SyncroIP Networking Basics: Planning Your IP Camera Deployment

IP cameras bring the advantages of high definition recording, selectable area digital zoom, and other advanced capabilities to CCTV installations. While they offer improvements over analog systems, these benefits can come with increased complexity. In analog systems, cameras typically connect to a DVR using coaxial cable, and the DVR is the only device that needs to communicate on the network. With IP systems, every camera is connected to the network. When planning IP camera installations, you need to determine the best way to connect your IP cameras to the network.

The following terms will be used throughout this article:

- **Power over Ethernet (PoE):** Power over Ethernet is a standard for sending electrical power to devices over Ethernet cabling. PoE uses one of the pairs of wires in Ethernet cables to transmit power, while using other pairs of wires to transmit video or other data over the network. This simplifies IP camera installations, as only one cable is run to each camera.

- **Switch:** Switches are used to transport data throughout a local area network (LAN). They contain multiple Ethernet ports. When data is being sent through the network, a switch determines which device to send it to based on the addressing information in the data. Some switches contain PoE capabilities, meaning they can also send power to IP cameras (for example the FLIR ACCDPS281 8+1 PoE switch; coming soon).

- **Router:** A router is a networking device that creates a local area network (LAN) and connects devices on that network to the Internet by communicating with an Internet service provider (ISP) via a DSL or cable modem. Routers include features such as a Dynamic Host Configuration Protocol Server (DHCP), which automatically provisions IP addresses to devices on the network, and a Network Address Translator (NAT), which routes data to and from the Internet to LAN devices. Most routers include a built-in Ethernet switch to connect multiple devices to the network.

- **IP Camera:** An IP camera is a security camera that uses Ethernet or Wi-Fi connectivity to transmit video over computer networks.

• **NVR:** An NVR or Network Video Recorder simplifies IP camera installations by performing many of the same tasks as an analog DVR. It records video from multiple IP cameras to one or multiple hard drives, manages recording schedules, and streams video from IP cameras to the Internet. FLIR and Digimerge NVRs contain a built-in PoE switch. This allows cameras to be connected directly to the NVR for power and network transmission.

A computer server may be used to perform the functions of an NVR with specialized software such as Milestone XProtect®. This article will use the term NVR/Server to identify either a dedicated NVR device or a computer server that supports IP cameras.

Required Equipment for IP Camera Installs

To install an IP camera system, you will need the following:

- **IP Cameras**

- **NVR/Server with High-capacity Storage:** To save time, it is recommended to use a FLIR or Digimerge SyncroIP NVR. A SyncroIP NVR will automatically detect and record supported IP cameras and contains a built-in PoE switch for easy installation.

- **PoE Switch or Power Supplies for the IP Cameras:** This requirement depends on the number of cameras you are using in the installation. Each camera will need to receive power from a PoE switch or a DC power adapter. You can power a single camera off each of the NVR's PoE ports, but any cameras exceeding the number of PoE ports will need to be connected to an external PoE switch (recommended) or to a DC power adapter. They will also need to connect to the LAN either through the PoE switch or via a direct connection to the router.

- **Router:** A router is required to connect the NVR to the Internet and to connect devices within the system. The router will assign DHCP addresses to the IP cameras to ensure that any cameras connected to the LAN will be detected by the NVR.

- **Cat5e or Cat6 Ethernet Cabling**

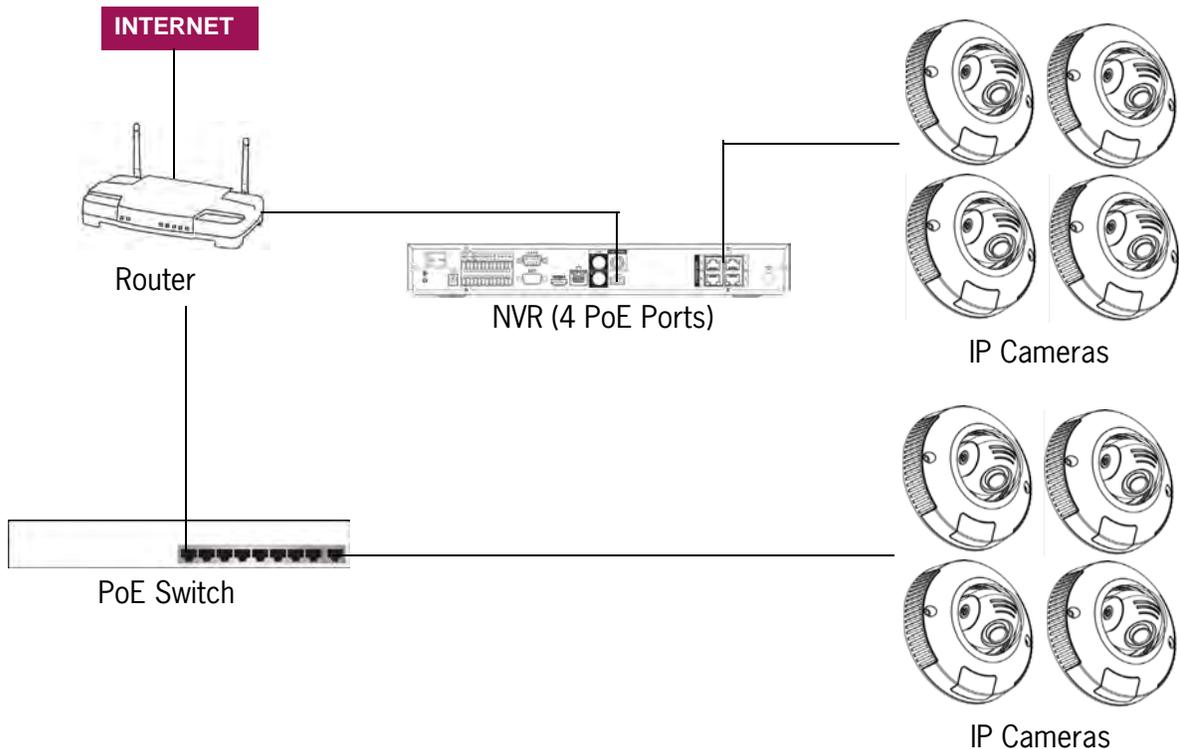See the following page for recommended installation scenarios.

Recommended Installation Diagrams

Lines between devices represent physical connections using Ethernet cabling.

Scenario 1: 4-Channel NVR with 4 PoE Ports and 4 IP Cameras

INTERNET

Router

NVR (4 PoE Ports)
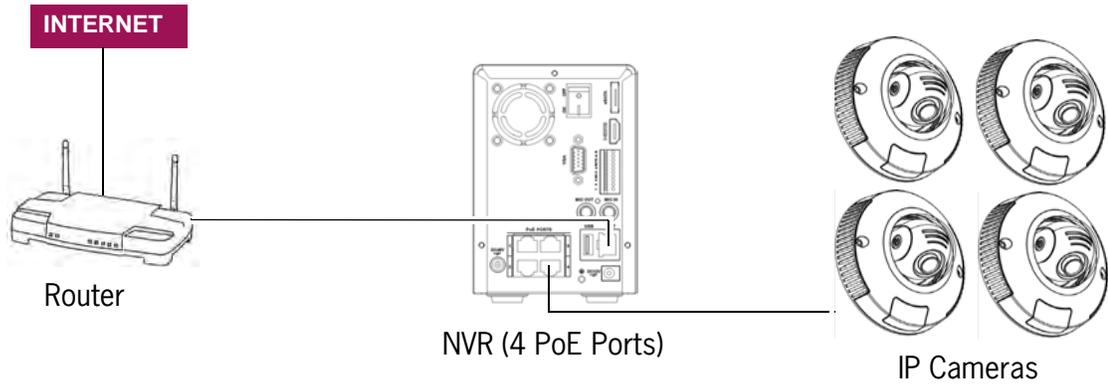
IP Cameras

Scenario 2: 8-Channel NVR with 4 PoE Ports and 8 IP Cameras

INTERNET

Router

NVR (4 PoE Ports)

IP Cameras

PoE Switch

IP Cameras

NOTE: Unlike DVRs, the number of channels supported on an NVR may be different than the number of physical inputs on the back panel of the unit. In the example, the NVR supports 8 channels in total. It has 4 PoE inputs for direct camera connections and can support an additional 4 cameras that are connected to the LAN, in this case via the PoE switch.

References

1. "The Difference Between Hubs, Switches and Routers" http://www.webopedia.com/DidYouKnow/Hardware_Software/2006/router_switch_hub.asp
2. "NAT" http://www.webopedia.com/TERM/N/NAT.html