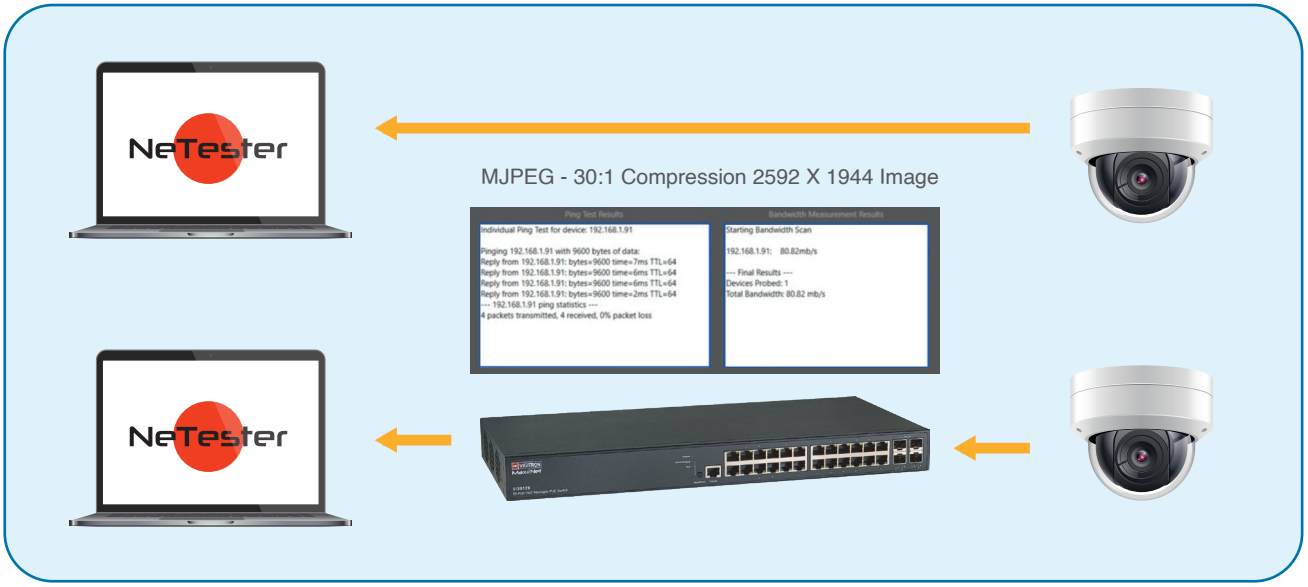
NeTester can be used at any point in the network to determine transmission performance.



Built in test generator can determine packet size, delay and the potential for losing packets.

See two primary different methods of communications between connected devices:
UDP is one way communications that data is continuously sent from the source to the transmission which is generally used with IP cameras.

TCP is bidirectional communications which requires the sender receive an acknowledgment from the receiver. It is used in network communications between clients, servers, switches and networks



NeTester™ shows performance for individual devices and performance for the total network.

Vigitron offers FreeRun NeTester™ and NetObserver demonstration programs that do not require any network or device connections.

We also offer a full version 90 day evaluation program that at the end of the trial period can easily be purchased.

Both programs can be downloaded without any charge or obligation using the following link:

FREERUN

In addition to NeTester™ and NetObserver™ software Vigitron offers a complete line of Test Equipment for evaluating network PoE performance.
For more information download our Test equipment bookle

TEST EQUIPMENT

About Vigitron Inc.

Vigitron is a leading global manufacturer of innovative complete infrastructure transmission solutions for IP CCTV systems. Vigitron product performance is supported by complete certified testing along with integration with world-leading IP-based security products.

We offer free and without obligation Infrastructure Design Services staffed by experienced system engineers. Vigitron provides the industry's longest warranty. Vigitron is based in San Diego with local and worldwide sales and manufacturing facilities.