

Step 1: Arrange the Networks by Required Hosts in Descending Order

- Network 4 (1000 PCs)
 - Network 1 (510 PCs)
 - VLAN41 (250 PCs)
 - VLAN40 (111 PCs)
 - VLAN42 (VoIP, 4 phones)
 - R1 – R2 Interconnection (2 devices)
 - R1 – SP1 Interconnection (2 devices)
 - R2 – SP2 Interconnection (2 devices)
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Step 2: Subnetting Based on Required Hosts

1. **Network 4 (1000 PCs):**
 - To fit 1000 PCs, we need at least 1024 IP addresses. So, we need a **/22** subnet.
 - **Subnet Mask**
 - **Usable IP Range:** 1024 IPs (1022 usable)
 - **Example Network**
2. **Network 1 (510 PCs):**
 - To fit 510 PCs, we need at least 512 IP addresses. So, we need a **/23** subnet.
 - **Subnet Mask**
 - **Usable IP Range:** 512 IPs (510 usable)
 - **Example Network**
3. **VLAN41 (250 PCs):**
 - To fit 250 PCs, we need at least 256 IP addresses. So, we need a **/24** subnet.
 - **Subnet Mask**
 - **Usable IP Range:** 256 IPs (254 usable)
 - **Example Network**
4. **VLAN40 (111 PCs):**
 - To fit 111 PCs, we need at least 128 IP addresses. So, we need a **/25** subnet.
 - **Subnet Mask**
 - **Usable IP Range:** 128 IPs (126 usable)
 - **Example Network**
5. **VLAN42 (VoIP, 4 phones):**
 - For 4 phones, we need at least 8 IP addresses. So, we need a **/29** subnet.
 - **Subnet Mask**
 - **Usable IP Range:** 8 IPs (6 usable)
 - **Example Network**
6. **R1 – R2 Interconnection (2 devices):**
 - For 2 devices, we need at least 4 IP addresses. So, we need a **/30** subnet.
 - **Subnet Mask**
 - **Usable IP Range:** 4 IPs (2 usable)
 - **Example Network**
7. **R1 – SP1 Interconnection (2 devices):**
 - Same as above, **/30** subnet.
 - **Subnet Mask**
 - **Usable IP Range:** 4 IPs (2 usable)
 - **Example Network**

8. **R2 – SP2 Interconnection (2 devices):**
 - Same as above, /30 subnet.
 - **Subnet Mask**
 - **Usable IP Range:** 4 IPs (2 usable)
 - **Example Network**

Final Subnet Calculation Summary:

Network	Subnet Mask	Usable IP Range	Total IPs	Usable Hosts
Network 4 (1000 PCs)	/22		1024	1022
Network 1 (510 PCs)	/23		512	510
VLAN41 (250 PCs)	/24		256	254
VLAN40 (111 PCs)	/25		128	126
VLAN42 (VoIP, 4 phones)	/29		8	6
R1 – R2 Interconnection	/30		4	2
R1 – SP1 Interconnection	/30		4	2
R2 – SP2 Interconnection	/30		4	2

Calculating usable IP address,

The first IP from all subnet will be used for the network address, hence from 2nd IP it will used.

Subnet Calculation Recap:

1. **Network 4 (1000 PCs)**
 - Usable Range
 - **First Usable IP**
 - **Second Usable IP**
2. **Network 1 (510 PCs)**
 - Usable Range: **192.168.4.1**
 - **First Usable IP:**
 - **Second Usable IP:**
3. **VLAN41 (250 PCs)**
 - Usable Range: **192.168.6.1**

- **First Usable IP:**
- **Second Usable IP:**
- 4. **VLAN40 (111 PCs)**
 - Usable Range: 192.168.7.1
 - **First Usable IP**
 - **Second Usable IP**
- 5. **VLAN42 (VoIP, 4 phones)**
 - Usable Range:
 - **First Usable IP**
 - **Second Usable IP**
- 6. **R1 – R2 Interconnection (2 devices)**
 - Usable Range:
 - **First Usable IP**
 - **Second Usable IP**
- 7. **R1 – SP1 Interconnection (2 devices)**
 - Usable Range:
 - **First Usable IP**
 - **Second Usable IP**
- 8. **R2 – SP2 Interconnection (2 devices)**
 - Usable Range: 192.168.7.145
 - **First Usable IP**
 - **Second Usable IP**

Summary of First and Second Usable IPs:

Network	Subnet Mask	First Usable IP	Second Usable IP
Network 4 (1000 PCs)	/22		
Network 1 (510 PCs)	/23		
VLAN41 (250 PCs)	/24		
VLAN40 (111 PCs)	/25		
VLAN42 (VoIP, 4 phones)	/29		
R1 – R2 Interconnection	/30		
R1 – SP1 Interconnection	/30		
R2 – SP2 Interconnection	/30		

Script to configure IP address of all routers: