

CCNA 200-301 v1.1

MODULE 2 — NETWORK ACCESS

Complete Hands-on Training Labs

Topology • Configuration • Verification • Troubleshooting

NETWORK GUIDE ACADEMY

Instructor / Student Lab Guide

Scope: This guide covers the current CCNA v1.1 Network Access objectives 2.1 through 2.9. The final capstone integrates VLANs, trunks, EtherChannel, Rapid PVST+, device management and wireless infrastructure in one campus scenario. Supplementary PAgP EtherChannel and classic PVST+ STP foundation labs are also included for broader operational practice.

Module 2 Lab Map

- 2.1 VLANs spanning multiple switches — access ports, data/voice VLANs, default VLAN and connectivity
- 2.2 Interswitch connectivity — trunk ports, 802.1Q, native VLAN and allowed VLAN control
- 2.3 Layer 2 discovery — CDP and LLDP
- 2.4 EtherChannel — Layer 2/Layer 3 LACP plus a supplementary PAgP negotiation lab
- 2.5 STP and Rapid PVST+ — classic PVST+ root/port election, Rapid PVST+, PortFast, Root Guard, Loop Guard, BPDU Filter and BPDU Guard
- 2.6 Wireless architectures and AP modes — autonomous, controller-based, cloud-managed, local/FlexConnect/monitor/sniffer/bridge
- 2.7 WLAN infrastructure — AP/WLC physical connectivity, access/trunk ports and LAG
- 2.8 Network device management — console, Telnet, SSH, HTTP/HTTPS, TACACS+/RADIUS and cloud-managed concepts
- 2.9 Wireless LAN GUI interpretation — WLAN creation fields, security, QoS and advanced settings
- Integrated capstone — router-on-a-stick, VLANs, LACP, Rapid PVST+, SSH and wireless infrastructure

How to use the detailed device configurations

Each lab uses one configuration path only. Commands are not repeated in an abbreviated section and then repeated again later. The device-by-device configuration shown in the Lab execution section is the single source of truth for that lab.

Verification output is representative Cisco IOS/IOS XE output. MAC addresses, interface hardware strings, counters, timers, software versions and some command formatting can vary by platform. Focus on the fields identified under What to verify.

Follow the lab in order: topology and addressing plan → Device 1 complete configuration → remaining device configurations → verification command and expected output → What to verify → end-to-end test → troubleshooting/fault exercise. Do not re-enter a configuration unless the lab explicitly tells you to change it for a fault or mode-comparison test.

Recommended Lab Platforms

Cisco Packet Tracer for VLAN, trunking, STP, EtherChannel, basic wireless and management-access practice.

Cisco Modeling Labs (CML), EVE-NG or GNS3 with compatible IOS/IOS XE images for more realistic CLI behavior.

Physical Catalyst switches / IOS XE routers when available. Interface names may differ; adapt Gi/Fa/Te numbering to your platform.

For WLC tasks, use a supported controller simulator, Catalyst 9800 lab, Packet Tracer wireless components, or instructor screenshots for interpretation.

Standard Verification Workflow

1. Confirm physical/interface state before checking higher-layer configuration.
2. Validate VLAN and trunk state; then check STP/EtherChannel state where applicable.
3. Check management IP, default gateway/routing and neighbor discovery.
4. Run reachability tests (ping/SSH/GUI association).
5. Use show commands to prove the expected state, not only a successful ping.
6. Introduce one fault, predict the symptom, verify the fault, correct it, and re-run the same verification.

Lab 2.1 — VLANs Across Multiple Switches — Data and Voice VLANs

CCNA objective: Configure and verify VLANs (normal range) spanning multiple switches; access ports (data and voice), default VLAN and connectivity.

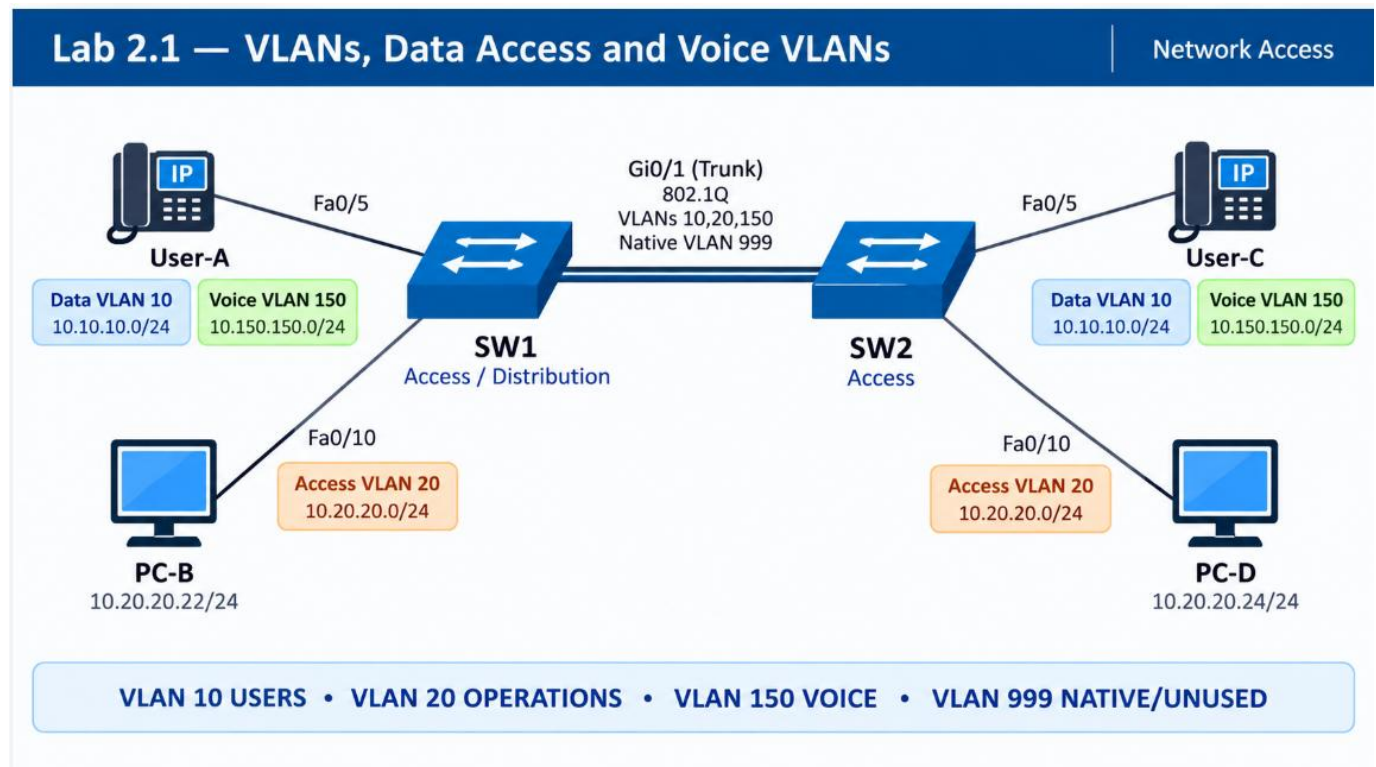


Figure 2.1: VLANs Across Multiple Switches — Data and Voice VLANs reference topology

Lab objectives

- Create normal-range VLANs on two switches.
- Move user ports out of VLAN 1 and assign access VLANs.
- Configure a data VLAN and a voice VLAN on the same switchport.
- Verify VLAN membership, access mode, voice VLAN behavior and end-to-end Layer 2 reachability.
- Recognize common VLAN misconfiguration symptoms.

Addressing and VLAN plan

Item	Value	Purpose
VLAN 10	USERS	User data
VLAN 20	OPERATIONS	Operations data
VLAN 150	VOICE	IP phones
VLAN 999	NATIVE-BLACKHOLE	Native / unused
PC-A / PC-C	10.10.10.11 / .33	VLAN 10
PC-B / PC-D	10.20.20.22 / .24	VLAN 20

Execution sequence: configure each device once, then verify the resulting state using the sample output and What to verify criteria.

Lab execution — device-by-device configuration and verification

SW1 - Complete lab configuration

```
enable
configure terminal
hostname SW1
!
vlan 10
  name USERS
vlan 20
  name OPERATIONS
vlan 150
  name VOICE
vlan 999
  name NATIVE-BLACKHOLE
!
interface FastEthernet0/5
  description USER-A_PHONE_AND_PC
  switchport mode access
  switchport access vlan 10
  switchport voice vlan 150
  spanning-tree portfast
  no shutdown
!
interface FastEthernet0/10
  description PC-B_OPERATIONS
  switchport mode access
  switchport access vlan 20
  spanning-tree portfast
  no shutdown
!
interface GigabitEthernet0/1
  description TRUNK_TO_SW2
  switchport mode trunk
  switchport trunk native vlan 999
  switchport trunk allowed vlan 10,20,150,999
  no shutdown
end
write memory
```

SW2 - Complete lab configuration

```
enable
configure terminal
hostname SW2
!
vlan 10
  name USERS
vlan 20
  name OPERATIONS
vlan 150
```

```

name VOICE
vlan 999
  name NATIVE-BLACKHOLE
!
interface FastEthernet0/5
  description USER-C_PHONE_AND_PC
  switchport mode access
  switchport access vlan 10
  switchport voice vlan 150
  spanning-tree portfast
  no shutdown
!
interface FastEthernet0/10
  description PC-D_OPERATIONS
  switchport mode access
  switchport access vlan 20
  spanning-tree portfast
  no shutdown
!
interface GigabitEthernet0/1
  description TRUNK_TO_SW1
  switchport mode trunk
  switchport trunk native vlan 999
  switchport trunk allowed vlan 10,20,150,999
  no shutdown
end
write memory

```

End-device addressing

- PC-A: 10.10.10.11/24, connected through the data side of the phone on SW1 Fa0/5. Default gateway is not required for this Layer 2-only lab.
- PC-C: 10.10.10.33/24, connected through the data side of the phone on SW2 Fa0/5.
- PC-B: 10.20.20.22/24 on SW1 Fa0/10.
- PC-D: 10.20.20.24/24 on SW2 Fa0/10.
- Cisco IP phones use voice VLAN 150. The switch advertises the voice VLAN to supported phones; the attached PC remains in data VLAN 10.

Verification 1 - VLAN membership

SW1# show vlan brief

VLAN	Name	Status	Ports
1	default	active	Fa0/1, Fa0/2, Fa0/3, Fa0/4
10	USERS	active	Fa0/5
20	OPERATIONS	active	Fa0/10
150	VOICE	active	
999	NATIVE-BLACKHOLE	active	

What to verify

- VLANs 10, 20, 150 and 999 exist and are active.

- Fa0/5 appears under VLAN 10 because VLAN 10 is the data access VLAN; the voice VLAN is verified with the switchport command, not by expecting Fa0/5 under VLAN 150 in show vlan brief.
- Fa0/10 appears under VLAN 20.

Verification 2 - Data and voice access port

```
SW1# show interfaces fa0/5 switchport
Name: Fa0/5
Switchport: Enabled
Administrative Mode: static access
Operational Mode: static access
Access Mode VLAN: 10 (USERS)
Trunking Native Mode VLAN: 1 (default)
Voice VLAN: 150 (VOICE)
```

What to verify

- Administrative Mode and Operational Mode are static access.
- Access Mode VLAN is 10.
- Voice VLAN is 150.

Verification 3 - Inter-switch trunk

```
SW1# show interfaces trunk
```

Port	Mode	Encapsulation	Status	Native vlan
Gi0/1	on	802.1q	trunking	999

Port	Vlans allowed on trunk
Gi0/1	10,20,150,999

Port	Vlans allowed and active in management domain
Gi0/1	10,20,150,999

Port	Vlans in spanning tree forwarding state and not pruned
Gi0/1	10,20,150,999

What to verify

- Gi0/1 is trunking with 802.1Q.
- Native VLAN is 999 on both SW1 and SW2.
- VLANs 10, 20 and 150 are allowed and active across the trunk.

Verification 4 - MAC learning and Layer 2 reachability

```
SW1# show mac address-table dynamic vlan 10
Mac Address Table
```

Vlan	Mac Address	Type	Ports
10	0050.7966.6801	DYNAMIC	Fa0/5
10	0050.7966.6803	DYNAMIC	Gi0/1

```
PC-A> ping 10.10.10.33
Reply from 10.10.10.33: bytes=32 time<1ms TTL=128
```

Reply from 10.10.10.33: bytes=32 time<1ms TTL=128

Reply from 10.10.10.33: bytes=32 time<1ms TTL=128

Reply from 10.10.10.33: bytes=32 time<1ms TTL=128

What to verify

- The local VLAN 10 endpoint is learned on Fa0/5 and the remote VLAN 10 endpoint is learned through Gi0/1.
- PC-A reaches PC-C because both are in VLAN 10 and VLAN 10 is carried across the trunk.
- Repeat the same test between PC-B and PC-D for VLAN 20.

Troubleshooting drills

1. Put PC-B port in VLAN 10 by mistake. Predict which hosts it can reach, then verify with “**show vlan brief**”.
2. Delete VLAN 20 from SW2 and observe how the access port appears/inactivates depending on platform. Re-create the VLAN.
3. Remove the voice VLAN command from SW1 Fa0/5 and verify the switchport operational data again.

Lab 2.2 — Interswitch Connectivity — 802.1Q Trunks and Native VLAN

CCNA objective: Configure and verify interswitch connectivity: trunk ports, 802.1Q and native VLAN.

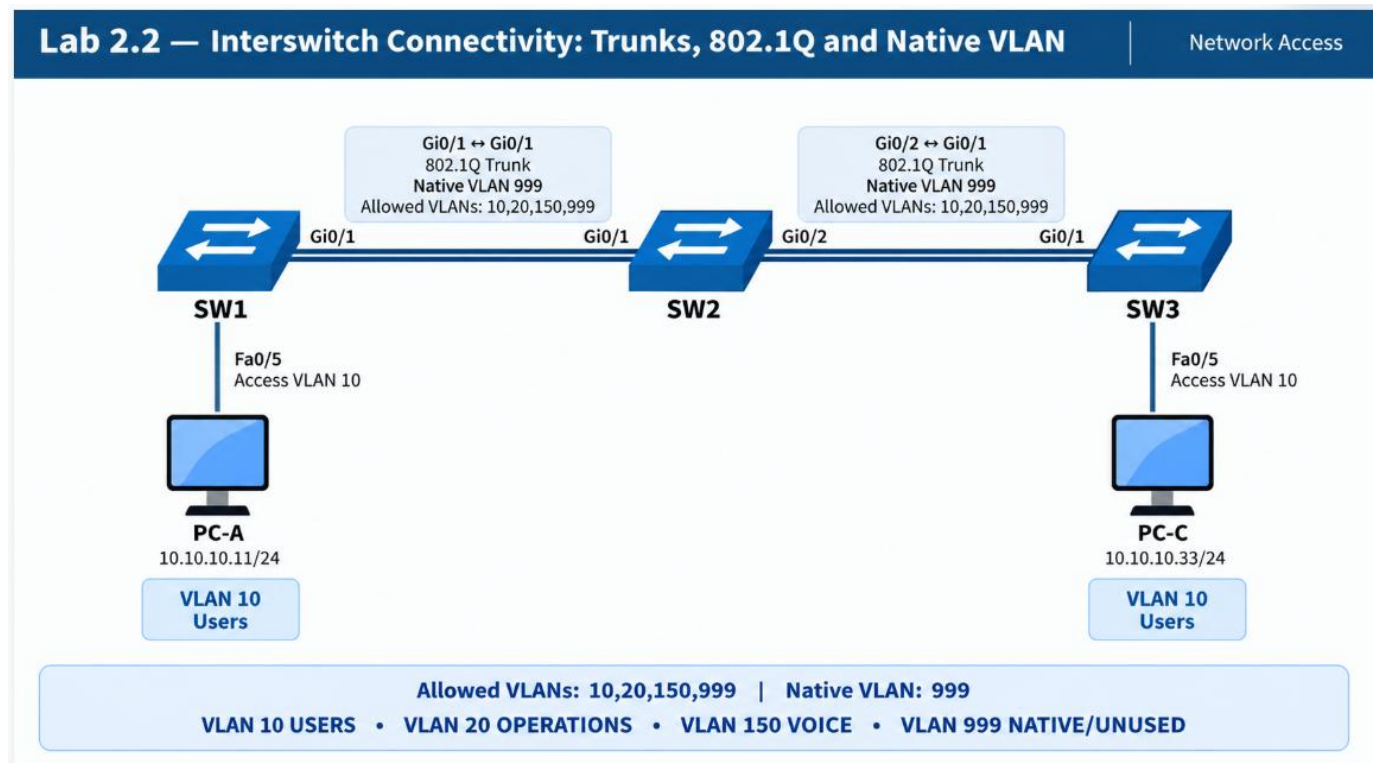


Figure 2.2: Interswitch Connectivity — 802.1Q Trunks and Native VLAN reference topology

Lab objectives

- Build static 802.1Q trunks between three switches.
- Set VLAN 999 as the native VLAN on both ends of every trunk.
- Restrict allowed VLANs and verify the active forwarding list.
- Troubleshoot trunk mode, native VLAN and allowed-VLAN mismatches.

Execution sequence: configure each device once, then verify the resulting state using the sample output and What to verify criteria.

Lab execution — device-by-device configuration and verification

SW1 - Complete lab configuration

```
enable
configure terminal
hostname SW1
vlan 10
  name USERS
vlan 20
  name OPERATIONS
vlan 150
  name VOICE
vlan 999
  name NATIVE-BLACKHOLE
```

```

!
interface FastEthernet0/5
  description PC-A_VLAN10
  switchport mode access
  switchport access vlan 10
  spanning-tree portfast
  no shutdown
!
interface GigabitEthernet0/1
  description TRUNK_TO_SW2_GI0_1
  switchport mode trunk
  switchport trunk native vlan 999
  switchport trunk allowed vlan 10,20,150,999
  no shutdown
end
write memory

```

SW2 - Complete lab configuration

```

enable
configure terminal
hostname SW2
vlan 10
  name USERS
vlan 20
  name OPERATIONS
vlan 150
  name VOICE
vlan 999
  name NATIVE-BLACKHOLE
!
interface GigabitEthernet0/1
  description TRUNK_TO_SW1_GI0_1
  switchport mode trunk
  switchport trunk native vlan 999
  switchport trunk allowed vlan 10,20,150,999
  no shutdown
!
interface GigabitEthernet0/2
  description TRUNK_TO_SW3_GI0_1
  switchport mode trunk
  switchport trunk native vlan 999
  switchport trunk allowed vlan 10,20,150,999
  no shutdown
end
write memory

```

SW3 - Complete lab configuration

```

enable
configure terminal
hostname SW3
vlan 10
  name USERS
vlan 20
  name OPERATIONS
vlan 150

```