

LAN - Network Topology Architectures

- Three-tier Architecture.
- Two-tier Architecture.
- Spine-Leaf Architecture (Data Center).



Three-Tier Architecture

Access Layer

Provides network access to the users

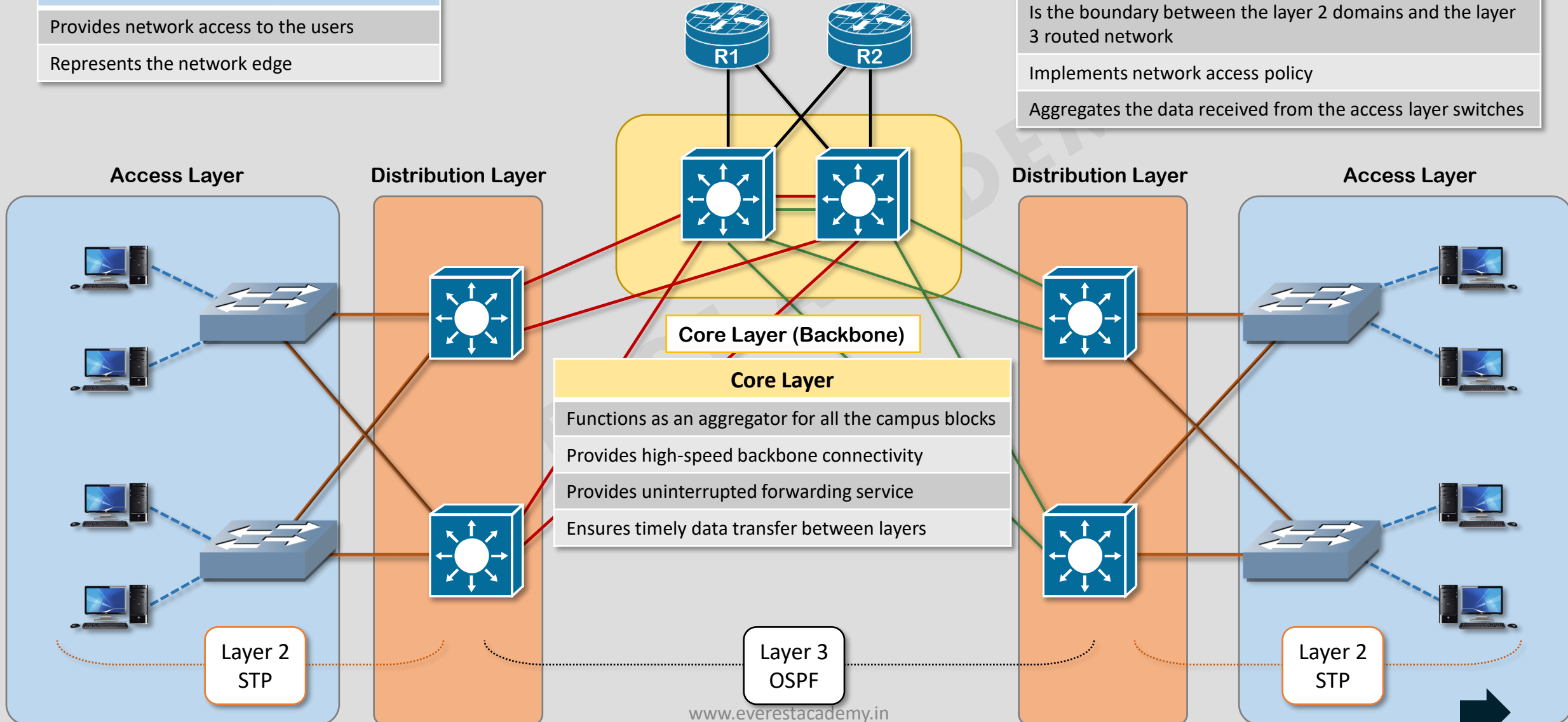
Represents the network edge

Distribution Layer

Is the boundary between the layer 2 domains and the layer 3 routed network

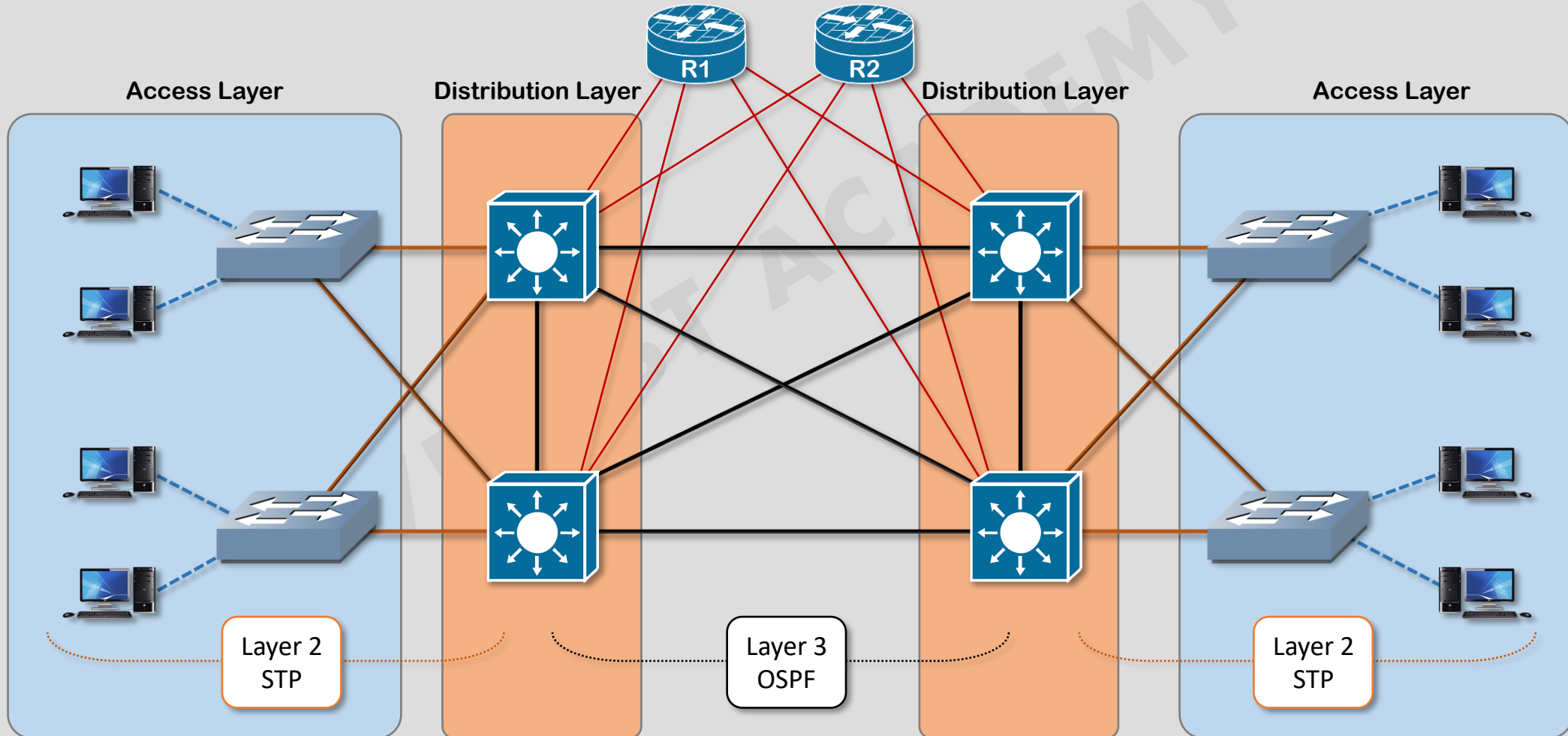
Implements network access policy

Aggregates the data received from the access layer switches



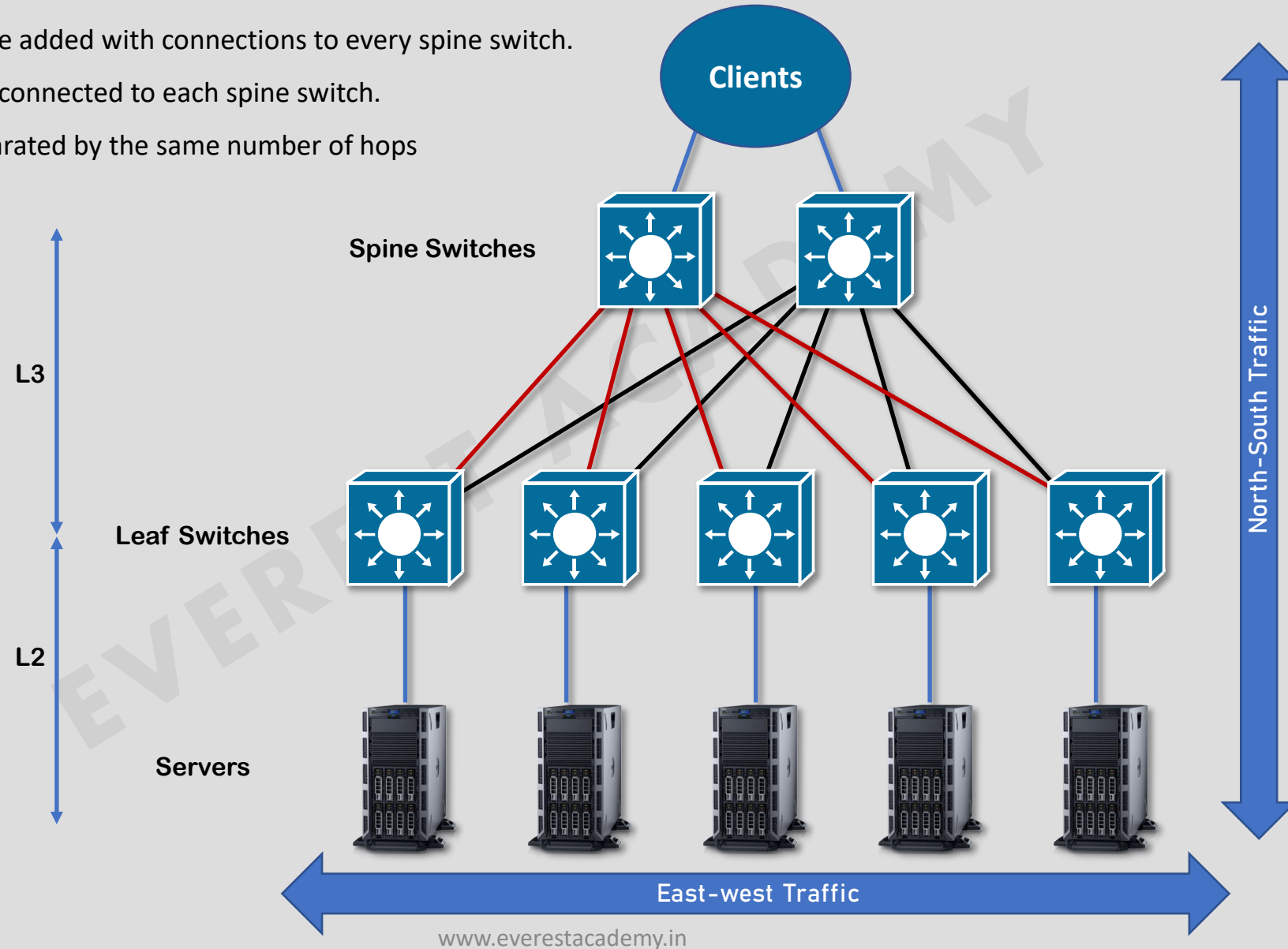
Two-Tier (Collapsed Core) Architecture

- Most appropriate for small network designs .
- Single device handles the core and the distribution layer .
- More cost-effective than three-tier architecture.

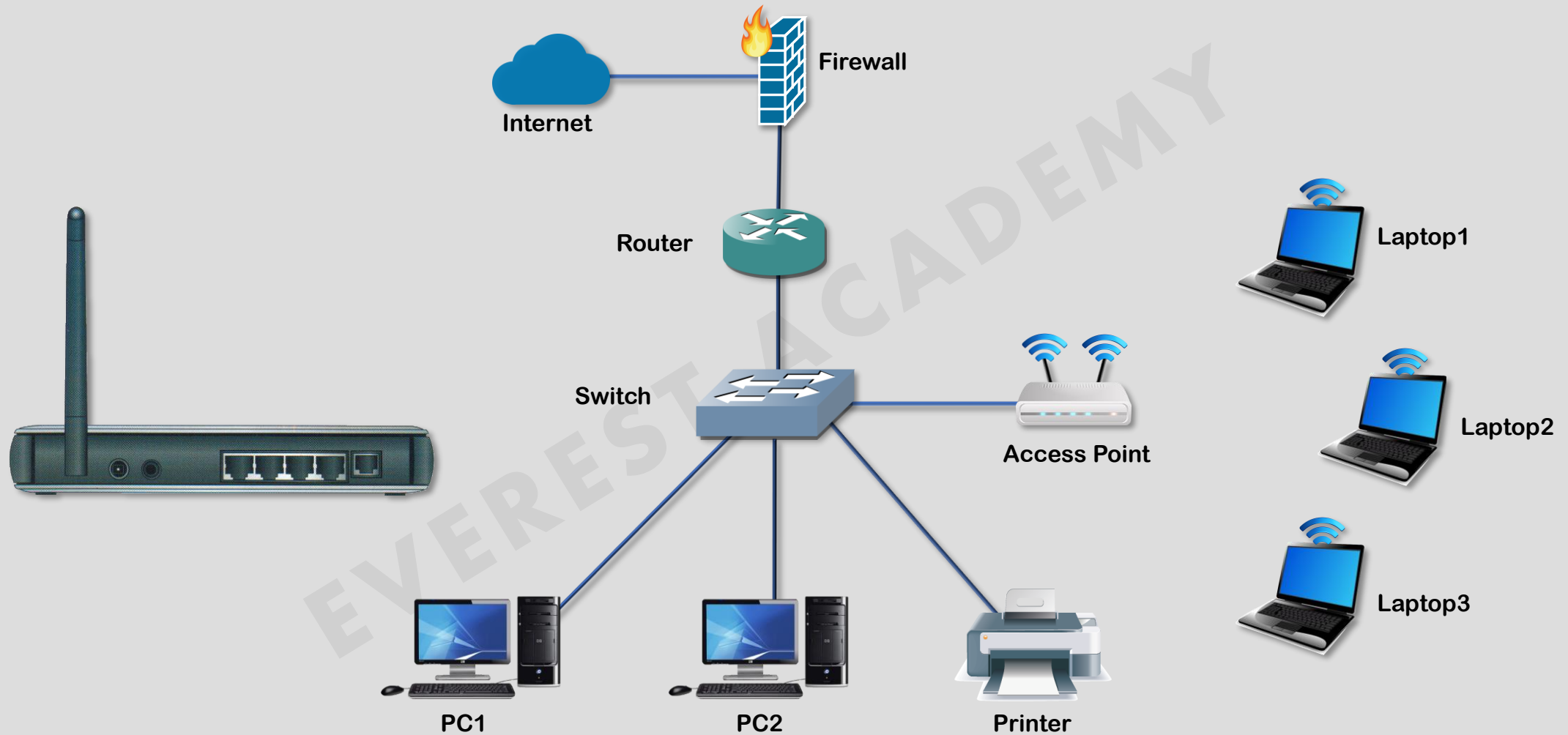


Spine-Leaf Architecture (Data Center)

- A leaf switch can be added with connections to every spine switch.
- Each leaf switch is connected to each spine switch.
- Each device is separated by the same number of hops

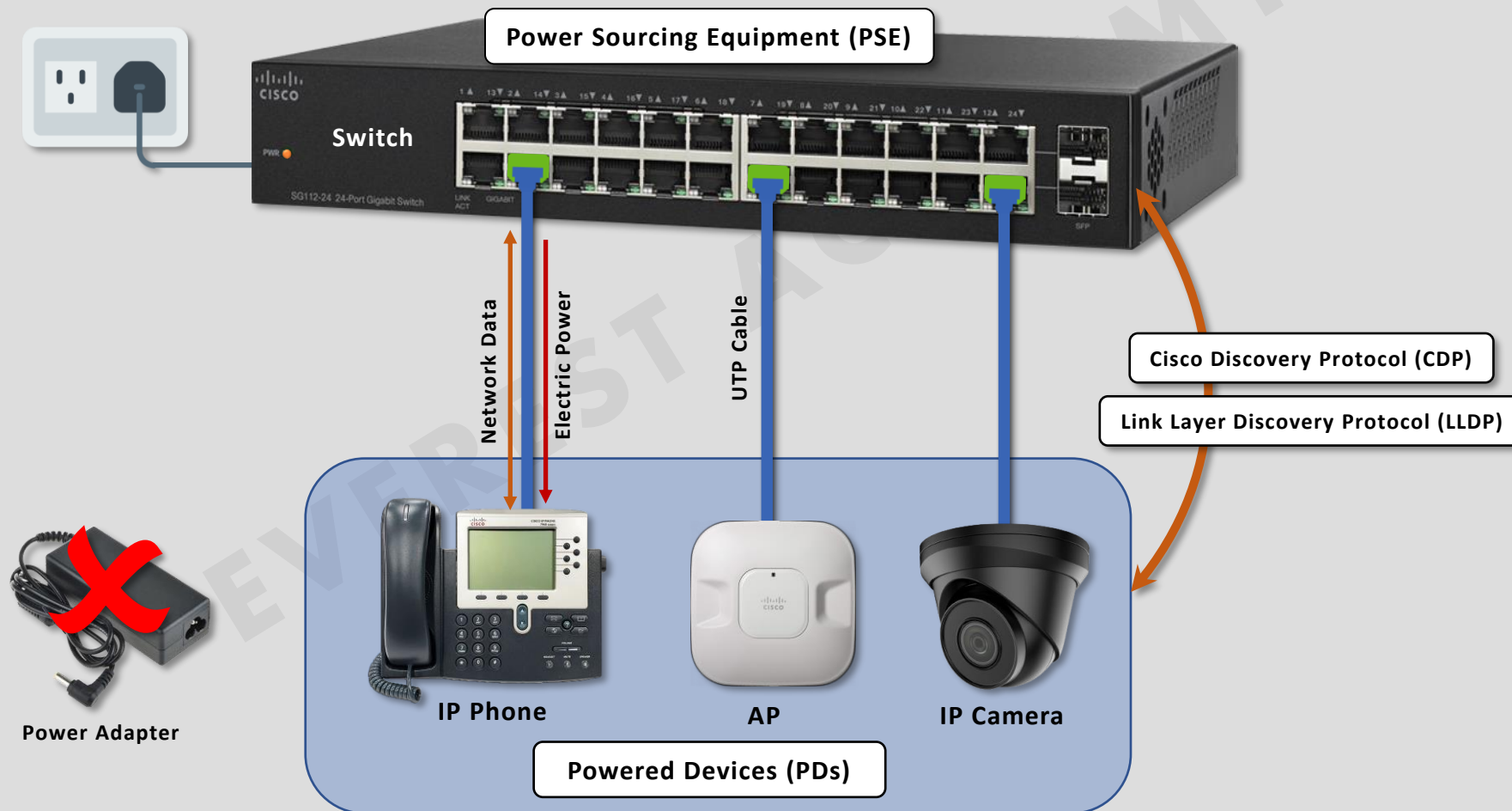


Small Office Home Office (SOHO)



Power over Ethernet (PoE)

- ❑ Power over Ethernet (PoE) is a networking technology that can transmit both **data** and **electric power** over one single twisted-pair (UTP) Ethernet cable.
- ❑ Power over Ethernet (PoE) allows a single cable to provide both data connection and electric power to devices such as **wireless access points, IP cameras, and VoIP phones**.



The Benefits of PoE



☐ **Time and cost savings :**

PoE can reduce the time and expense of having electrical power cabling installed.



☐ **Flexibility :**

Without being tethered to electrical outlets, devices such as IP Phone, security cameras, and wireless access points can be positioned in ideal locations.



☐ **Safety :**

Power delivery using PoE is designed to intelligently protect network equipment from overload, underpowering, and incorrect installation.



☐ **Reliability :**

PoE power comes from a central and universally compatible source and not from a collection of distributed wall adapters. It can be backed up by an uninterruptible power supply (UPS), allowing for continuous operation even during power failures.

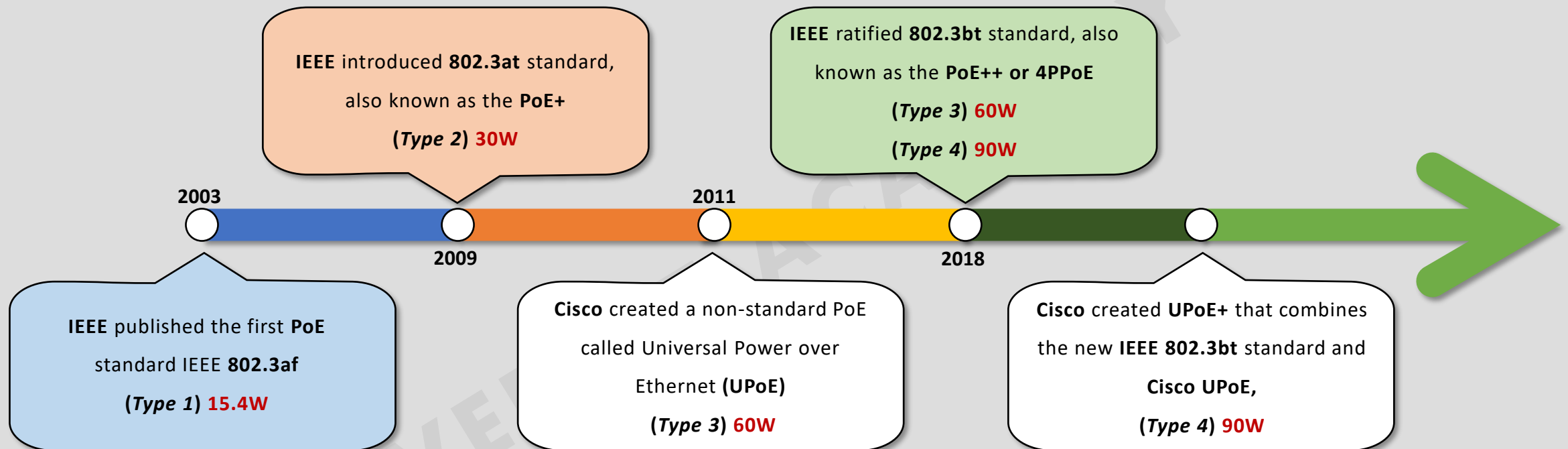


☐ **Scalability :**

Having power available on the network means that the installation and distribution of network connections are simple and effective.



PoE Standards










PoE Types and Classes

- ❑ The class defines the maximum power that can be delivered by the PSE to a PD.

Type	Class	PoE Standard	Power over twisted pairs	Max. Power Output of PSE	Max. Power Input of PD
1	1	IEEE 802.3af (PoE)	2 pairs	4W	3.84W
	2			7W	6.49W
	3			15.4W	12.95W
2	4	IEEE 802.3at (PoE+)	2 pairs	30W	25.5W
3		Cisco UPoE	4 pairs	60W	51W
	5	IEEE 802.3bt (PoE++)	4 pairs	45W	40W
	6			60W	51W
4	7	IEEE 802.3bt (PoE++)	4 pairs	75W	62W
	8			90W	71W
		Cisco UPoE+		90W	71W

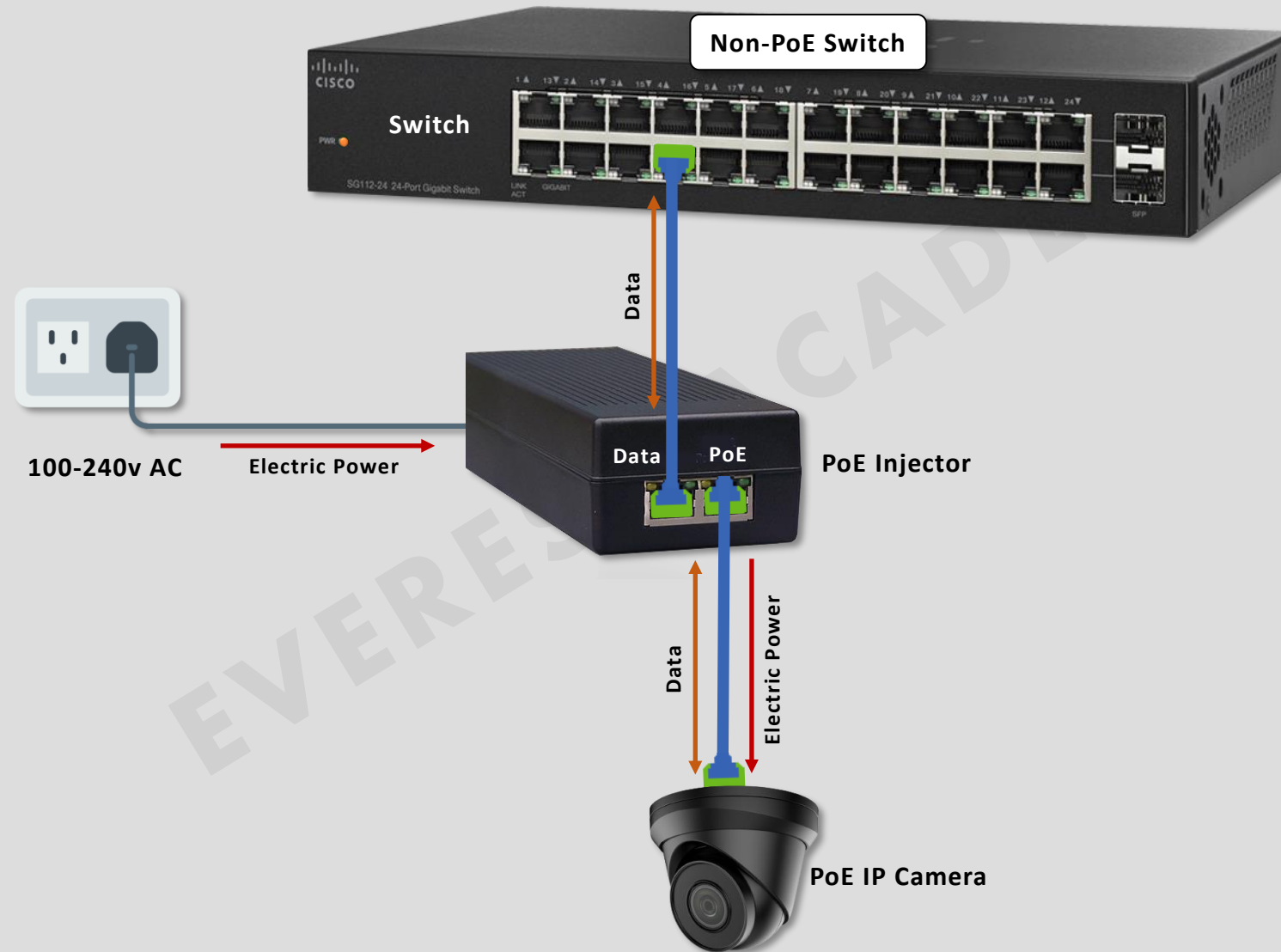


PoE Applications

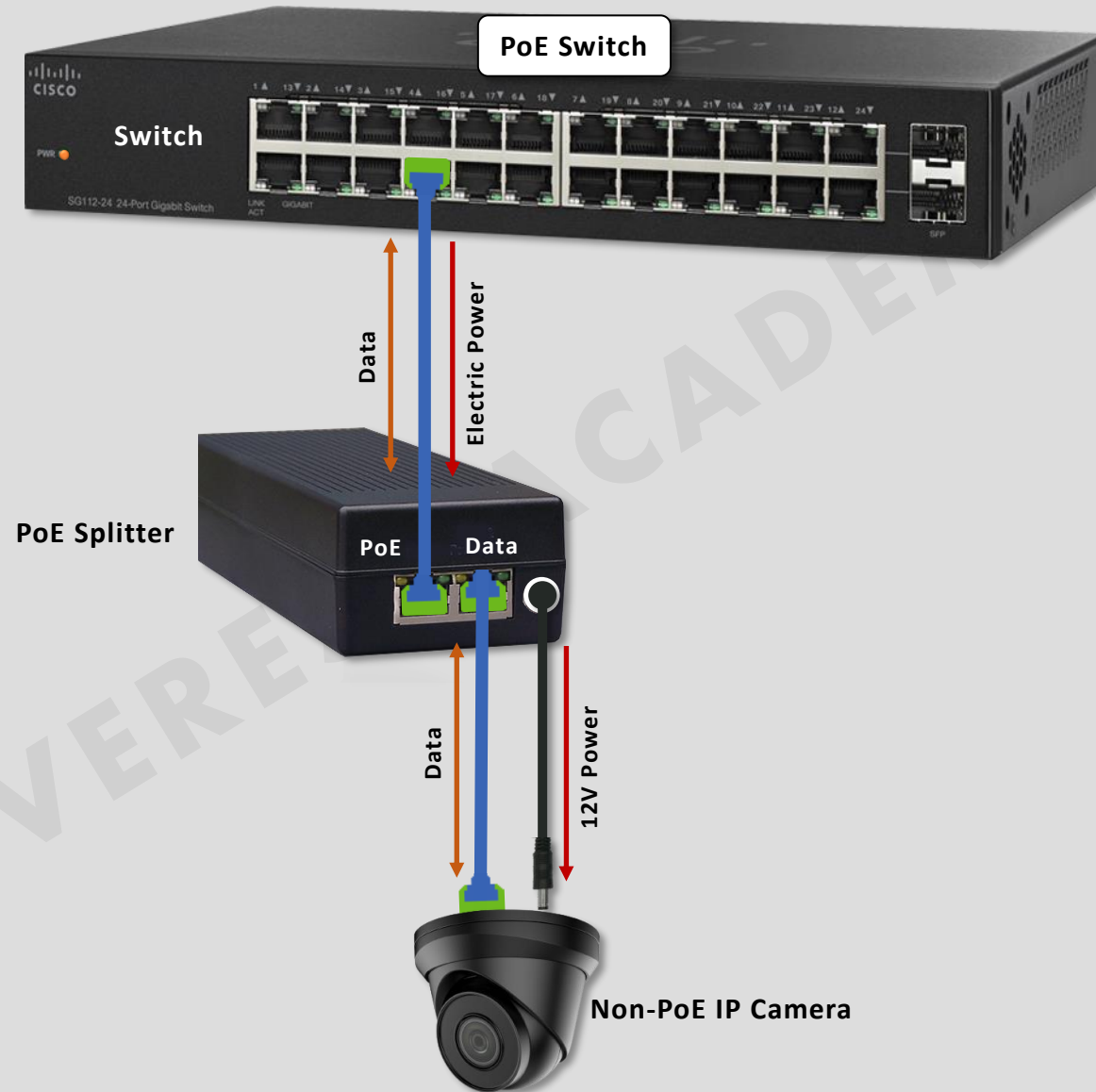
PoE Type 1 IEEE 802.3af Up to 15.4 Watts	PoE Type 2 IEEE 802.3at (PoE+) Up to 30 Watts	PoE Type 3 IEEE 802.3bt Up to 60 Watts	PoE Type 3 Cisco UPoE Up to 60 Watts	PoE Type 4 IEEE 802.3bt Up to 90 Watts	PoE Type 4 Cisco UPoE+ Up to 90 Watts
 <p>IP Phone</p>	 <p>AP</p>  <p>PTZ IP Camera</p>	 <p>Information Kiosk</p>  <p>Point of Sale</p>		 <p>PoE TV</p>  <p>PoE Laptop</p>	



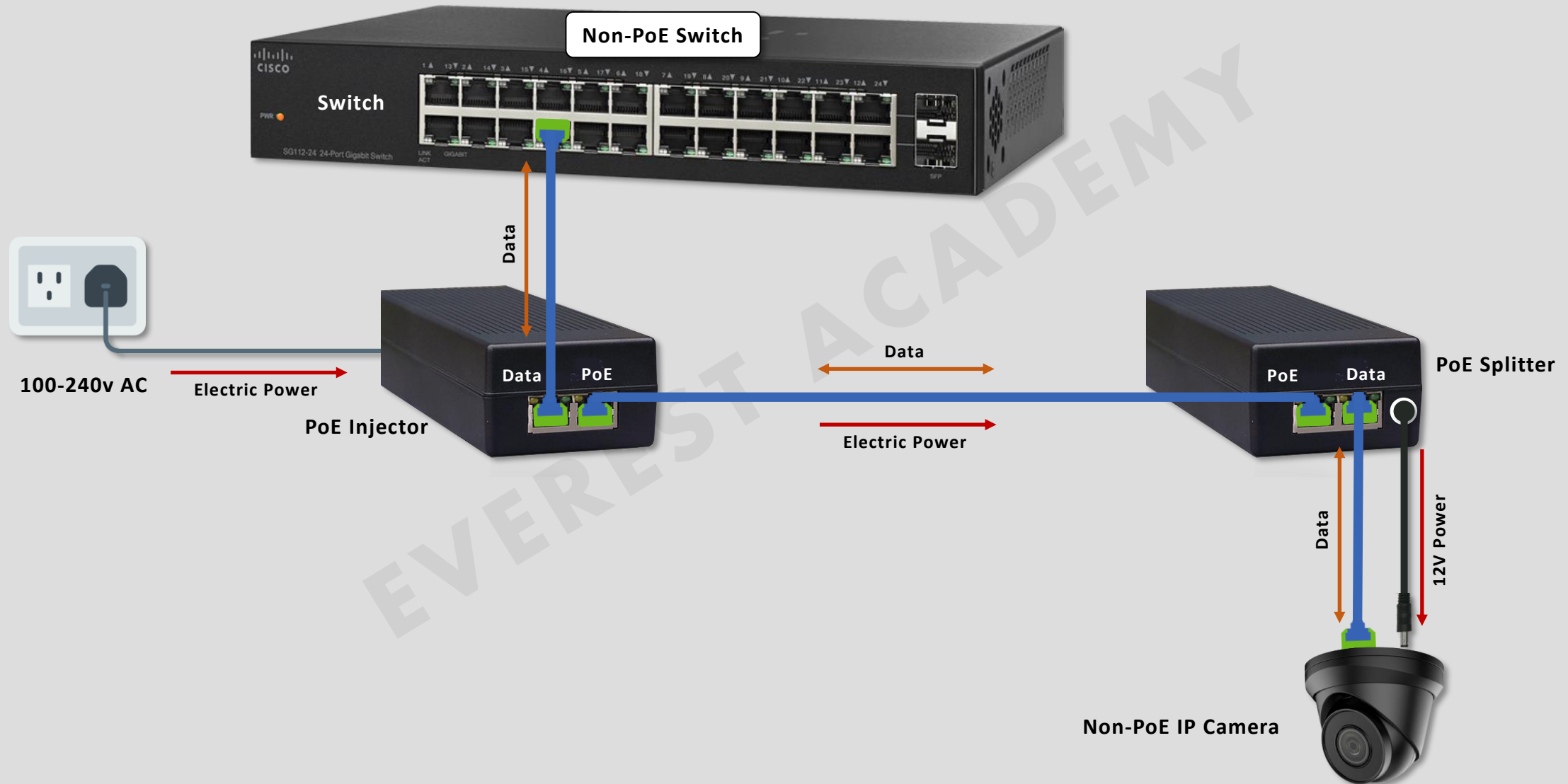
PoE Injector and PoE Splitter



PoE Injector and PoE Splitter



PoE Injector and PoE Splitter



```
Switch>
Switch>ena
Switch#show power
Switch#show power in
Switch#show power inline
Available:360(w)  Used:6(w)  Remaining:354(w)
```

Interface	Admin	Oper	Power (Watts)	Device	Class	Max
Fa0/1	auto	off	0.0	n/a	n/a	15.4
Fa0/2	auto	off	0.0	n/a	n/a	15.4
Fa0/3	auto	off	0.0	n/a	n/a	15.4
Fa0/4	auto	off	0.0	n/a	n/a	15.4
Fa0/5	auto	off	0.0	n/a	n/a	15.4
Fa0/6	auto	off	0.0	n/a	n/a	15.4
Fa0/7	auto	off	0.0	n/a	n/a	15.4
Fa0/8	auto	off	0.0	n/a	n/a	15.4
Fa0/9	auto	off	0.0	n/a	n/a	15.4
Fa0/10	auto	off	0.0	n/a	n/a	15.4
Fa0/11	auto	on	6.3	IP Phone 7960	n/a	15.4
Fa0/12	auto	off	0.0	n/a	n/a	15.4
Fa0/13	auto	off	0.0	n/a	n/a	15.4
Fa0/14	auto	off	0.0	n/a	n/a	15.4

