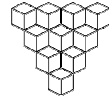


# **IP Address Design Exercises**

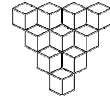
*For a rainy weekend...*

# Address Calculations (1)



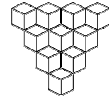
- Which one of the following addresses matches 32/4 ?
  - ◆ 10.119.22.0
  - ◆ 65.209.10.0
  - ◆ 5.0.1.0
  - ◆ 33.33.1.0
  - ◆ 96.21.3.0

## Address Calculations (2)



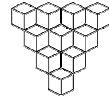
- Which one of the following prefixes matches 95.254.36.0 ?
  - ◆ 95.254.46/23
  - ◆ 95.254.37/24
  - ◆ 95.254.36/24
  - ◆ 95.254.40/23

## Address Calculations (3)



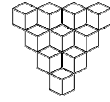
- Which one of the following address prefixes contains 65.40/13 ?
  - ◆ 65.128/11
  - ◆ 65.128/10
  - ◆ 65.192/10
  - ◆ 65.64/12
  - ◆ 65.0/10

## Address Calculations (4)



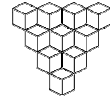
- Which one of the following prefixes matches both 229.65.47.0 and 229.65.56.0 ?
  - ◆ 229.65.32.0/20
  - ◆ 229.65.49.0/20
  - ◆ 229.65.37.0/19
  - ◆ 229.65.35.0/21

# Subnetting (1)



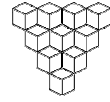
- **Given network 175.32.0.0 with subnet mask 255.255.255.0**
  - ◆ Total number of subnets ?
  - ◆ Range of Subnet addresses ?
  - ◆ Number of hosts per subnet ?
  - ◆ Range of host addresses ?

## Subnetting (2)



- **Given network 31.0.0.0 with subnet mask 255.255.255.0**
  - ◆ Total number of subnets ?
  - ◆ Range of Subnet addresses ?
  - ◆ Number of hosts per subnet ?
  - ◆ Range of host addresses ?

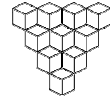
## Subnetting (3)



- **Given network 31.0.0.0 with subnet mask 255.255.192.0**
  - ◆ Total number of subnets ?
  - ◆ Range of Subnet addresses ?
  - ◆ Number of hosts per subnet ?
  - ◆ Range of host addresses ?

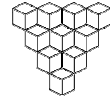


## Subnetting (4)



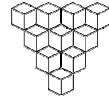
- **Given address 5.228.229.195 with subnet mask 255.255.255.224**
  - ◆ Net-ID ?
  - ◆ Host-ID ?
  - ◆ Subnet broadcast address ?
  - ◆ Maximal number of hosts ?
  - ◆ Range of subnet addresses ?

## Subnetting (5)



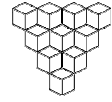
- **Given address 192.4.4.67 with subnet mask 255.255.255.252**
  - ◆ **Net-ID ?**
  - ◆ **Host-ID ?**
  - ◆ **Subnet broadcast address ?**
  - ◆ **Maximal number of hosts ?**
  - ◆ **Range of subnet addresses ?**

## Subnetting (6)



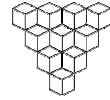
- **An organization received the network number 193.1.1.0/24 for further subnetting**
- **Six subnets are required**
- **Up to 25 hosts per subnet**
  - ◆ **Create a list of all subnet addresses**
  - ◆ **Identify subnet zero and subnet broadcast addresses**

## Subnetting (7)



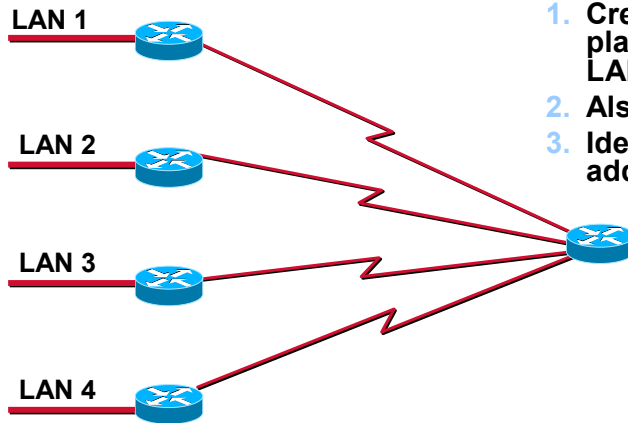
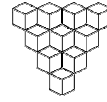
- **An organization received the network number 120.10.0.0/16 for further subnetting**
- **Up to 60 hosts per subnet**
  - ◆ **Create a list of all subnet addresses**
  - ◆ **Identify subnet zero and subnet broadcast addresses**

## VLSM (1)



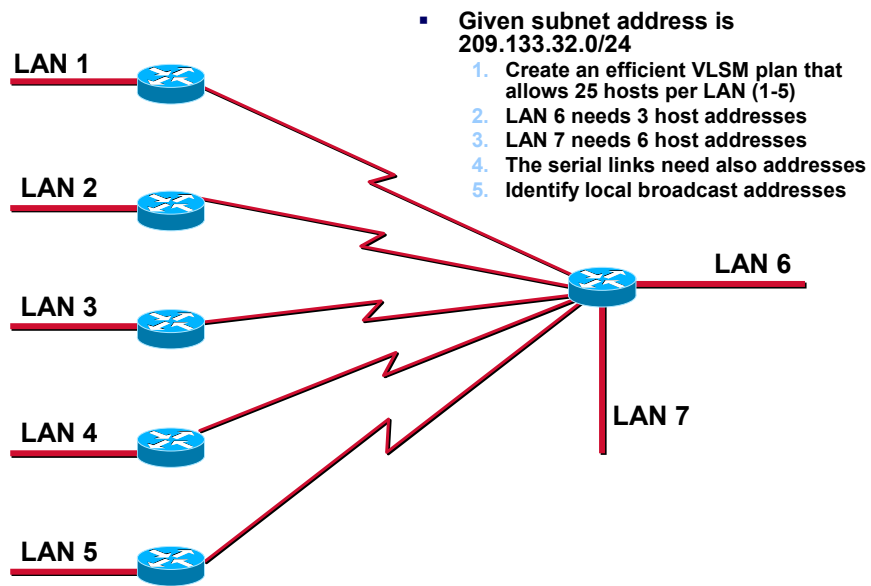
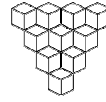
- **An organization received the network number 100.22.0.0/16**
  - ◆ **Create 16 subnets**
  - ◆ **Create 32 sub-subnets each, except subnet 10, which should have 16 sub-subnets**
  - ◆ **Create 8 sub-sub-subnets for the 5th sub-subnet of subnet 10**

## VLSM (2)

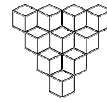


- **Given subnet address is 179.55.32.0/20**
  1. Create an efficient VLSM plan that allows 25 hosts per LAN
  2. Also address the serial links
  3. Identify local broadcast addresses

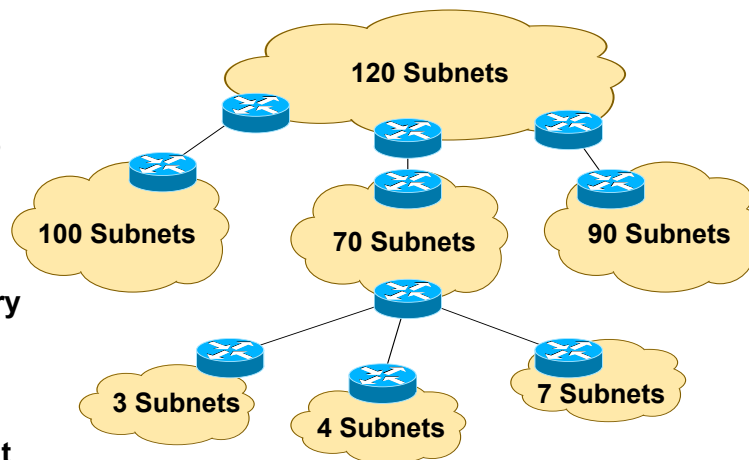
# VLSM (3)



# Hierarchical Addressing

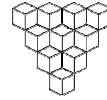


1. Create VLSM address plan using subnets of 130.5.0.0/16
2. Support route summarization at border routers!
3. Which summary route is advertised at the border routers?
4. How many host addresses are available in each level?

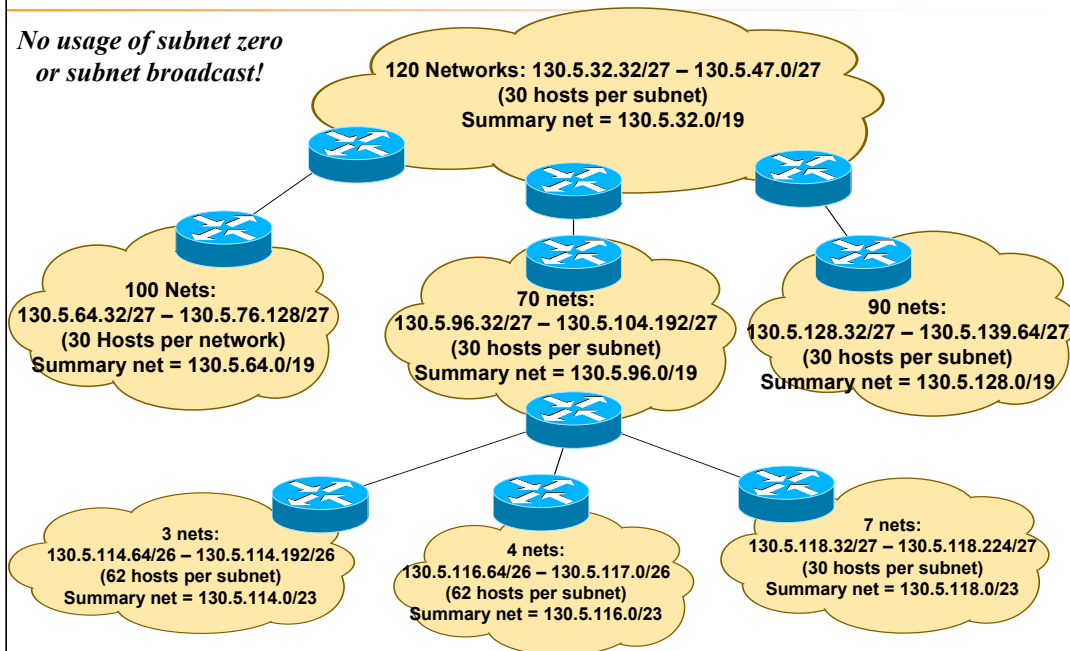




# One Solution



*No usage of subnet zero  
or subnet broadcast!*

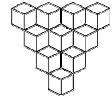


(C) Herbert Haas 2004/10/14

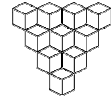
17

```

130.5.001 00000.00000000/19 Summary net
          00000.001*****/27 1st
          01111.000*****/27 120th subnet
130.5.010 00000.00000000/19 Summary net
          00000.001*****/27 1st subnet
          01100.100*****/27 100th subnet
130.5.011 00000.00000000/19 Summary net
          00000.001*****/27 1st subnet
          01000.110*****/27 70th subnet
          10010.00000000/23 Summary net
              0.01*****/26 1st subnet
              0.11*****/26 3rd subnet
          10100.00000000/23 Summary net
              0.01*****/26 1st subnet
              1.00*****/26 4th subnet
          10110.00000000/23 Summary net
              0.001*****/27 1st subnet
              0.111*****/27 7th subnet
130.5.100 00000.00000000/19 Summary net
          00000.001*****/27 1st subnet
          01011.010*****/27 90th subnet
    
```

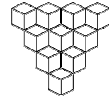


## CIDR (1)



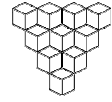
- Identify the network numbers that are specified by the CIDR block **198.31.168.0/21**
- Identify the network numbers that are specified by the CIDR block **199.24.0.0/13**

## CIDR (2)



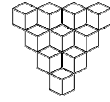
- **Aggregate the following network addresses using CIDR**
  - ◆ **200.47.132.0/24**
  - ◆ **200.47.133.0/24**
  - ◆ **200.47.134.0/24**
  - ◆ **200.47.135.0/24**

## CIDR (3)



- **Aggregate the following network addresses using CIDR**
  - ◆ **200.47.146.0/24**
  - ◆ **200.47.147.0/24**
  - ◆ **200.47.148.0/24**
  - ◆ **200.47.149.0/24**

## CIDR (4)



- **Aggregate the following network addresses using CIDR**
  - ◆ **200.47.96.0/24**
  - ◆ **200.47.97.0/24**
  - ◆ **200.47.98.0/24**
  - ...
  - ◆ **200.47.158.0/24**
  - ◆ **200.47.159.0/24**

2 Supernets:

200.47.96.0/19

200.47.128.0/19

*“The good thing  
about standards is  
that there are so  
many to choose  
from”*

**Andrew S. Tanenbaum**