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ENTERPRISE NETWORK DESIGN AND IMPLEMENTATION USING HUAWEI DATACOM TECHNOLOGIES (NETFUSION)

HUAWEI ENSP SIMULATION

28 Nov, 2025

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SPECIAL THANKS TO OUR SUPERVISIOR ENG.SAMAH EISSA

HUAWEI ENSP SIMULATION

30 Nov, 2025

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TEAM MEMBERS

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Under the supervision of Engineer Samah Eisa

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PROJECT OVERVIEW

Project Objective:

Design a network for two buildings to enable secure and efficient communication.

Implemented Services:

- FTP Service
- VRRP
- STP
- WLAN
- AAA
- ACL
- OSPF
- DHCP

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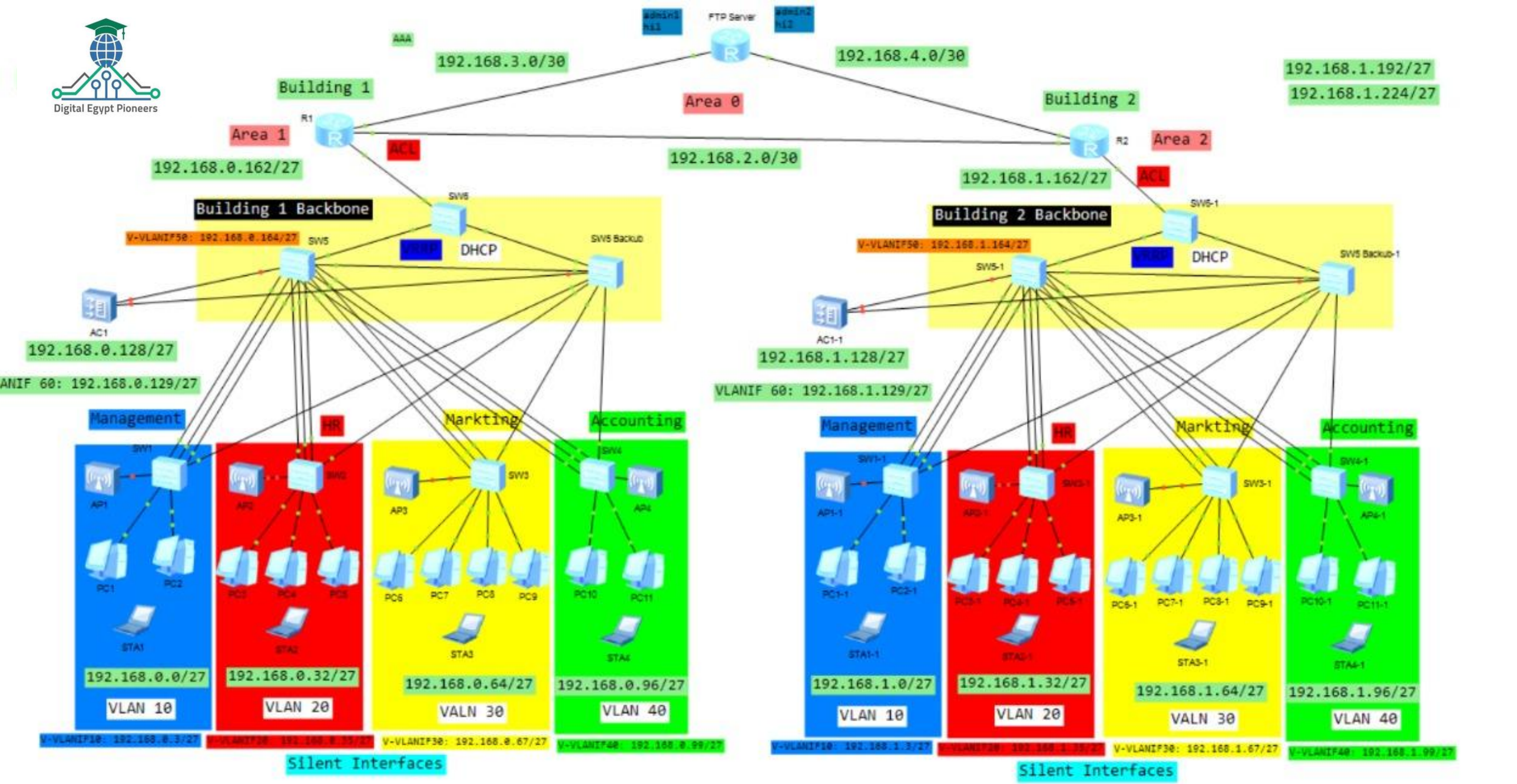
NETWORK TOPOLOGY

Topology includes:

- Building 1 & Building 2
- Core & Backup Switches
- Routers connecting both buildings
- VLANs for departments
- Eth-Trunk connections



OUR TOPOLOGY

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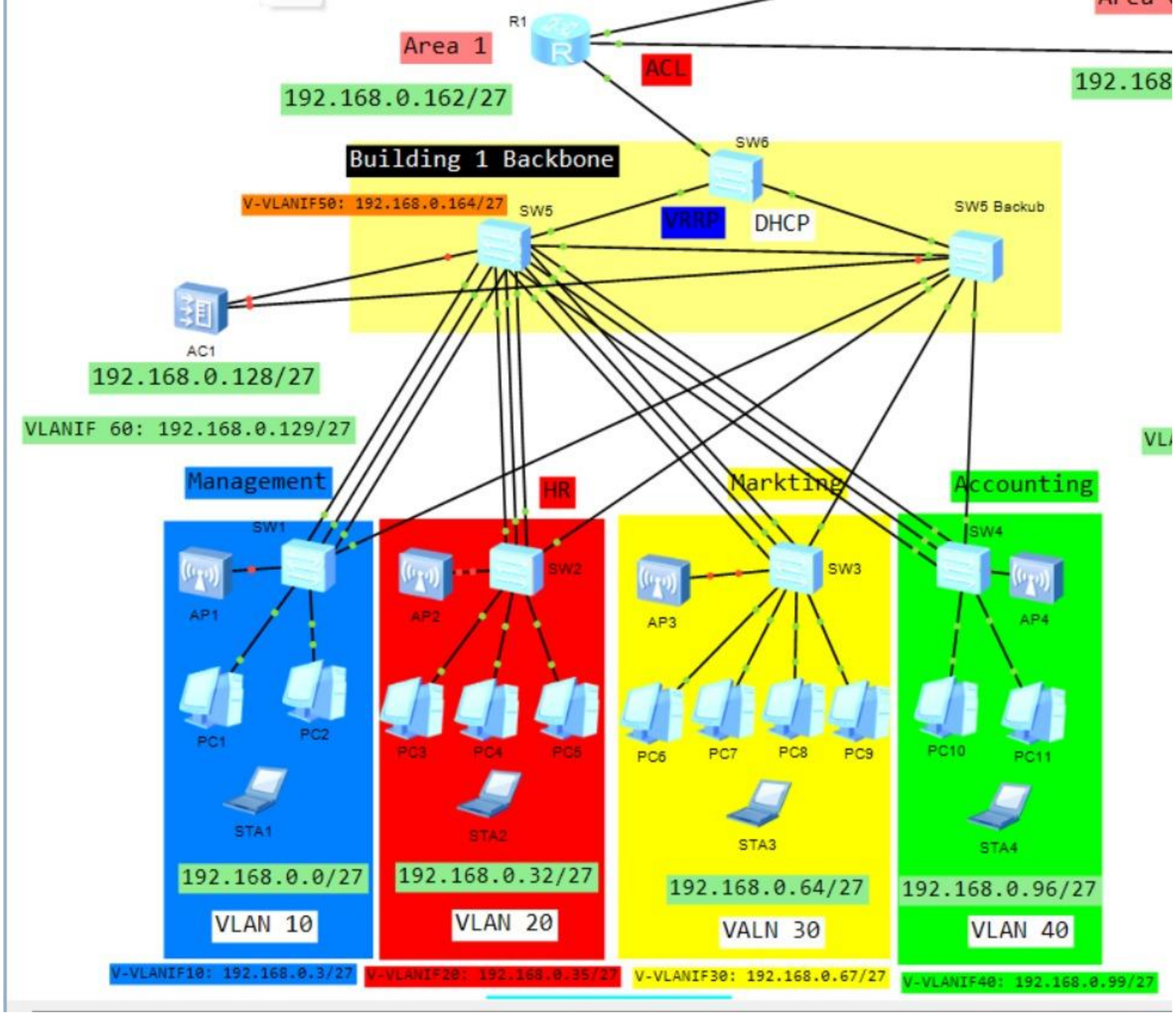

BUILDING 1

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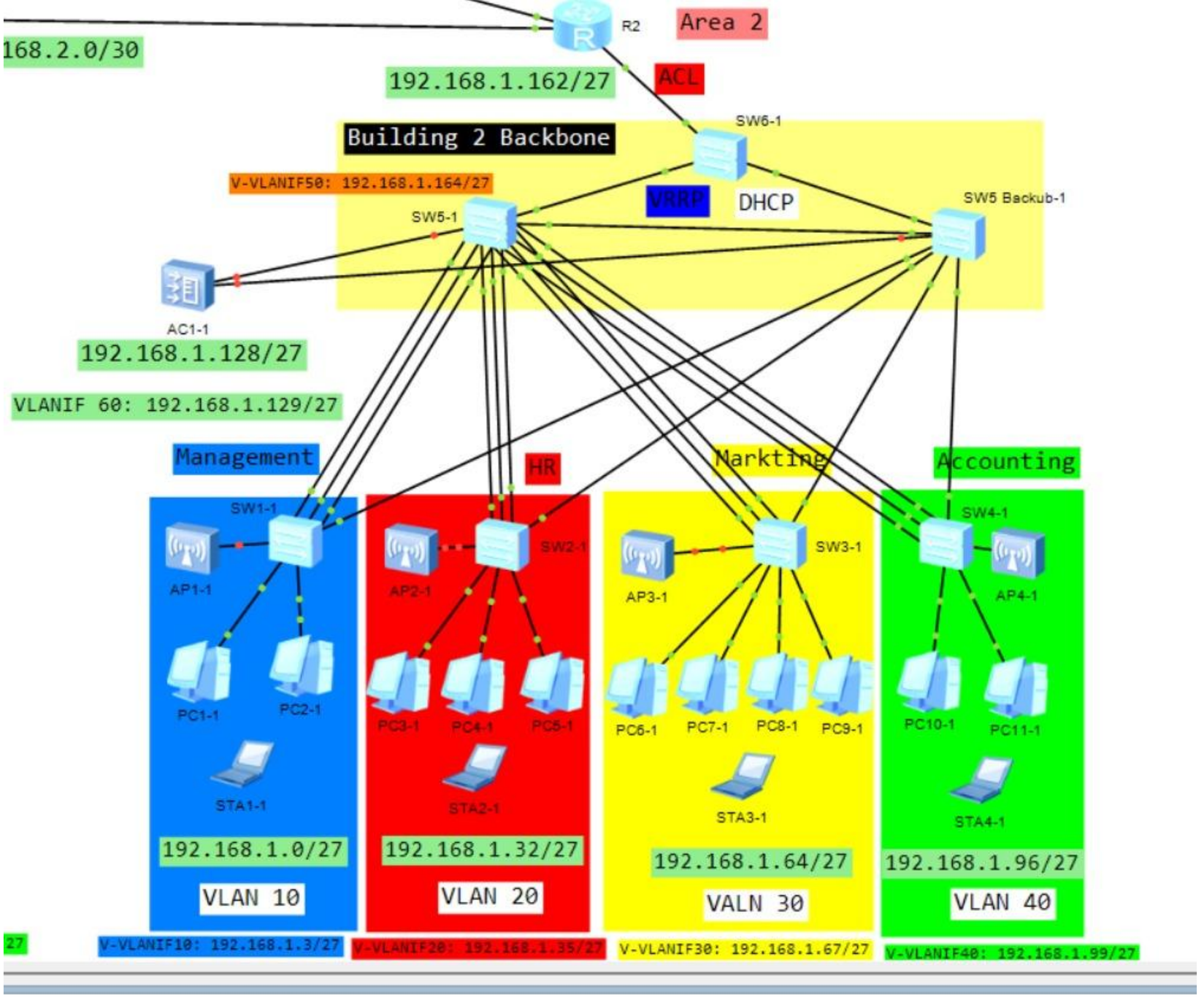

BUILDING 2

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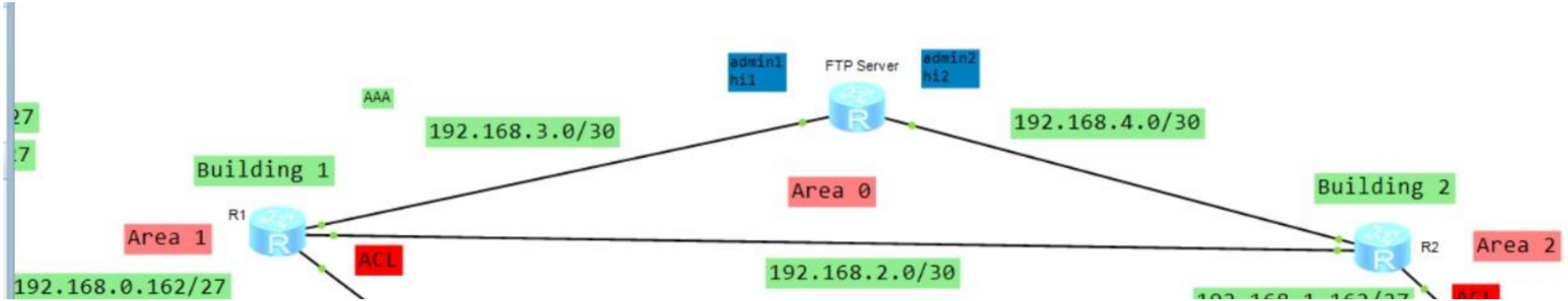

FTP SERVER AND OSPF ON ROUTERS

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DEPARTMENTS & ACL

Department segmentation in each building:

ACL Usage:

- Managers can exchange data between buildings
- Other departments are restricted

Security:

- All inter-building data passes through Management

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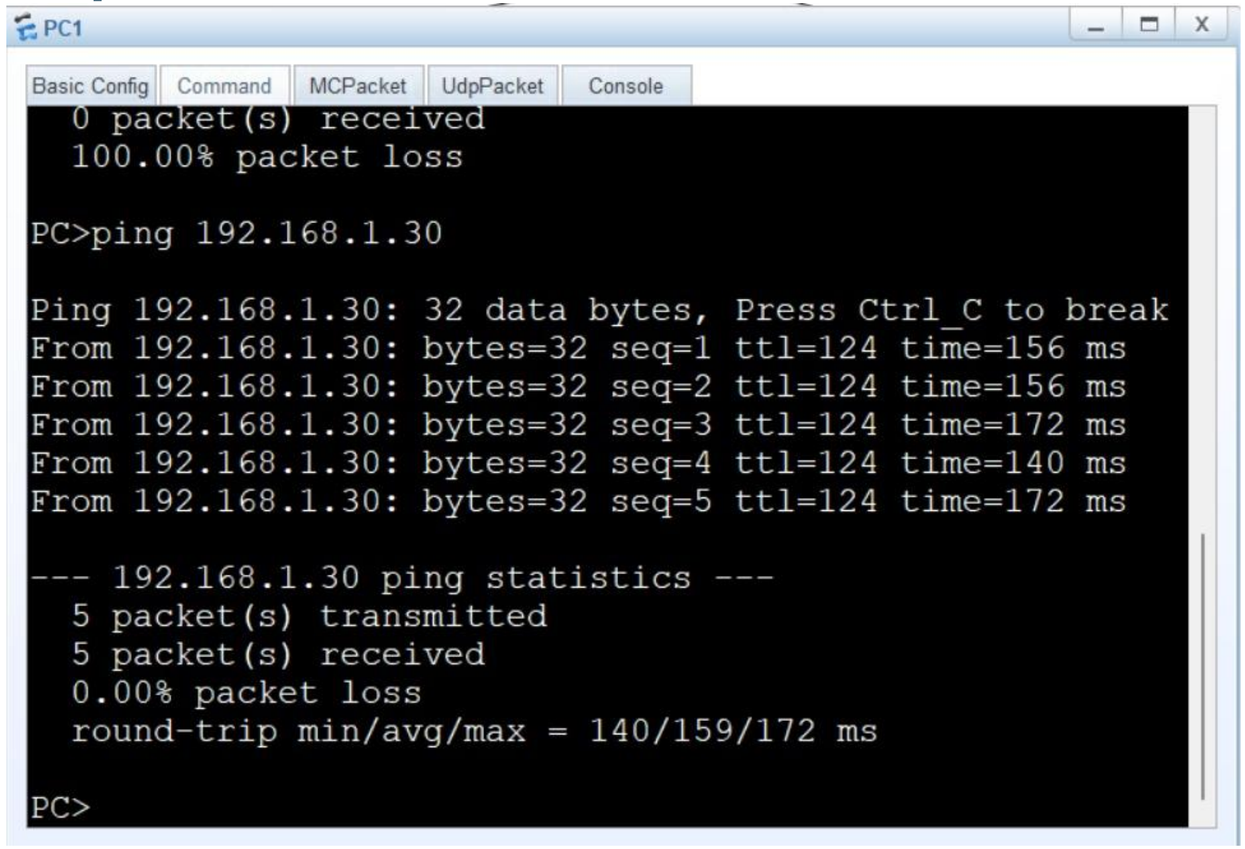
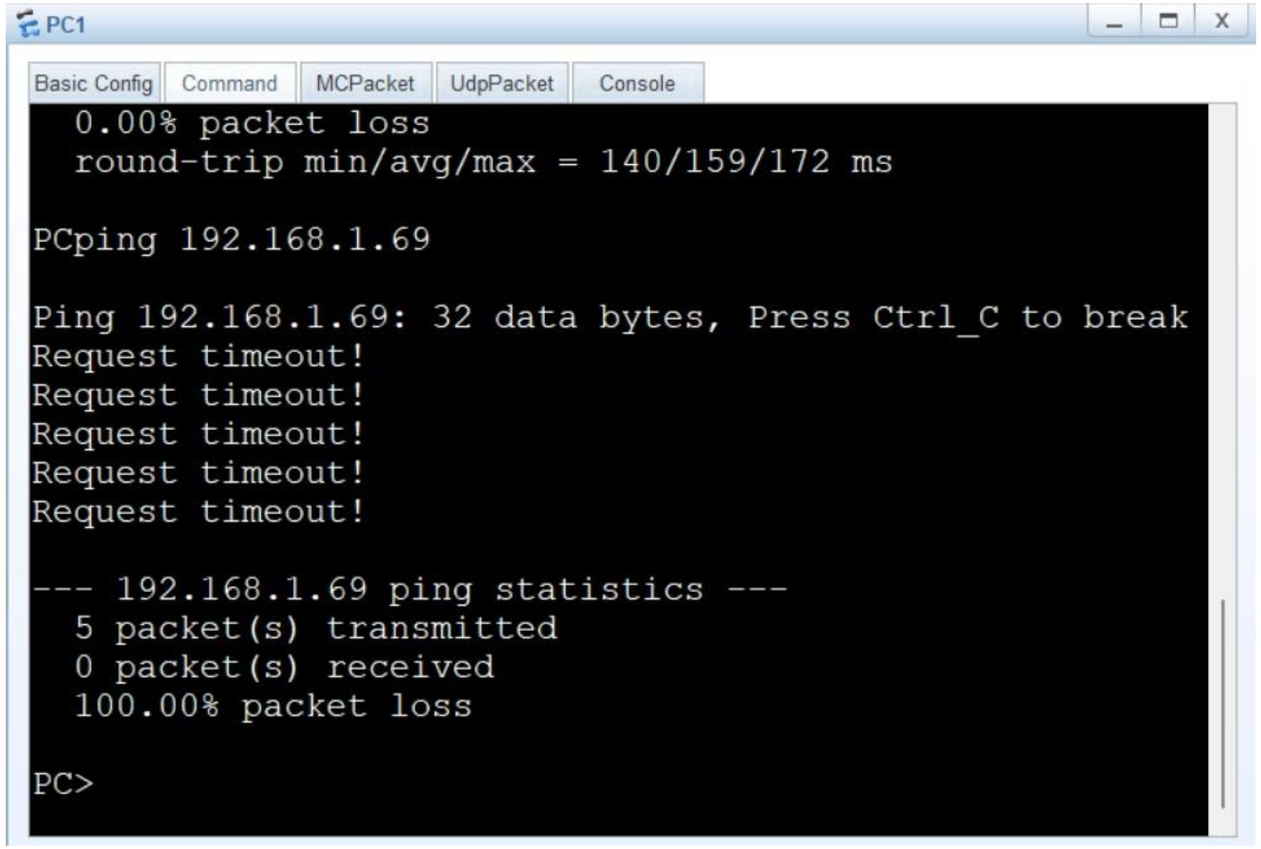
DEPARTMENTS & ACL



Manager ping to another Manager



Ping to HR or Marketing or Accounting

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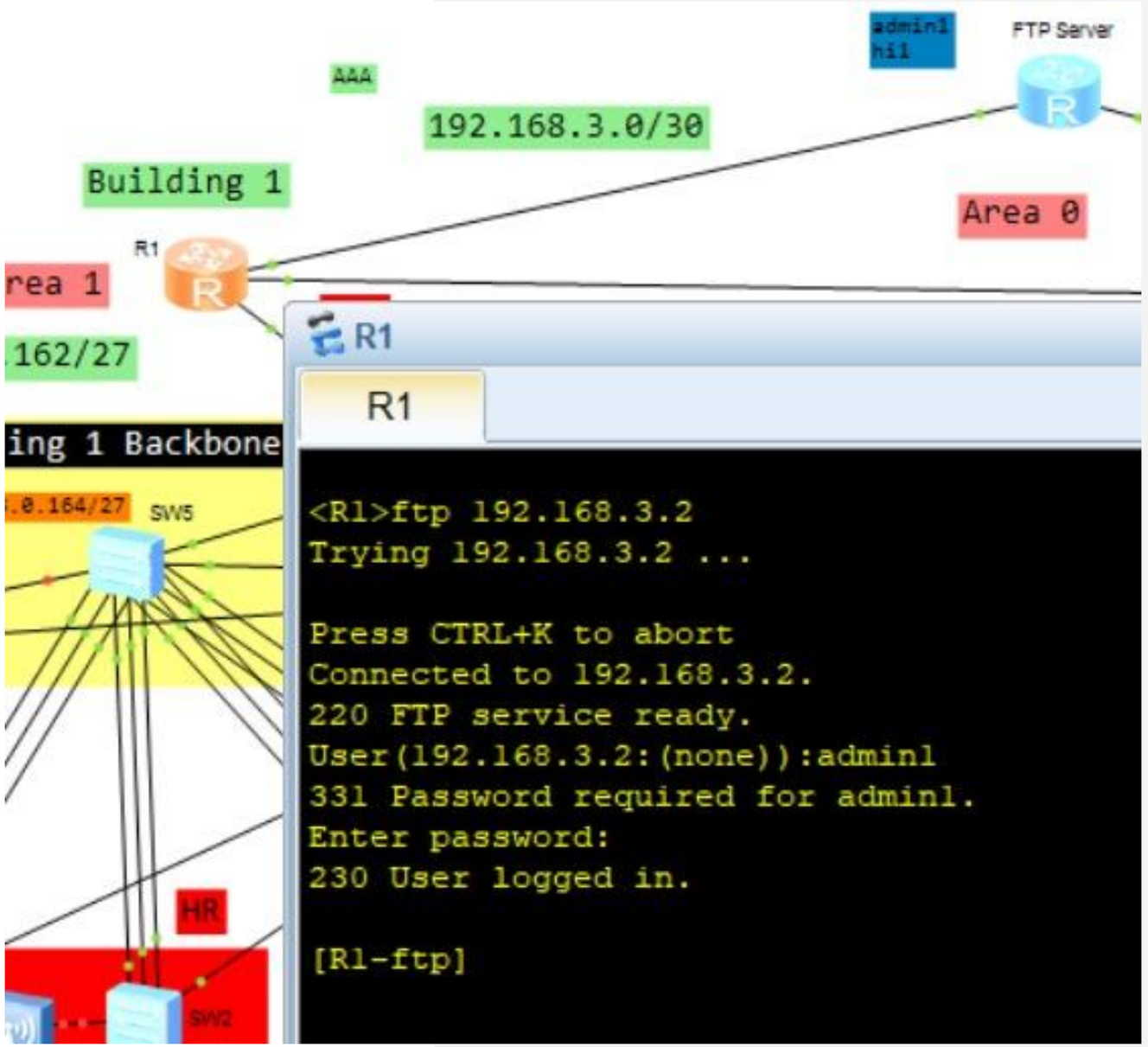
AAA AND FTP SERVER



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VRRP SETUP

Goal: High Availability

- Core Switch + Backup Switch
- 10 seconds delay before failover
- Automatic takeover on failure

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VRRP SETUP

SW5

SW5 | SW5 Back

```
The device is running!

<Huawei>
<Huawei>dis vrrp br
VRID  State        Interface                Type     Virtual IP
------------------------------------------------------------------
10    Master       Vlanif10                 Normal   192.168.0.3
20    Master       Vlanif20                 Normal   192.168.0.35
30    Master       Vlanif30                 Normal   192.168.0.67
40    Master       Vlanif40                 Normal   192.168.0.99
50    Master       Vlanif50                 Normal   192.168.0.164
------------------------------------------------------------------
Total:5     Master:5     Backup:0     Non-active:0
<Huawei>
```

SW5 Backub

SW5 | SW5 Back

```
<Huawei>dis vrrp br
VRID  State        Interface                Type     Virtual IP
------------------------------------------------------------------
10    Backup       Vlanif10                 Normal   192.168.0.3
20    Backup       Vlanif20                 Normal   192.168.0.35
30    Backup       Vlanif30                 Normal   192.168.0.67
40    Backup       Vlanif40                 Normal   192.168.0.99
50    Backup       Vlanif50                 Normal   192.168.0.164
------------------------------------------------------------------
Total:5     Master:0     Backup:5     Non-active:0
<Huawei>
```

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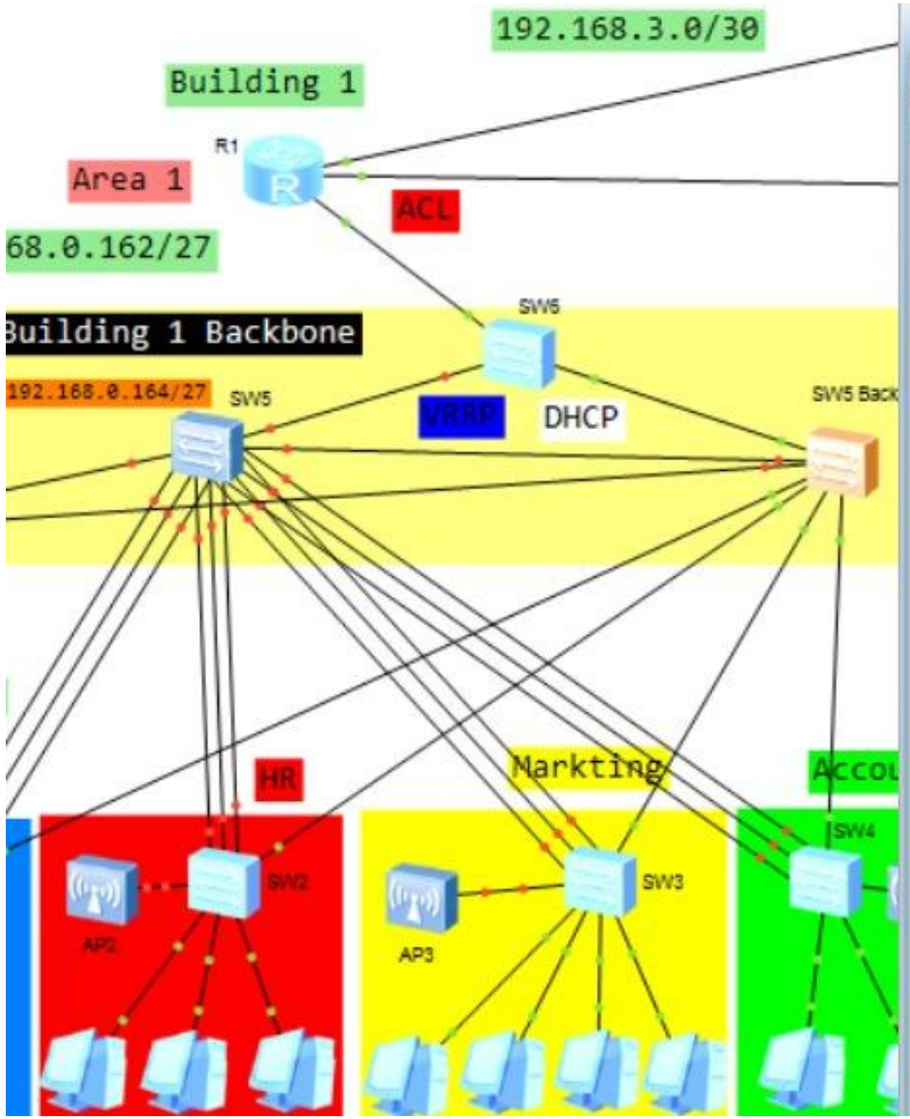

SW5 Backub

SW5 Back

```
<Huawei>dis vrrp br
VRID  State        Interface                  Type     Virtual IP
------------------------------------------------------------------
10    Backup       Vlanif10                   Normal   192.168.0.3
20    Backup       Vlanif20                   Normal   192.168.0.35
30    Backup       Vlanif30                   Normal   192.168.0.67
40    Backup       Vlanif40                   Normal   192.168.0.99
50    Backup       Vlanif50                   Normal   192.168.0.164
------------------------------------------------------------------
Total:5     Master:0     Backup:5     Non-active:0
<Huawei>
<Huawei>dis vrrp br
VRID  State        Interface                  Type     Virtual IP
------------------------------------------------------------------
10    Master       Vlanif10                   Normal   192.168.0.3
20    Master       Vlanif20                   Normal   192.168.0.35
30    Master       Vlanif30                   Normal   192.168.0.67
40    Master       Vlanif40                   Normal   192.168.0.99
50    Master       Vlanif50                   Normal   192.168.0.164
------------------------------------------------------------------
Total:5     Master:5     Backup:0     Non-active:0
<Huawei>
```

WHEN MASTER SWITCH FAIL

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STP, VLAN REDUNDANCY & ETH-TRUNK

- STP prevents loops
- VLAN redundancy between main & backup switches
- Eth-Trunk provides bandwidth aggregation & redundancy

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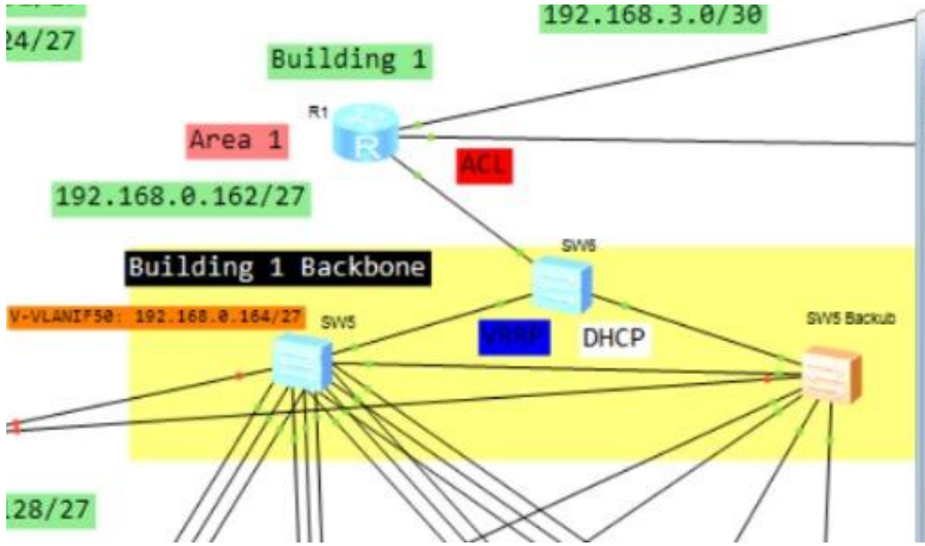
STP

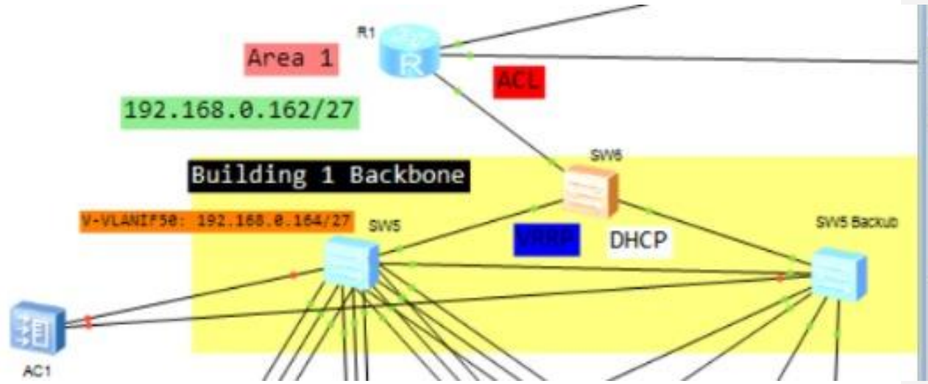


SW5 Backub

SW5 Back

```
The device is running!

<Huawei>
<Huawei>dis stp br
 MSTID  Port                        Role  STP State     Protection
   0    Ethernet0/0/6               ALTE  DISCARDING      NONE
   0    Ethernet0/0/7               ALTE  DISCARDING      NONE
   0    Ethernet0/0/11              ALTE  DISCARDING      NONE
   0    Ethernet0/0/12              ALTE  DISCARDING      NONE
   0    Ethernet0/0/22              ROOT  FORWARDING      NONE
   0    GigabitEthernet0/0/1        DESI  FORWARDING      NONE
<Huawei>
```



SW6

```
The device is running!

<Huawei>dis stp br
 MSTID  Port                        Role  STP State     Protection
   0    Ethernet0/0/1               ROOT  FORWARDING      NONE
   0    Ethernet0/0/2               ALTE  DISCARDING      NONE
   0    GigabitEthernet0/0/1        DESI  FORWARDING      NONE
<Huawei>
```

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ETH-TRUNK

```
Eth-Trunk3's state information is:
Local:
LAG ID: 3                   WorkingMode: STATIC
Preempt Delay: Disabled     Hash arithmetic: According to SIP-XOR-DIP
System Priority: 30000      System ID: 4c1f-cca0-4844
Least Active-linknumber: 1  Max Active-linknumber: 2
Operate status: up          Number Of Up Port In Trunk: 2
--------------------------------------------------------------------------------
ActorPortName           Status    PortType PortPri PortNo PortKey PortState Weight
Ethernet0/0/3           Selected  100M     32768   4      801     10111100  1
Ethernet0/0/6           Selected  100M     32768   7      801     10111100  1
Ethernet0/0/7           Unselect  100M     32768   8      801     10100000  1

Partner:
--------------------------------------------------------------------------------
ActorPortName           SysPri    SystemID        PortPri PortNo PortKey PortState
Ethernet0/0/3           32768     4c1f-cce2-5d19  32768   2      801     10111100
Ethernet0/0/6           32768     4c1f-cce2-5d19  32768   3      801     10111100
Ethernet0/0/7           32768     4c1f-cce2-5d19  32768   4      801     10100000

Eth-Trunk4's state information is:
Local:
LAG ID: 4                   WorkingMode: STATIC
Preempt Delay: Disabled     Hash arithmetic: According to SIP-XOR-DIP
System Priority: 30000      System ID: 4c1f-cca0-4844
Least Active-linknumber: 1  Max Active-linknumber: 2
Operate status: up          Number Of Up Port In Trunk: 2
--------------------------------------------------------------------------------
ActorPortName           Status    PortType PortPri PortNo PortKey PortState Weight
Ethernet0/0/13          Selected  100M     32768   14     1057    10111100  1
Ethernet0/0/14          Selected  100M     32768   15     1057    10111100  1
Ethernet0/0/15          Unselect  100M     32768   16     1057    10100000  1

Partner:
--------------------------------------------------------------------------------
ActorPortName           SysPri    SystemID        PortPri PortNo PortKey PortState
Ethernet0/0/13          32768     4c1f-cc81-667a  32768   4      1057    10111100
Ethernet0/0/14          32768     4c1f-cc81-667a  32768   5      1057    10111100
Ethernet0/0/15          32768     4c1f-cc81-667a  32768   6      1057    10100000
```

SW5

```
<Huawei>
<Huawei>dis eth
<Huawei>dis eth-trunk
Eth-Trunk1's state information is:
Local:
LAG ID: 1                   WorkingMode: STATIC
Preempt Delay: Disabled     Hash arithmetic: According to SIP-XOR-DIP
System Priority: 30000      System ID: 4c1f-cca0-4844
Least Active-linknumber: 1  Max Active-linknumber: 2
Operate status: up          Number Of Up Port In Trunk: 2
--------------------------------------------------------------------------------
ActorPortName           Status    PortType PortPri PortNo PortKey PortState Weight
Ethernet0/0/1           Selected  100M     32768   2      289     10111100  1
Ethernet0/0/4           Selected  100M     32768   5      289     10111100  1
Ethernet0/0/5           Unselect  100M     32768   6      289     10100000  1

Partner:
--------------------------------------------------------------------------------
ActorPortName           SysPri    SystemID        PortPri PortNo PortKey PortState
Ethernet0/0/1           32768     4c1f-cc63-354f  32768   2      289     10111100
Ethernet0/0/4           32768     4c1f-cc63-354f  32768   3      289     10111100
Ethernet0/0/5           32768     4c1f-cc63-354f  32768   4      289     10100000

Eth-Trunk2's state information is:
Local:
LAG ID: 2                   WorkingMode: STATIC
Preempt Delay: Disabled     Hash arithmetic: According to SIP-XOR-DIP
System Priority: 30000      System ID: 4c1f-cca0-4844
Least Active-linknumber: 1  Max Active-linknumber: 2
Operate status: up          Number Of Up Port In Trunk: 2
--------------------------------------------------------------------------------
ActorPortName           Status    PortType PortPri PortNo PortKey PortState Weight
Ethernet0/0/2           Selected  100M     32768   3      545     10111100  1
Ethernet0/0/8           Selected  100M     32768   9      545     10111100  1
Ethernet0/0/9           Unselect  100M     32768   10     545     10100000  1

Partner:
--------------------------------------------------------------------------------
ActorPortName           SysPri    SystemID        PortPri PortNo PortKey PortState
Ethernet0/0/2           32768     4c1f-ccd3-182b  32768   3      545     10111100
Ethernet0/0/8           32768     4c1f-ccd3-182b  32768   4      545     10111100
Ethernet0/0/9           32768     4c1f-ccd3-182b  32768   5      545     10100000
```

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VLANS AND INTER-VLANS

```
Vlanif10 current state : UP
Line protocol current state : UP
Last line protocol up time : 2025-11-29 19:32:24 UTC-08:00
Description:
Route Port,The Maximum Transmit Unit is 1500
Internet Address is 192.168.0.1/27
IP Sending Frames' Format is PKTFMT_ETHNT_2, Hardware address is 4c1f-cca0-4844
Current system time: 2025-11-29 19:53:02-08:00
    Input bandwidth utilization  : --
    Output bandwidth utilization : --

Vlanif20 current state : UP
Line protocol current state : UP
Last line protocol up time : 2025-11-29 19:32:24 UTC-08:00
Description:
Route Port,The Maximum Transmit Unit is 1500
Internet Address is 192.168.0.33/27
IP Sending Frames' Format is PKTFMT_ETHNT_2, Hardware address is 4c1f-cca0-4844
Current system time: 2025-11-29 19:53:02-08:00
    Input bandwidth utilization  : --
    Output bandwidth utilization : --

Vlanif30 current state : UP
Line protocol current state : UP
Last line protocol up time : 2025-11-29 19:32:24 UTC-08:00
Description:
Route Port,The Maximum Transmit Unit is 1500
Internet Address is 192.168.0.65/27
IP Sending Frames' Format is PKTFMT_ETHNT_2, Hardware address is 4c1f-cca0-4844
Current system time: 2025-11-29 19:53:06-08:00
    Input bandwidth utilization  : --
    Output bandwidth utilization : --
```

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VLANS AND INTER-VLANS

```
Vlanif40 current state : UP
Line protocol current state : UP
Last line protocol up time : 2025-11-29 19:32:24 UTC-08:00
Description:
Route Port,The Maximum Transmit Unit is 1500
Internet Address is 192.168.0.97/27
IP Sending Frames' Format is PKTFMT_ETHNT_2, Hardware address is 4c1f-cca0-4844
Current system time: 2025-11-29 19:53:06-08:00
    Input bandwidth utilization  : --
    Output bandwidth utilization : --

Vlanif50 current state : UP
Line protocol current state : UP
Last line protocol up time : 2025-11-29 19:32:24 UTC-08:00
Description:
Route Port,The Maximum Transmit Unit is 1500
Internet Address is 192.168.0.161/27
IP Sending Frames' Format is PKTFMT_ETHNT_2, Hardware address is 4c1f-cca0-4844
Current system time: 2025-11-29 19:53:08-08:00
    Input bandwidth utilization  : --
    Output bandwidth utilization : --
```

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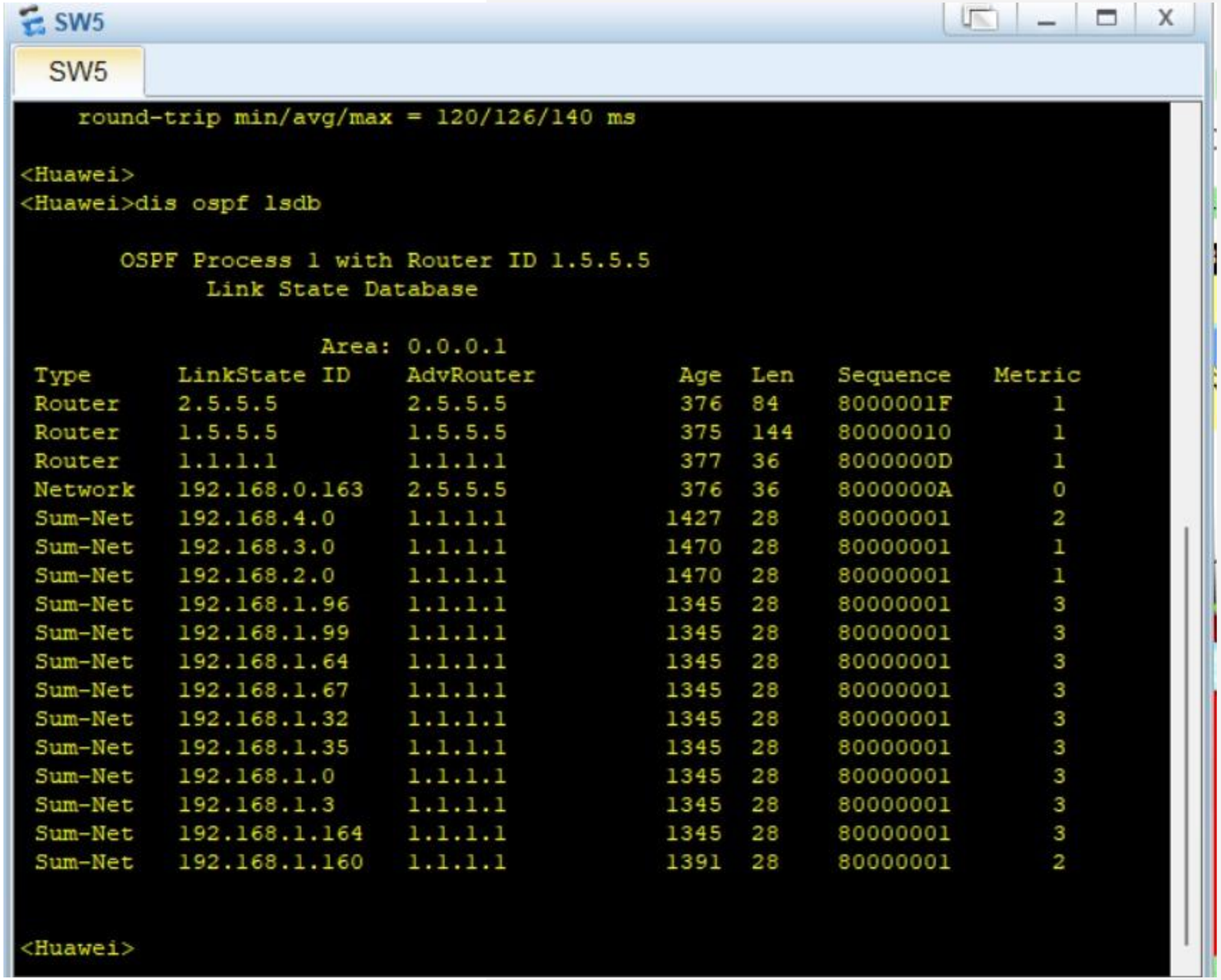
OSPF ROUTING PROTOCOL



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OSPF ROUTING PROTOCOL

R2

```
<R2>dis ospf lsdb

      OSPF Process 1 with Router ID 2.2.2.2
            Link State Database

                  Area: 0.0.0.0
Type      LinkState ID    AdvRouter          Age  Len   Sequence   Metric
Router    2.2.2.2         2.2.2.2           1486  48    80000008        1
Router    1.1.1.1         1.1.1.1           1486  48    80000007        1
Router    3.3.3.3         3.3.3.3           1490  48    80000008        1
Network   192.168.3.2     3.3.3.3           1491  32    80000001        0
Network   192.168.4.2     3.3.3.3           1490  32    80000002        0
Network   192.168.2.2     2.2.2.2           1486  32    80000002        0
Sum-Net   192.168.1.96    2.2.2.2           1408  28    80000001        2
Sum-Net   192.168.1.99    2.2.2.2           1408  28    80000001        2
Sum-Net   192.168.1.64    2.2.2.2           1408  28    80000001        2
Sum-Net   192.168.1.67    2.2.2.2           1408  28    80000001        2
Sum-Net   192.168.1.32    2.2.2.2           1408  28    80000001        2
Sum-Net   192.168.1.35    2.2.2.2           1408  28    80000001        2
Sum-Net   192.168.1.0     2.2.2.2           1408  28    80000001        2
Sum-Net   192.168.1.3     2.2.2.2           1408  28    80000001        2
Sum-Net   192.168.1.164   2.2.2.2           1408  28    80000001        2
Sum-Net   192.168.1.160   2.2.2.2           1453  28    80000001        1
Sum-Net   192.168.0.96    1.1.1.1            447  28    80000002        2
Sum-Net   192.168.0.99    1.1.1.1            444  28    80000001        2
Sum-Net   192.168.0.64    1.1.1.1            447  28    80000002        2
Sum-Net   192.168.0.67    1.1.1.1            444  28    80000001        2
Sum-Net   192.168.0.32    1.1.1.1            447  28    80000002        2
Sum-Net   192.168.0.35    1.1.1.1            444  28    80000001        2
Sum-Net   192.168.0.0     1.1.1.1            447  28    80000002        2
Sum-Net   192.168.0.3     1.1.1.1            444  28    80000001        2
Sum-Net   192.168.0.164   1.1.1.1            444  28    80000001        2
Sum-Net   192.168.0.160   1.1.1.1           1536  28    80000001        1

                  Area: 0.0.0.2
Type      LinkState ID    AdvRouter          Age  Len   Sequence   Metric
Router    2.5.5.5         2.5.5.5           1411  84    80000011        1
Router    2.2.2.2         2.2.2.2           1410  36    80000004        1
Router    1.5.5.5         1.5.5.5           1415  144   80000010        1
Network   192.168.1.163   2.5.5.5           1411  36    80000004        0
Sum-Net   192.168.4.0     2.2.2.2           1455  28    80000001        1
Sum-Net   192.168.3.0     2.2.2.2           1455  28    80000001        2
Sum-Net   192.168.2.0     2.2.2.2           1455  28    80000001        1
Sum-Net   192.168.0.96    2.2.2.2            448  28    80000002        3
Sum-Net   192.168.0.99    2.2.2.2            445  28    80000001        3
Sum-Net   192.168.0.64    2.2.2.2            448  28    80000002        3
Sum-Net   192.168.0.67    2.2.2.2            445  28    80000001        3
Sum-Net   192.168.0.32    2.2.2.2            448  28    80000002        3
```

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DHCP CONFIGURATION

Enable DHCP service on the device

Create DHCP pools for each VLAN

- Configure:

– Network address

– Subnet mask

– Default gateway (VLANIF interface)

Ensure APs and wireless clientsreceive correct IP addresses

Test DHCP by releasing andrenewing IP on end devices

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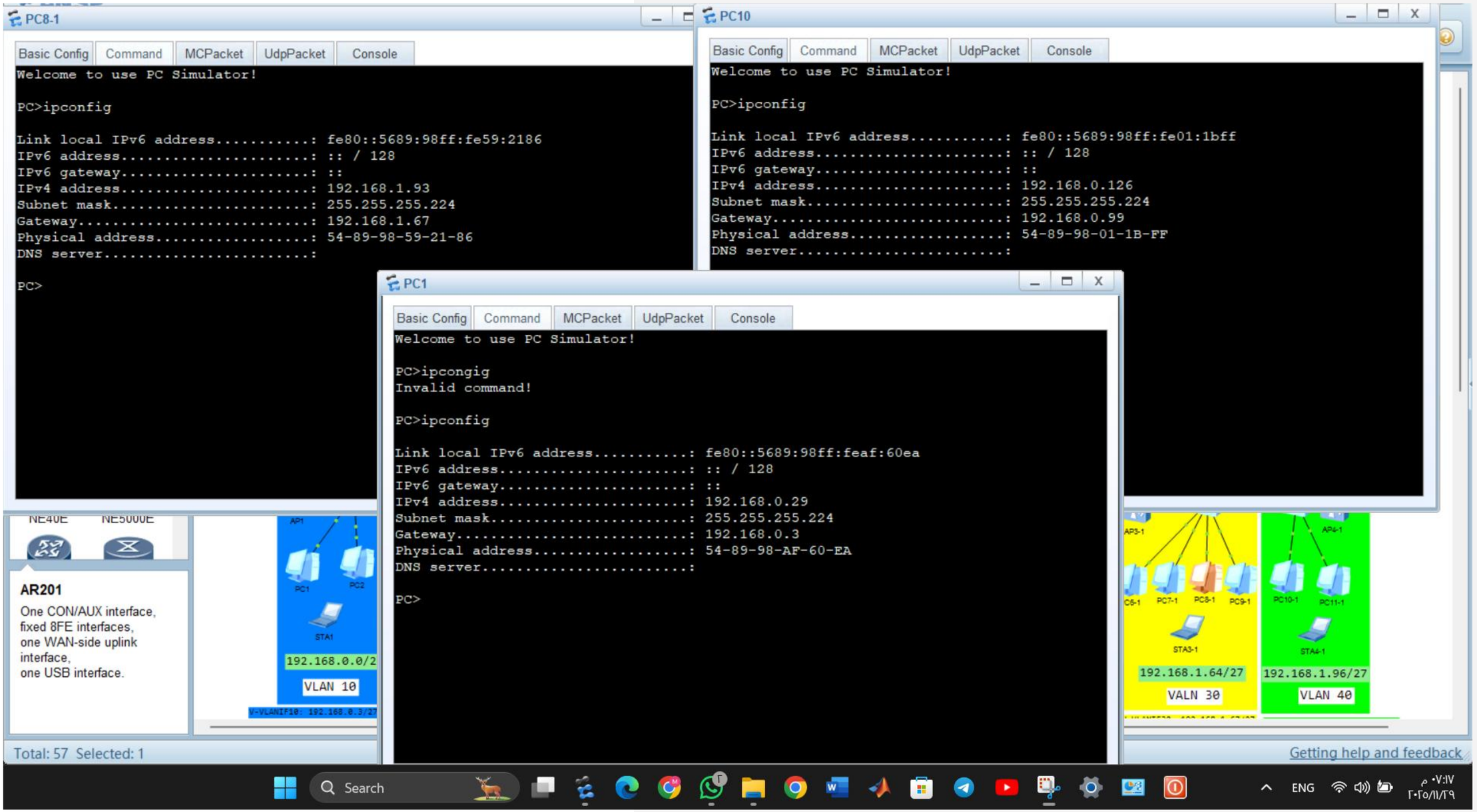
DHCP CONFIGURATION



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WLAN CONFIGURATION

- Wireless communication between buildings
- Access Points for user connectivity
- Secure traffic management

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SUMMARY / KEY POINTS

- Network secured with ACL & AAA
- High availability using VRRP
- VLANs & STP ensure continuity
- Eth-Trunk improves bandwidth & redundancy
- Inter-building communication via routers

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THANK YOU

Any Questions?

30 Nov, 2025