# Internet Registry procedures

The Addressing Plan
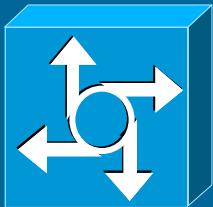
# Addressing Plan

- **To complete documentation**
  - First need a technical <u>PLAN</u>
    - Documenting the architecture of the present and eventual goal

  - IP addressing is fundamental part of network design

  - IP addressing 'planning' example to follow..
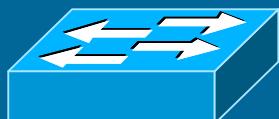
Some Icons

Router
(layer 3, IP datagram forwarding)

Network Access Server
(layer 3, IP datagram forwarding)
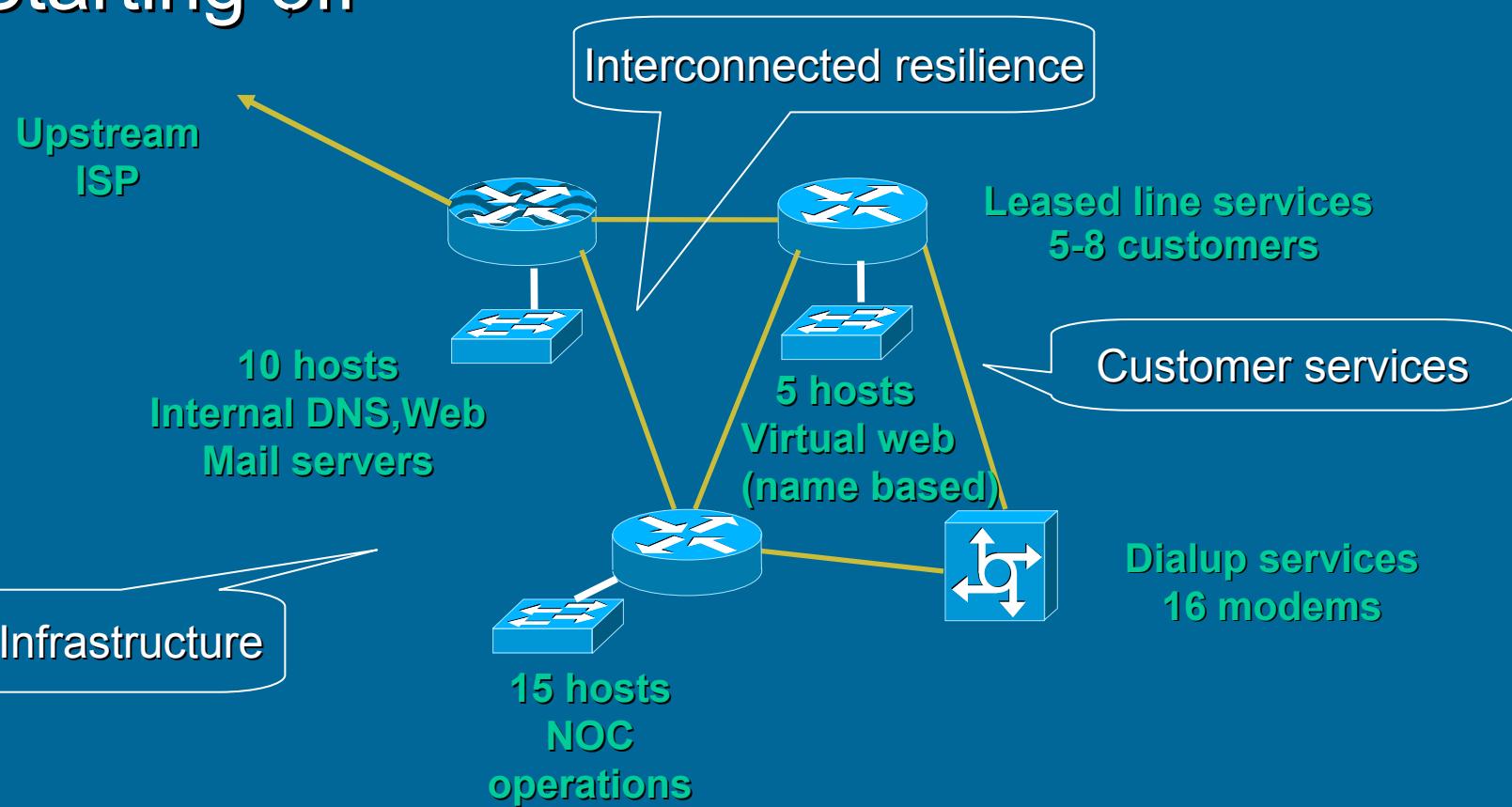
Ethernet switch
(layer 2, packet forwarding)

Addressing Plan
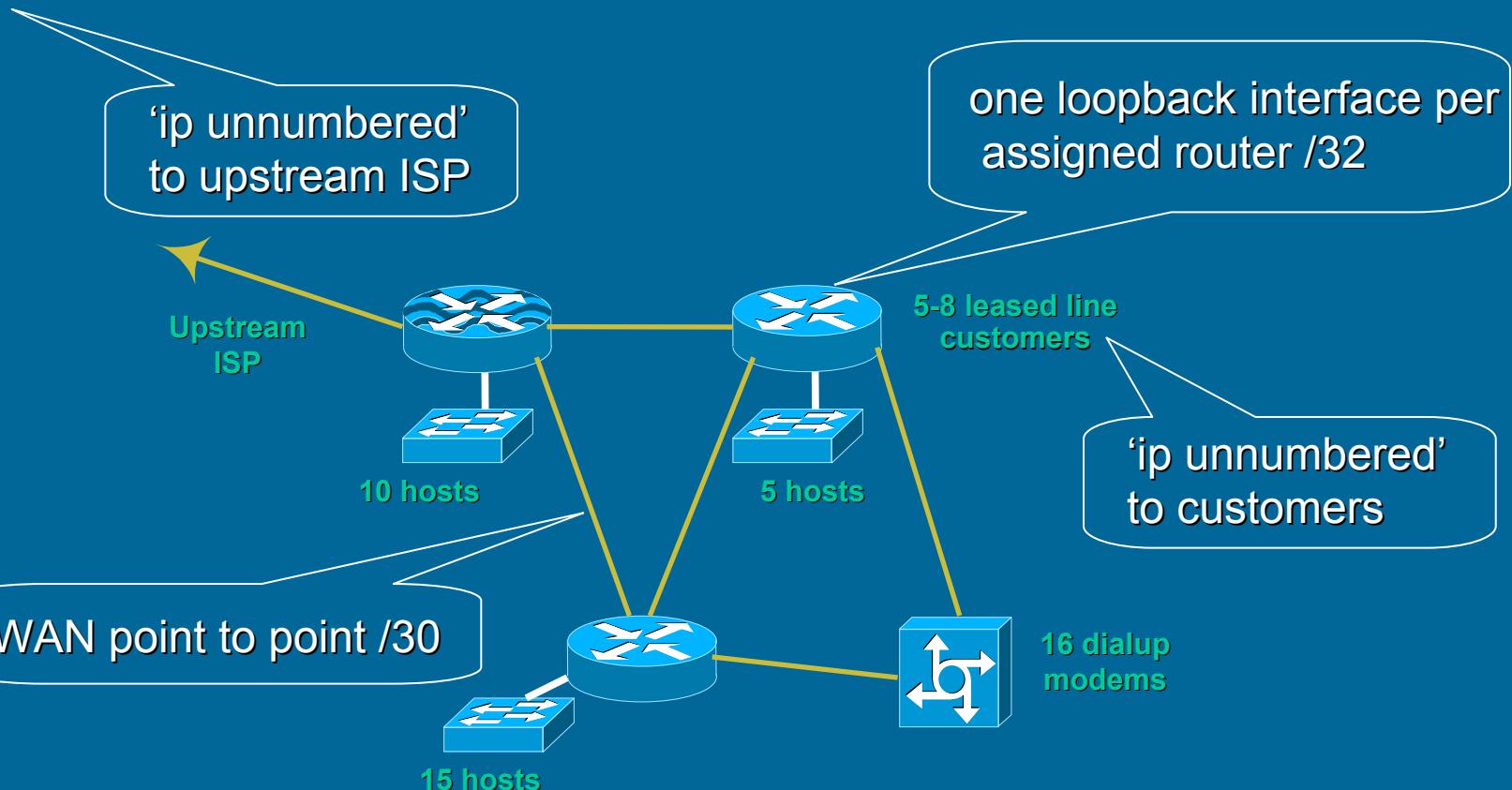
- **Identify components of network**
  - Customer services
  - ISP internal infrastructure

- **Identify phases of deployment**
  - Starting off, 6 months, 12 months

- **Identify equipment and topology changes**
  - Need for redundancy
  - Need for increased scale

Network Plan

◆ **Starting off**

Interconnected resilience

**Upstream
ISP**

**Leased line services
5-8 customers**

Customer services

**10 hosts
Internal DNS,Web
Mail servers**

**5 hosts
Virtual web
(name based)**

ISP Infrastructure

**Dialup services
16 modems**

**15 hosts
NOC
operations**

Network Plan

'ip unnumbered' to upstream ISP

one loopback interface per assigned router /32

Upstream ISP

5-8 leased line customers

10 hosts

5 hosts

'ip unnumbered' to customers

WAN point to point /30

16 dialup modems

15 hosts

Addressing Plan

◆ **Initial addressing plan**

-numbers of host addresses (interfaces)
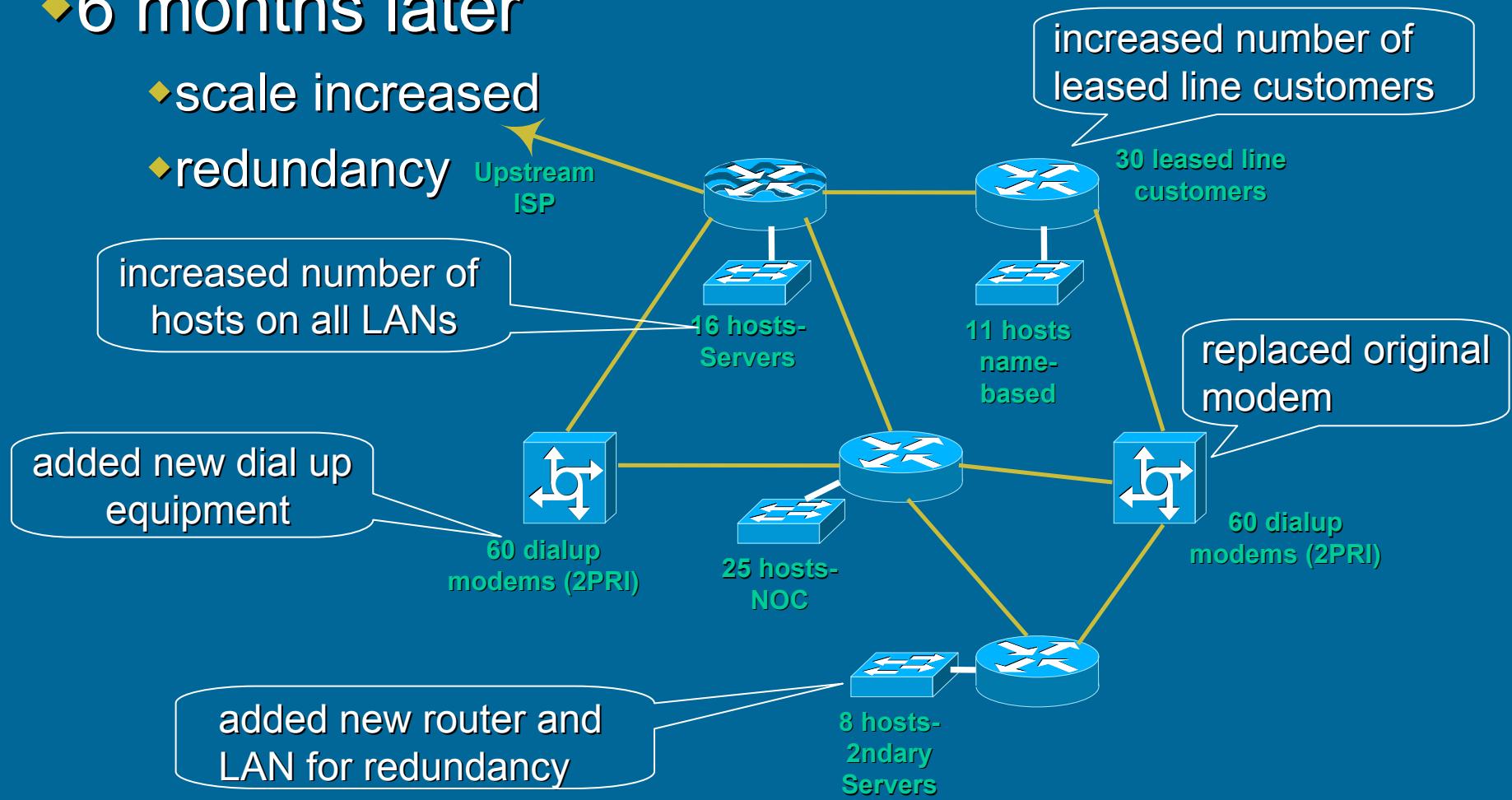
|		
network-plan:	16	analogue dialup modems, vendor 'x'
network-plan:	5	LAN -web hosting (Name-based hosting)
network-plan:	128	**5-8 leased line customers (/28)**
network-plan:	15	LAN -NOC and Ops management
network-plan:	10	LAN -mail,DNS, web servers internal
network-plan:	4	loopback router interfaces
network-plan:	2	router WAN ports (x 5 lines)

Network Plan

◆6 months later

- ◆scale increased
- ◆redundancy

Upstream ISP

increased number of leased line customers

30 leased line customers

increased number of hosts on all LANs

16 hosts-Servers

11 hosts name-based

replaced original modem

added new dial up equipment

60 dialup modems (2PRI)

25 hosts-NOC

60 dialup modems (2PRI)

added new router and LAN for redundancy

8 hosts-2ndary Servers

Addressing Plan

- ## Network plan at 6 months
  ### -increases in hosts (interfaces)

Changed description

network-plan:	16/	60	**2 PRI dialup modems, vendor 'y'**
network-plan:	5/	11	LAN -web hosting (Name-based hosting)
network-plan:	128/	512	30 leased line customers (pool)
network-plan:	15/	25	LAN -NOC and Ops management
network-plan:	10/	16	LAN -mail,DNS, web servers internal
network-plan:	4/	6	loopback router interfaces
network-plan:	2/	2	router WAN ports (x 8 lines)
network-plan:	0/	60	**2 PRI dialup modems**
network-plan:	0/	8	**LAN-secondary servers**
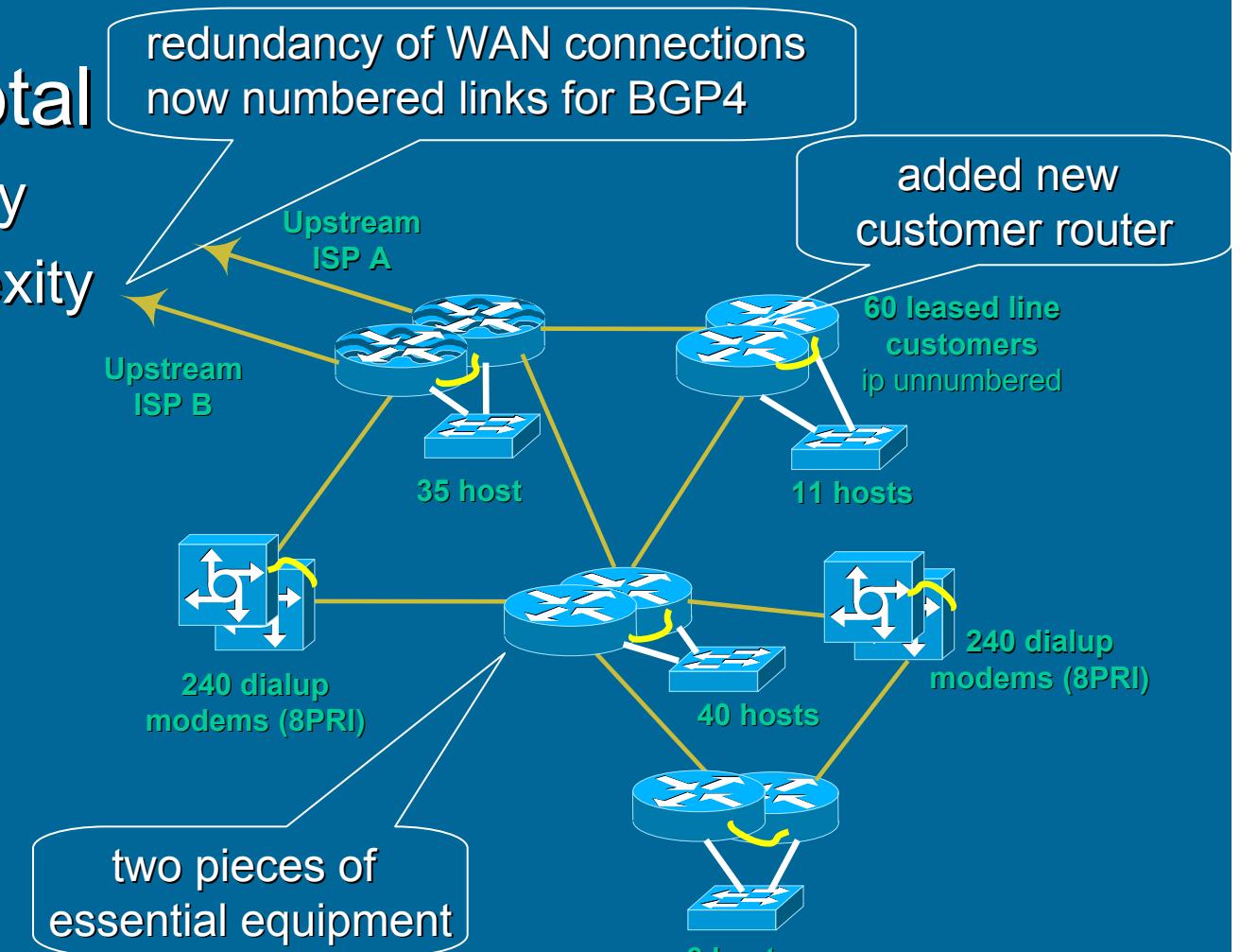
New hardware

Network Plan

- **12 months total**
  - site redundancy
  - greater complexity
  - *efficiency*

redundancy of WAN connections now numbered links for BGP4

added new customer router

Upstream ISP A

Upstream ISP B

35 host

60 leased line customers
ip unnumbered

11 hosts

240 dialup modems (8PRI)

40 hosts

240 dialup modems (8PRI)

two pieces of essential equipment

8 hosts

Addressing Plan

◆ **Network plan at 12 months**

-increases in hosts (interfaces)
-one year total

network-plan:	16/60/	**240**	8 PRI dialup modems, vendor x
network-plan:	0/60/	**240**	8 PRI dialup modems, vendor y
network-plan:	5/11/	**11**	LAN -web hosting (Name-based hosting)
network-plan:	128/512/	**1020**	60 leased line customers (pool)
network-plan:	15/25/	**40**	LAN -NOC and Ops management
network-plan:	10/16/	**35**	LAN -mail,DNS, web servers internal
network-plan:	0/8/	**8**	LAN-secondary servers
network-plan:	2/2/	**2**	router WAN ports (x 8 lines)
network-plan:	4/6	**12**	loopback router interfaces

Addressing Plan

- ## Can now determine subnet sizes

network-plan:	256	16/60/**240**	8 PRI dialup modems, vendor x
network-plan:	256	0/60/**240**	8 PRI dialup modems, vendor y
network-plan:	16	5/11/**11**	LAN -web hosting (Name-based hosting)
network-plan:	1024	128/512/**1020**	60 leased line customers (pool)
network-plan:	64	15/25/**40**	LAN -NOC and Ops management
network-plan:	64	10/16/**35**	LAN -mail,DNS, web servers internal
network-plan:	8	0/8/**8**	LAN-secondary servers
network-plan:	4	2/2/**2**	router WAN ports (x 8 lines)
network-plan:	16	4/6/**12**	loopback router interfaces

Addressing Plan

- ## Addressing plan for network-plan
  - re-ordered **large to small** according to relative subnet size
  - determination of relative subnet addresses

network-plan:	0.0.0.0	1024	128/512/1020	60 leased line customers (pool)
network-plan:	0.0.4.0	256	16/60/240	8 PRI dial up modems, vendor x
network-plan:	0.0.5.0	256	0/60/240	8 PRI dial up modems, vendor y
network-plan:	0.0.6.0	64	10/16/35	LAN -mail,DNS, web internal
network-plan:	0.0.6.64	64	15/25/40	LAN -NOC and Ops management
network-plan:	0.0.6.128	16	5/11/11	LAN -web hosting (Name-based hosting)
network-plan:	0.0.6.144	16	0/8/8	LAN -secondary servers
network-plan:	0.0.6.160	16	4/6/12	loopback router interfaces
network-plan:	0.0.6.176	4	2/2/2	router WAN ports (x8)

  - cumulative total 0.0.6.208

Addressing Plan

Addressing plan for network-plan

determination of subnet masks

network-plan:	0.0.0.0	**255.255.252.0**	1024	128/512/1020	60 leased line customers
network-plan:	0.0.4.0	**255.255.255.0**	256	16/60/240	8 PRI dial up modems, vendor x
network-plan:	0.0.5.0	**255.255.255.0**	256	0/60/240	8 PRI dial up modems, vendor y
network-plan:	0.0.6.0	**255.255.255.192**	64	10/16/35	LAN -mail,DNS, web internal
network-plan:	0.0.6.64	**255.255.255.192**	64	15/25/40	LAN -NOC & Ops management
network-plan:	0.0.6.128	**255.255.255.240**	16	5/11/11	LAN -web hosting (Name-based)
network-plan:	0.0.6.144	**255.255.255.240**	16	0/8/8	LAN -secondary servers
network-plan:	0.0.6.160	**255.255.255.240**	16	4/6/12	loopback router interfaces
network-plan:	0.0.6.176	**255.255.255.252**	4	2/2/2	router WAN ports (x 8)

Addressing Plan

- ## Addressing plan for network-plan
  - ### connect to the Internet (full-time, part-time)?

```
network-plan:  0.0.0.0     255.255.252.0    YES   1024  128/512/1020  60 leased customers
network-plan:  0.0.4.0     255.255.255.0    PART  256   16/60/240   8 PRI dial up modems..
network-plan:  0.0.5.0     255.255.255.0    PART  256   0/60/240    8 PRI dial up modems..
network-plan:  0.0.6.0     255.255.255.192  YES   64    10/16/35    LAN -mail,DNS, web internal
network-plan:  0.0.6.64    255.255.255.192  YES   64    15/25/40    LAN -NOC & Ops managemen
network-plan:  0.0.6.128   255.255.255.240  YES   16    5/11/11     LAN -web hosting (Name-based)
network-plan:  0.0.6.144   255.255.255.240  YES   16    0/8/8       LAN -secondary servers
network-plan:  0.0.6.160   255.255.255.240  YES   16    4/6/12      loopback router interfaces
network-plan:  0.0.6.176   255.255.255.252  YES   4     2/2/2       router WAN ports (x 8 )
```

Addressing Plan

◆ Addressing plan complete

- ◆ total planned for customer assignments /22
- ◆ total planned for ISP infrastructure /24 + /23

network-plan:	0.0.0.0	255.255.252.0	YES	1024	128/512/1020	60 leased line customers
network-plan:	0.0.4.0	255.255.255.0	PART	256	16/60/240	8 PRI dial up modems..
network-plan:	0.0.5.0	255.255.255.0	PART	256	0/60/240	8 PRI dial up modems..
network-plan:	0.0.6.0	255.255.255.192	YES	64	10/16/35	LAN -mail,DNS, web internal
network-plan:	0.0.6.64	255.255.255.192	YES	64	15/25/40	LAN -NOC & Ops managemen
network-plan:	0.0.6.128	255.255.255.240	YES	16	5/11/11	LAN -web hosting (Name-based)
network-plan:	0.0.6.144	255.255.255.240	YES	16	0/8/8	LAN -secondary servers
network-plan:	0.0.6.160	255.255.255.240	YES	16	4/6/12	loopback router interfaces
network-plan:	0.0.6.176	255.255.255.252	YES	4	2/2/2	router WAN ports (x 8 lines)

◆ <u>detailed</u>, <u>efficient</u> and <u>accurate</u>

Questions?