

Everything You Need
To Know About...

POE

A GUIDE FROM EXPERTS AT

SILVERNET

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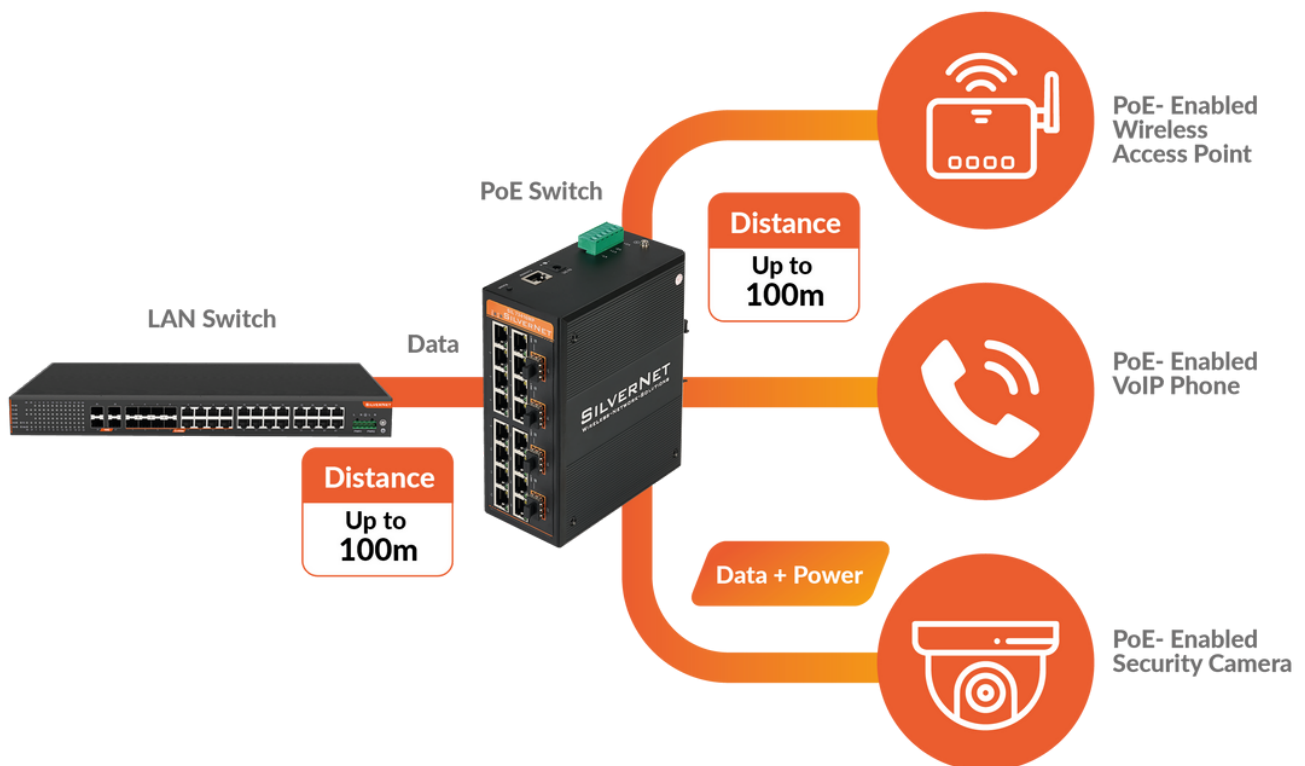
Power over Ethernet (PoE) is an impressive technology that has been around since the early 2000's, becoming more powerful, and more commonly used over the years. Despite it's increased usage, many people have questions about what it is, as well as how, when and where to use it.

Wireless experts at SilverNet have put together this simple document to explain some of the basics about PoE to help you make a confident, informed choice for your PoE installations.

What is PoE?

Power over Ethernet (PoE) is a technology that enables electrical power to be transmitted over Ethernet cables - the same cables that are used for data transmission.

Using PoE technology eliminates the need for separate power cables, and so reduces the complexity and cost of network installations.



PoE was first standardized in 2003 by the Institute of Electrical and Electronics Engineers (IEEE) under the 802.3af standard, which provided up to 15.4 watts of power to a device. Since then things have moved on, and several other PoE standards have been developed, including:

Standard	Power Provided to Device...	Suitable for...	Established in...
802.3af-2003	Up To 15.4w	Lower power requirement devices such as WIFI APs and IP telephones	2003
802.3at (PoE+)	Up To 30w	Higher-powered devices such as IP cameras and wireless access points	2009
802.3bt (PoE++)	Up To 90w	Even higher-powered devices such as high-end laptops and pan-tilt-zoom (PTZ) cameras	2018

In addition to these standards, there are also several proprietary PoE technologies available. These proprietary technologies can provide even more power than the standard PoE technologies, but they are typically only compatible with devices from the same manufacturer.

Important Note...

802.3bt Type 3 is a new type of PoE that was introduced in 2020 and can provide up to 60 watts of power to a device.

802.3bt Type 4 is the highest-powered PoE standard available, providing up to 90 watts of power to a device.

In Summary:

PoE is a versatile technology that can simplify network installations and reduce costs by eliminating the need for separate power cables. With several different standards and proprietary technologies available, there is a PoE solution for almost any device or application.

What Cable Should I Use for PoE?

The cable requirements for PoE depend on the specific standard being used. Below you'll find a breakdown of the cable requirements for each PoE standard.

Standard	Requirements	Pins/Pairs
802.3af (PoE)	Category 3 or higher Ethernet cable for distances up to 100 meters (328 feet), or Category 5 or higher Ethernet cable for distances up to 150 meters (492 feet)	4 Pins/2 Pairs
802.3at (PoE+)	Category 5 or higher Ethernet cable for distances up to 100 meters (328 feet)	4 Pins/2 Pairs
802.3bt (PoE++)	Category 5 or higher Ethernet cable for distances up to 100 meters (328 feet) when using Type 3 PoE, and Category 6 or higher Ethernet cable for distances up to 100 meters (328 feet) when using Type 4 PoE	8 Pins/ 4 Pairs

Important Note...

It's important to note that the cable requirements for PoE also depend on the power requirements of the device being powered. To avoid power loss over longer distances, devices requiring more power will generally need higher quality Ethernet cables to avoid power loss over longer distances.

In Summary:

The cable needed depends on the PoE standard you're installing, and the power requirements of the device you're powering. Make sure to check the requirements before installation to avoid any potential damage to your equipment.

In addition to cable requirements, it's also vital to ensure that the network switch or injector used to provide PoE is compatible with the specific PoE standard being used. This information should be provided in the device's specifications, but if not be sure to contact the manufacturer for further advice.

Can PoE Damage My Equipment?

Properly designed and implemented Power over Ethernet (PoE) systems should not cause any harm to your equipment.

PoE is designed to deliver power to PoE-enabled devices in a safe, reliable way. Prior to sending any power to a connected Powered Device (PD), the Power Sourcing Equipment (PSE) conducts a “handshake procedure” to determine the amount of power the device needs. This procedure uses low voltage and is non-destructive to any connected device, whether PoE or non-PoE.

In Summary:

If you follow the PoE standards and power requirements, use good-quality Ethernet cables, and install surge protectors, you can implement PoE safely and without causing harm to your equipment. Follow our safety guidelines for success...

SilverNet's PoE Safety Guidelines

Check the PoE Standards: Make sure that your PoE-enabled devices and PoE injectors/switches comply with the same PoE standard. Mixing different PoE standards can result in overloading or underpowering the devices, which can cause damage.

Check the Power Requirements: Make sure that the power requirements of your PoE devices do not exceed the power output of your PoE injectors/switches. Overloading the PoE injectors/switches can cause overheating and damage to the equipment.

Check the Cable Quality: Ensure that the Ethernet cables used in your PoE system are of good quality and can handle the power and data transmission requirements. Poor-quality Ethernet cables can lead to power loss and damage the equipment.

Use Surge Protectors: Install surge protectors on your PoE equipment to protect against power surges and lightning strikes. These can cause irreparable damage to your equipment if they are not protected.

What is PoE Mode?

Power over Ethernet (PoE) has several modes of operation which determine how power is delivered over Ethernet cables.

Three PoE modes are supported:

Mode A: Also known as "Alternative A" or "Pins 1,2,3,6".

Mode A delivers power over the same wires as data transmission (pins 1, 2, 3, and 6) in an Ethernet cable. This mode is used in IEEE 802.3af and 802.3at standards and provides up to 15.4W and 30W of power, respectively.

Mode B: Also known as "Alternative B" or "Pins 4,5,7,8".

Mode B delivers power over the spare wires in an Ethernet cable (pins 4, 5, 7, and 8) while data transmission uses pins 1, 2, 3, and 6. Mode B is not used in any IEEE PoE standard, but is used in some proprietary PoE systems.

Mode AB: Also known as "Alternative A+B" or "Pins 1,2,3,6,4,5,7,8".

Mode AB is a combination of Mode A and Mode B, which means that both data and power are transmitted over all eight wires in an Ethernet cable. Mode AB is used in IEEE 802.3bt (Type 3 and Type 4) standards and can provide up to 60W and 90W of power, respectively.

Important Note...

It's important to note that the PoE modes supported by a particular device depend on its PoE standard and its power requirements. For example, a device that supports IEEE 802.3af can only receive power using Mode AB.

In Summary:

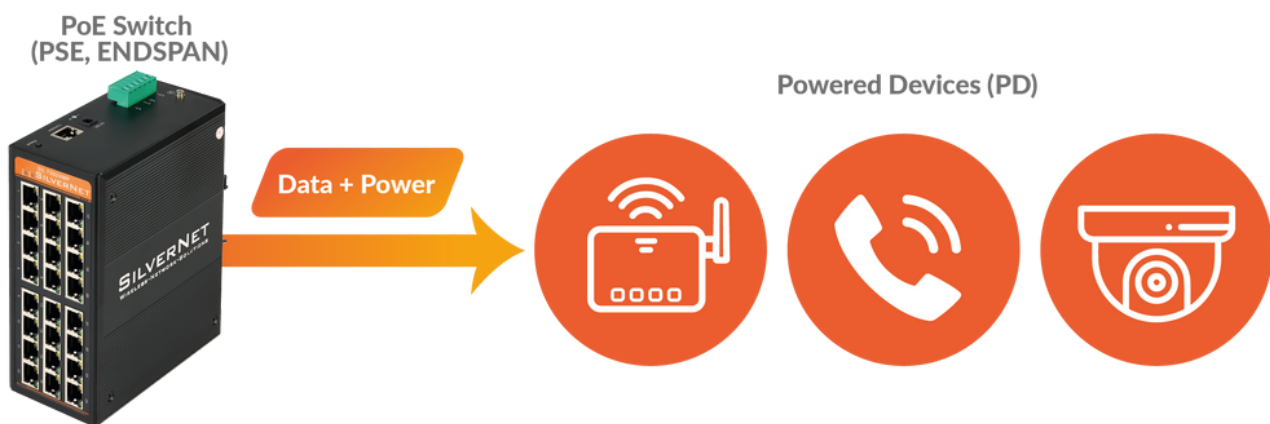
There are 3 modes of PoE operation, determining how power is delivered. However, PoE modes supported by a particular device can depend on its PoE standard and power requirements, so be sure to check compatibility.

What is a PoE Midspan or PoE Endspan?

An Endspan and a Midspan are two different methods for delivering Power over Ethernet (PoE) to devices.

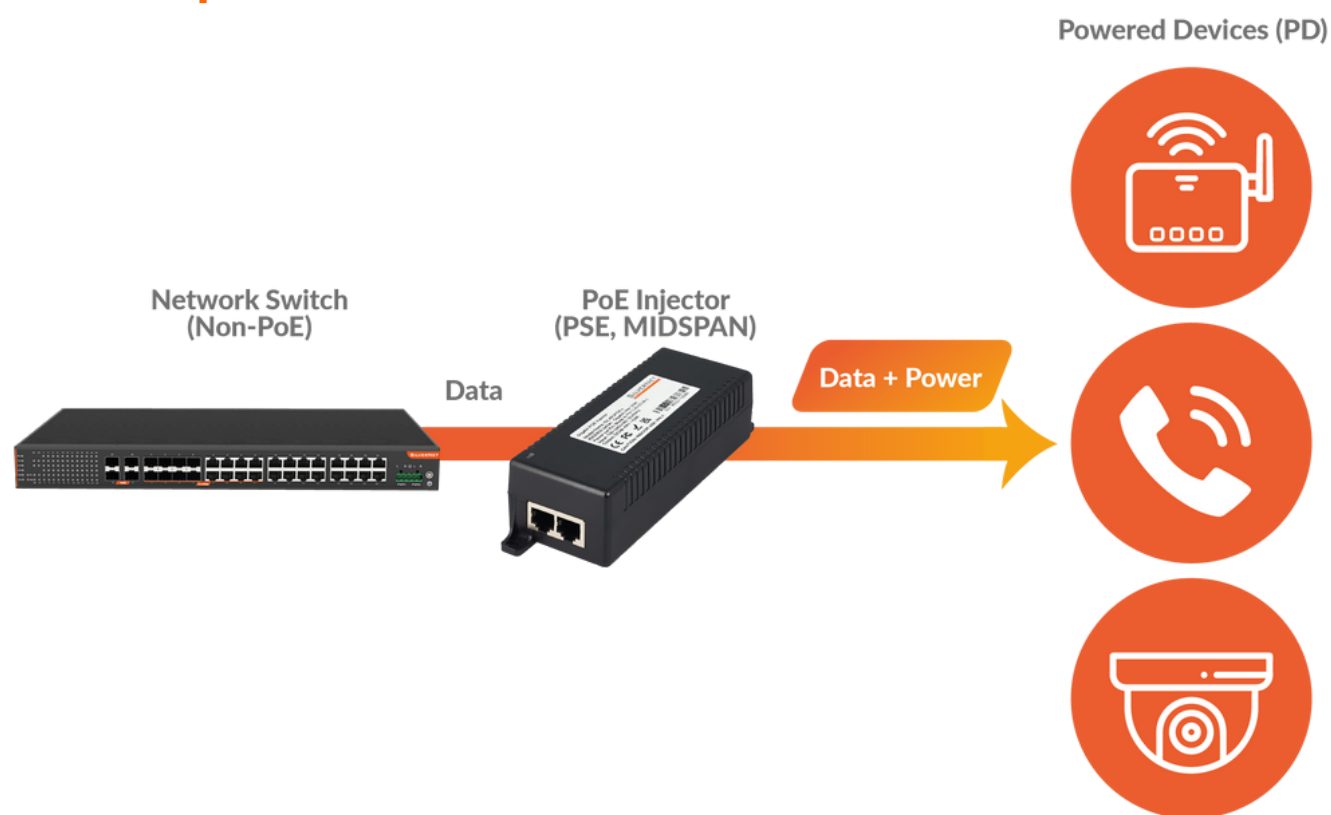
An Endspan, also known as a PoE switch or an Ethernet switch with integrated PoE, is a network switch that is capable of delivering power to PoE-enabled devices. Endspans can provide power to PoE devices through the same Ethernet cable used for data transmission, and are often used in network installations where PoE is required for multiple devices.

PoE Endspan



On the other hand, a Midspan, also known as a PoE injector, is a device that is placed between the network switch and the PoE-enabled device. The midspan injects power into the Ethernet cable, allowing it to be transmitted to the PoE device. Midspans are often used in network installations where PoE is only required for a few devices, or where an existing network switch does not support PoE.

PoE Midspan



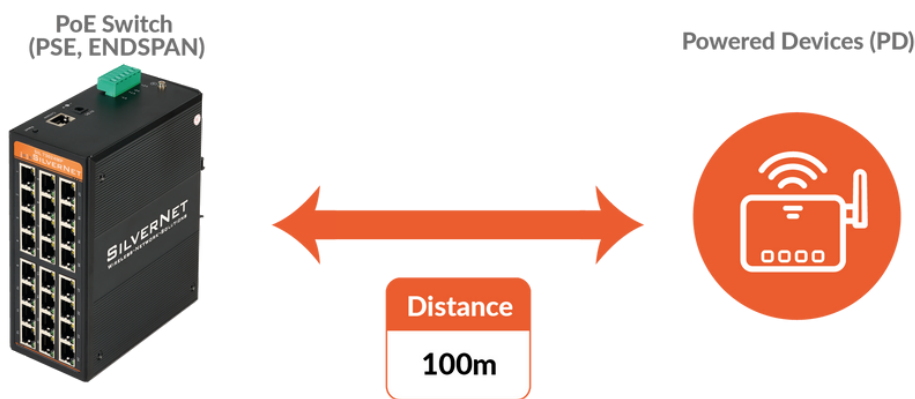
The key difference between Endspans and Midspans is the location where the power is injected into the Ethernet cable. Endspans inject power from within the network switch, while Midspans inject power from an external device. This can affect the overall network architecture and the number of devices that can be powered using PoE.

In Summary:

Endspans are more commonly used in larger network installations where PoE is required for multiple devices, while Midspans are more commonly used in smaller network installations or in situations where PoE is only required for a few devices.

What if the distance to my device is further than 100m?

Power over Ethernet (PoE) has a maximum cable length of 100 meters (328 feet) for data and power transmission over Ethernet cables. However, there are several methods you can use to extend PoE beyond this limit...

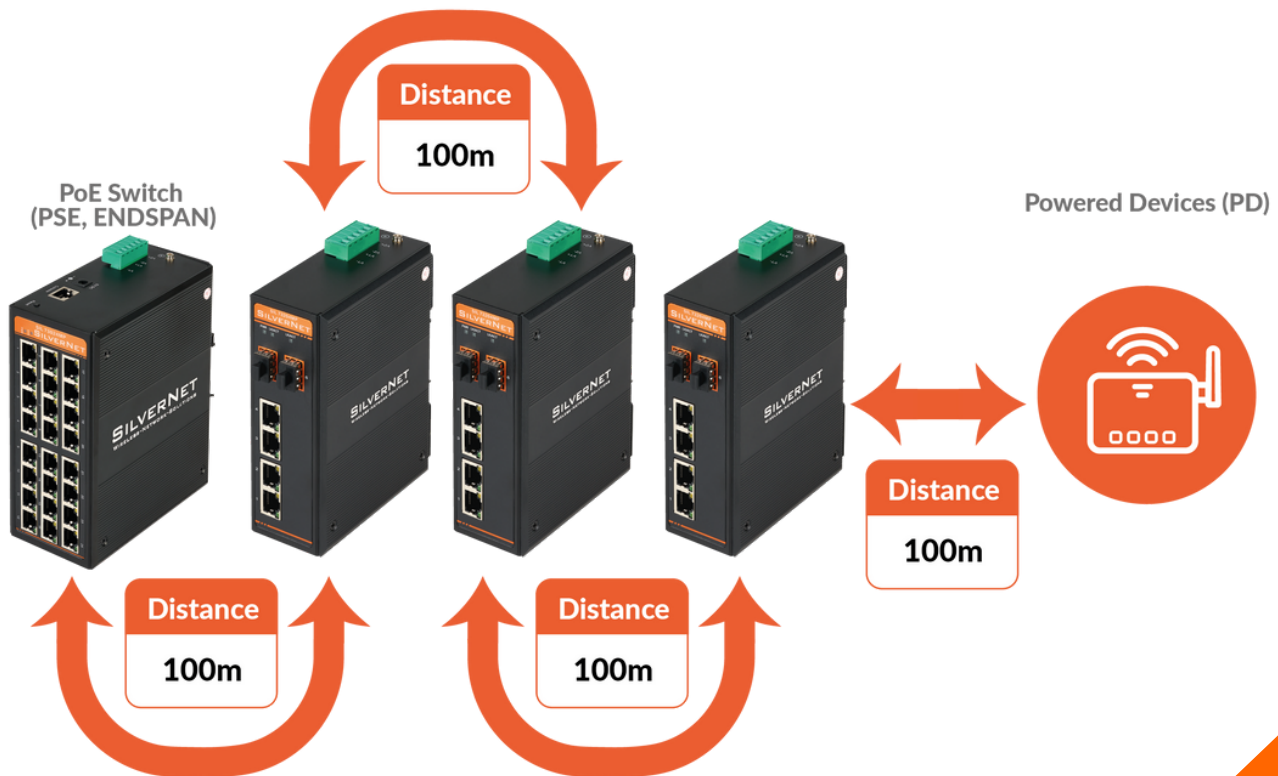


Over 100m, Other Options

PoE Extenders: They work by amplifying the PoE signal and regenerating the power at the far end of the Ethernet cable. PoE extenders are typically used in situations where it is not feasible or cost-effective to install additional network switches or power sources.

Fibre Optic Cable: Fibre optic cable can transmit data and power over much longer distances than Ethernet cables - this is called PoF (Power over Fibre). However, fibre optic cable requires special connectors and equipment, which can be more expensive than Ethernet cabling.

Multiple PoE Injectors/Switches: In situations where it is not feasible to use PoE extenders or fibre optic cable, you can install multiple PoE injectors or switches along the network path to extend the range of PoE. This can be a cost-effective solution, but it can also be more complex to manage and configure.



Important Note...

Extending the range of PoE beyond 100 meters can reduce the power available to the PoE device at the far end of the Ethernet cable. This is due to power loss over the longer cable lengths. To avoid this, you may need to use higher-quality Ethernet cable or use devices that are designed to compensate for power loss over longer cable lengths.

In Summary:

You can extend your PoE further than 100 metres, but make sure to weigh up the pro's and con's of each method above to ensure you're using the right one for your requirements.

What SilverNet products are PoE?

All SilverNet devices are designed to be PoE compliant. From our Series 7 Industrial switches and Aero Intelligent WiFi equipment to our supplied PoE injectors that come with our PRO Range Professional wireless links, PoE is the most convenient method of powering a device whilst maintaining full operability.

On the next page you'll find a Switch Selector, designed to help you choose the correct switch for your needs, with confidence.

Available devices are:

- Series 7 Switches
- AERO Wi-Fi
- PRO Wireless Bridges

If you have any further questions about PoE, or would like advice or information about any SilverNet products, contact our experts today:

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Now that you understand the in's and out's of PoE, its time to decide which Switch is right for you. Designed to meet the demanding requirements of industrial environments, SilverNet switches offer unrivalled performance and reliability. Explore the different features of our range of industrial switches below to find the ideal switch for your needs.

	Un-Managed			Managed						BT		10G		Rackmount		
	SIL 73101P	SIL 73204P	SIL 73208P	SIL 73204MP	SIL 73208MP	SIL 73416MP	SIL 73024MP	SIL 731216MP	SIL 73424MP	SIL 73204MP-BT	SIL 73208MP-BT	SIL 73408MP-10G	SIL 73816MP-10G	SIL 734C24MP	SIL 716E8C4M	SIL 716S8C4M
Management																
Un-managed	✓	✓	✓													
Managed				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Total Number of 1 Gb Ethernet Ports																
1-3	✓															
4-6		✓		✓						✓						
8-12			✓		✓						✓		✓			
14-20						✓		✓					✓			
24-32							✓	✓	✓					✓	✓	✓
Total Number of 1 Gb PoE Ports																
1	✓															
4		✓		✓						✓						
8			✓		✓						✓		✓			
16						✓	✓	✓					✓			
24									✓					✓		
Total Number of 1Gb SFP Ports																
1	✓															
2		✓	✓	✓	✓					✓	✓					
4						✓			✓			✓		✓		
8													✓			✓
12								✓								
16															✓	
Number of 10G SFP+ Ports																
4													✓	✓	✓	✓
Speed																
1Gb	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
10Gb												✓	✓	✓	✓	✓
PoE																
15.4W PoE (802.3af)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
30W PoE (802.3at)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
60W PoE (802.3bt)										✓	✓					
90W PoE (802.3bt)										✓	✓					
Installation Type																
Desktop	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Wall Mount	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
DIN Rail	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Rackmount														✓	✓	✓
Features																
VLAN				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
QoS				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Multicast				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Static Routing																
Jumbo Frames				✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
Layer 2				✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
Layer 3																
MSTP/RSTP/STP				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
RSTP				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
MSTP				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓



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