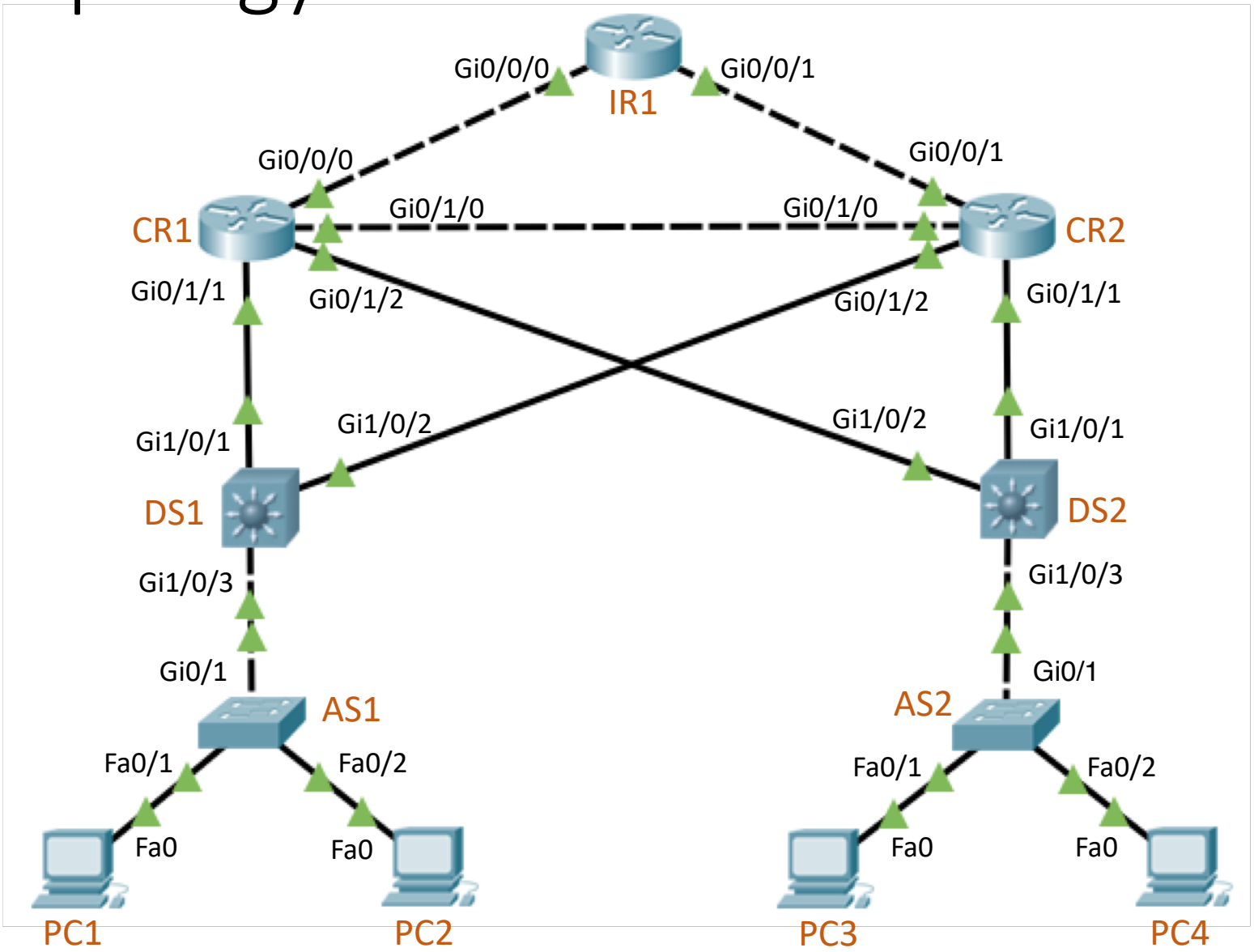
HSRP

Lab Activity

Lab Setup

- Simulator: Packet Tracer
- Router: 4321
  - Shutdown the power
    - Click on the Router
    - Go to “Physical” tab
    - Click on the power switch at the left side (near Green light)
  - Add a new line card
    - Click on the “NIM-ES2-4” tab on the left menu
    - Drag the 4-port card (at the bottom right corner) to the first blank slot from the left
  - Power back the device
- L3 Switch: 3650-24PS
  - Add a ”AC-POWER-SUPPLY” module
- L2 Switch: 2960
- PC: PC-PT

Topology


IR1
Gi0/0/0
Gi0/0/1
CR1
CR2
Gi0/0/0
Gi0/0/1
Gi0/1/0
Gi0/1/0
Gi0/1/1
Gi0/1/2
Gi0/1/2
Gi0/1/1
Gi1/0/1
Gi1/0/2
Gi1/0/2
Gi1/0/1
DS1
DS2
Gi1/0/3
Gi1/0/3
Gi0/1
Gi0/1
AS1
AS2
Fa0/1
Fa0/2
Fa0/1
Fa0/2
Fa0
Fa0
Fa0
Fa0
PC1
PC2
PC3
PC4

IP Plan

- IP Address:
  - Loopback 50 (R3): 50.50.50.1/32
  - Peering (IR1, CR1 and CR2): 100.100.XY.X(Y)/24
- OSPF (IR1, CR1 and CR2)
  - Process ID: 1, Area: 0
- IP address of PCs (A = VLAN ID)
  - PC1/PC2: 10.10.A.1/24, GW: 10.10.A.254
  - PC3/PC4: 10.10.A.2/24, GW: 10.10.A.254
- HSRP
  - CR1 SVI: 10.10.A.252/24
  - CR2 SVI: 10.10.A.253/24
  - Virtual Router/GW: 10.10.A.254/24

Task 0: Troubleshooting Basics

Verification

```
show standby
show standby brief
show standby neighbor vlan <number>
show standby
show ip arp
```

Task 1: Basic Configuration

Task 1.1: Internet Router Config

Example: IR1

```
interface GigabitEthernet0/0/0
 no shutdown
 ip address 100.100.12.1 255.255.255.0
 description *** Connected to R2 ***
!
interface GigabitEthernet0/1/0
 no shutdown
 ip address 100.100.13.1 255.255.255.0
 description *** Connected to R3 ***
!
interface loopback 50
 ip address 50.50.50.1 255.255.255.255
```

Task 1.2: Core Router Config

Example: CR1

```
(In privilege mode)

vlan database
 vlan 10 name FACULTY
 vlan 20 name STUDENT
 exit
```

Verify:

```
show vlan brief
```

Task 1.2: Core Router Config

Example: CR1

```
interface GigabitEthernet0/0/0
 no shutdown
 ip address 100.100.12.2 255.255.255.0
 description *** Connected to R1 ***
!
interface range GigabitEthernet0/1/0-2
 no shutdown
 switchport mode trunk
!
interface Vlan10
 ip address 10.10.10.252 255.255.255.0
!
interface Vlan20
 ip address 10.10.20.252 255.255.255.0
```

Task 1.3: Distribution Switch Config

Example: DS1

```
vtp mode transparent
!
vlan 10
 name FACULTY
!
vlan 20
 name STUDENT
!
interface range gi1/0/1-3
 switchport trunk encapsulation dot1q
 switchport mode trunk
```

Task 1.2: Access Switch Config

Example: AS1

```
vtp mode transparent
!
vlan 10
 name FACULTY
!
vlan 20
 name STUDENT
!
interface gi0/1
 switchport mode trunk
!
interface fa0/1
 switchport access vlan 10
!
interface fa0/2
 switchport access vlan 20
```

Task 1.4: PC Configuration

PC1 and PC3:

IP Address: 10.10.10.1 and 10.10.10.2

Subnet Mask: 255.255.255.0

Gateway: 10.10.10.254

PC2 and PC4:

IP Address: 10.10.20.1 and 10.10.20.2

Subnet Mask: 255.255.255.0

Gateway: 10.10.20.254

Task 1.5: OSPF Config

Example: IR1

```
int range gi0/0/0,gi0/0/1,lo50
 ip ospf 1 area 0
```

Example: CR1

```
int vlan 10
 ip ospf 1 area 0
!
int vlan 20
 ip ospf 1 area 0
!
int gi0/0/0
 ip ospf 1 area 0
```

Task 2: RSTP Configuration

Task 2: RSTP Configuration

- Make sure that RSTP Root Bridge is the same as the HSRP GW
  - CR1: Root Bridge for VLAN 10
  - CR2: Root Bridge for VLAN 20

  - **Example: CR1**

```
spanning-tree mode rapid-pvst
spanning-tree vlan 10 root primary
spanning-tree vlan 20 root secondary
```

Task 3: HSRP Configuration

Task 3: HSRP Configuration

- Configure HSRP on CR1 and CR2
  - Interface VLAN IP
  - Standby IP
  - Priority
  - Version (optional)
  - Authentication (Optional)
  - Preemption (Optional)
  - Timers (Optional)
- Before configuring CR2, shut down all trunk interfaces (no VLAN communication with CR1)

Task 3: HSRP Configuration

Example: CR1

```
interface vlan10
 standby 10 ip 10.10.10.254
 standby 10 preempt
 standby 10 priority 105
 standby 10 version 2
!
interface vlan20
 standby 20 ip 10.10.20.254
 standby 20 preempt
```

CR1# show standby brief

```
                     P indicates configured to preempt.
                     |
Interface   Grp  Pri P State   Active          Standby         Virtual IP
Vl10        10   105 P Active  local           10.10.10.253    10.10.10.254
Vl20        20   100 P Standby 10.10.20.253    Local           10.10.20.254
```

CR1# show standby

Vlan10 - Group 10 (version 2)
  State is Active
    7 state changes, last state change 00:00:17
  Virtual IP address is 10.10.10.254
  Active virtual MAC address is 0000.0C9F.F00A
    Local virtual MAC address is 0000.0C9F.F00A (v2 default)
  Hello time 3 sec, hold time 10 sec
    Next hello sent in 1.352 secs
  Preemption enabled
  Active router is local
  Standby router is 10.10.10.253
  Priority 105 (configured 105)
  Group name is hsrp-Vl1-10 (default)

Vlan20 - Group 20
  State is Standby
    12 state changes, last state change 00:46:57
  Virtual IP address is 10.10.20.254
  Active virtual MAC address is 0000.0C07.AC14
    Local virtual MAC address is 0000.0C07.AC14 (v1 default)
  Hello time 3 sec, hold time 10 sec
    Next hello sent in 1.952 secs
  Preemption enabled
  Active router is 10.10.20.253, priority 105 (expires in 8 sec)
    MAC address is 0000.0C07.AC14
  Standby router is local
  Priority 100 (default 100)
  Group name is hsrp-Vl2-20 (default)

ARP Table

CR1# show ip arp

Protocol	Address	Age (min)	Hardware Addr	Type	Interface
Internet	10.10.10.1	52	00D0.9783.7E48	ARPA	Vlan10
Internet	10.10.10.2	51	0060.2FB7.A3E4	ARPA	Vlan10
Internet	10.10.10.252	-	0001.C782.CB01	ARPA	Vlan10
Internet	10.10.10.253	46	0001.C7AE.B301	ARPA	Vlan10
Internet	**10.10.10.254**	**52**	**0000.0C9F.F00A**	**ARPA**	**Vlan10**
Internet	10.10.20.1	46	0090.2B63.A2CE	ARPA	Vlan20
Internet	10.10.20.2	44	000B.BE1A.A56A	ARPA	Vlan20
Internet	10.10.20.252	-	0001.C782.CB02	ARPA	Vlan20
Internet	10.10.20.253	46	0001.C7AE.B302	ARPA	Vlan20
Internet	100.100.12.1	52	000A.F34E.B101	ARPA	Gig0/0/0
Internet	100.100.12.2	-	00D0.FF3D.D701	ARPA	Gig0/0/0

CR2# show ip arp

Protocol	Address	Age (min)	Hardware Addr	Type	Interface
Internet	10.10.10.1	48	00D0.9783.7E48	ARPA	Vlan10
Internet	10.10.10.2	49	0060.2FB7.A3E4	ARPA	Vlan10
Internet	10.10.10.252	48	0001.C782.CB01	ARPA	Vlan10
Internet	10.10.10.253	-	0001.C7AE.B301	ARPA	Vlan10
Internet	10.10.20.1	51	0090.2B63.A2CE	ARPA	Vlan20
Internet	10.10.20.2	51	000B.BE1A.A56A	ARPA	Vlan20
Internet	10.10.20.252	48	0001.C782.CB02	ARPA	Vlan20
Internet	10.10.20.253	-	0001.C7AE.B302	ARPA	Vlan20
Internet	**10.10.20.254**	**55**	**0000.0C07.AC14**	**ARPA**	**Vlan20**
Internet	100.100.13.1	55	000A.F34E.B102	ARPA	Gig0/0/1
Internet	100.100.13.3	-	0002.1626.2302	ARPA	Gig0/0/1

Ping from PC1 and PC2

- Start ping to loopback 50 of R1 from all the four PCs

  `ping –t 50.50.50.1`

  - The IP should be reachable

Trace from PC1 and PC2

PC1: tracert 50.50.50.1

```
Tracing route to 50.50.50.1 over a maximum of 30 hops:

  1    1 ms       0 ms       0 ms      10.10.10.252
  2    0 ms       0 ms       1 ms      50.50.50.1

Trace complete.
```

PC2: tracert 50.50.50.1

```
Tracing route to 50.50.50.1 over a maximum of 30 hops:

  1    1 ms       0 ms       0 ms      10.10.20.253
  2    0 ms       0 ms       0 ms      50.50.50.1

Trace complete.
```

Verification

- Start unlimited ping to loopback 50 of R1 from all the four PCs

  `ping –t 50.50.50.1`

- Shutdown CR1-IR1 link, check the ping report
  - Stop ping from PC1 and start trace to 50.50.50.1

```
C:\>tracert 50.50.50.1
Tracing route to 50.50.50.1 over a maximum of 30 hops:

  1    0 ms      1 ms      0 ms      10.10.10.252
  2    1 ms      0 ms      0 ms      10.10.10.253
  3    0 ms      12 ms     1 ms      50.50.50.1
```

Verification

- Shutdown CR1-DS1 link, check the trace to 50.50.50.1 from PC1

```
C:\>tracert 50.50.50.1
Tracing route to 50.50.50.1 over a maximum of 30 hops:
  1    0 ms      1 ms      0 ms      10.10.10.252
  2    1 ms      0 ms      0 ms      10.10.10.253
  3    0 ms      12 ms     1 ms      50.50.50.1
```

- Shutdown CR1-CR2 link, check the trace to 50.50.50.1 from PC1

```
C:\>tracert 50.50.50.1
Tracing route to 50.50.50.1 over a maximum of 30 hops:
  1    0 ms      1 ms      0 ms      10.10.10.252
  2    1 ms      0 ms      0 ms      10.10.10.253
  3    0 ms      12 ms     1 ms      50.50.50.1
```

Verification

- Check the HSRP status from CR1
  CR1# show standby brief
- Shutdown CR1-DS2 link, check the trace to 50.50.50.1 from PC1

```
C:\>tracert 50.50.50.1
Tracing route to 50.50.50.1 over a maximum of 30 hops:
  1    1 ms      0 ms      0 ms      10.10.10.253
  2    0 ms      12 ms     1 ms      50.50.50.1
```

- Check the HSRP status from CR1

```
CR2#show standby brief
                     P indicates configured to preempt.
                     |
Interface   Grp  Pri P State    Active      Standby         Virtual IP
Vl10        10   100 P Active   local       unknown         10.10.10.254
Vl20        20   105 P Active   local       10.10.20.252    10.10.20.254
```

Verification

- Enable all the interface on CR1
- Configure HSRP tracking on CR1
  - Track Gi0/0/0 with a default decrement value (10)

```
int vlan 10
 standby 10 track GigabitEthernet0/0/0
```

- Shutdown Gi0/0/0 of CR1. Any changes?

```
%HSRP-6-STATECHANGE: Vlan10 Grp 10 state Speak -> Standby
```

- check the trace to 50.50.50.1 from PC1

```
C:\>tracert 50.50.50.1
Tracing route to 50.50.50.1 over a maximum of 30 hops:
  1    1 ms       0 ms       0 ms       10.10.10.253
  2    0 ms       12 ms      1 ms       50.50.50.1
```