

Subnetting Solution for IP Address Spaces

June 11, 2025

Problem Statement

An organization needs 5 subnets for the following IP address spaces:

- a. 207.124.24.0/25
- b. 30A0:A030:1234:2000::/60

Perform subnetting and show all work.

Solution

Part a: IPv4 Address Space (207.124.24.0/25)

- **Given:** 207.124.24.0/25 (subnet mask: 255.255.255.128)
- **Total Hosts:** $2^{(32 - 25)} = 128$ **addresses****Required Subnets :** 5
- **New Subnet Bits:** $2^3 = 8 \geq 5$, *soborrow3bits*, *newmask : /28(255.255.255.240)***Hosts per Subnet :** $2^{(32 - 28)} = 16$, *with14usablehosts*
- **Subnet Calculation:**
 - Subnet 1: 207.124.24.0 - 207.124.24.15 (Network: 207.124.24.0, Broadcast: 207.124.24.15)
 - Subnet 2: 207.124.24.16 - 207.124.24.31 (Network: 207.124.24.16, Broadcast: 207.124.24.31)
 - Subnet 3: 207.124.24.32 - 207.124.24.47 (Network: 207.124.24.32, Broadcast: 207.124.24.47)
 - Subnet 4: 207.124.24.48 - 207.124.24.63 (Network: 207.124.24.48, Broadcast: 207.124.24.63)
 - Subnet 5: 207.124.24.64 - 207.124.24.79 (Network: 207.124.24.64, Broadcast: 207.124.24.79)
- **Verification:** /25 supports 8 /28 subnets ($128 / 16 = 8$), so 5 subnets fit.

Part b: IPv6 Address Space (30A0:A030:1234:2000::/60)

- **Given:** 30A0:A030:1234:2000::/60
- **Total Addresses:** $2^{(128 - 60)} = 2^6 8 \text{ addresses}$ **Required Subnets :** 5
- **New Subnet Bits:** $2^3 = 8 \geq 5$, *so borrow 3 bits, new prefix : /63* **Addresses per Subnet :** $2^{(128 - 63)} = 2^6 5 \text{ addresses}$
- **Subnet Calculation:**
 - Subnet 1: 30A0:A030:1234:2000:: - 30A0:A030:1234:203F:FFFF:FFFF:FFFF:FFFF (/63)
 - Subnet 2: 30A0:A030:1234:2040:: - 30A0:A030:1234:207F:FFFF:FFFF:FFFF:FFFF (/63)
 - Subnet 3: 30A0:A030:1234:2080:: - 30A0:A030:1234:20BF:FFFF:FFFF:FFFF:FFFF (/63)
 - Subnet 4: 30A0:A030:1234:20C0:: - 30A0:A030:1234:20FF:FFFF:FFFF:FFFF:FFFF (/63)
 - Subnet 5: 30A0:A030:1234:2100:: - 30A0:A030:1234:213F:FFFF:FFFF:FFFF:FFFF (/63)
- **Verification:** /60 supports 8 /63 subnets (2^3), *and 5 subnets are within range.*