



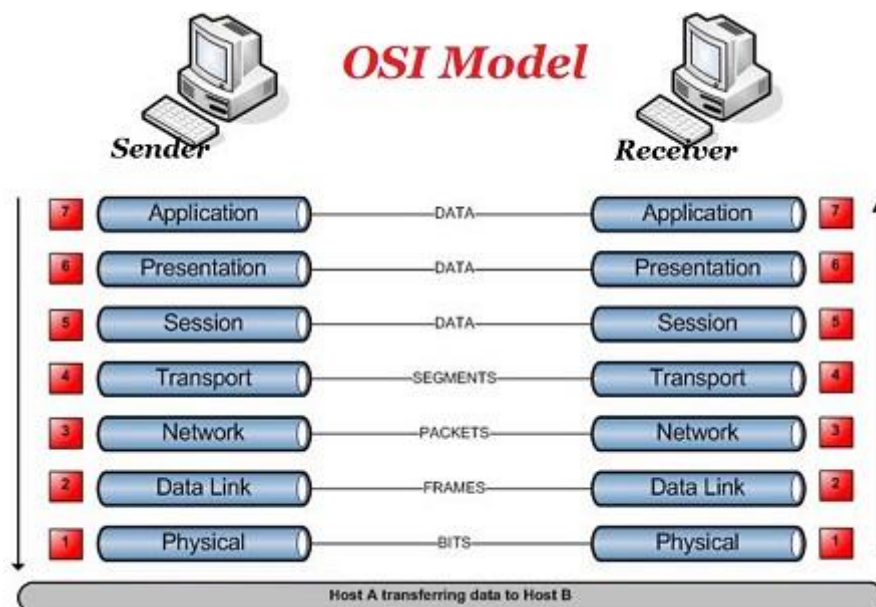
INSCAPE DATA CORPORATION

## Layer 2 Switch vs. Layer 3 Switch

### Difference between Layer 2 / Layer 2+ Switch and Layer 3 Switch

A network switch is a hardware device that connects multiple devices by using packets switching to receive and transmit data, i.e., packets, in one local area network (LAN). More specifically, the network switch uses addresses to transmit and receive the packets to and from each of the devices. Each device has two types of addresses, namely, MAC (Media Access Control) address and IP (Internet Protocol) address. Logically, two devices communicate with each other based on a seven-layer OSI (Open System Interconnect) model, i.e., network protocols, and the two devices follow the network protocols, as shown below, to communicate with each other and the rest of the devices in the network.

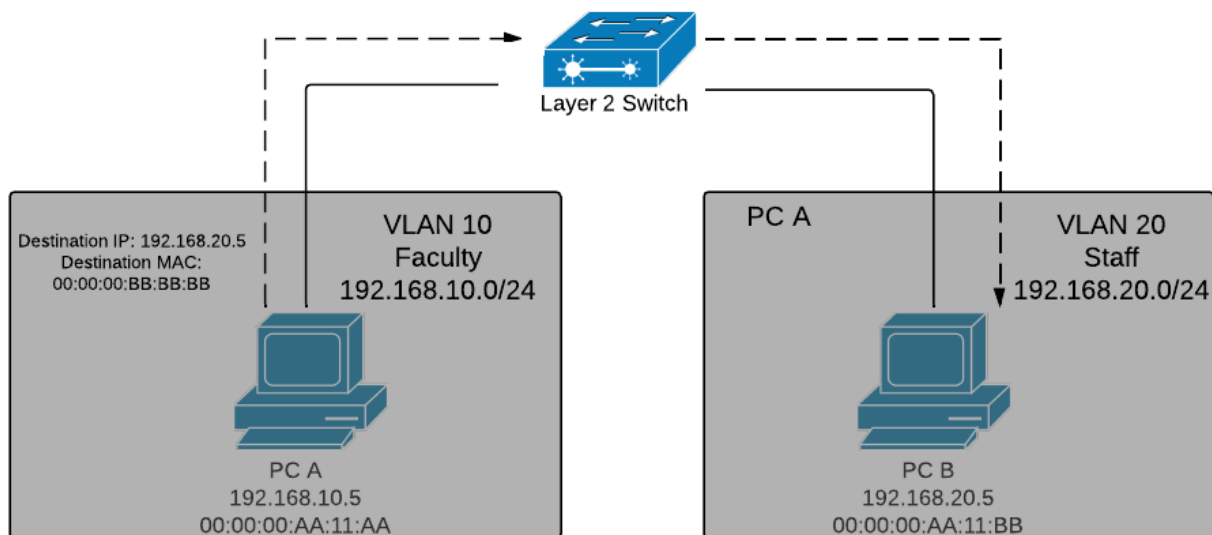
A Layer 2 switch works on layer 2 of the OSI model i.e., data link layer and sends a packet to destination port using the MAC address table which stores the mac address of a device associated with that port. A Layer 3 switch works on layer 3 of the OSI model i.e., network layer where it route packet by using IP address via hardware switching, and it is used widely in VLAN applications. In this article, we will provide an overview of the difference between Layer 2 / 2+ and Layer 3 switches in general and help to guide you through the selection process when considering the Layer 2 / 2+ and Layer 3 switches.



**7-Layer OSI Network Model**

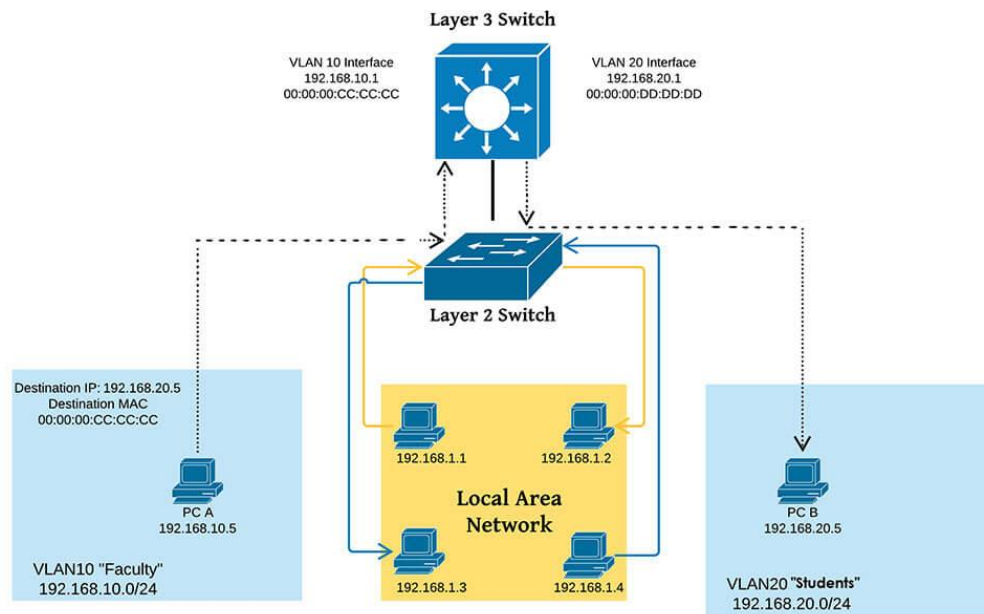
## What Is Layer 2 and Layer 2+ Switch?

A Layer 2 switch links devices together by switching the packets sent and received in the network, which means they operate using devices' MAC addresses to redirect the data packets from the source port to the destination port. It does that by maintaining a MAC address table to remember which ports have which MAC addresses assigned, as demonstrated in the diagram below. A MAC address operates within the Layer 2 of the OSI reference model. A MAC address differentiates one device from another with each device being assigned a unique MAC address. It utilizes hardware-based switching techniques to manage traffic in a LAN (Local Area Network). As switching occurs at Layer 2, the process is quite faster because all it does is sorting MAC addresses at a physical layer. In simple terms, a Layer 2 switch acts as a bridge between multiple devices. The Layer 2+ switch adds some Layer 3 features, i.e., VLAN. For example: DHCP snooping, ACL rule according to IP address, and the Layer 2+ is capable of doing some routing using static routes between VLANs.



## What Is Layer 3 Switch?

Unlike Layer 2 switches, Layer 3 does routing using IP addresses, and the routing table is implemented by ASIC's (Application Specific Integrated Circuits). Layer 2 switches were not able to route data packets at layer 3. As a result, the Layer 3 switch performs much faster in routing compared to the Layer 2 switch with the specialized hardware in routing data packets, as demonstrated in the diagram. Layer 3 switches have fast switching capabilities and they have higher port density. They are significant upgrades over the traditional routers to provide better performance and the main advantage of using Layer 3 switches is that they can route data packets without making extra network hops, thus making it faster than routers. However, they lack some added functionalities of a true router. Layer 3 switches are commonly used in large scale enterprises. Generally speaking, a Layer 3 switch is nothing but a high-speed router but without WAN connectivity.

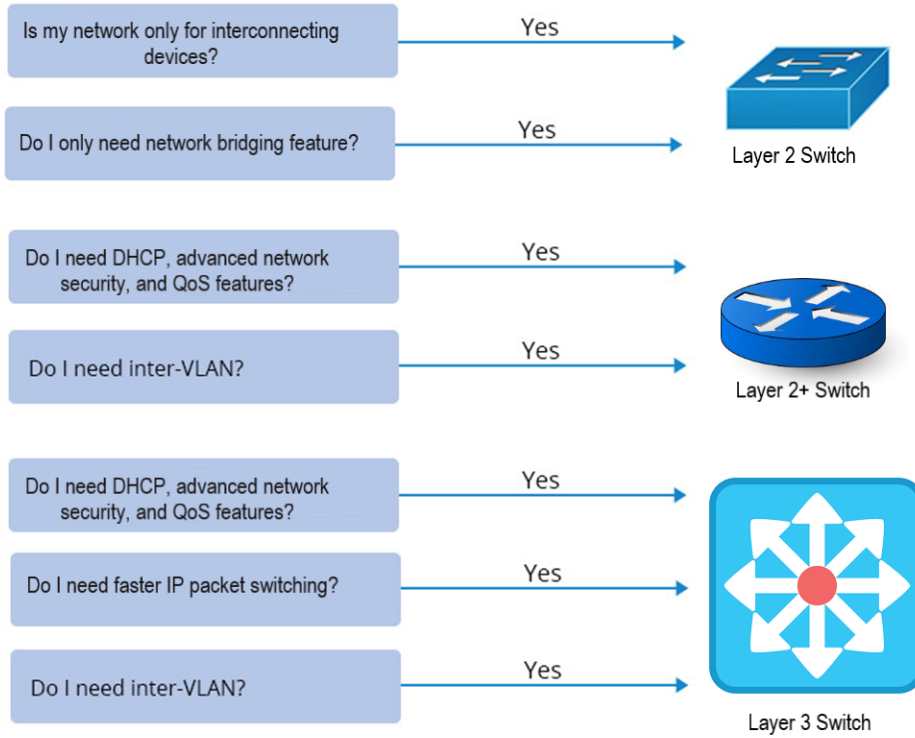


## Layer 2 / 2+ vs. Layer 3 Switch

The main difference between Layer 2 and Layer 3 is the switching and routing function. A Layer 2 switch works with MAC addresses only and does not care about IP addresses or any items of higher layers. But, a Layer 3 switch, or multilayer switch, can do all the job that a Layer 2 switch does. The Layer 3 switch can do static routing and or dynamic routing. That means, a Layer 3 switch has both MAC address table and IP routing table, and it can handle intra-VLAN communication and packets routing between different VLANs as well. A switch that adds only static routing is known as a Layer 2+ or Layer 3. Other than routing packets, Layer 3 switches also include some functions that require the ability to understand the IP address information of data entering the switch, such as tagging VLAN traffic based on IP address instead of manually configuring a port. In general, the Layer 3 switches are more powerful than the Layer 2 / 2+ switches.

When considering between Layer 2 and Layer 3 switches, you should look into where it will be used. If you only have a Layer 2 domain, you can go for Layer 2 switch. A pure Layer 2 domain is where the hosts are connected, so a Layer 2 switch will work fine there. This is usually called media access layer in a network topology. If you need the switch to aggregate multiple access switches and do inter-VLAN routing, then a Layer 3 switch is needed. The following diagram and table help and guide you through the comparison and selection process when you considering the Layer 2 / 2+ and Layer 3 switches.

## Selection Guides



**Layer 2 / 2+ and Layer 3 Comparison Table**

Item	Layer 2 Switch	Layer 2+ Switch	Layer 3 Switch
Switching Function	MAC address	MAC address	IP address switching by hardware
802.1x, ACL, DHCP Snooping Security Feature	No	Yes	Yes
Spanning Tree Bridging Feature	Yes	Yes	Yes
VLAN Tagging Based on IP Address	No	Yes	Yes
Inter-VLAN	No	Yes	Yes

## Summary

This article intends to provide an overview of Layer 2, Layer 2+ and Layer 3 PoE switches and the article is more toward Inscape Data's switches in general. Based on this overview, we hope you will have a better understanding when selecting a switch to meet your specific application. If you would like to learn more about the technical details of Inscape Data's network switches, please contact our sales and customer service team by email, [sales@inscapedata.com](mailto:sales@inscapedata.com). You can also visit [Inscape Data's website product page](#) and find one of the switches for your needs.

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