

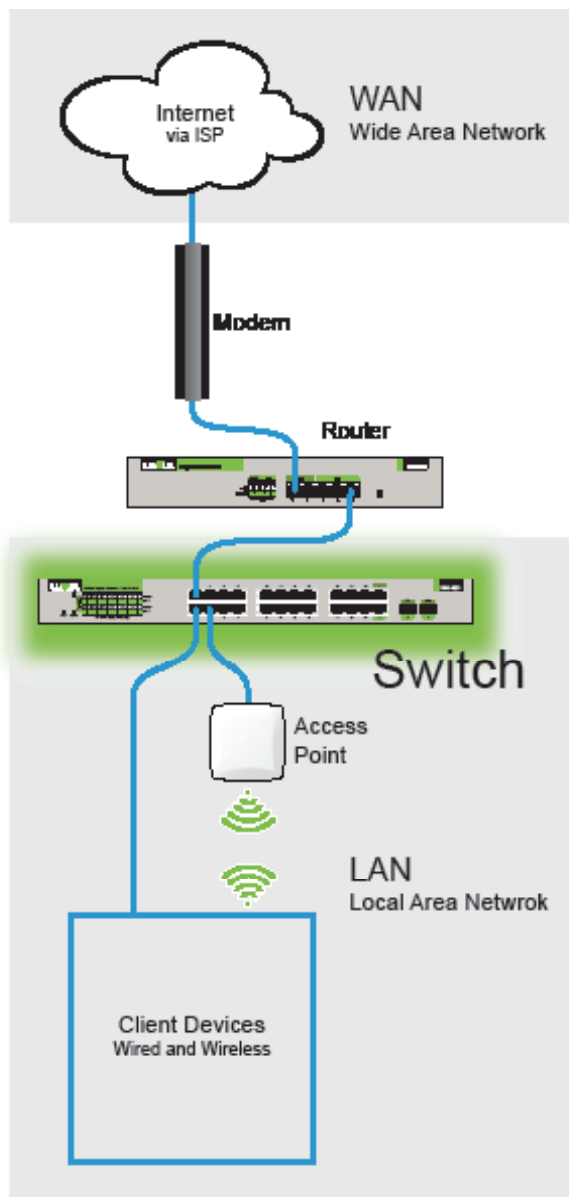
# Professional Installer's Guide to IP Networking: Ethernet Switches

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In the previous 3 installments of this series, we discussed the basic components of an IP network, the functions of those components and then took a closer look at Routers. In this issue we will focus on Ethernet Switches—the backbone of your local network. When selecting a switch or a combination of switches for your network, there are several issues to consider:

## **Fast Ethernet or Gigabit**

The decision of whether to use Fast Ethernet (10/100Mbps) or Gigabit (1000Mbps) is really a matter of economics, practicality and where the switch resides within the network. A network is only as good as its weakest link, so it stands to reason that using Gigabit (which delivers 10X the performance of Fast Ethernet) is typically the safe and recommended choice to ensure network performance and longevity. This is especially true for any core switch within the network. At the same time, Fast Ethernet is relatively inexpensive and 100Mbps is more than sufficient for many applications. That being the case, Fast Ethernet may be a reliable and cost-effective option for connecting non-critical devices at the edge of the network.



## Switch Fabric

The Switch Fabric or Backplane determines how much bandwidth the switch really offers. All switches are not created equal and it is important to understand the switching capacity before making a buying decision. For optimal network performance, be sure to choose a switch with a Non-Blocking (Full Duplex) architecture. What this means is that the switch can send and receive data simultaneously at full data rates. For example, a Gigabit (1000Mbps) connection based on a Full Duplex architecture provides a download rate of 1000Mbps as well as an upload rate of 1000Mbps—essentially making the true throughput of each port 2000Mbps. On the other hand, a Half Duplex switch architecture does not allow for simultaneous data transfers. Rather, it uses one channel for both send and receive data, creating a bottleneck and dramatically reducing network performance.

A Non-Blocking/Full Duplex switch fabric essentially doubles the amount of bandwidth available. So, if buying a 24-port Gigabit switch, look for one that has a 48 Gigabit (48000Mbps) Switch Fabric/Backplane Bandwidth. Making sure your switch choice is capable of non-blocking performance will provide an optimal local network backbone and improve user experience tremendously.

Image 1: Typical IP Networking Components and Topology



Image 2: Luxul Family of Managed and Unmanaged Switches

## Managed or Unmanaged

Ethernet switches can be either Unmanaged plug-and-play devices with no user definable settings; or Managed, allowing for optimization and prioritization of certain ports and applications. When should you use a managed switch? Here are a few cases where a managed switch will help you deliver the best possible solution to your customer:

- ▶ Whenever using VoIP, Streaming Media or other critical applications. Most managed switches support Quality of Service (QoS) functionality, which allows you to set priorities for these applications and ensure optimal performance.
- ▶ If you need to setup a secure guest network or otherwise isolate network traffic of certain applications, a managed switch can be used to configure a Virtual Local Area Network (VLAN).
- ▶ Any applications that call for specific protocol support such as IGMP (Internet Group Management Protocol), or STP-RSTP-MSTP (Spanning Tree Protocols) will require a managed switch.
- ▶ The number of devices on the network may determine whether or not to use a managed switch. With more devices, you have more switches. Anytime you have a network with 3 or more switches, a central managed switch is recommended for optimal control and configuration.
- ▶ Another practical benefit of a managed switch is the ability to gather data. With Port Statistics, SNMP (Simple Network Management Protocol), and Syslog support there are many different ways to see what is going on and even be notified when you are off site (through a supported SNMP Management Suite).



The choice of managed or unmanaged depends on the circumstances and is typically even a mix of both when using multiple switches. The primary consideration really comes down to understanding how many and what types of devices will be on the network as well as any extra support that may be required by the devices or applications.

### **Power over Ethernet (PoE)**

Power over Ethernet (PoE) lets you run both data and power to a device using a single Ethernet cable, making device installation very simple and cost-effective. This capability can be especially helpful if the device is in a difficult to reach location or if there is no local power available where the device will be placed. It's especially useful for IP security camera placement. Another great benefit is that Ethernet cable is relatively inexpensive and pulling it does not require a licensed electrician.

Switches that support PoE are available with the same basic options as non-PoE switches (i.e. Managed, Unmanaged, Gigabit, Fast Ethernet). A Managed PoE Switch will typically provide similar capabilities as a managed non-PoE switch, plus it will give you the capability of remotely managing and power cycling your PoE devices.

Before selecting a PoE switch, be sure to understand the PoE power requirements of the devices that will be connected to the switch. PoE is currently available in three flavors:



Image 3: Luxul 24-Port Gigabit Managed PoE Switch (XMS-1024P)

- ▶ 802.3af PoE (Autosensing 48VDC 15.4 Watts)
- ▶ 802.3at PoE+ (Autosensing 48VDC 30 Watts).
- ▶ Legacy PoE (48VDC 48 Watts continuous power)

Most modern switches are either 802.3af or 802.3at (backwards compatible with 802.3af). Some switches, such as the Luxul 24-port Gigabit Managed PoE Switch can support both. Most modern PoE switches are incapable of supporting Legacy PoE.

With so many Ethernet switch choices and options available, the decision of which switch or switches to use is really a function of the specific installation and application requirements. There is no one-size fits all and it is important for an installer to understand the implications of using each of the various options in order to best deliver an efficient and affordable network solution.