Project 1 Documentation

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A 16 department, 28 network (38 subnetted) office network consisting of 8 Layer 2 switches, 4 Multilayer switches and 5 routers (6 including ISP) with internet connectivity capabilities. Utilising the following protocols:

- Network Address Translation (NAT
- Border Gateway Protocol (BGP)
- Open Shortest Path First (OSPF)
- Spanning Tree Protocol (STP)
- Vlan Trunking Protocol (VTP)
- Hot Standby Router Protocol (HSRP)
- Dynamic Host Configuration Protocol (DHCP)
- Virtual Local Area Network (VLAN)
- IP routing
- 802.1Q Encapsulation Protocol

Network Devices

Cisco WS-C3560-24PS – Multilayer Switch

Ports, PoE & Connectivity

- 24 × 10/100 Mbps Ethernet (RJ-45) ports. Cisco+2IQElectro+2

- 2 × SFP-based Gigabit Ethernet uplink ports (for fiber or other SFP modules). XS Network Tech+2Subspace+2

- Supports Power over Ethernet (PoE) under IEEE 802.3af (and Cisco prestandard) — can power devices like IP phones, access-points, cameras directly over the network cable. Cisco+2XS Network Tech+2

- PoE Budget: up to 370 W total across the switch; up to 15.4 W per port. Cisco+2XS Network Tech+2

Switching & Routing Capabilities

- Switching capacity (back-plane): ~ 32 Gbps. XS Network Tech+1

- Forwarding rate (for 64-byte packets): ~ 6.5–6.6 Mpps (million packets per second) depending on exact sub-model. XS Network Tech+2Sistek+2

- Supports multilayer switching: that is basic Layer-2 switching + Layer-3 features (static routing, basic inter-VLAN routing, RIP, etc.) when using appropriate software image. Cisco+2IQElectro+2

- VLAN support (802.1Q), ACLs (access control lists), port-based authentication (802.1X), QoS — enough for many business / small-to-medium networks. IQElectro+2nghiahung.vn+2

Use Cases

- A small/medium-size network - office, small data center, CCTV / IP-camera network, IP-phone / VoIP setup, wireless-Aps - benefiting from PoE.

- Inter-VLAN routing + segmentation

- Power + data on same Ethernet cable - e.g. powering wireless APs or security cameras, where running separate power might be difficult.

- Legacy / budget setups - if you can get it used/refurbished at good price and don't need state-of-the-art throughput.

Cisco 2911 Cisco 2900 series – router

⬚ Routing & Protocol support

- Supports standard routing protocols (IPv4/IPv6, OSPF, EIGRP, BGP, etc.), static routing, NAT, policy-based routing, MPLS in many cases, QoS, etc. ALLHDD+2Dustin Media+2

⬚ Security & VPN

- Embedded hardware encryption for VPN (IPsec, SSL, etc.), firewall, intrusion prevention / protection (IPS), content filtering / firewall policies — so you can use it as a secure gateway/firewall. txo.com+2Secure IT Store+2

⬚ Voice / Telephony / Multimedia

- It has DSP (digital signal processor) slots which — when populated with voice/voice-interface modules — let you use it as a voice gateway (VoIP, analog/digital voice lines, unified communications, etc.). Comtrade+2Apple Networking Systems+2

⬚ Modularity / Expansion

- 4 Enhanced-H-Speed WAN Interface Card (EHWIC) slots, a service-module slot, DSP slots — meaning you can adapt it to different WAN types (serial, ISDN, DSL, fiber via modules), add voice interfaces, or extra services depending on need. Cisco+2Comtrade+2

⬚ Power / Deployment Flexibility

- It supports AC power supply; certain models/modules allow (or used to allow) PoE or Cisco Inline Power, and there's support for an external redundant power supply (RPS) — useful if deploying in branch offices or environments where uptime matters. Secure IT Store+2Cisco+2

Cisco 2960 – 24TT – Layer 2 Switch

Features and Specs

- It provides **24 × 10/100 Mbps (Fast Ethernet)** ports for end-devices. Secure IT Store+22+شبکه گستران فرابورس
- Additionally, it includes **2 uplink ports** that are **10/100/1000 Mbps (Gigabit RJ-45)** — useful for linking to a router, backbone, another switch, or fiber uplink (depending on environment). شبکه گستران فرابورس+1
- Switching/backplane capacity: **16 Gbps switching fabric**, forwarding rate ~ **6.5 Mpps** (64-byte packets) under its LAN-Base configuration. Cisco+2DiscTech+2
- MAC address table: supports up to ~ 8000 MACs. B&H Photo Video+1
- VLAN support: up to **255 VLANs (or up to 4,000 VLAN IDs, depending on config)**. B&H Photo Video+22+شبکه گستران فرابورس
- Jumbo / extended frame support: up to ~ 9,000 byte MTU (jumbo frames) if used properly — useful if you're doing bridging for larger frames (e.g. storage traffic, special setups). B&H Photo Video+1
- Management & features: Because it's a managed switch (not unmanaged), you get typical enterprise-edge features: VLANs, spanning-tree, port security, IGMP snooping, QoS, broadcast/multicast suppression, SNMP/management support. bsbroadcast.com+1

 What It's Good For — Use Cases

- Small/medium-size **office or branch networks** where you need multiple wired devices (PCs, VoIP phones, printers) at Fast-Ethernet speed.
- **Edge/access layer** in larger networks: e.g. connecting a group of desktops, APs (non-high throughput), IP phones, printers — with uplink to a core router/switch via the 1G uplinks.
- **VLAN segmentation, network organization, security** — if you need to separate traffic (e.g. VLAN for office, VLAN for guest, VLAN for voice) using a reliable Cisco managed switch.
- **Budget-conscious / legacy networks** — if your internet / internal bandwidth demands don't require full Gigabit per port, the 2960-24TT still delivers stable switching and enterprise-grade reliability at likely lower cost (used or refurbished).

Protocols

Access Layer – Layer 2 switch

- **Dynamic Host Configuration Protocol (DHCP)**

  Automatically assigns **IP addresses**, default gateway, DNS and other settings to devices.

  Process: **DORA**

  - Discover

  - Offer

  - Request

  - Acknowledge

- **Virtual Local Area Network (VLAN)**

  Logically separates a physical switch into **multiple networks**.
  Improves security, performance, and network segmentation.

  Example:

  - VLAN 10 = Staff

  - VLAN 20 = Students

  - VLAN 30 = Voice

- **Spanning Tree Protocol (STP)**

  Prevents **switching loops** in Layer 2 networks.
  Ensures only **one active path** between switches by blocking redundant links.

  Key Points:

  - Elects a **Root Bridge**

  - Blocks ports to avoid loops

  - Versions: STP, RSTP, MSTP

- **VLAN Trunking Protocol (VTP)**

  Cisco proprietary protocol that **manages VLANs centrally**.
  A VTP Server shares VLAN information with VTP Clients over **trunk links**.

  Modes:

  - Server

  - Client

  - Transparent (doesn't participate)

  Risk: One wrong VTP server can wipe out VLANs.

Distribution Layer – Multilayer switch

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- **IP Routing**

  The process of forwarding packets between networks using routing tables.
  Can be done using:

  - Static routes

  - Dynamic routing protocols (OSPF, EIGRP, BGP, RIP)

  Routers and L3 switches perform routing.

- **802.1Q Encapsulation (VLAN Trunking)**

  The IEEE standard for tagging VLAN traffic over a trunk link.
  Adds a 4-byte tag to Ethernet frames to identify the VLAN.

  Used between:

  - Switch ↔ Switch

  - Switch ↔ Router (Router-on-a-Stick)

  - Switch ↔ Server

- **Hot Standby Router Protocol (HSRP)**

  Cisco protocol for **default gateway redundancy**.
  Two routers act as one **virtual gateway**.

  Key Points:

  - Active router + Standby router

  - Shared **virtual IP + virtual MAC**

  - Provides failover if the active router dies

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- **Open Shortest Path First (OSPF)**

OSPF is a fast, scalable **link-state routing protocol** used inside large networks (IGP).
It calculates the best path using **Dijkstra's SPF algorithm**.

Key Points:

- Cost metric

- Divides networks into Areas (e.g., Area 0 backbone)

- Sends LSAs (Link-State Advertisements)

- Converges fast

- Supports VLSM and CIDR

Network layer – Router (Rn)

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<u>Network Access Layer</u> – Access Router

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  - Divides networks into Areas (e.g., Area 0 backbone)

  - Sends LSAs (Link-State Advertisements)

  - Converges fast

  - Supports VLSM and CIDR

- **Border Gateway Protocol (BGP)**

  BGP is the **routing protocol of the Internet**.
  Used between ISPs and large organizations.
  It determines the **best path between different autonomous systems (AS)** based on **policies**, not just metrics.

  Key Points:

  - Exterior Gateway Protocol (EGP)

  - Path vector protocol

  - Uses AS-Path, Local-Pref, MED, Weight

  - Runs over TCP port 179

- **Network Address Translation (NAT)**

Translates **private IP addresses** inside a LAN to a **public IP** for internet access. Types:

- **Static NAT** – one-to-one mapping

- **Dynamic NAT** – pool of public addresses

- **PAT (Overload)** – many private IPs share **one public IP** using ports (most common)

Purpose: conserve public IPv4 addresses + add security

Network

Link	Network	Usable host Range	Broadcast
LAN NETWORK			
Vlan 10	10.1.1.0/24	10.1.1.1 – 10.1.1.251	10.1.1.255
Vlan 20	20.1.1.0/24	20.1.1.1 – 20.1.1.251	20.1.1.255
Vlan 30	30.1.1.0/24	30.1.1.1 – 30.1.1.251	30.1.1.255
Vlan 40	40.1.1.0/24	40.1.1.1 – 40.1.1.251	40.1.1.255
Vlan 50	50.1.1.0/24	50.1.1.1 – 50.1.1.251	50.1.1.255
Vlan 60	60.1.1.0/24	60.1.1.1 – 60.1.1.251	60.1.1.255
Vlan 70	70.1.1.0/24	70.1.1.1 – 70.1.1.251	70.1.1.255
Vlan 80	80.1.1.0/24	80.1.1.1 – 80.1.1.251	80.1.1.255
Vlan 90	90.1.1.0/24	90.1.1.1 – 90.1.1.251	90.1.1.255
Vlan 100	100.1.1.0/24	100.1.1.1 – 100.1.1.251	100.1.1.255
Vlan 110	110.1.1.0/24	110.1.1.1 – 110.1.1.251	110.1.1.255
Vlan 120	120.1.1.0/24	120.1.1.1 – 120.1.1.251	120.1.1.255
Vlan 130	130.1.1.0/24	130.1.1.1 – 130.1.1.251	130.1.1.255
Vlan 140	140.1.1.0/24	140.1.1.1 – 140.1.1.251	140.1.1.255
Vlan 150	150.1.1.0/24	150.1.1.1 – 150.1.1.251	150.1.1.255
Vlan 160	160.1.1.0/24	160.1.1.1 – 160.1.1.251	160.1.1.255

WAN NETWORK			
ISP – Access Router	1.1.1.0/30	1.1.1.1 – 1.1.1.2	1.1.1.3
Access Router – R1	3.3.3.8/30	3.3.3.9 – 3.3.3.10	3.3.3.11
Access Router – R2	3.3.3.20/30	3.3.3.21 – 3.3.3.22	3.3.3.23
Access Router – R3	3.3.3.16/30	3.3.3.17 – 3.3.3.18	3.3.3.19
Access Router – R4	3.3.3.28/30	3.3.3.29 – 3.3.3.30	3.3.3.31
R1 – R2	3.3.3.12/30	3.3.3.13 – 3.3.3.14	3.3.3.14
R2 – R4	3.3.3.32/30	3.3.3.33 – 3.3.3.34	3.3.3.35
R1 – R3	3.3.3.0/30	3.3.3.1 – 3.3.3.2	3.3.3.3

R3 – R4	3.3.3.36/30	3.3.3.37 – 3.3.3.38	3.3.3.39
R1 – R4	3.3.3.4/30	3.3.3.5 – 3.3.3.6	3.3.3.7
R3 – R2	3.3.3.24/30	3.3.3.255 – 3.3.3.26	3.3.3.27
SW1 – R1	190.1.1.0/24	190.1.1.1 - 190.1.1.254	190.1.1.255
SW1 – R3	180.1.1.0/24	180.1.1.1 - 180.1.1.254	180.1.1.255
SW2 – R1	200.1.1.0/24	200.1.1.1 - 200.1.1.254	200.1.1.255
SW2 – R3	210.1.1.0/24	210.1.1.1 - 210.1.1.254	210.1.1.255
SW3 – R2	191.1.1.0/24	191.1.1.1 – 191.1.1.254	191.1.1.255
SW3 – R4	201.1.1.0/24	201.1.1.1 – 201.1.1.254	201.1.1.255
SW4 – R2	181.1.1.0/24	181.1.1.1 – 181.1.1.254	181.1.1.255
SW4 – R4	211.1.1.0/24	211.1.1.1 – 211.1.1.254	211.1.1.255
ETHERCHANNEL 1	170.1.1.0/24	170.1.1.1- 170.1.1.254	170.1.1.255
ETHERCHANNEL 2	171.1.1.0/24	171.1.1.1 – 171.1.1.254	171.1.1.255
Tunnel 1	192.168.1.0/32	192.168.1.1- 192.168.1.2	192.168.1.3

Network Device Configuration

- Access-Router

  hostname Access-Router

  ip cef

  license udi pid CISCO2911/K9 sn FTX15246D8N-

  spanning-tree mode pvst

  interface Tunnel1

  ip address 192.168.1.13 255.255.255.0

  mtu 1476

  interface Serial0/1/0

  ip address 3.3.3.21 255.255.255.252

  clock rate 2000000

  interface Serial0/2/0

  ip address 3.3.3.18 255.255.255.252

  interface Serial0/2/1

  ip address 3.3.3.29 255.255.255.252

  clock rate 2000000

  interface Serial0/3/0

  ip address 1.1.1.1 255.255.255.0

  clock rate 2000000

interface Serial0/3/1

ip address 3.3.3.10 255.255.255.252

ip nat inside

router eigrp 1

network 192.168.1.0

router ospf 10

log-adjacency-changes

network 3.3.3.8 0.0.0.3 area 0

network 3.3.3.16 0.0.0.3 area 0

network 3.3.3.20 0.0.0.3 area 0

network 3.3.3.28 0.0.0.3 area 0

network 1.1.1.0 0.0.0.3 area 0

default-information originate

router bgp 193

bgp log-neighbor-changes

no synchronization

neighbor 1.1.1.2 remote-as 556

network 1.1.1.0 mask 255.255.255.252

ip nat inside source list 10 interface Serial0/2/1 overload

ip classless

ip route 0.0.0.0 0.0.0.0 1.1.1.2

access-list 10 permit any

- <u>ISP</u>

hostname ISP

ip cef

license udi pid CISCO2911/K9 sn FTX15245HG4-

spanning-tree mode pvst

<u>interface Loopback1</u>

ip address 8.8.8.8 255.255.255.255

<u>interface Tunnel1</u>

ip address 192.168.1.14 255.255.255.0

mtu 1476

<u>interface Serial0/3/0</u>

ip address 1.1.1.2 255.255.255.0

<u>router eigrp 1</u>

network 192.168.1.0

<u>router ospf 10</u>

log-adjacency-changes

network 1.1.1.0 0.0.0.3 area 0

<u>router bgp 556</u>

bgp log-neighbor-changes

no synchronization

neighbor 1.1.1.1 remote-as 193

neighbor 192.168.1.13 remote-as 193

network 1.1.1.0 mask 255.255.255.252

access-list 10 permit any

- R1

hostname R1

license udi pid CISCO2911/K9 sn FTX15246YUJ-

spanning-tree mode pvst

interface GigabitEthernet0/0

ip address 190.1.1.2 255.255.255.0

duplex auto

speed auto

interface GigabitEthernet0/1

ip address 200.1.1.2 255.255.255.0

duplex auto

speed auto

interface Serial0/2/0

ip address 3.3.3.9 255.255.255.252

interface Serial0/2/1

ip address 3.3.3.1 255.255.255.252

interface Serial0/3/0

ip address 3.3.3.13 255.255.255.252

clock rate 2000000

interface Serial0/3/1

ip address 3.3.3.5 255.255.255.252

clock rate 2000000

router ospf 10

log-adjacency-changes

network 190.1.1.0 0.0.0.255 area 0

network 200.1.1.0 0.0.0.255 area 0

network 3.3.3.0 0.0.0.3 area 0

network 3.3.3.8 0.0.0.3 area 0

network 3.3.3.4 0.0.0.3 area 0

network 3.3.3.12 0.0.0.3 area 0

default-information originate

ip nat inside source list 10 interface GigabitEthernet0/1 overload

ip classless

ip route 0.0.0.0 0.0.0.0 2.2.2.1

access-list 10 permit any

- R2

  hostname R2

  ip cef

  license udi pid CISCO2911/K9 sn FTX1524N44N-

  spanning-tree mode pvst

  interface GigabitEthernet0/0

  ip address 181.1.1.1 255.255.255.0

  duplex auto

  speed auto

  interface GigabitEthernet0/1

  ip address 191.1.1.1 255.255.255.0

  duplex auto

  speed auto

  interface Serial0/2/0

  ip address 3.3.3.14 255.255.255.252

  interface Serial0/2/1

  ip address 3.3.3.26 255.255.255.252

  clock rate 2000000

  interface Serial0/3/0

  ip address 3.3.3.22 255.255.255.252

- R2

interface Serial0/3/1

ip address 3.3.3.33 255.255.255.252

clock rate 2000000

router ospf 10

log-adjacency-changes

network 3.3.3.12 0.0.0.3 area 0

network 3.3.3.20 0.0.0.3 area 0

network 3.3.3.24 0.0.0.3 area 0

network 3.3.3.32 0.0.0.3 area 0

network 191.1.1.0 0.0.0.255 area 0

network 181.1.1.0 0.0.0.255 area 0

default-information originate

ip nat inside source list 10 interface GigabitEthernet0/2 overload

ip classless

access-list 10 permit any

- R3

hostname R3

ip cef

license udi pid CISCO2911/K9 sn FTX1524CH4R-

spanning-tree mode pvst

interface GigabitEthernet0/0

ip address 210.1.1.2 255.255.255.0

duplex auto

speed auto

interface GigabitEthernet0/1

ip address 180.1.1.2 255.255.255.0

duplex auto

speed auto

interface Serial0/2/0

ip address 3.3.3.2 255.255.255.252

clock rate 2000000

interface Serial0/2/1

ip address 3.3.3.25 255.255.255.252

interface Serial0/3/0

ip address 3.3.3.17 255.255.255.252

clock rate 2000000

interface Serial0/3/1

ip address 3.3.3.37 255.255.255.252

router ospf 10

log-adjacency-changes

network 210.1.1.0 0.0.0.255 area 0

network 180.1.1.0 0.0.0.255 area 0

network 3.3.3.0 0.0.0.3 area 0

network 3.3.3.16 0.0.0.3 area 0

network 3.3.3.24 0.0.0.3 area 0

network 3.3.3.36 0.0.0.3 area 0

default-information originate

- R4

hostname R4

license udi pid CISCO2911/K9 sn FTX1524UQ80-

spanning-tree mode pvst

interface GigabitEthernet0/0

ip address 211.1.1.1 255.255.255.0

duplex auto

speed auto

interface GigabitEthernet0/1

ip address 201.1.1.1 255.255.255.0

duplex auto

speed auto

interface Serial0/2/0

ip address 3.3.3.38 255.255.255.252

clock rate 2000000

interface Serial0/2/1

ip address 3.3.3.6 255.255.255.252

interface Serial0/3/0

ip address 3.3.3.30 255.255.255.252

interface Serial0/3/1

ip address 3.3.3.34 255.255.255.252

router ospf 10

log-adjacency-changes

network 3.3.3.28 0.0.0.3 area 0

network 3.3.3.32 0.0.0.3 area 0

network 3.3.3.4 0.0.0.3 area 0

network 3.3.3.36 0.0.0.3 area 0

network 201.1.1.0 0.0.0.255 area 0

network 211.1.1.0 0.0.0.255 area 0

- SW1

hostname SW1

ip routing

spanning-tree mode pvst

interface Port-channel10
no switchport
ip address 170.1.1.1 255.255.255.0

interface FastEthernet0/1
no switchport
ip address 190.1.1.1 255.255.255.0
duplex auto
speed auto

interface FastEthernet0/2
no switchport
ip address 180.1.1.1 255.255.255.0
duplex auto
speed auto

interface FastEthernet0/3

no switchport

no ip address

channel-group 10 mode on

duplex auto

speed auto

interface FastEthernet0/4

no switchport

no ip address

channel-group 10 mode on

duplex auto

speed auto

interface FastEthernet0/5

no switchport

no ip address

channel-group 10 mode on

duplex auto

speed auto

interface FastEthernet0/6

no switchport

no ip address

channel-group 10 mode on

duplex auto

speed auto

interface FastEthernet0/7

no switchport

no ip address

channel-group 10 mode on

duplex auto

speed auto

interface FastEthernet0/8

no switchport

no ip address

channel-group 10 mode on

duplex auto

speed auto

interface FastEthernet0/9

no switchport

no ip address

channel-group 10 mode on

duplex auto

speed auto

interface FastEthernet0/10

no switchport

no ip address

channel-group 10 mode on

duplex auto

speed auto

interface FastEthernet0/11

switchport trunk encapsulation dot1q

switchport mode trunk

interface FastEthernet0/12

switchport trunk encapsulation dot1q

switchport mode trunk

interface FastEthernet0/13

switchport trunk encapsulation dot1q

switchport mode trunk

interface FastEthernet0/14

switchport trunk encapsulation dot1q

switchport mode trunk

interface Vlan10

mac-address 00e0.f723.1b01

ip address 10.1.1.254 255.255.255.0

standby 10 ip 10.1.1.100

interface Vlan20

mac-address 00e0.f723.1b02

ip address 20.1.1.254 255.255.255.0

standby 20 ip 20.1.1.100

interface Vlan30

mac-address 00e0.f723.1b03

ip address 30.1.1.254 255.255.255.0

standby 30 ip 30.1.1.100

interface Vlan40

mac-address 00e0.f723.1b04

ip address 40.1.1.254 255.255.255.0

standby 40 ip 40.1.1.100

interface Vlan50

mac-address 00e0.f723.1b05

ip address 50.1.1.254 255.255.255.0

standby 50 ip 50.1.1.100

interface Vlan60

mac-address 00e0.f723.1b06

ip address 60.1.1.254 255.255.255.0

standby 60 ip 60.1.1.100

interface Vlan70

mac-address 00e0.f723.1b07

ip address 70.1.1.254 255.255.255.0

standby 70 ip 70.1.1.100

interface Vlan80

mac-address 00e0.f723.1b08

ip address 80.1.1.254 255.255.255.0

standby 80 ip 80.1.1.100

router ospf 10

log-adjacency-changes

network 180.1.1.0 0.0.0.255 area 0

network 190.1.1.0 0.0.0.255 area 0

network 170.1.1.0 0.0.0.3 area 0

network 10.1.1.0 0.0.0.255 area 0

network 20.1.1.0 0.0.0.255 area 0

network 30.1.1.0 0.0.0.255 area 0

network 40.1.1.0 0.0.0.255 area 0

network 50.1.1.0 0.0.0.255 area 0

network 60.1.1.0 0.0.0.255 area 0

network 70.1.1.0 0.0.0.255 area 0

network 80.1.1.0 0.0.0.255 area 0

default-information originate

- <u>SW2</u>

  hostname SW2

  ip routing

  spanning-tree mode pvst

  <u>interface Port-channel10</u>

  no switchport

  ip address 170.1.1.2 255.255.255.0

  <u>interface FastEthernet0/1</u>

  no switchport

  ip address 200.1.1.1 255.255.255.0

  duplex auto

  speed auto

  <u>interface FastEthernet0/2</u>

  no switchport

  ip address 210.1.1.1 255.255.255.0

  duplex auto

  speed auto

interface FastEthernet0/3

no switchport

no ip address

channel-group 10 mode on

duplex auto

speed auto

interface FastEthernet0/4

no switchport

no ip address

channel-group 10 mode on

duplex auto

speed auto

interface FastEthernet0/5

no switchport

no ip address

channel-group 10 mode on

duplex auto

speed auto

interface FastEthernet0/6

no switchport

no ip address

channel-group 10 mode on

duplex auto

speed auto

interface FastEthernet0/7

no switchport

no ip address

channel-group 10 mode on

duplex auto

speed auto

interface FastEthernet0/8

no switchport

no ip address

channel-group 10 mode on

duplex auto

speed auto

interface FastEthernet0/9

no switchport

no ip address

channel-group 10 mode on

duplex auto

speed auto

interface FastEthernet0/10

no switchport

no ip address

channel-group 10 mode on

duplex auto

speed auto

interface FastEthernet0/11

switchport trunk encapsulation dot1q

switchport mode trunk

interface FastEthernet0/12

switchport trunk encapsulation dot1q

switchport mode trunk

interface FastEthernet0/13

switchport trunk encapsulation dot1q

switchport mode trunk

interface Vlan10

mac-address 0040.0b06.b901

ip address 10.1.1.253 255.255.255.0

standby 10 ip 10.1.1.100

interface Vlan20

mac-address 0040.0b06.b902

ip address 20.1.1.253 255.255.255.0

standby 20 ip 20.1.1.100

interface Vlan30

mac-address 0040.0b06.b903

ip address 30.1.1.253 255.255.255.0

standby 30 ip 30.1.1.100

interface Vlan40

mac-address 0040.0b06.b904

ip address 40.1.1.253 255.255.255.0

standby 40 ip 40.1.1.100

interface Vlan50

mac-address 0040.0b06.b905

ip address 50.1.1.253 255.255.255.0

standby 50 ip 50.1.1.100

interface Vlan60

mac-address 0040.0b06.b906

ip address 60.1.1.253 255.255.255.0

standby 60 ip 60.1.1.100

interface Vlan70

mac-address 0040.0b06.b907

ip address 70.1.1.253 255.255.255.0

standby 70 ip 70.1.1.100

interface Vlan80

mac-address 0040.0b06.b908

ip address 80.1.1.253 255.255.255.0

standby 80 ip 80.1.1.100

router ospf 10

log-adjacency-changes

network 200.1.1.0 0.0.0.3 area 0

network 210.1.1.0 0.0.0.3 area 0

network 210.1.1.0 0.0.0.255 area 0

network 200.1.1.0 0.0.0.255 area 0

network 170.1.1.0 0.0.0.3 area 0

default-information originate

- SW3

  hostname SW3

  ip routing

  spanning-tree mode pvst

  interface Port-channel10

  no switchport

  ip address 171.1.1.1 255.255.255.0

  interface FastEthernet0/1

  no switchport

  ip address 201.1.1.2 255.255.255.0

  duplex auto

  speed auto

interface FastEthernet0/2

no switchport

ip address 191.1.1.2 255.255.255.0

duplex auto

speed auto

interface FastEthernet0/7

channel-group 10 mode on

interface FastEthernet0/8

channel-group 10 mode on

interface FastEthernet0/9

channel-group 10 mode on

interface FastEthernet0/10

channel-group 10 mode on

interface FastEthernet0/11

switchport trunk encapsulation dot1q

switchport mode trunk

interface FastEthernet0/12

switchport trunk encapsulation dot1q

switchport mode trunk

interface FastEthernet0/13

switchport trunk encapsulation dot1q

switchport mode trunk

interface FastEthernet0/14

switchport trunk encapsulation dot1q

switchport mode trunk

interface Vlan90

mac-address 00d0.9747.8701

ip address 90.1.1.254 255.255.255.0

standby 90 ip 90.1.1.100

interface Vlan100

mac-address 00d0.9747.8702

ip address 100.1.1.254 255.255.255.0

standby 100 ip 100.1.1.100

interface Vlan110

mac-address 00d0.9747.8703

ip address 110.1.1.254 255.255.255.0

standby 110 ip 110.1.1.100

interface Vlan120

mac-address 00d0.9747.8704

ip address 120.1.1.254 255.255.255.0

standby 120 ip 120.1.1.100

interface Vlan130

mac-address 00d0.9747.8705

ip address 130.1.1.254 255.255.255.0

standby 130 ip 130.1.1.100

interface Vlan140

mac-address 00d0.9747.8706

ip address 140.1.1.254 255.255.255.0

standby 140 ip 140.1.1.100

interface Vlan150

mac-address 00d0.9747.8707

ip address 150.1.1.254 255.255.255.0

standby 150 ip 150.1.1.100

interface Vlan160

mac-address 00d0.9747.8708

ip address 160.1.1.254 255.255.255.0

standby 160 ip 160.1.1.100

router ospf 10

log-adjacency-changes

network 191.1.1.0 0.0.0.255 area 0

network 181.1.1.0 0.0.0.255 area 0

- SW4

hostname SW4

ip routing

spanning-tree mode pvst

interface Port-channel10
no switchport
ip address 171.1.1.2 255.255.255.0

interface FastEthernet0/1
no switchport
ip address 211.1.1.2 255.255.255.0
duplex auto
speed auto

interface FastEthernet0/2
no switchport
ip address 181.1.1.2 255.255.255.0
duplex auto
speed auto

interface FastEthernet0/7
channel-group 10 mode on

interface FastEthernet0/8

channel-group 10 mode on

interface FastEthernet0/9

channel-group 10 mode on

interface FastEthernet0/10

channel-group 10 mode on

interface FastEthernet0/11

switchport trunk encapsulation dot1q

switchport mode trunk

interface FastEthernet0/12

switchport trunk encapsulation dot1q

switchport mode trunk

interface FastEthernet0/13

switchport trunk encapsulation dot1q

switchport mode trunk

interface FastEthernet0/14

switchport trunk encapsulation dot1q

switchport mode trunk

interface Vlan90

mac-address 0000.0c86.ad02

ip address 90.1.1.253 255.255.255.0

standby 90 ip 90.1.1.100

interface Vlan100

mac-address 0000.0c86.ad03

ip address 100.1.1.253 255.255.255.0

standby 100 ip 100.1.1.100

interface Vlan110

mac-address 0000.0c86.ad04

ip address 110.1.1.253 255.255.255.0

standby 110 ip 110.1.1.100

interface Vlan120

mac-address 0000.0c86.ad05

ip address 120.1.1.253 255.255.255.0

standby 120 ip 120.1.1.100

interface Vlan130

mac-address 0000.0c86.ad06

ip address 130.1.1.253 255.255.255.0

standby 130 ip 130.1.1.100

interface Vlan140

mac-address 0000.0c86.ad07

ip address 140.1.1.253 255.255.255.0

standby 140 ip 140.1.1.100

interface Vlan150

mac-address 0000.0c86.ad08

ip address 150.1.1.253 255.255.255.0

standby 150 ip 150.1.1.100

interface Vlan160

mac-address 0000.0c86.ad09

ip address 160.1.1.253 255.255.255.0

standby 160 ip 160.1.1.100

router ospf 10

log-adjacency-changes

network 211.1.1.0 0.0.0.255 area 0

network 181.1.1.0 0.0.0.255 area 0

network 160.1.1.0 0.0.0.255 area 0

network 150.1.1.0 0.0.0.255 area 0

network 140.1.1.0 0.0.0.255 area 0

network 130.1.1.0 0.0.0.255 area 0

network 120.1.1.0 0.0.0.255 area 0

network 110.1.1.0 0.0.0.255 area 0

network 100.1.1.0 0.0.0.255 area 0

network 90.1.1.0 0.0.0.255 area 0

network 171.1.1.0 0.0.0.255 area 0

network 201.1.1.0 0.0.0.255 area 0

- Access-Layer1

  hostname Access-Layer1

  ip dhcp excluded-address 10.1.1.100
  ip dhcp excluded-address 10.1.1.254

  ip dhcp pool vlan10-pool
  network 10.1.1.0 255.255.255.0
  default-router 10.1.1.100
  ip dhcp pool vlan20-pool
  network 20.1.1.0 255.255.255.0
  default-router 20.1.1.100

  spanning-tree mode pvst
  spanning-tree extend system-id

  interface FastEthernet0/1
  switchport mode trunk

  interface FastEthernet0/2
  switchport mode trunk

  interface FastEthernet0/3
  switchport access vlan 20

  interface FastEthernet0/4
  switchport access vlan 20

interface FastEthernet0/5

switchport access vlan 20

interface FastEthernet0/6

switchport access vlan 20

interface FastEthernet0/7

switchport access vlan 20

interface FastEthernet0/8

switchport access vlan 20

interface FastEthernet0/9

switchport access vlan 10

interface FastEthernet0/10

switchport access vlan 10

interface FastEthernet0/11

switchport access vlan 10

interface FastEthernet0/12

switchport access vlan 10

interface FastEthernet0/13

switchport access vlan 10

interface FastEthernet0/14

switchport access vlan 10

interface Vlan10

ip address 10.1.1.252 255.255.255.0

interface Vlan20

ip address 20.1.1.252 255.255.255.0

- Access-Layer2

  hostname Access-Layer2

  ip dhcp excluded-address 40.1.1.100

  ip dhcp excluded-address 30.1.1.100

  ip dhcp pool vlan30-pool

  network 30.1.1.0 255.255.255.0

  default-router 30.1.1.100

  ip dhcp pool vlan40-pool

  network 40.1.1.0 255.255.255.0

  default-router 40.1.1.100

  spanning-tree mode pvst

  spanning-tree extend system-id

  interface FastEthernet0/1

  switchport mode trunk

interface FastEthernet0/2

switchport mode trunk

interface FastEthernet0/3

switchport access vlan 40

interface FastEthernet0/4

switchport access vlan 40

interface FastEthernet0/5

switchport access vlan 40

interface FastEthernet0/6

switchport access vlan 40

interface FastEthernet0/7

switchport access vlan 40

interface FastEthernet0/8

switchport access vlan 40

interface FastEthernet0/9

switchport access vlan 30

interface FastEthernet0/10

switchport access vlan 30

interface FastEthernet0/11

switchport access vlan 30

interface FastEthernet0/12

switchport access vlan 30

interface FastEthernet0/13

switchport access vlan 30

interface FastEthernet0/14

switchport access vlan 30

interface Vlan30

ip address 30.1.1.252 255.255.255.0

interface Vlan40

ip address 40.1.1.252 255.255.255.0

- <u>Access-Layer3</u>

  hostname Access-Layer3

  ip dhcp excluded-address 50.1.1.100
  ip dhcp excluded-address 60.1.1.100

  ip dhcp pool vlan50-pool
  network 50.1.1.0 255.255.255.0
  default-router 50.1.1.100
  ip dhcp pool vlan60-pool
  network 60.1.1.0 255.255.255.0
  default-router 60.1.1.100

  spanning-tree mode pvst
  spanning-tree extend system-id

  <u>interface FastEthernet0/1</u>
  switchport mode trunk

  <u>interface FastEthernet0/2</u>
  switchport mode trunk

  <u>interface FastEthernet0/3</u>
  switchport access vlan 60

  <u>interface FastEthernet0/4</u>
  switchport access vlan 60

interface FastEthernet0/5

switchport access vlan 60

interface FastEthernet0/6

switchport access vlan 60

interface FastEthernet0/7

switchport access vlan 60

interface FastEthernet0/8

switchport access vlan 60

interface FastEthernet0/9

switchport access vlan 50

interface FastEthernet0/10

switchport access vlan 50

interface FastEthernet0/11

switchport access vlan 50

interface FastEthernet0/12

switchport access vlan 50

interface FastEthernet0/13

switchport access vlan 50

interface FastEthernet0/14

switchport access vlan 50

interface Vlan50

ip address 50.1.1.252 255.255.255.0

interface Vlan60

ip address 60.1.1.252 255.255.255.0

- Access-Layer4

hostname Access-Layer4

ip dhcp excluded-address 70.1.1.100

ip dhcp excluded-address 80.1.1.100

ip dhcp pool vlan70-pool

network 70.1.1.0 255.255.255.0

default-router 70.1.1.100

ip dhcp pool vlan80-pool

network 80.1.1.0 255.255.255.0

default-router 80.1.1.100

spanning-tree mode pvst

spanning-tree extend system-id

interface FastEthernet0/1

switchport mode trunk

interface FastEthernet0/2

switchport mode trunk

interface FastEthernet0/3

switchport access vlan 80

interface FastEthernet0/4

switchport access vlan 80

interface FastEthernet0/5

switchport access vlan 80

interface FastEthernet0/6

switchport access vlan 80

interface FastEthernet0/7

switchport access vlan 80

interface FastEthernet0/8

switchport access vlan 80

interface FastEthernet0/9

switchport access vlan 70

interface FastEthernet0/10

switchport access vlan 70

interface FastEthernet0/11

switchport access vlan 70

interface FastEthernet0/12

switchport access vlan 70

interface FastEthernet0/13

switchport access vlan 70

interface FastEthernet0/14

switchport access vlan 70

interface Vlan70

ip address 70.1.1.252 255.255.255.0

interface Vlan80

ip address 80.1.1.252 255.255.255.0

- <u>Access-Layer5</u>

  hostname Access-Layer5

  ip dhcp excluded-address 160.1.1.254

  ip dhcp excluded-address 160.1.1.100

  ip dhcp excluded-address 150.1.1.100

  ip dhcp excluded-address 150.1.1.254

  ip dhcp pool vlan160-pool

  network 160.1.1.0 255.255.255.0

  default-router 160.1.1.100

  ip dhcp pool vlan150-pool

  network 150.1.1.0 255.255.255.0

  default-router 150.1.1.100

  spanning-tree mode pvst

  spanning-tree extend system-id

  <u>interface FastEthernet0/1</u>

  switchport mode trunk

  <u>interface FastEthernet0/2</u>

  switchport mode trunk

  <u>interface FastEthernet0/3</u>

  switchport access vlan 150

interface FastEthernet0/4

switchport access vlan 150

interface FastEthernet0/5

switchport access vlan 150

interface FastEthernet0/6

switchport access vlan 150

interface FastEthernet0/7

switchport access vlan 150

interface FastEthernet0/8

switchport access vlan 150

interface FastEthernet0/9

switchport access vlan 160

interface FastEthernet0/10

switchport access vlan 160

interface FastEthernet0/11

switchport access vlan 160

interface FastEthernet0/12

switchport access vlan 160

interface FastEthernet0/13

switchport access vlan 160

interface FastEthernet0/14

switchport access vlan 160

interface Vlan150

ip address 150.1.1.252 255.255.255.0

interface Vlan160

ip address 160.1.1.252 255.255.255.0

- Access-Layer6

hostname Access-Layer6

ip dhcp excluded-address 130.1.1.100

ip dhcp excluded-address 140.1.1.100

ip dhcp excluded-address 140.1.1.254

ip dhcp excluded-address 130.1.1.254

ip dhcp pool vlan140-pool

network 140.1.1.0 255.255.255.0

default-router 140.1.1.100

ip dhcp pool vlan130-pool

network 130.1.1.0 255.255.255.0

default-router 130.1.1.100

spanning-tree mode pvst

spanning-tree extend system-id

interface FastEthernet0/1

switchport mode trunk

interface FastEthernet0/2

switchport mode trunk

interface FastEthernet0/3

switchport access vlan 130

interface FastEthernet0/4

switchport access vlan 130

interface FastEthernet0/5

switchport access vlan 130

interface FastEthernet0/6

switchport access vlan 130

interface FastEthernet0/7

switchport access vlan 130

interface FastEthernet0/8

switchport access vlan 130

interface FastEthernet0/9

switchport access vlan 140

interface FastEthernet0/10

switchport access vlan 140

interface FastEthernet0/11

switchport access vlan 140

interface FastEthernet0/12

switchport access vlan 140

interface FastEthernet0/13

switchport access vlan 140

interface FastEthernet0/14

switchport access vlan 140

interface Vlan130

ip address 130.1.1.252 255.255.255.0

interface Vlan140

ip address 140.1.1.252 255.255.255.0

hostname Access-Layer7

ip dhcp pool vlan120-pool

network 120.1.1.0 255.255.255.0

default-router 120.1.1.100

ip dhcp pool vlan110-pool

network 110.1.1.0 255.255.255.0

default-router 110.1.1.100

spanning-tree mode pvst

spanning-tree extend system-id

interface FastEthernet0/3

switchport access vlan 110

interface FastEthernet0/4

switchport access vlan 110

interface FastEthernet0/5

switchport access vlan 110

interface FastEthernet0/6

switchport access vlan 110

interface FastEthernet0/7

switchport access vlan 110

interface FastEthernet0/8

switchport access vlan 110

interface FastEthernet0/9

switchport access vlan 120

interface FastEthernet0/10

switchport access vlan 120

interface FastEthernet0/11

switchport access vlan 120

interface FastEthernet0/12

switchport access vlan 120

interface FastEthernet0/13

switchport access vlan 120

interface FastEthernet0/14

switchport access vlan 120

interface Vlan110

ip address 110.1.1.252 255.255.255.0

interface Vlan120

ip address 120.1.1.252 255.255.255.0

- <u>Access-Layer8</u>

  hostname Access-Layer8

  ip dhcp pool vlan100-pool

  network 100.1.1.0 255.255.255.0

  default-router 100.1.1.100

  ip dhcp pool vlan90-pool

  network 90.1.1.0 255.255.255.0

  default-router 90.1.1.100

  spanning-tree mode pvst

  spanning-tree extend system-id

  <u>interface FastEthernet0/1</u>

  switchport mode trunk

  <u>interface FastEthernet0/2</u>

  switchport mode trunk

  <u>interface FastEthernet0/3</u>

  switchport access vlan 90

  <u>interface FastEthernet0/4</u>

  switchport access vlan 90

  <u>interface FastEthernet0/5</u>

  switchport access vlan 90

interface FastEthernet0/6

switchport access vlan 90

interface FastEthernet0/7

switchport access vlan 90

interface FastEthernet0/8

switchport access vlan 90

interface FastEthernet0/9

switchport access vlan 100

interface FastEthernet0/10

switchport access vlan 100

interface FastEthernet0/11

switchport access vlan 100

interface FastEthernet0/12

switchport access vlan 100

interface FastEthernet0/13

switchport access vlan 100

interface FastEthernet0/14

switchport access vlan 100

interface Vlan90

ip address 90.1.1.252 255.255.255.0

interface Vlan100

ip address 100.1.1.252 255.255.255.0

```
C:\>ping 110.1.1.3

Pinging 110.1.1.3 with 32 bytes of data:

Request timed out.
Reply from 110.1.1.3: bytes=32 time=1ms TTL=124
Reply from 110.1.1.3: bytes=32 time=12ms TTL=124
Reply from 110.1.1.3: bytes=32 time=2ms TTL=124

Ping statistics for 110.1.1.3:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 12ms, Average = 5ms

C:\>
C:\>
C:\>tracert 110.1.1.3

Tracing route to 110.1.1.3 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      30.1.1.254
  2    0 ms      0 ms      1 ms      190.1.1.2
  3    1 ms      1 ms      1 ms      3.3.3.38
  4    1 ms      0 ms      0 ms      211.1.1.2
  5    0 ms      6 ms      9 ms      110.1.1.3

Trace complete.

C:\>
```
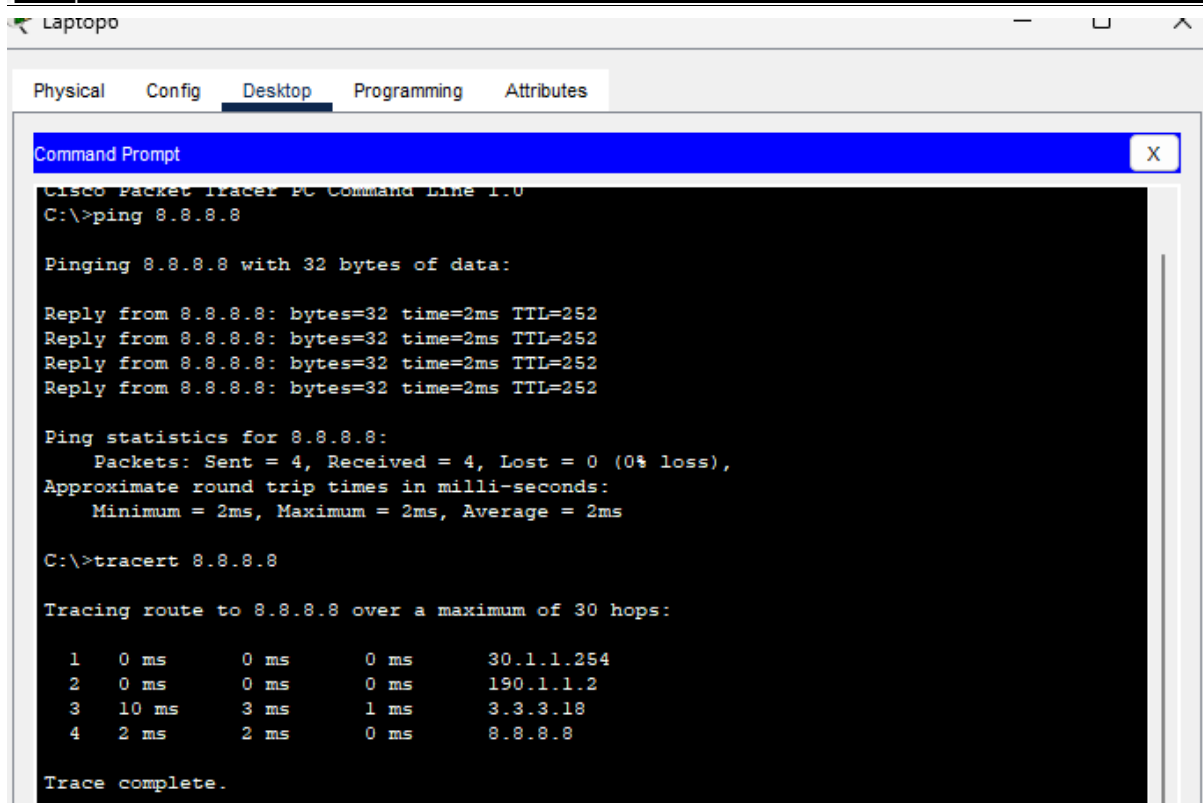
Laptop0 ─ □ ∧

| Physical | Config | Desktop | Programming | Attributes |

Command Prompt X

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 8.8.8.8

Pinging 8.8.8.8 with 32 bytes of data:

Reply from 8.8.8.8: bytes=32 time=2ms TTL=252
Reply from 8.8.8.8: bytes=32 time=2ms TTL=252
Reply from 8.8.8.8: bytes=32 time=2ms TTL=252
Reply from 8.8.8.8: bytes=32 time=2ms TTL=252

Ping statistics for 8.8.8.8:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 2ms, Average = 2ms

C:\>tracert 8.8.8.8

Tracing route to 8.8.8.8 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      30.1.1.254
  2    0 ms      0 ms      0 ms      190.1.1.2
  3   10 ms      3 ms      1 ms      3.3.3.18
  4    2 ms      2 ms      0 ms      8.8.8.8

Trace complete.
```

```
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#Hostname ISP
ISP(config)#int L1

ISP(config-if)#
%LINK-5-CHANGED: Interface Loopback1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1, changed state to up

ISP(config-if)#ip add 8.8.8.8 255.255.255.255
ISP(config-if)#no shut
```

```
ISP(config-if)#int se0/3/1
ISP(config-if)#no shut

ISP(config-if)#
%LINK-5-CHANGED: Interface Serial0/3/1, changed state to up

ISP(config-if)#ip a
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/3/1, changed state to up

% Ambiguous command: "ip a"
ISP(config-if)#
ISP(config-if)#ip add 1.1.1.2 255.255.255.252
ISP(config-if)#router bgp 555
ISP(config-router)#network 1.1.1.1
ISP(config-router)#network 1.1.1.1 mask 255.255.255.252
ISP(config-router)#neighbo
ISP(config-router)#network 1.1.1.0 mask 255.255.255.252
ISP(config-router)#neig
ISP(config-router)#neighbor 1.1.1.1 remo
ISP(config-router)#neighbor 1.1.1.1 remote-as 444
ISP(config-router)#
ISP#
%SYS-5-CONFIG_I: Configured from console by console
```

```
ISP#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
ISP(config)#
ISP(config)#router ospf 10
ISP(config-router)#network 1.1.1.0 0.0.0.3 area 0
ISP(config-router)#
00:25:05: %OSPF-5-ADJCHG: Process 10, Nbr 3.3.3.2 on Serial0/3/1 from LOADING to FULL,
Loading Done
```

```
Enter configuration commands, one per line.  End with C
R5(config)#router ospf 10
R5(config-router)#default
R5(config-router)#default-information
R5(config-router)#default-information originate
R5(config-router)#
```
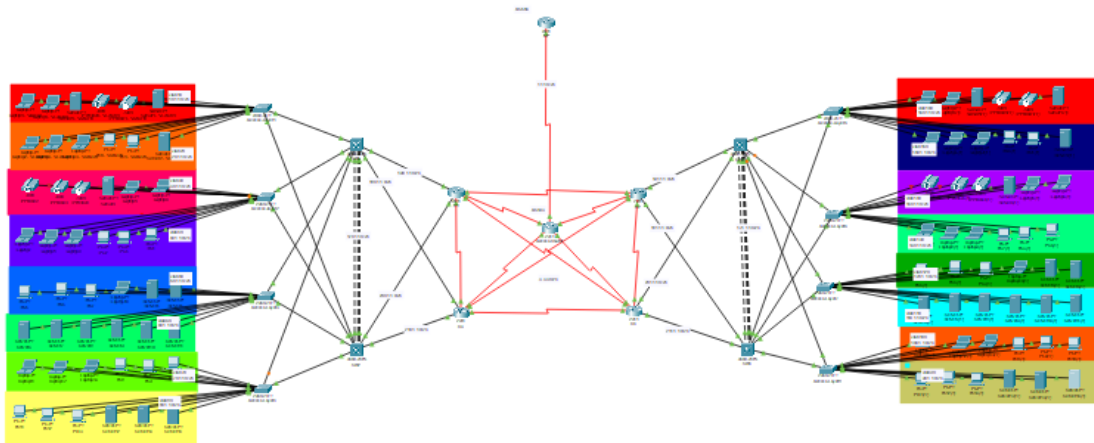
```
Access-Layer10(config)#
Access-Layer10(config)#
Access-Layer10(config)#int
Access-Layer10(config)#interface r
Access-Layer10(config)#interface range f
Access-Layer10(config)#interface range fastEthernet0/1 - 2
Access-Layer10(config-if-range)#no shut
Access-Layer10(config-if-range)#sw
Access-Layer10(config-if-range)#switchport access
Access-Layer10(config-if-range)#switchport access vlan 10
% Access VLAN does not exist. Creating vlan 10
```

```
Access-Layer10(config-if-range)#exit
Access-Layer10(config)#ip dhcp pool vlan10-pool
Access-Layer10(dhcp-config)#network 10.1.1.0 255.255.255.0
Access-Layer10(dhcp-config)#default
Access-Layer10(dhcp-config)#default-router 10.1.1.100
Access-Layer10(dhcp-config)#exit
```

```
Switch>EN
Switch#CONFI
Switch#con
Switch#conf
Switch#configure t
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#Hostname Access-Layer10
```

```
Access-Layer10(config-if-range)#exit
Access-Layer10(config)#ip dhcp pool vlan10-pool
Access-Layer10(dhcp-config)#network 10.1.1.0 255.255.255.0
Access-Layer10(dhcp-config)#default
Access-Layer10(dhcp-config)#default-router 10.1.1.100
Access-Layer10(dhcp-config)#exit
Access-Layer10(config)#ip dh
Access-Layer10(config)#ip dhcp ex
Access-Layer10(config)#ip dhcp excluded-address 10.1.1.254
Access-Layer10(config)#
```

```
Access-Layer10(config)#interface fastEthernet 0/3
Access-Layer10(config-if)#swi
Access-Layer10(config-if)#switchport mo
Access-Layer10(config-if)#switchport mode trunk

Access-Layer10(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to up
```

```
Switch>en
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

Switch(config)#hostname SW5
```

```
SW5(config)#int fa0/1
SW5(config-if)#no shut
SW5(config-if)#swit
SW5(config-if)#switchport tr
SW5(config-if)#switchport trunk en
SW5(config-if)#switchport trunk encapsulation
SW5(config-if)#switchport trunk encapsulation dotlq
SW5(config-if)#swi
SW5(config-if)#switchport mo
SW5(config-if)#switchport mode trunk
SW5(config-if)#
```

```
Access-Layer10(config-if)#int vlan 10
Access-Layer10(config-if)#
%LINK-5-CHANGED: Interface Vlan10, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan10, changed state to up

Access-Layer10(config-if)#ip add 10.1.1.252
% Incomplete command.
Access-Layer10(config-if)#ip add 10.1.1.252 255.255.255.0
```

```
SW5(config)#int fa0/1
SW5(config-if)#no shut
SW5(config-if)#swit
SW5(config-if)#switchport tr
SW5(config-if)#switchport trunk en
SW5(config-if)#switchport trunk encapsulation
SW5(config-if)#switchport trunk encapsulation dotlq
SW5(config-if)#swi
SW5(config-if)#switchport mo
SW5(config-if)#switchport mode trunk
SW5(config-if)#int vlan 10
SW5(config-if)#ip add 10.1.1.254 255.255.255.0
SW5(config-if)#vlan 10
SW5(config-vlan)#
%LINK-5-CHANGED: Interface Vlan10, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan10, changed state to up
```

```
SW5(config-if)#int vlan 10
SW5(config-if)#ip add 10.1.1.254 255.255.255.0
SW5(config-if)#vlan 10
SW5(config-vlan)#
%LINK-5-CHANGED: Interface Vlan10, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan10, changed state to up

SW5(config-vlan)#int vlan 10
SW5(config-if)#standby 10 ip 10.1.1.100
SW5(config-if)#
```

PC0

_ _ □ ✕

Physical | Config | Desktop | Programming | Attributes

IP Configuration ✕

Interface | FastEthernet0 | ⌄

IP Configuration

🔘 DHCP   ⭘ Static   DHCP request successful.

IPv4 Address	10.1.1.1
Subnet Mask	255.255.255.0
Default Gateway	10.1.1.100
DNS Server	0.0.0.0

IPv6 Configuration

⭘ Automatic   🔘 Static

IPv6 Address	/
Link Local Address	FE80::20A:F3FF:FE45:4B9
Default Gateway	
DNS Server	

802.1X

☐ Use 802.1X Security

Authentication	MD5 ⌄
Username	
Password	

☐ Top

PC1

Physical | Config | **Desktop** | Programming | Attributes

IP Configuration

Interface: FastEthernet0

IP Configuration

● DHCP   ○ Static   DHCP request successful.

IPv4 Address: 10.1.1.2

Subnet Mask: 255.255.255.0

Default Gateway: 10.1.1.100

DNS Server: 0.0.0.0

IPv6 Configuration

○ Automatic   ● Static

IPv6 Address: _____ / _____

Link Local Address: FE80::206:2AFF:FEEC:BD6C

Default Gateway: _____

DNS Server: _____

802.1X

☐ Use 802.1X Security

Authentication: MD5

Username: _____

Password: _____

☐ Top

```
SW5(config)#
SW5(config)#ip routing
SW5(config)#int fa0/2
SW5(config-if)#ip add 190.1.1.1 255.255.255.0
SW5(config-if)#no shut
SW5(config-if)#exit
SW5(config)#
```

```
SW5(config)#router ospf 10
SW5(config-router)#network 10.1.1.0 0.0.0.255 area 0
SW5(config-router)#network 190.1.1.0 0.0.0.255 area 0
SW5(config-router)#
```

```
SW5(config)#
SW5(config)#vtp domain Plaza
Changing VTP domain name from NULL to Plaza
SW5(config)#vtp password plaza
Setting device VLAN database password to plaza
SW5(config)#vtp mode server
Device mode already VTP SERVER.
SW5(config)#
```

```
Access-Layer10#sh vtp stat
VTP Version capable              : 1 to 2
VTP version running             : 1
VTP Domain Name                 : Plaza
VTP Pruning Mode                : Disabled
VTP Traps Generation            : Disabled
Device ID                       : 0060.5C22.7B00
Configuration last modified by 0.0.0.0 at 3-1-93 00:03:19
Local updater ID is 10.1.1.252 on interface Vl10 (lowest numbered VLAN interfa

Feature VLAN :
-------------
VTP Operating Mode              : Server
Maximum VLANs supported locally  : 255
Number of existing VLANs        : 6
Configuration Revision          : 1
MD5 digest                      : 0xF3 0x08 0x3C 0x44 0x2E 0xBD 0xDF 0xFE
                                  0x6C 0x38 0x21 0xC8 0x7E 0xC0 0x83 0x9A
```

```
Access-Layer10(config)#
Access-Layer10(config)#vtp mode Client
Setting device to VTP CLIENT mode.
Access-Layer10(config)#
```

```
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#
Router(config)#hostname R5
```

```
R5(config-if)#IP ADD 190.1.1.2 255.255.255.0
R5(config-if)#EX
R5(config)#ROUTER OSPF 10
R5(config-router)#NETWORK 190.1.1.0 0.0.0.3 AREA 0
R5(config-router)#
```

```
R5#
00:14:53: %OSPF-5-ADJCHG: Process 10, Nbr 190.1.1.1 on GigabitEthernet0/0 from LOADING to
FULL, Loading Done
```

```
R5#SH IP ROUTE
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

      10.0.0.0/24 is subnetted, 1 subnets
O        10.1.1.0/24 [110/2] via 190.1.1.1, 00:00:03, GigabitEthernet0/0
      190.1.0.0/16 is variably subnetted, 2 subnets, 2 masks
C        190.1.1.0/24 is directly connected, GigabitEthernet0/0
L        190.1.1.2/32 is directly connected, GigabitEthernet0/0
```

```
R5#
R5#CONF T
Enter configuration commands, one per line.  End with CNTL
R5(config)#
R5(config)#INT SE0/3/0
R5(config-if)#NO SHUT

%LINK-5-CHANGED: Interface Serial0/3/0, changed state to d
R5(config-if)#
R5(config-if)#IP ADD 3.3.3.1 255.255.255.252
R5(config-if)#ROUTER OSPF 10
R5(config-router)#NETWORK 3.3.3.0 0.0.0.3 AREA 0
R5(config-router)#
```

```
Router>EN
Router#CONF T
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#
Router(config)#HOSTNAME Access-Router1
Access-Router1(config)#int se0/3/0
Access-Router1(config-if)#no shut

Access-Router1(config-if)#
%LINK-5-CHANGED: Interface Serial0/3/0, changed state to up

Access-Router1(config-if)#ip add 3.3.3.2 255.255.255.252
Access-Router1(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/3/0, changed state to up

Access-Router1(config-if)#router ospf 10
Access-Router1(config-router)#network 3.3.3.0 0.0.0.3 area 0
Access-Router1(config-router)#
Access-Router1#
%SYS-5-CONFIG_I: Configured from console by console
```

```
00:16:49: %OSPF-5-ADJCHG: Process 10, Nbr 190.1.1.2 on Serial0/3/0 from LOADING to FULL,
Loading Done
```

```
Access-Router1#
Access-Router1#
Access-Router1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Access-Router1(config)#
Access-Router1(config)#int se0/3/1
Access-Router1(config-if)#no shut

%LINK-5-CHANGED: Interface Serial0/3/1, changed state to down
Access-Router1(config-if)#
Access-Router1(config-if)#ip add 1.1.1.1 255.255.255.252
Access-Router1(config-if)#router ospf 10
Access-Router1(config-router)#network 1.1.1.1 0.0.0.3 area 0
Access-Router1(config-router)#
```

```
Access-Router1(config)#int se0/3/1
Access-Router1(config-if)#no shut

%LINK-5-CHANGED: Interface Serial0/3/1, changed state to down
Access-Router1(config-if)#
Access-Router1(config-if)#ip add 1.1.1.1 255.255.255.252
Access-Router1(config-if)#router ospf 10
Access-Router1(config-router)#network 1.1.1.1 0.0.0.3 area 0
Access-Router1(config-router)#exit
Access-Router1(config)#router bgp 444
Access-Router1(config-router)#network 1.1.1.0 m
Access-Router1(config-router)#network 1.1.1.0 mask 255.255.255.252
Access-Router1(config-router)#nei
Access-Router1(config-router)#neighbor 1.1.1.2 remote
Access-Router1(config-router)#neighbor 1.1.1.2 remote-as 555
Access-Router1(config-router)#exit
Access-Router1(config)#
```

```
Access-Router1(config)#acc
Access-Router1(config)#access-list 10 per
Access-Router1(config)#access-list 10 permit any
Access-Router1(config)#
```

```
Access-Router1(config)#ip nat in
Access-Router1(config)#ip nat inside so
Access-Router1(config)#ip nat inside source 1
Access-Router1(config)#ip nat inside source list 10
Access-Router1(config)#ip nat inside source list 10 int se0/3/0
Access-Router1(config)#
```

```
Access-Router1(config)#int se0/3/0
Access-Router1(config-if)#ip nat inside
Access-Router1(config-if)#int se0/3/1
Access-Router1(config-if)#ip nat outside
Access-Router1(config-if)#
```

Project link 1:

https://drive.google.com/drive/folders/16BdPfaIVFzDV2Xi1ZRGB1MNtjGWFXwnl?usp=drive_link

Project link 2:

https://github.com/Plaza2005/Office-Network---Project-1