

VLAN QUICK FACTS

	Full Name	Virtual Local Area Network
	Standard	IEEE 802.1Q
	Purpose	Logical LAN Segmentation
	VLAN ID	1–4094
	Access Port	One VLAN
	Trunk Port	Multiple VLANs
	Native VLAN	Untagged on 802.1Q Trunk*

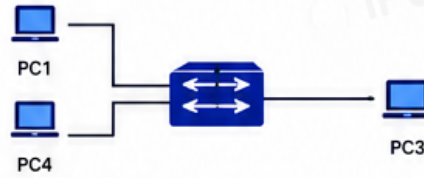
*By default behavior on typical Cisco 802.1Q trunks.

★ VLAN = ONE PHYSICAL NETWORK → MULTIPLE LOGICAL NETWORKS

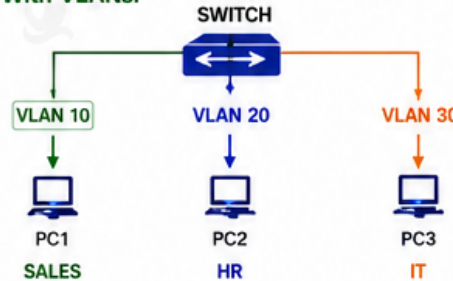
WHY VLANs?

Without VLANs:

ONE BROADCAST DOMAIN



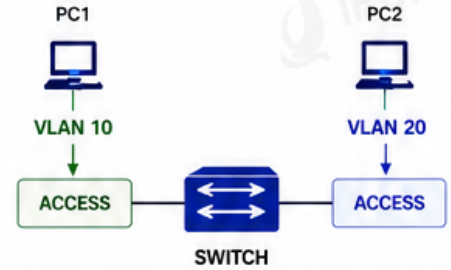
With VLANs:



★ VLAN = SEGMENTATION

ACCESS PORT

An access port normally carries traffic for one VLAN.



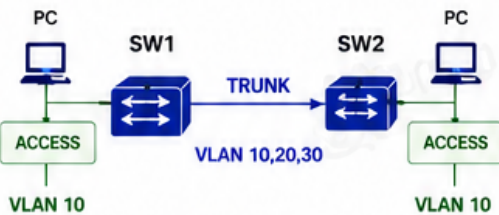
Configuration:

```
interface GigabitEthernet0/1
switchport mode access
switchport access vlan 10
```

★ ACCESS PORT = ONE DATA VLAN

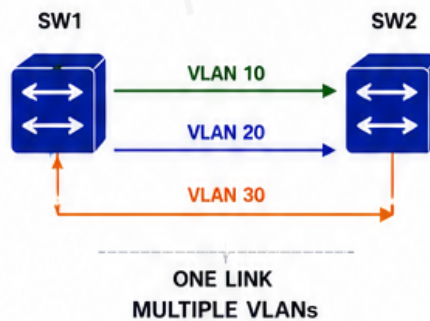
ACCESS vs TRUNK

	Access Port	Trunk Port
Usually	One Data VLAN	Multiple VLANs
Used For	End Devices	Network Devices
Frame Handling	Data Frames Typically Untagged	VLANs Identified with 802.1Q Tags
Examples	PC / Printer / Server	Switch / Router / AP



VLAN TRUNKING

A trunk allows multiple VLANs to cross a single physical link.



Configuration:

```
interface GigabitEthernet0/24
switchport mode trunk
```

★ TRUNK = MULTIPLE VLANs → ONE LINK

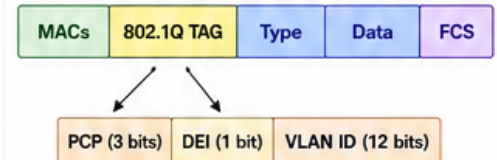
IEEE 802.1Q

802.1Q inserts a VLAN tag into Ethernet frames carried across a trunk.

NORMAL ETHERNET FRAME



802.1Q TAGGED FRAME



The 802.1Q tag is 4 bytes.

Key fields: PCP • DEI • VLAN ID

★ VLAN ID = 12 BITS

NATIVE VLAN

Traffic for the native VLAN is normally sent untagged on a Cisco 802.1Q trunk.



Configure:

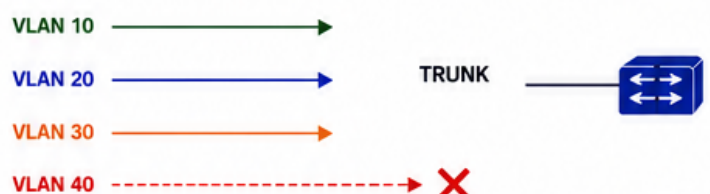
```
interface GigabitEthernet0/24
switchport trunk native vlan 99
```

★ NATIVE VLAN MISMATCH → TROUBLE

ALLOWED VLANs

Limit which VLANs can cross a trunk:

```
interface GigabitEthernet0/24
switchport trunk allowed vlan 10,20,30
```



★ ALLOWED VLAN LIST = CONTROL TRUNK TRAFFIC

VLAN CONFIGURATION

Create VLANs:

```
vlan 10
name SALES

vlan 20
name USERS

vlan 30
name VOICE
```

Assign an access port:

```
interface GigabitEthernet0/1
switchport mode access
switchport access vlan 10
```

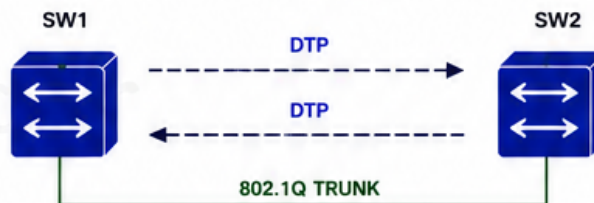
Verify:

```
show vlan brief
```

★ CREATE VLANs → ASSIGN PORTS → VERIFY

DTP

DTP = Dynamic Trunking Protocol



★ DTP = TRUNK NEGOTIATION

DTP MODES

Mode	Behavior	Common Combinations		
		Side A	Side B	Result
Access	Forces Access			
Trunk	Forces Trunk	Desirable	Auto	Trunk
Dynamic Desirable	Actively Tries to Form Trunk	Desirable	Desirable	Trunk
		Auto	Auto	Access
Dynamic Auto	Passively Waits for Trunk	Trunk	Trunk	Trunk

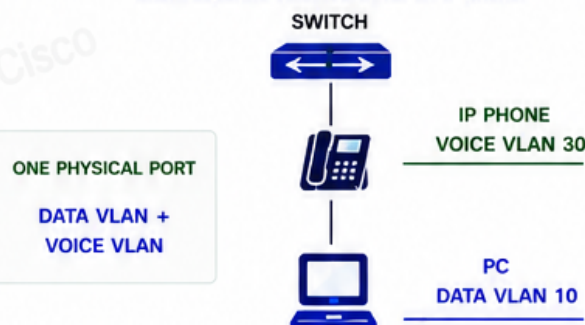
Disable DTP negotiation on a manual trunk:

```
switchport mode trunk
switchport nonegotiate
```

★ AUTO + AUTO ≠ TRUNK

VOICE VLAN

A switch port can support a data VLAN for the PC and a separate voice VLAN for an IP phone.

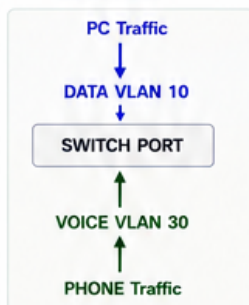


★ ONE PHYSICAL PORT → DATA VLAN + VOICE VLAN

VOICE VLAN CONFIGURATION

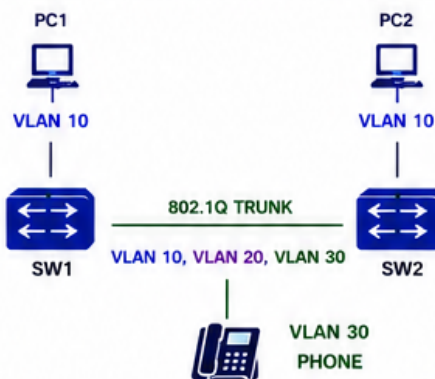
```
interface GigabitEthernet0/10
switchport mode access
switchport access vlan 10
switchport voice vlan 30
```

Traffic Flow:



★ PHONE TAGS VOICE TRAFFIC • PC USES ACCESS VLAN

COMPLETE VLAN EXAMPLE



SW1 Configuration:

```
vlan 10
vlan 20
vlan 30

interface GigabitEthernet0/1
switchport mode access
switchport access vlan 10

interface GigabitEthernet0/24
switchport mode trunk
switchport trunk allowed vlan 10,20,30
```

★ TRUNK CARRIES MULTIPLE VLANs • ACCESS PORTS CARRY ONE

ACCESS, TRUNK & VOICE

Port Type	VLAN Usage	Typical Device
Access	One Data VLAN	PC / Printer
Trunk	Multiple VLANs	Switch / Router / AP
Access + Voice	Data + Voice VLAN	IP Phone + PC

ACCESS	TRUNK	VOICE PHONE
PC	SW1	PHONE
1 VLAN	MANY VLANs	DATA + VOICE

★ CHOOSE THE RIGHT PORT TYPE FOR THE RIGHT DEVICE

VLAN VERIFICATION

Useful Commands:

```
show vlan brief
show interfaces trunk
show interfaces switchport
```



★ VLAN → ACCESS PORT → TRUNK → ALLOWED VLAN → NATIVE VLAN