VoIP- IP System Network

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Sommario

[Request: 2](#_Toc157873988)

[Note / request: 2](#_Toc157873989)

[Devices: 3](#_Toc157873990)

[LAYOUT 4](#_Toc157873991)

[CONFIGURAZIONE 5](#_Toc157873992)

[TABELLE 7](#_Toc157873993)

# Request:

All desktops have an associated telephone set (each PC is connecting directly to a Phone, not a switch). The network consists of four servers (DHCP, EMAIL, DNS, HTTP) located at the server-side site and is fully configured for the operations, and all servers are shared between all users.

Finance 10 phones + 10 PCs

HR 10 phones + 10 PCs

Sales 10 phones + 10 PCs

ICT 10 phones + 10 PCs

IP address:

192.168.100.0/24 for Data

172.16.100.0/24 for Voice

10.10.10.0/24 between the routers

## Note / request:

1. Design a networked system to meet the given specifications. Use packet tracer software to design your network.
2. Routers- Each department is to have VoIP enabled router with server-side LAN attached to the ICT department router. Note: use Cisco 2811 router.
3. Switches- Each department has an access layer switch. Note: use Cisco 2960 switch.
4. Connections- Use serial connections between a router and a router, then a straight through cable between the router to switch, switch to hosts, phones to PCs.
5. Subnets- Each department will be accessing two subnetworks, for example, data and voice subnets. Note: carry out appropriate subnetting.
6. Basic settings- Configure basic device settings such as hostnames, console passwords, enable passwords, banner messages, encrypt all passwords, and disable IP domain lookup.
7. DHCP Server- For voice (VoIP), use the respective router as the DHCP server while for Data use the DHCP server device at the server-side site.
8. VLANs- Each department will be in two VLANS. One for data and another for voice. Note: All IP phones in the network should be in VLAN 100.
9. Inter-VLAN Routing- Use router-on-a-stick to enable inter-VLAN routing on the network. Note: create subinterfaces for both data and voice VLANs.
10. IP Addressing- All devices in the network are expected to obtain an IP address dynamically from the respective DHCP servers while the devices in the server room are to be allocated IP addresses statically.
11. Routing protocol- Use OSPF as the routing protocol to advertise routes on the routers.
12. Remote Access- Configure SSH in all the routers for remote login.
13. Telephony service- Configure VoIP on the routers and allocate dial numbers in this format for the departments, Finance (1..), HR (2..), Sales (3..), and ICT (4..), (where 1.. can be 101 to 199) and so on.
14. Routing for VoIP- Configure dial-peering on the routers to allow IP phones from different routers to communicate.
15. Finalize- Test Communication, ensure everything configured is working as expected.
16. Creating a network topology using Cisco Packet Tracer.
17. Hierarchical Network Design.
18. Connecting Networking devices with Correct cabling.
19. Configuring Basic device settings.
20. Creating VLANs and assigning ports VLAN numbers.
21. Creating both data and voice VLANs and assigning ports VLAN numbers.
22. Subnetting and IP Addressing.
23. Configuring Inter-VLAN Routing on the Routers (router-on-a-stick).
24. Configuring Dedicated DHCP Server device for Data to provide dynamic IP allocation.
25. Configuring Routers as DHCP server for Voice to provide IP Phones dynamic IP allocation.
26. Configuring SSH for secure Remote access.
27. Configuring OSPF as the routing protocol.
28. Configuring VoIP or Telephony service configuration in all routers.
29. Configuring Routing for VoIP or Dial peering configuration in all routers.
30. Host Device Configurations.
31. Test and Verifying Network Communication

## Devices:

1 router for each Department: 4

1 switch for each department: 4

4 servers DHCP, EMAIL, DNS, HTTP

10 phone each department: 40

10 pc per department: 40

# LAYOUT

Immagine che contiene testo, arte, design, modello

Descrizione generata automaticamente

# CONFIGURAZIONE

**Configuration switch:**

Enable password cisco

Line console 0

Password cisco

Login

Exit

Banner motd /Unauthorised/

service password-encryption

no ip domain-lookup

do wr

***Configuration vlan on SW:***

conf t

int range f0/2-11

switchport mode acc

switchport acc vlan 40

switchport voice vlan 100

int f0/1 switchport mode trunk

vlan 40

name DATA

vlan 100

name VOICE

do wr

**Configuration router:**

Enable password cisco

Line console 0

Password cisco

Login

Exit

Banner motd /Unauthorised/

service password-encryption

no ip domain-lookup

ip domain-name cisco.net

crypto key generate rsa general-keys modulus 1024

ip ssh version 2

user cisco pass cisco

line vty 0 15

login local

transport input ssh

do wr

***Configuration DHCP Voice on Router :***

Service dhcp

Ip dhcp exclu 172.16.100.97

Ip dhcp pool ICT-Voice

Network 172.16.100.96 255.255.255.224

Default-router 172.16.100.97

Option 150 ip 172.16.100.97

Exit

Do wr

NOTE

DHCP option 150 **provides the IP addresses of a list of TFTP servers**.

2^5 = 32 – 2 = 30 host mask: 32 – 5 = 27

2^3= 8 -2 = 6 host masks: 32 - 3 = 29

# TABELLE

**DATA IP NETWORK: 192.168.100.0/24**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| DEPARTMENT | Network | Number of devices | Subnet mask | Host Range | Broadcast |
| Finance | 192.168.100.0 | 20 | /27 | 192.168.100.1  192.168.100.30 | 192.168.100.31 |
| HR | 192.168.100.32 | 20 | /27 | 192.168.100.33  192.168.100.62 | 192.168.100.63 |
| Sales | 192.168.100.64 | 20 | /27 | 192.168.100.65  192.168.100.94 | 192.168.100.95 |
| ICT | 192.168.100.96 | 20 | /27 | 192.168.100.97  192.168.100.126 | 192.168.100.127 |
| Server | 192.168.100.128 | 4 | /29 | 192.168.100.105  192.168.100.110 | 192.168.100.135 |

VOIP NETWORK 172.16.100.0/24

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| DEPARTMENT | Network | Number of devices | Subnet mask | Host Range | Broadcast |
| Finance | 172.16.100.0 | 20 | /27 | 172.16.100.1  172.16.100.30 | 172.16.100.31 |
| HR | 172.16.100.32 | 20 | /27 | 172.16.100.33  172.16.100.62 | 172.16.100.63 |
| Sales | 172.16.100.64 | 20 | /27 | 172.16.100.65  172.16.100.94 | 172.16.100.95 |
| ICT | 172.16.100.96 | 20 | /27 | 172.16.100.97  172.16.100.126 | 172.16.100.127 |

**Ip between the routers** 10.10.10.0/24

|  |  |
| --- | --- |
| n | Network |
| Finance - HR | 10.10.10.0/30 |
| HR - Sales | 10.10.10.4/30 |
| Sales - ICT | 10.10.10.8/30 |
| ICT - Finance | 10.10.10.12/30 |

**SERVER IPv4 Address**

|  |  |
| --- | --- |
| NAME | IPv4  Address |
| DHCP | 192.168.100.130/29 |
| EMAIL | 192.168.100.131/29 |
| DNS | 192.168.100.132/29 |
| HTTP | 192.168.100.133/29 |

**Router IP**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Router | Router to Switch  IP | Router – Router  0/3/0 | Router – Router  0/3/1 | Router Voice Ip |
| Finance | 192.168.100.1/27 | .13 | .1 | 172.16.100.1/27 |
| HR | 192.168.100.33/27 | .2 | .5 | 172.16.100.33/27 |
| Sales | 192.168.100.65/27 | .6 | .9 | 172.16.100.65/27 |
| ICT  SERVER | 192.168.100.97/27  192.168.100.129/29 | .10 | .14 | 172.16.100.97/27 |