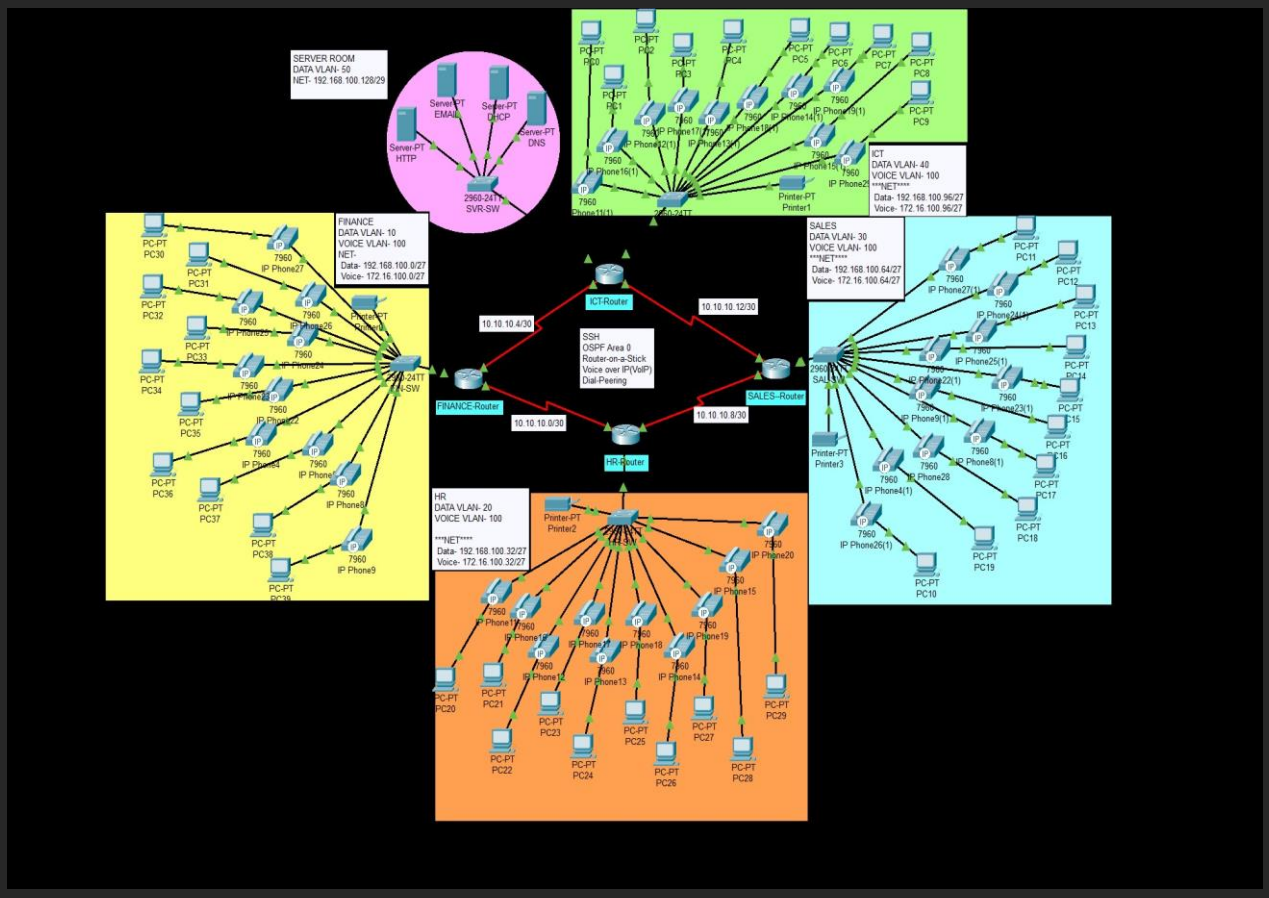

SERVER ROOM
DATA VLAN- 50
NET- 192.168.100.128/29
Server-PT EMAIL
Server-PT DHCP
Server-PT DNS
Server-PT HTTP
2960-24TT SVR-SW
ICT
DATA VLAN- 40
VOICE VLAN- 100
NET**
Data- 192.168.100.96/27
Voice- 172.16.100.96/27
FINANCE
DATA VLAN- 10
VOICE VLAN- 100
NET-
Data- 192.168.100.0/27
Voice- 172.16.100.0/27
ICT-Router
10.10.10.4/30
10.10.10.12/30
SSH
OSPF Area 0
Router-on-a-Stick
Voice over IP(VoIP)
Dial-Peering
FINANCE-Router
SALES--Router
10.10.10.0/30
10.10.10.8/30
HR-Router
SALES
DATA VLAN- 30
VOICE VLAN- 100
NET**
Data- 192.168.100.64/27
Voice- 172.16.100.64/27
HR
DATA VLAN- 20
VOICE VLAN- 100
NET**
Data- 192.168.100.32/27
Voice- 172.16.100.32/27

VoIP Cisco Packet Tracer Project Documentation

1. IP addressing
   i. PCs and printers

IP Addressing

PCs + Printers

Base Network: 192.168.100.0

Department	Network Address	Devices PCs + Printers	Subnet Mask	Host Address Range	Broadcast Address
Finance	192.168.100.0	21	255.255.255.224/27	192.168.100.1 to 192.168.100.30	192.168.100.31
HR	192.168.100.32	21	255.255.255.224/27	192.168.100.33 to 192.168.100.62	192.168.100.63
Sales	192.168.100.64	21	255.255.255.224/27	192.168.100.65 to 192.168.100.94	192.168.100.95
ICT	192.168.100.96	21	255.255.255.224/27	192.168.100.97 to 192.168.100.126	192.168.100.127
ServerSide	192.168.100.128	4	255.255.255.248/29	192.168.100.129 to 192.168.100.134	192.168.100.135

   ii. Phones

IP Phones

Base Network: 172.16.100.0

Department	Network Address	Phones	Subnet Mask	Host Address Range	Broadcast Address
Finance	172.16.100.0	20	255.255.255.224/27	172.16.100.1 to 172.16.100.30	172.16.100.31
HR	172.16.100.32	20	255.255.255.224/27	172.16.100.33 to 172.16.100.62	172.16.100.63
Sales	172.16.100.64	20	255.255.255.224/27	172.16.100.65 to 172.16.100.94	172.16.100.95
ICT	172.16.100.96	20	255.255.255.224/27	172.16.100.97 to 172.16.100.126	172.16.100.127

   iii. Between Routers

Between the Routers

No.	Network Address
Finance to HR	10.10.10.0/30
Finance to ICT	10.10.10.4/30
Sales to HR	10.10.10.8/30
Sales to ICT	10.10.10.12/30

2. Enabling routers

Configuration Code with Comments- Cisco IOS

```
! Set the hostname to SALES-Router
hostname SALES-Router

! Set the enable password to "cisco"
enable password cisco

! Configure the console line
line console 0
 password cisco
 login

! Set the message of the day banner to "NO UNAUTHORIZED ACCESS, THIS IS PUNISHABLE BY LAW!!!"
```

```
banner motd #NO UNAUTHORIZED ACCESS, THIS IS PUNISHABLE BY LAW!!!#

! Enable password encryption
service password-encryption

! Disable DNS domain lookup
no ip domain lookup

! Save the configuration
do wr

! Create a local user account with the username "cisco" and password "cisco"
username cisco password cisco

! Set the domain name to "cisco.net"
ip domain name cisco.net

! Generate a 1024-bit RSA key pair for secure communication
crypto key generate rsa general-keys modulus 1024

! Enable SSH version 2 for remote access
ip ssh version 2

! Configure the VTY lines for remote management
line vty 0 15
  login local
  transport input ssh

! Save the configuration
do wr
```

---

3. Configuring VLANs in Switches

```
--------------------------------------------------------------------------------
Configuration Code with Comments- Cisco IOS
--------------------------------------------------------------------------------

! Set the enable password to "cisco"
enable password cisco

! Enter global configuration mode
conf t

! Configure interface FastEthernet 0/1 as a trunk port
interface FastEthernet 0/1
  switchport mode trunk
  exit

! Configure interfaces FastEthernet 0/2 to 0/24 as access ports
interface range FastEthernet 0/2-24
  switchport mode access
  exit
```

```
! Create VLAN 20 with name DATA
vlan 20
  name DATA
  exit

! Create VLAN 100 with name VOICE
vlan 100
  name VOICE
  exit

! Configure interfaces FastEthernet 0/2 to 0/24 as access ports in VLAN 10 for data and VLAN 100 for
voice
interface range FastEthernet 0/2-24
  switchport mode access
  switchport access vlan 10
  switchport voice vlan 100
  exit

! Save the configuration
do wr

! Show IP interface brief
do sh ip int brief

! Show startup configuration
do sh start
```

---

4. Enabling Servers

Configuration Code with Comments- Cisco IOS

```
! Create VLAN 50 with the name DATA

vlan 50

  name DATA


! Configure interface FastEthernet 0/1 as a trunk port

interface FastEthernet 0/1

  switchport mode trunk

  exit


! Configure interfaces FastEthernet 0/2 to 0/5 as access ports in VLAN 50 for server connectivity
```

```
interface range FastEthernet 0/2-5
  switchport mode access
  switchport access vlan 50
  exit

! Save the configuration
do wr
```

---

5. Configuring DHCP for Voice

Configuration Code with Comments - Cisco IOS

```
! Exclude IP address 172.16.100.97 from DHCP address pool
ip dhcp excluded-address 172.16.100.97

! Configure DHCP pool named ICTVOICE
ip dhcp pool ICTVOICE

  ! Define the network and subnet mask for the DHCP pool
  network 172.16.100.96 255.255.255.224

  ! Set the default router (gateway) for DHCP clients
  default-router 172.16.100.97

  ! Set option 150 to provide the TFTP server IP address for DHCP clients
  option 150 ip 172.16.100.97

  exit

! Save the configuration
do wr
```

---

6. Inter-VLAN routing on the routers plus IP DHCP helper addresses

---

Configuration Code with Comments- Cisco IOS

```
! Configure interface FastEthernet 0/0.40 for VLAN 40
interface FastEthernet 0/0.40

  ! Set the VLAN encapsulation to dot1Q with VLAN ID 40
  encapsulation dot1Q 40

  ! Assign the IP address and subnet mask to the interface
  ip address 192.168.100.97 255.255.255.224

  ! Configure the DHCP helper address to forward DHCP requests
  ip helper-address 192.168.100.130

  exit

! Configure interface FastEthernet 0/0.100 for VLAN 100
interface FastEthernet 0/0.100

  ! Set the VLAN encapsulation to dot1Q with VLAN ID 100
  encapsulation dot1Q 100

  ! Assign the IP address and subnet mask to the interface
  ip address 172.16.100.97 255.255.255.224

  exit

! Save the configuration
do wr
```

```
!_________SERVER ROOM_____________________

! Configure interface FastEthernet 0/1.50 for VLAN 50 in the server room
interface FastEthernet 0/1.50

  ! Set the VLAN encapsulation to dot1Q with VLAN ID 50
  encapsulation dot1Q 50

  ! Assign the IP address and subnet mask to the interface
  ip address 192.168.100.129 255.255.255.248

  exit
```

---

7. OSPF on the Routers

Configuration Code with Comments- Cisco IOS

```
! Configure OSPF process with process ID 10
router ospf 10

  ! Advertise network 10.10.10.8/30 in area 0
  network 10.10.10.8 0.0.0.3 area 0

  ! Advertise network 10.10.10.12/30 in area 0
  network 10.10.10.12 0.0.0.3 area 0

  ! Advertise network 192.168.100.64/27 in area 0
  network 192.168.100.64 0.0.0.31 area 0

  ! Advertise network 172.16.100.64/27 in area 0
  network 172.16.100.64 0.0.0.31 area 0

  exit

! Save the configuration
do wr
```

---

8. Configure VoIP for all the Routers

Configuration Code with Comments- Cisco IOS

```
! Enable VoIP services on the router
telephony-service

  ! Set the maximum number of directory numbers (DNs) to 20
  max-dn 20

  ! Configure the IP source address and port for VoIP signaling
  ip source-address 172.16.100.1 port 2000

  ! Automatically assign DNs from 1 to 20
  auto assign 1 to 20

  exit

! Configure ephone-DNs for each extension

! HR Department Extensions
ephone-dn 1
  number 201
```

```
ephone-dn 2
  number 202

ephone-dn 3
  number 203

ephone-dn 4
  number 204

ephone-dn 5
  number 205

ephone-dn 6
  number 206

ephone-dn 7
  number 207

ephone-dn 8
  number 208

ephone-dn 9
  number 209

ephone-dn 10
  number 210

! Sales Department Extensions
ephone-dn 11
  number 301

ephone-dn 12
  number 302

ephone-dn 13
  number 303

ephone-dn 14
  number 304

ephone-dn 15
  number 305

ephone-dn 16
  number 306

ephone-dn 17
  number 307

ephone-dn 18
  number 308

ephone-dn 19
```

```
  number 309

ephone-dn 20
  number 310

! ICT Department Extensions
ephone-dn 21
  number 401

ephone-dn 22
  number 402

ephone-dn 23
  number 403

ephone-dn 24
  number 404

ephone-dn 25
  number 405

ephone-dn 26
  number 406

ephone-dn 27
  number 407

ephone-dn 28
  number 408

ephone-dn 29
  number 409

ephone-dn 30
  number 410

! Save the configuration
do wr
```

---

9. Dial-peering Configuration in all the Routers

Configuration Code with Comments- Cisco IOS

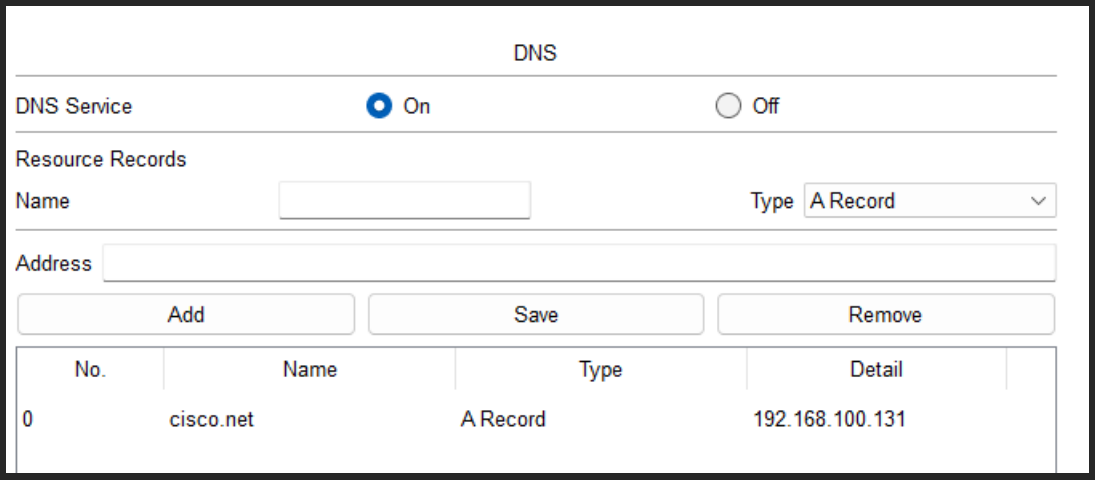
```
! Configure dial peer for VoIP communication

! Dial Peer 1- Destination pattern starting with '2'
dial-peer voice 1 voip
  destination-pattern 2..
  session target ipv4:10.10.10.2   ! Set the session target IP address to 10.10.10.2
  exit
```

```
! Dial Peer 2- Destination pattern starting with '4'
dial-peer voice 2 voip
  destination-pattern 4..
  session target ipv4:10.10.10.6   ! Set the session target IP address to 10.10.10.6
  exit

! Dial Peer 3- Destination pattern starting with '3'
dial-peer voice 3 voip
  destination-pattern 3..
  session target ipv4:10.10.10.10   ! Set the session target IP address to 10.10.10.10
  exit

! Save the configuration
do wr
```

---

10. Enabling HTTP and DNS servers

```
<!DOCTYPE html>
<html>
<head>
<title>VOIP project</title>
</head>
<body>
<h1>Project participants</h1>
<p>This is a basic HTML file.</p>
<ul>
<li>21BLC1668 - Kulkarni Atharva Gopinath</li>
<li>21BLC1667 - Meghavika Baidya</li>
</ul>
</body>
</html>
```



11. Testing the VOIP-telephony network

1. Pinging into other departments from ICT

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.100.5

Pinging 192.168.100.5 with 32 bytes of data:

Request timed out.
Reply from 192.168.100.5: bytes=32 time=20ms TTL=126
Reply from 192.168.100.5: bytes=32 time=35ms TTL=126
Reply from 192.168.100.5: bytes=32 time=2ms TTL=126

Ping statistics for 192.168.100.5:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 35ms, Average = 19ms
```

```
C:\>ping 192.168.100.66

Pinging 192.168.100.66 with 32 bytes of data:

Request timed out.
Reply from 192.168.100.66: bytes=32 time=4ms TTL=126
Reply from 192.168.100.66: bytes=32 time=17ms TTL=126
Reply from 192.168.100.66: bytes=32 time=19ms TTL=126

Ping statistics for 192.168.100.66:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 4ms, Maximum = 19ms, Average = 13ms
```

```
Pinging 192.168.100.46 with 32 bytes of data:

Request timed out.
Reply from 192.168.100.46: bytes=32 time=4ms TTL=125
Reply from 192.168.100.46: bytes=32 time=3ms TTL=125
Reply from 192.168.100.46: bytes=32 time=3ms TTL=125

Ping statistics for 192.168.100.46:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 3ms, Maximum = 4ms, Average = 3ms
```

2. Inter-department remote login

i. Accessing sales department from a finance PC

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ssh -l cisco 10.10.10.10

Password:

NO UNAUTHORISED ACCESS, THIS IS PUNISHABLE BY LAW!!!
```

As we can see, inter-department access of data is not allowed. However, voice calling is enabled which is shown below.

ii. Show start configuration

```
SAL-Router>en
Password:
SAL-Router#sh start
Using 2113 bytes
!
version 15.1
no service timestamps log datetime msec
no service timestamps debug datetime msec
service password-encryption
!
hostname SAL-Router
!
!
!
enable password 7 0822455D0A16
!
!
ip dhcp excluded-address 172.16.100.65
!
ip dhcp pool SALEVOICE
 network 172.16.100.64 255.255.255.224
 default-router 172.16.100.65
 option 150 ip 172.16.100.65
!
!
!
no ip cef
no ipv6 cef
!
!
!
username cisco password 7 0822455D0A16
!
!
license udi pid CISCO2811/K9 sn FTX10173L13-
!
```

3. Calling

i. Finance intra-department: 109 to 107

ii. Inter-department calling 104 to 201 (possible due to Dial Peering)

4. Testing DNS and HTTP