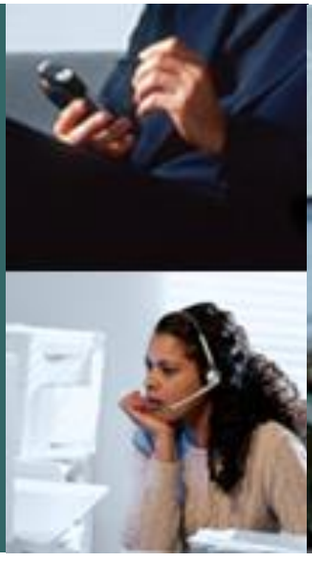
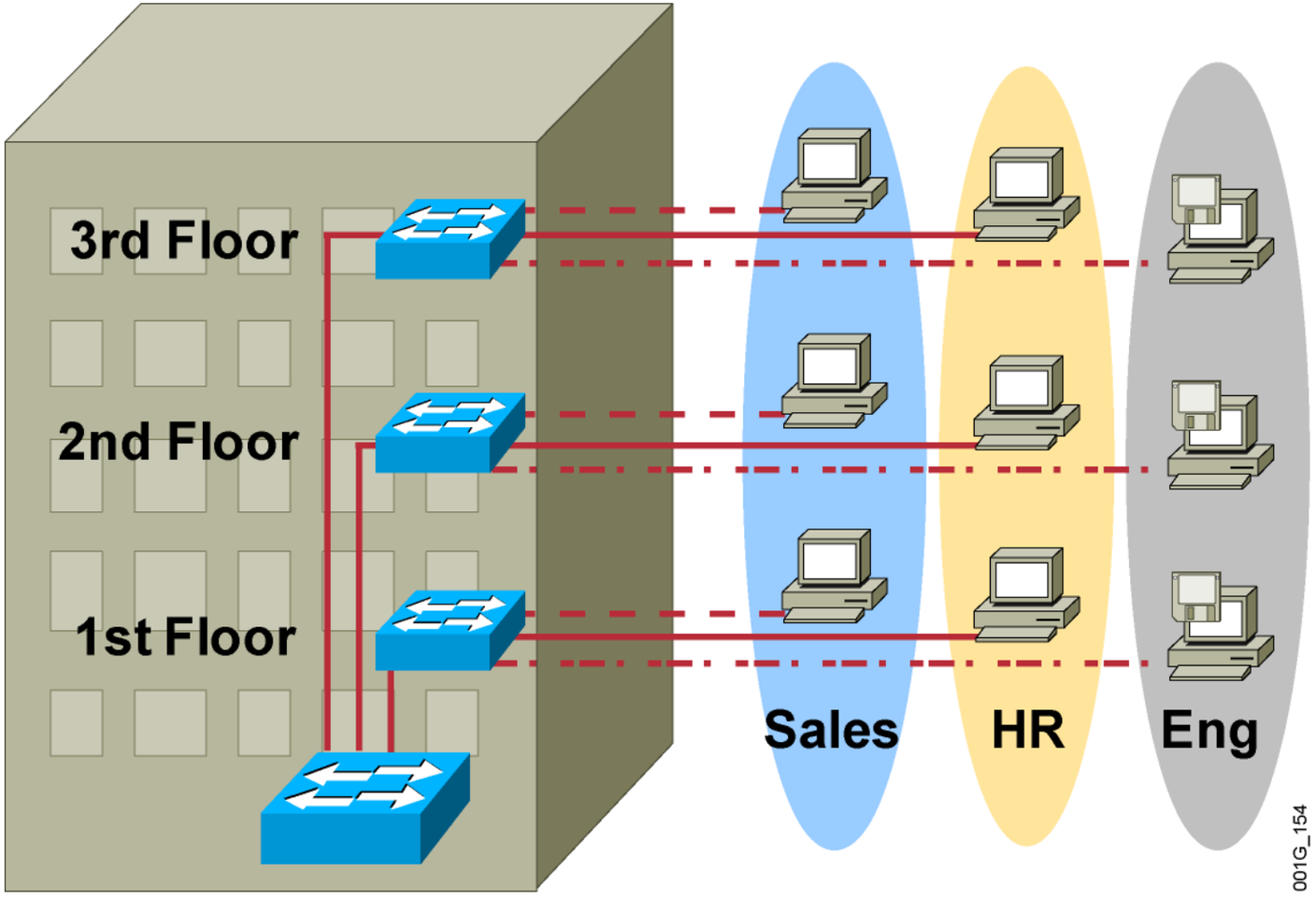
Extending Switched Networks with Virtual LANs

Introducing VLAN Operations



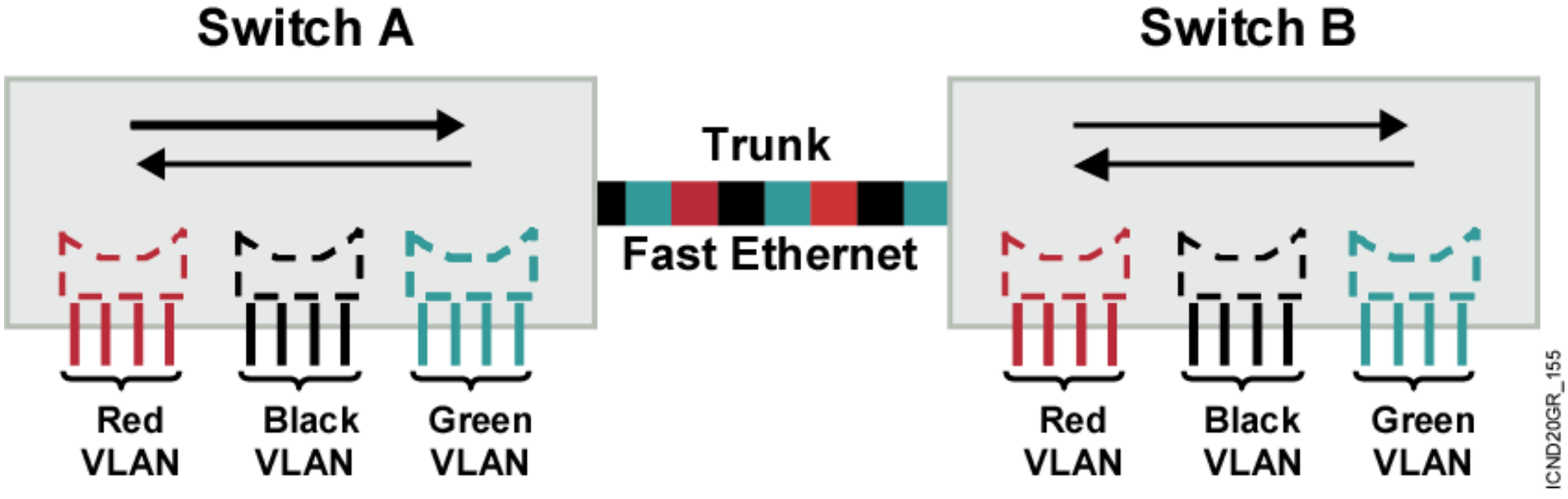
VLAN Overview



- Segmentation
- Flexibility
- Security

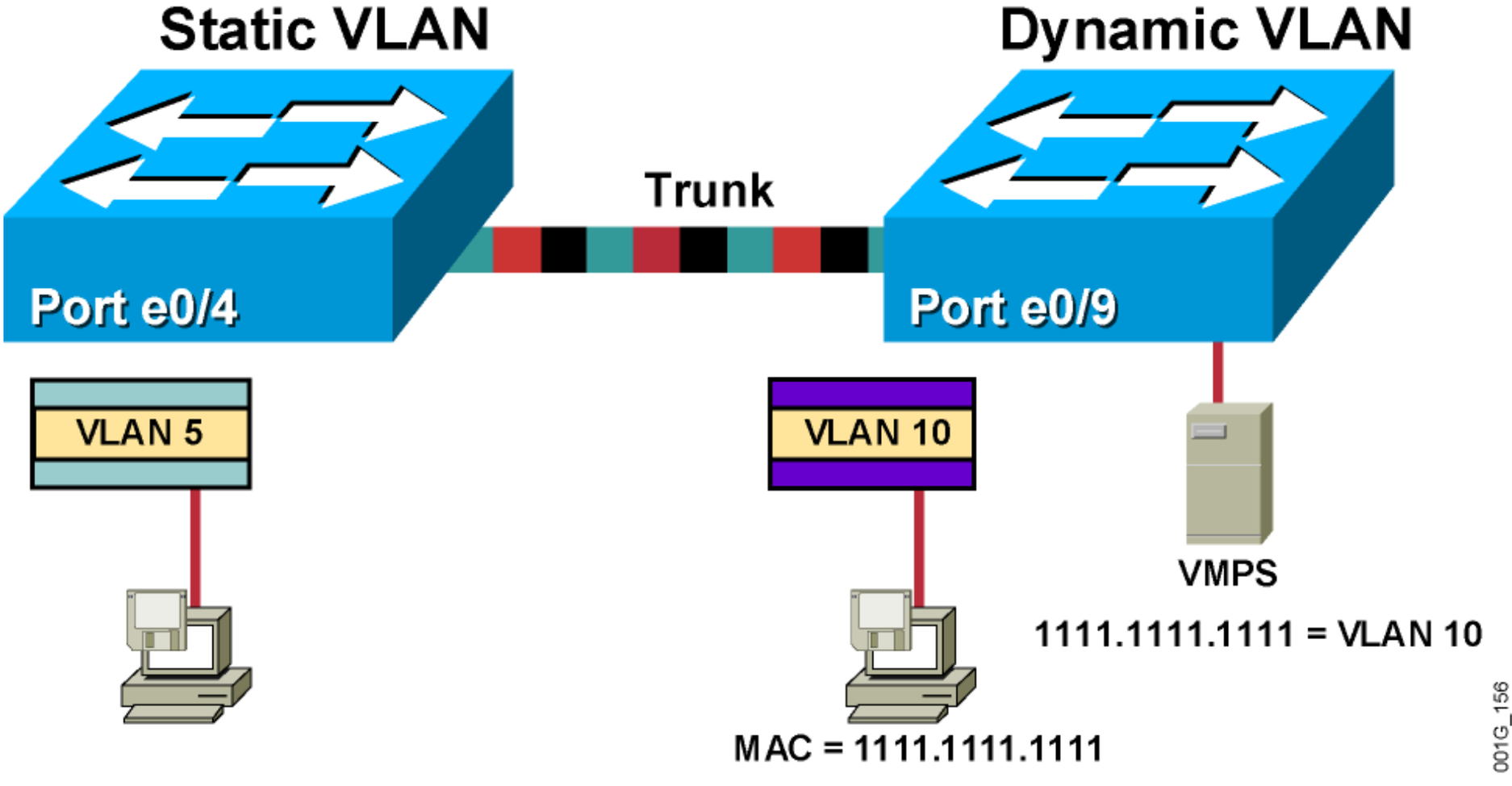
VLAN = Broadcast Domain = Logical Network (Subnet)

VLAN Operation

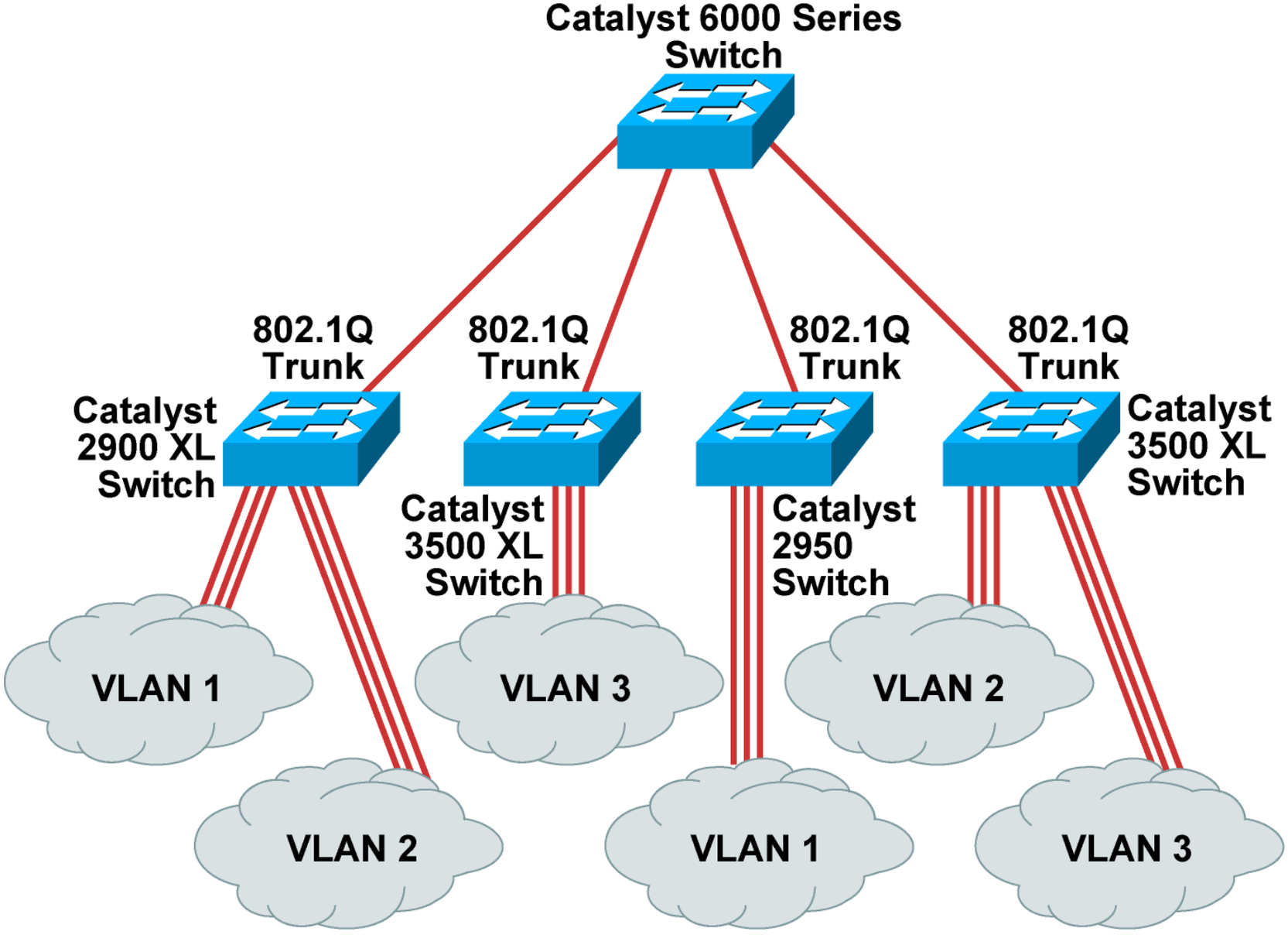


- Each logical VLAN is like a separate physical bridge.
- VLANs can span across multiple switches.
- Trunks carry traffic for multiple VLANs.
- Trunks use special encapsulation to distinguish between different VLANs.

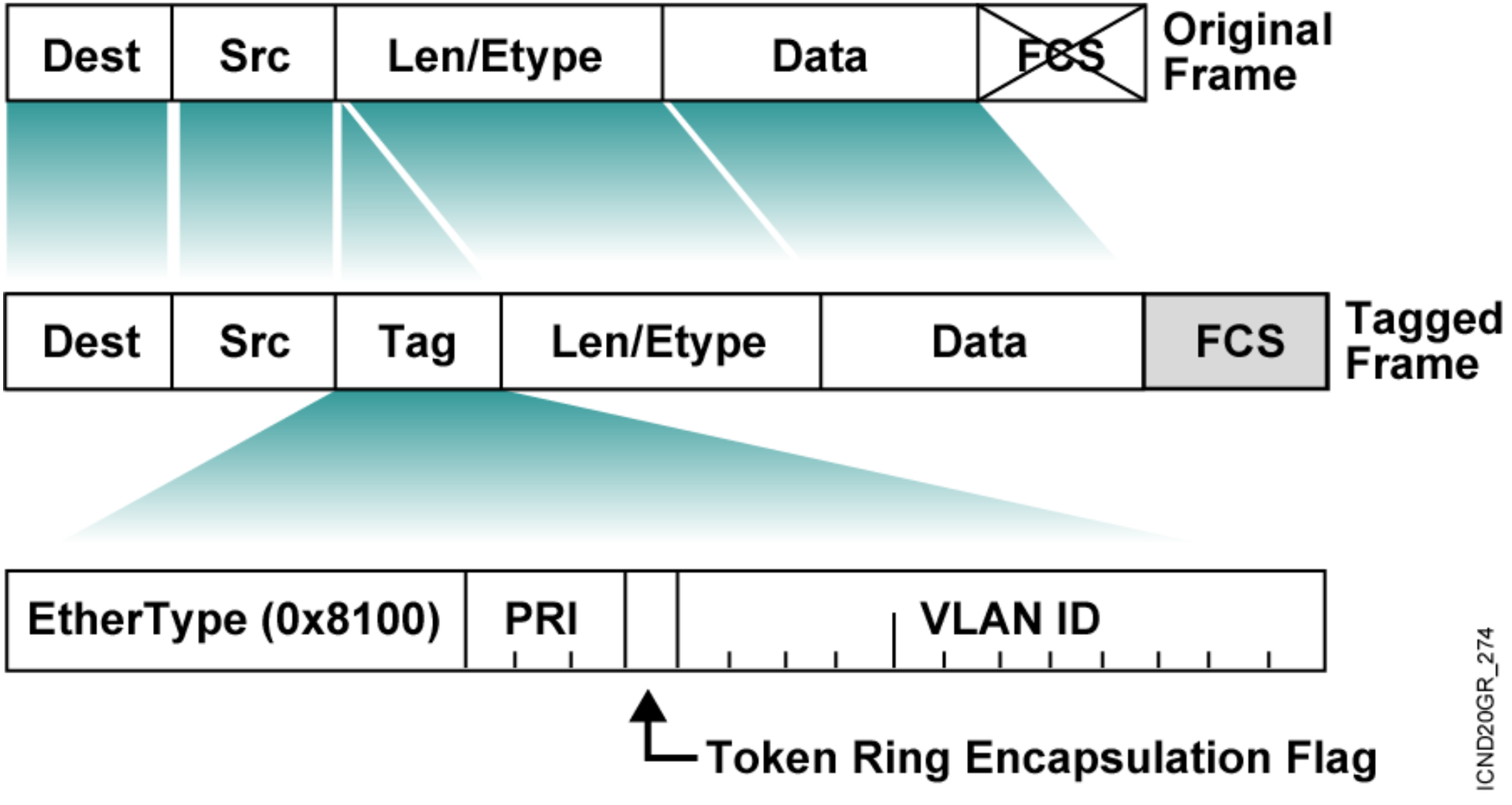
VLAN Membership Modes



802.1Q Trunking

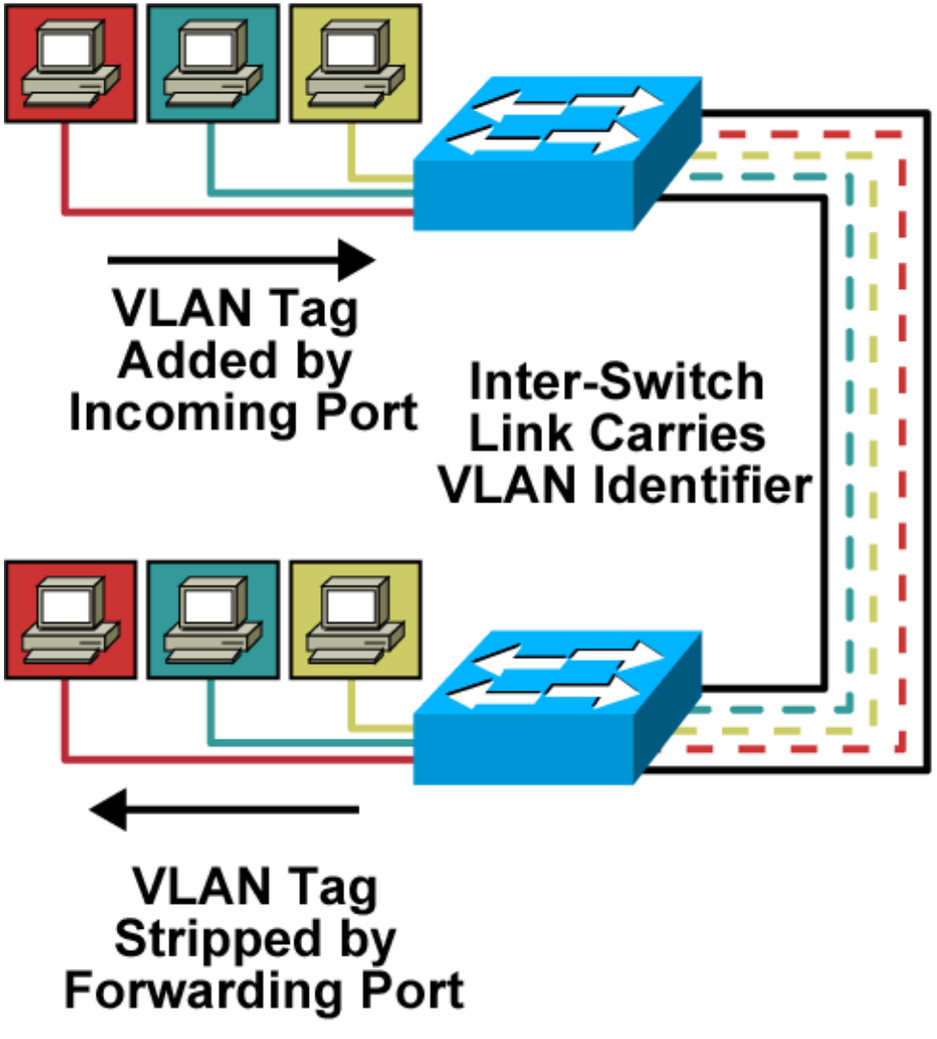


802.1Q Frame

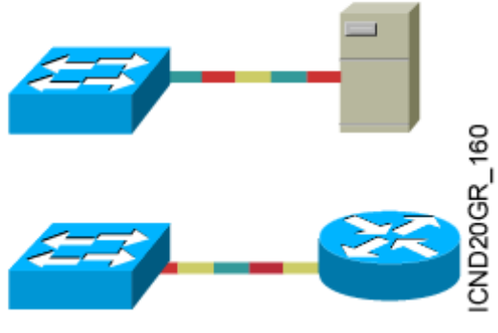

Dest
Src
Len/Etype
Data
FCS
Original Frame
Dest
Src
Tag
Len/Etype
Data
FCS
Tagged Frame
EtherType (0x8100)
PRI
VLAN ID
Token Ring Encapsulation Flag
ICND20GR_274

ISL Tagging

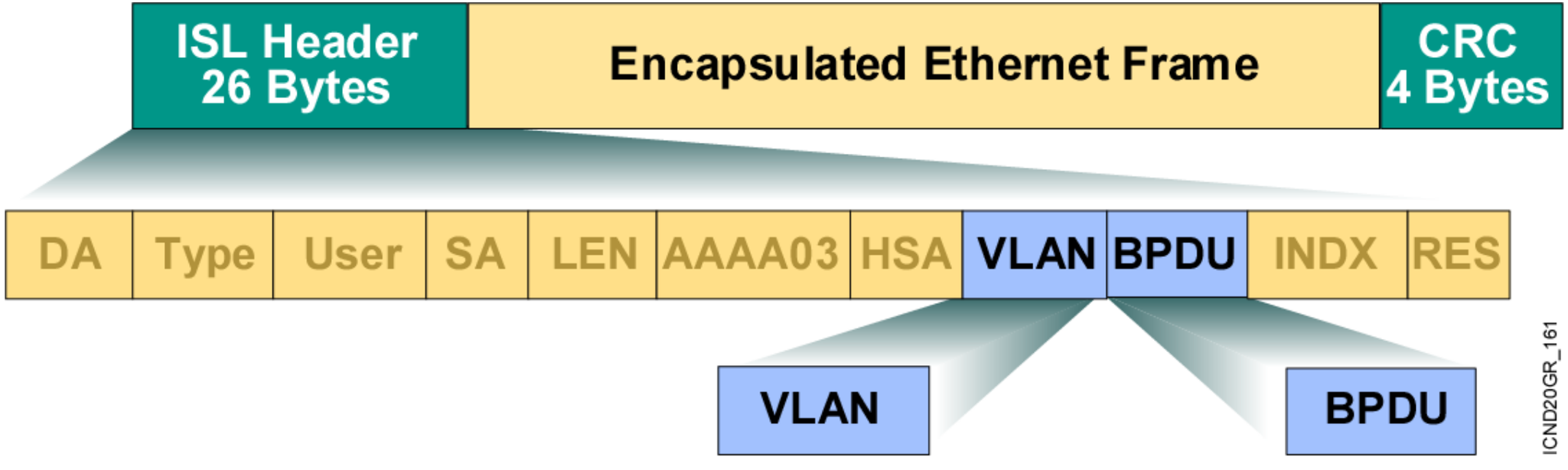
ISL trunks enable VLANs across a backbone.



- Performed with ASIC
- Not intrusive to client stations; ISL header not seen by client
- Effective between switches, and between routers and switches

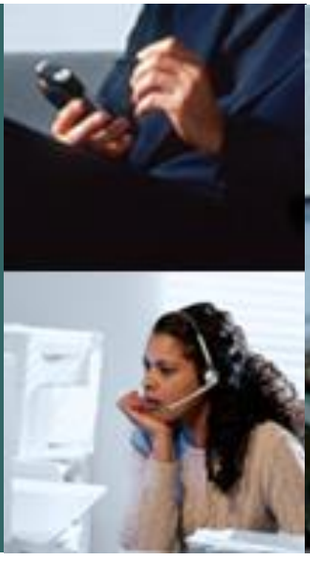


ISL Encapsulation



Extending Switched Networks with Virtual LANs

Configuring VLANs



Switch Ports and Trunk Ports

Command	Function
Access port switchport mode access	Sets the switch port to unconditionally be an access port
Trunk port switchport mode trunk	Sets the switch port to unconditionally become a trunk port
Dynamic port switchport mode dynamic	Sets the switch port to dynamically negotiate the status (access or trunk)

Configuring 802.1Q Trunking


```
wg_sw_a(config-if)#switchport mode trunk
```

- **Configures the port as a VLAN trunk**

Note: The Catalyst 2950 series switches support only 802.1Q encapsulation.

Configuring ISL Trunking


```
wg_sw_4000(config)# interface {fastethernet | gigabitethernet} slot/port
```

- **Select the interface to configure.**

```
wg_sw_4000(config-if)# shutdown
```

- **(Optional) Shut down the interface to prevent traffic flow until configuration is complete.**

```
wg_sw_4000(config-if)# switchport trunk encapsulation {isl | dot1q | negotiate}
```

- **(Optional) Specify the encapsulation. Note: You must enter this command with either the** isl **or** dot1q **keyword to support the switchport mode trunk command, which is not supported by the default mode (negotiate).**

```
wg_sw_4000(config-if)# switchport mode {dynamic {auto | desirable} | trunk}
```

- **Configure the interface as a Layer 2 trunk (required only if the interface is a Layer 2 access port or to specify the trunking mode).**

Configuring ISL Trunking (Cont.)


```
wg_sw_4000#configure terminal
wg_sw_4000(config-if)#interface gigabitEthernet 2/24
wg_sw_4000(config-if)#shutdown
wg_sw_4000(config-if)#switchport trunk encapsulation isl
wg_sw_4000(config-if)#switchport mode trunk
wg_sw_4000(config-if)#no shutdown
```

Note: Not all Catalyst series switches support ISL encapsulation.

VLAN Creation Guidelines

- **The maximum number of VLANs is switch-dependent.**
- **Most Catalyst desktop switches support 64 VLANs with a separate spanning tree per VLAN.**
- **VLAN 1 is the factory default Ethernet VLAN.**
- **CDP and VTP advertisements are sent on VLAN 1.**
- **The Catalyst switch IP address is in the management VLAN (VLAN 1 by default).**
- **To add or delete VLANs, the switch must be in VTP server or transparent mode.**

Adding a VLAN

Catalyst 2950 Series

```
Switch#configure terminal
Switch(config)#vlan 2
Switch(config-vlan)#name VLAN2
```

Modifying a VLAN Name


```
wg_sw_a(config-vlan)#name vlan-name
```

```
wg_sw_a#configure terminal
wg_sw_a(config)#vlan 2
wg_sw_a(config-vlan)#name switchlab2
```

Assigning Switch Ports to a VLAN

Catalyst 2950 Series

```
wg_sw_2950(config-if)#switchport access [vlan vlan# | dynamic]
```

```
wg-sw_2950#configure terminal
wg_sw_2950(config)#interface fastethernet 0/2
wg_sw_2950(config-if)#switchport access vlan 2

wg_sw_2950#sh vlan

VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------
1    default                           active    Fa0/1, Fa0/3, Fa0/4
  .    .    .    .    .
2    vlan2                             active    Fa0/2
```

Verifying a VLAN

Catalyst 2950 Series

```
wg_sw_2950#show vlan [brief | id vlan-id || name vlan-name]
```

```
wg_sw_2950#sh vlan id 2

VLAN Name                                Status    Ports
---- ----------------------------------- --------- -------------------------------
2    switchlab99                         active    Fa0/2, Fa0/12

VLAN Type  SAID       MTU   Parent RingNo BridgeNo Stp  BrdgMode Trans1 Trans2
---- ----- ---------- ----- ------ ------ -------- ---- -------- ------ ------
2    enet  100002     1500  -      -      -        -    -        0      0

.    .    .
wg_sw_2950#
```

Verifying VLAN Membership


```
wg_sw_2950#show vlan brief
```

```
wg_sw_2950#show vlan brief
VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
---
1    default                           active    Fa0/1, Fa0/2, Fa0/3, Fa0/4
2    vlan2                             active
3    vlan3                             active
4    vlan4                             active
1002 fddi-default                      act/unsup
1003 token-ring-default                act/unsup

VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
---
1004 fddinet-default                   act/unsup
1005 trnet-default                     act/unsup
```

```
wg_sw_2950#show interfaces interface switchport
```

Executing Adds, Moves, and Changes for VLANs


```
wg_sw_a(config)#vlan vlan-id
wg_sw_a(config-vlan)#
```

- Enters the privileged EXEC VLAN configuration mode
- Writes VLAN adds, moves, and changes to the vlan.dat file

```
wg_sw_a(config-if)#switchport access vlan vlan#
```

- Statically assigns a VLAN to a specific port

Amazon/Jeffrey Preston (傑夫·貝索斯)
City of The Future

Venture City:https://www.youtube.com/watch?v=ZjraUKJRIt8&t=934s
0-7:00,13:11-16:50, 18:50-21:10