## VLANs

### VLAN Creation

```bash
Switch(config)# vlan 100
Switch(config-vlan)# name Engineering
```

### Access Port Configuration

```bash
Switch(config-if)# switchport mode access
Switch(config-if)# switchport nonegotiate
Switch(config-if)# switchport access vlan 100
Switch(config-if)# switchport voice vlan 150
```

### Trunk Port Configuration

```bash
Switch(config-if)# switchport mode trunk
Switch(config-if)# switchport trunk encapsulation dot1q
Switch(config-if)# switchport trunk allowed vlan 10,100-200
Switch(config-if)# switchport trunk native vlan 10
```

### SVI Configuration

```bash
Switch(config)# interface vlan100
Switch(config-if)# ip address 192.168.100.1 255.255.255.0
```

### VLAN Trunking Protocol

**Domain** - Common to all switches participating in VTP

**Server Mode** - Generates and propagates VTP advertisements to clients; this mode is default on unconfigured switches

**Client Mode** - Receives and forwards advertisements from servers; VLANs cannot be manually configured on switches in client mode

**Transparent Mode** - Forwards advertisements but does not participate in VTP; VLANs must be configured manually

**Pruning** - VLANs not having any access ports on an end switch are removed from the trunk to reduce flooded traffic

### Switch Port Modes

- **trunk** - Forms an unconditional trunk
- **dynamic desirable** - Actively attempts to negotiate a trunk with the distant end
- **dynamic auto** - Will form a trunk only if requested by the distant end
- **access** - Will never form a trunk

### Terminology

**Trunking** - Extending multiple VLANs over the same physical connection

**Native VLAN** - By default, frames in this VLAN are untagged when sent across a trunk

**Access VLAN** - The VLAN to which an access port is assigned

**Voice VLAN** - If configured, enables minimal trunking to support voice traffic in addition to data traffic on an access port

**Dynamic Trunking Protocol (DTP)** - Can be used to automatically establish trunks between capable ports; carries a security risk

**Switched Virtual Interface (SVI)** - A virtual interface which provides a routed gateway into and out of a VLAN

### Trunk Types

<table>
<thead>
<tr>
<th>802.1Q ISL</th>
<th>802.1Q</th>
<th>ISL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Header Size</td>
<td>4 bytes</td>
<td>26 bytes</td>
</tr>
<tr>
<td>Trailer Size</td>
<td>N/A</td>
<td>4 bytes</td>
</tr>
<tr>
<td>Standard</td>
<td>IEEE</td>
<td>Cisco</td>
</tr>
<tr>
<td>Maximum VLANs</td>
<td>4094</td>
<td>1000</td>
</tr>
<tr>
<td>Command</td>
<td>dot1q</td>
<td>isl</td>
</tr>
</tbody>
</table>

### VLAN Numbers

- 0 Reserved
- 1 default
- 1002 fdci-default
- 1006-4094 Extended
- 1003 tr
- 4095 Reserved

### VLAN Encapsulation

<table>
<thead>
<tr>
<th>Ethernet Header</th>
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</thead>
<tbody>
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<table>
<thead>
<tr>
<th>ISL Header</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dest MAC</td>
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</table>

<table>
<thead>
<tr>
<th>Untagged</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dest MAC</td>
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</table>

<table>
<thead>
<tr>
<th>802.1Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dest MAC</td>
</tr>
</tbody>
</table>

### VTP Configuration

```bash
Switch(config)# vtp mode server
Switch(config)# vtp domain LASVEGAS
Switch(config)# vtp password Presley
Switch(config)# vtp version 2
Switch(config)# vtp pruning
```

### Troubleshooting

- show vlan
- show interface status
- show interface switchport
- show interface trunk
- show vtp status
- show vtp password