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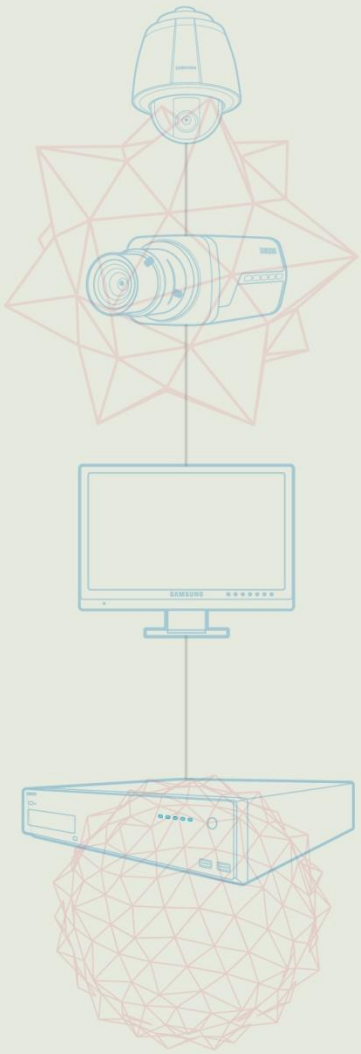
Network Expansion Devices, Switches & Routers

This chapter provides understandings on network devices such as switches and routers, used for expanding coverage of the network.



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Hub, Switch and Router

Ethernet hub, switch device and routers are network devices that connect the multiple devices that make up a network. With such devices, network products are physically connected and enabled for data transmission if assigned with proper network addresses that identify each device. Hubs, switches and routers are distinguished by how they transfer data to its destination.

Hubs usually referred to as 'dummy hubs', receives data from one connected device and sends it to all connected devices. A data packet is transferred to all connected devices, so the sending device has to check whether the data was sent by itself or not. Hence, the greater the connected devices, the bigger the data traffic and number of conflicts that may occur; this slows down the network speed. A Hub is cheaper than other network devices but it becomes less popular due to its weakness described above.

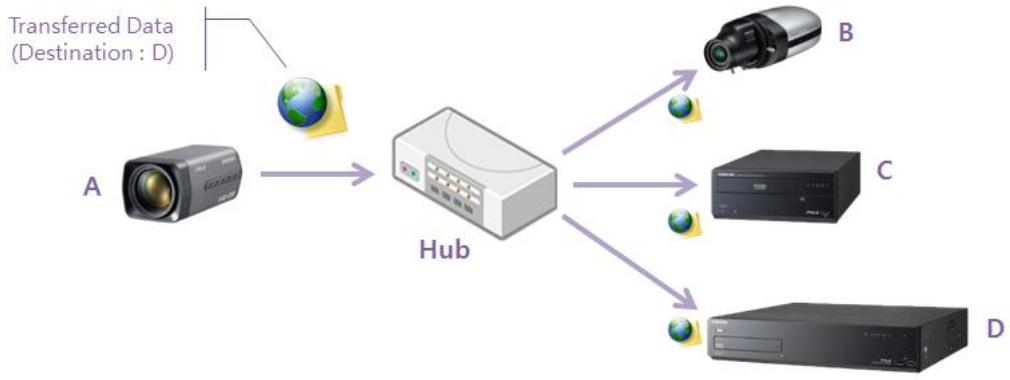


Fig 1. Data Transmission with Hub

Switch devices have the same role as a hub, but they identify the data packet's destination and only send it to the designated network device instead of sending to all the connected devices. This result in far better performance with regards to network speed compared to hubs. Equipped with an internal processor and memory of its own the switch device can stores all connected devices' MAC addresses as table in the memory. Then it identifies the data packet's destination by checking the table for the target device's MAC address, and sends the data to the designated device only. It is commonly used to expand a private network that is not connecting to another network.

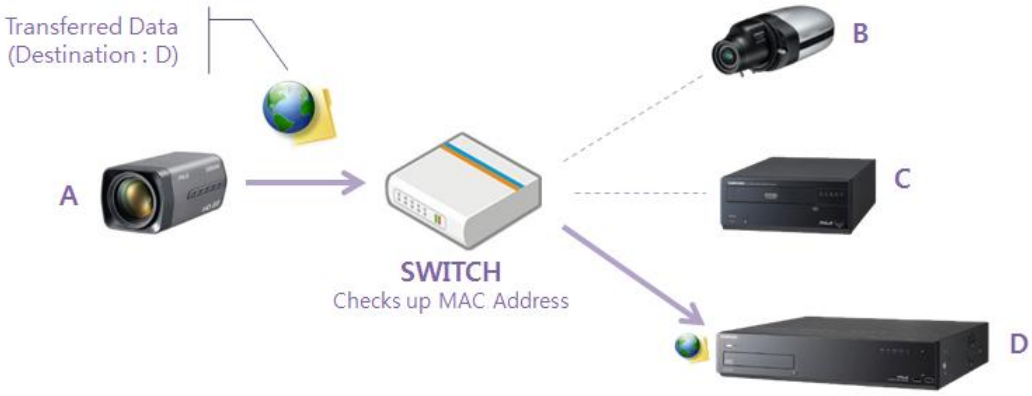


Fig 2. Data Transmission with Switch Device

Lastly, the Router, this is a device that also limits the data destination to the designated network device. It utilizes destination IP address specified in the data packet to distinguish the target device, and finds the optimal path to the destination device using this information. It also supports connection to an external network. It is commonly used to connect two or more networks to conform to a bigger network.

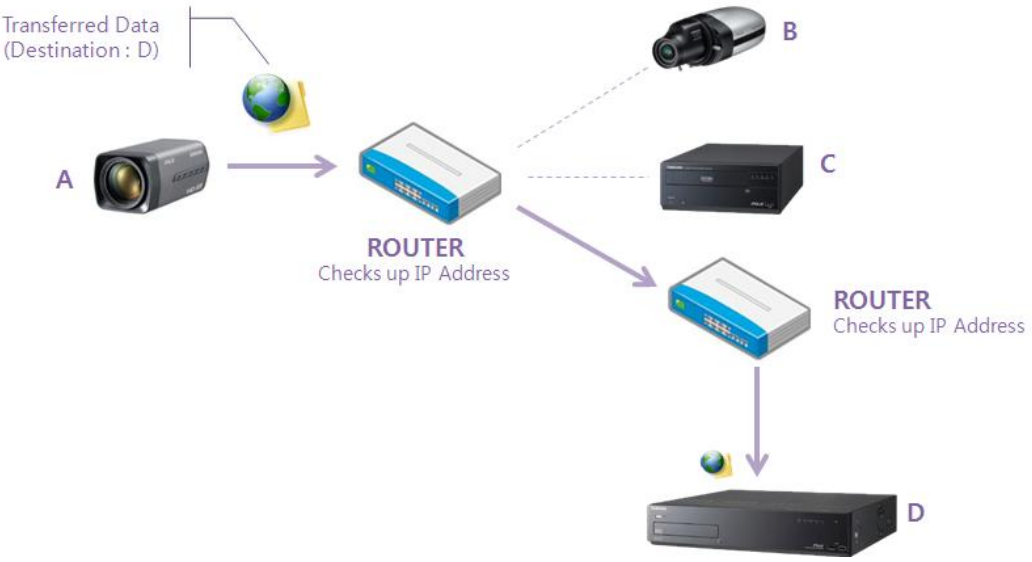
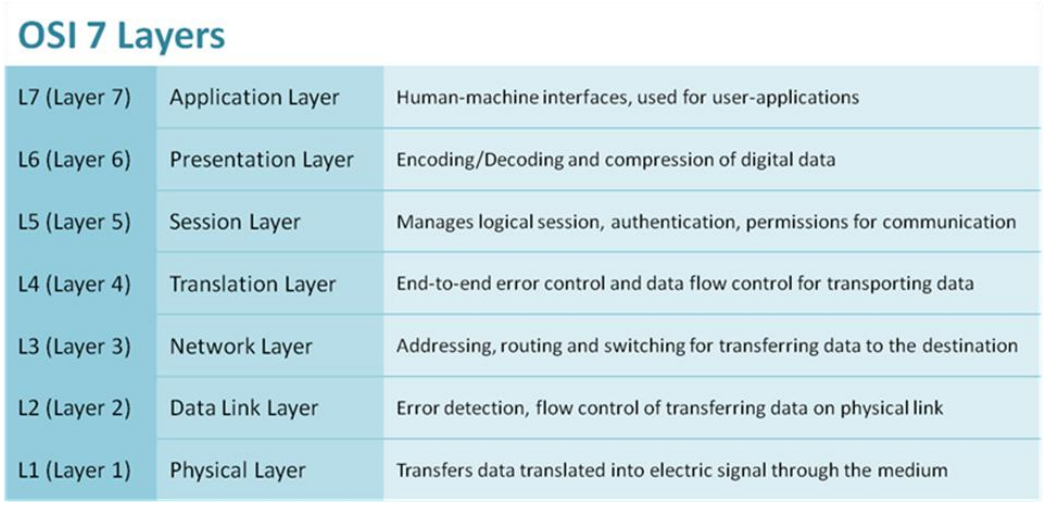


Fig 3. Data transmission to external network with Routers

L2 & L3 Switches

L2 and L3 switches are distinguished by how they interpret the destination address by referring to the information of a data packet. Transferring data on a network traverses OSI 7 layers; L2 switches refer to the 2nd of OSI 7 layers, while L3 switches refer to the 3rd layer.

Fig 4. OSI 7 Layers



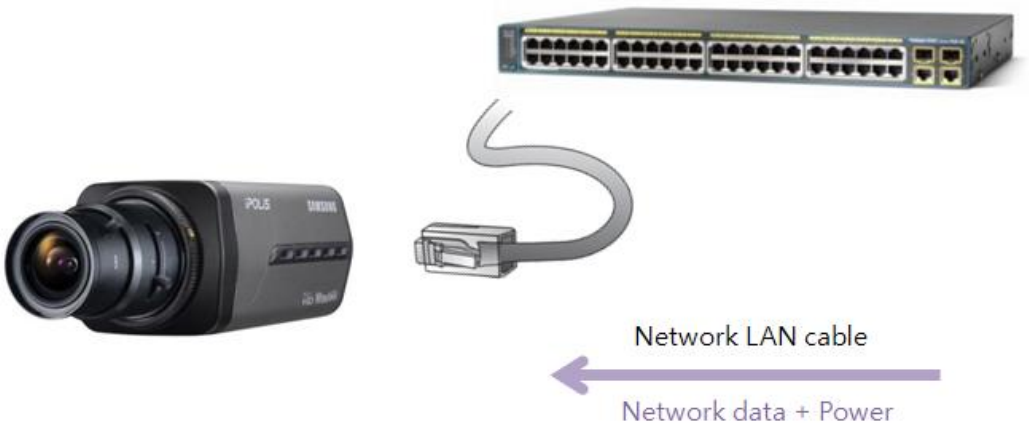
L2 switches are the most common device, supports less and simpler functions than L3 switches, and are affordable. Switch device has its own memory and reserves port mappings with MAC addresses connected to its ports. When transferring data, it reads destination MAC address from the data packet and looks up the memory table to only send to the designated port.. Due to its simplicity, it provides a robust, performance and is cheap. Still, it does not support expansion to an external network, and is commonly used to construct a small-sized network.

L3 switches use the destination IP address for data transmission. L3 switches are basically derived from L2 switches, but resemble router functions, and can be defined as a router device. They are integrated with router functions for connecting to external networks, and commonly equipped with high-performance hardware. They transfer data with memorized IP addresses mapped to each port of the device. These switches also provide various functions such as network traffic monitoring and virtual LAN construction.

PoE Switch

A PoE switch not only transfers data through the network cable but also transfers the power (Power over Ethernet). In general, to take advantage of PoE, a PoE network should be composed with PoE devices and PoE switch.

Fig 5. Powering Camera with PoE



A PoE switch is more expensive than general switch devices. But it saves the need tp run power cable to all connected network devices; this simplifies installation and cabling as well as reduced installation cost.

When constructing a PoE network, it is required to check the provided power capacity by the PoE switch and the number of supported PoE ports before the installation, when considering your requirements. If provided power by the PoE switch fails to satisfy camera's requirement, camera function may not properly perform.

Fig 6. PoE Switch

EX) Cisco Catalyst 2960 48 PoE Switch

Switch Model	Maximum Number of PoE+ (IEEE 802.3at) Ports*	Maximum Number of PoE (IEEE 802.3af) Ports*	Available PoE Power
10 Gigabit Uplinks with 10/100/1000 Ethernet Connectivity			
Cisco Catalyst 2960S-48FPD-L	24 ports up to 30W	48 ports up to 15.4W	740W

- PoE+ (IEEE 802.3at) : 24ports, 30W/port
- PoE (IEEE 802.3af) : 48ports, 15.4W/port

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■ Functions and specifications on this document are subject to change without prior notice for improved performance and quality.

You can find more information from the “Online Tutorial” at Samsung Techwin’s CCTV site.
http://www.samsungcctv.com