

# Welcome!

## APNIC Members Training Course

*Effective IP Address Management  
Asia Pacific Policies and Procedures*

24 February 2003, Taipei, Taiwan  
APNIC 15 Open Policy Meeting

# Introduction

- Presenters

- Miwa Fuji
  - Training Officer
- Narumon Sribudsayadee
  - Internet Resource Analyst
- Nurani Nimpuno
  - Training Development Officer
- Sunny Chendi
  - Internet Resource Analyst

<training@apnic.net>

# Assumptions & Objectives

## Assumptions

- Are current or prospective APNIC member
- Have not submitted many requests
- Are not familiar / up-to-date with policies
- Are not familiar with procedures

## Objectives

- Teach members how to request resources from APNIC
- Keep membership up-to-date with latest policies
- Liaise with members
  - ☺ Faces behind the e-mails



# Schedule

- Introduction (5)
- Policies (15)
- Whois Db Intro (38)
- TEA BREAK  
(10:30 – 11:00)**
- Addressing Plan (65)
- ISP Request form (81)
- ISP Request evaluation (110)
- LUNCH (12:30 – 13:30)**
- IP Management (123)
- 2nd Opinion Request (137)
- DB protection & updates (158)
- Reverse DNS (177)
- TEA BREAK  
(15:30 – 16:00)**
- DB admin & adv queries (201)
- ASN (218)
- IPv6 (238)
- Summary (263)



# Introduction to APNIC

Asia Pacific Network Information Centre

# What is APNIC?

- RIR for the Asia Pacific
  - Regional Internet Registry
    - Regional authority for Internet Resource distribution
    - IPv4 & IPv6 addresses, ASNs, reverse dns delegation
- Industry self-regulatory body
  - Non-profit, neutral and independent
- Open membership-based structure

# APNIC Services & Activities

## Resources Services

- IPv4, IPv6, ASN, reverse DNS
- Policy development
  - Approved and implemented by membership
- APNIC whois db
  - whois.apnic.net
  - Registration of resources

## Information dissemination

- APNIC meetings
- Web and ftp site
- Mailing lists
  - Open for anyone!
- Training Courses
  - Subsidised for members
- Co-ordination & liaison
  - With membership, other RIRs & other Internet Orgs.



# Questions ?

- Want to learn more about APNIC and the APNIC meetings?
  - *Come to the newcomers' orientation this evening at 18.00!*

# Internet Registry Allocation and Assignment

## Policies

# Overview of APNIC policies

Policies

- Definitions
- Background
- Objectives
- Environment
- Allocation & Assignment Policies
- Summary



# Allocation and Assignment

## Allocation

*“A block of address space held by an IR (or downstream ISP) for subsequent allocation or assignment”*

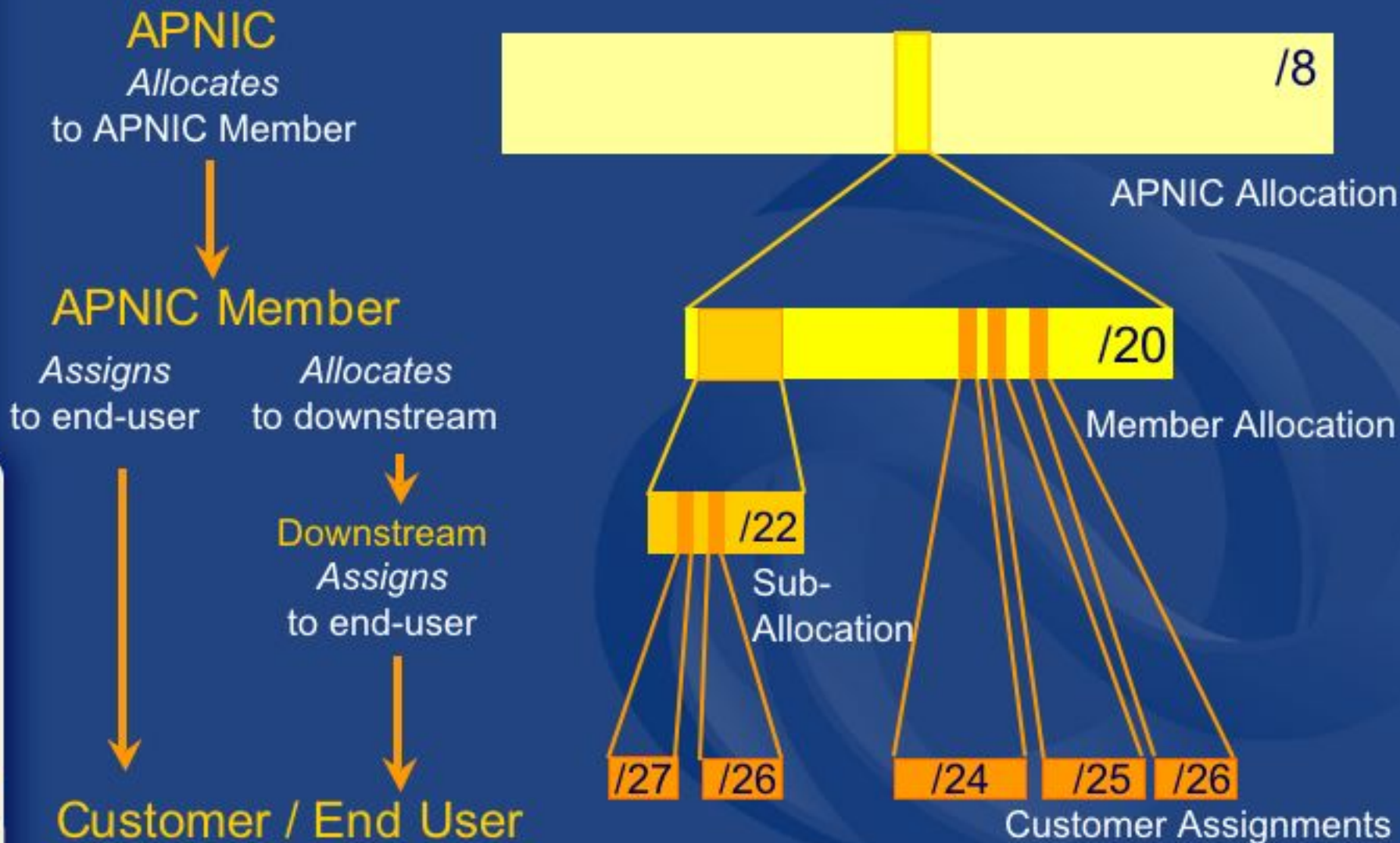
- Not yet used to address any networks

## Assignment

*“A block of address space used to address an operational network”*

- May be provided to LIR customers, or used for an LIR's infrastructure ('self-assignment')

# Allocation and Assignment





# Portable & non-portable

## Portable Assignments

- Customer addresses independent from ISP
  - Keeps addresses when changing ISP
- Bad for size of routing tables
- Bad for QOS: routes may be filtered, flap-dampened



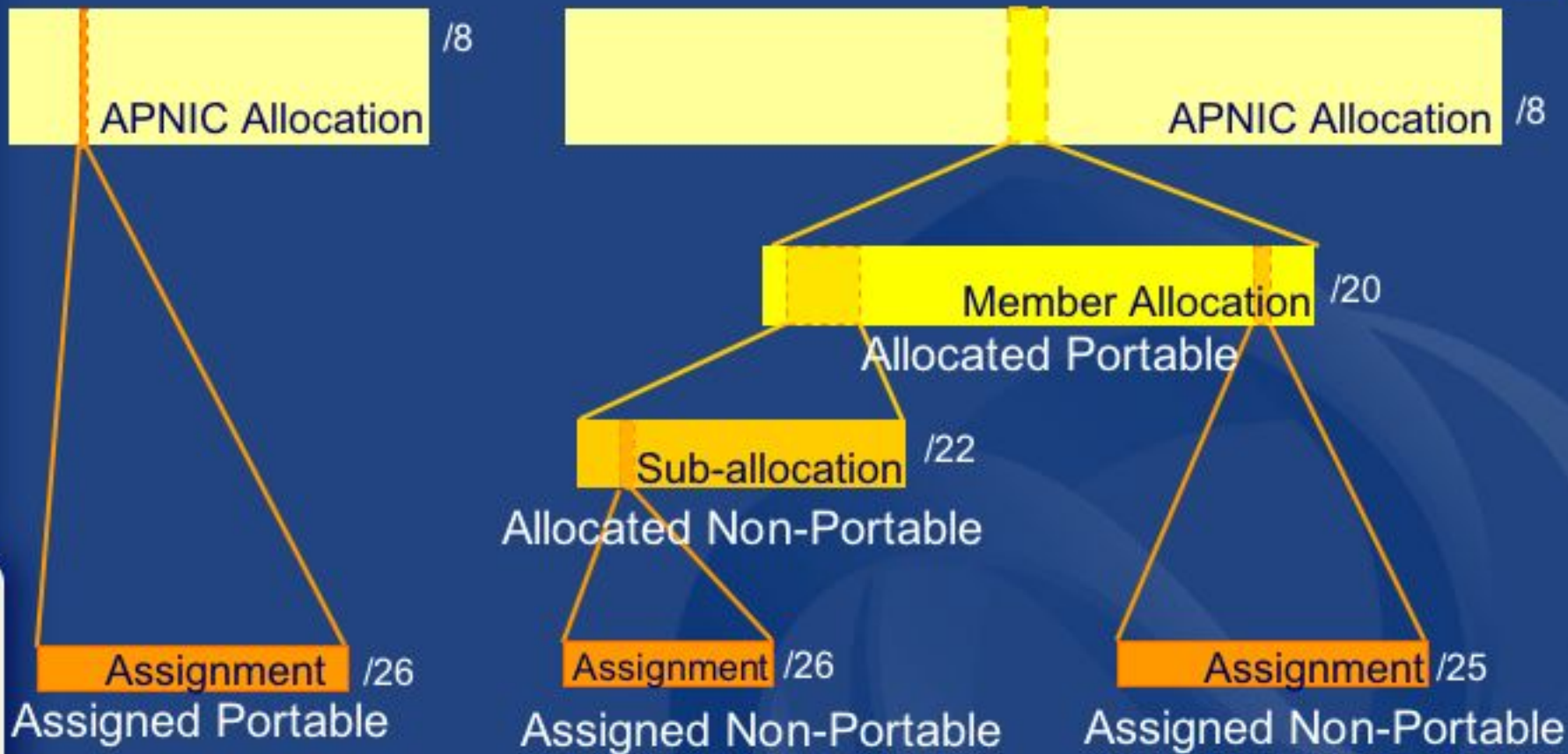
## Non-portable Assignments

- Customer uses ISP's address space
  - Must renumber if changing ISP
- Only way to effectively scale the Internet





# Allocation & assignment terms



- Terms used in 'status' field in the APNIC database
- Describes "portability" of the address space

# Classful and Classless

- **Classful** (*Obsolete*)
  - Wasteful address architecture
    - network boundaries are fixed at 8, 16 or 24 bits (class A, B, and C)
- **Classless**
  - Efficient architecture
    - network boundaries may occur at any bit (e.g. /12, /16, /19, /24 etc)
- **CIDR**
  - Classless Inter Domain Routing architecture
  - Allows *aggregation* of routes within ISPs infrastructure

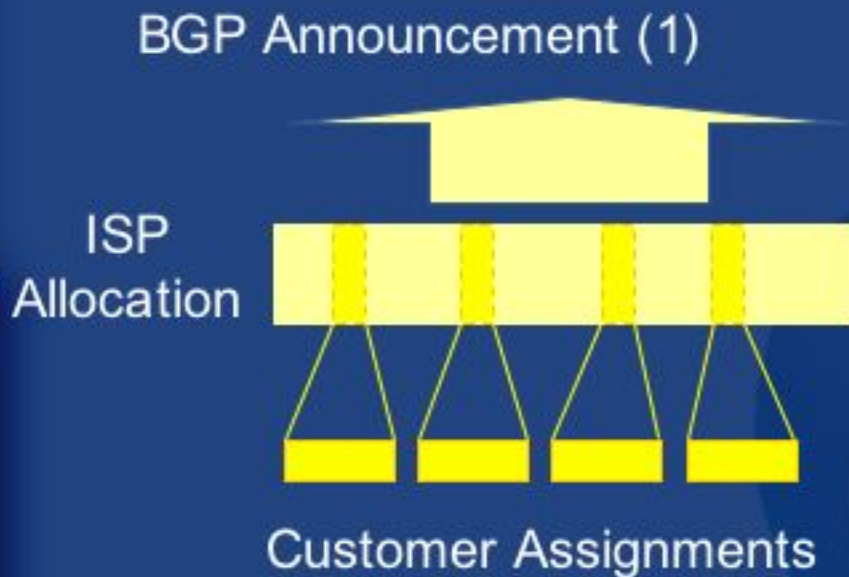
Best Current  
Practice





# Aggregation and “portability”

## Aggregation



(Non-portable Assignments)

## No Aggregation

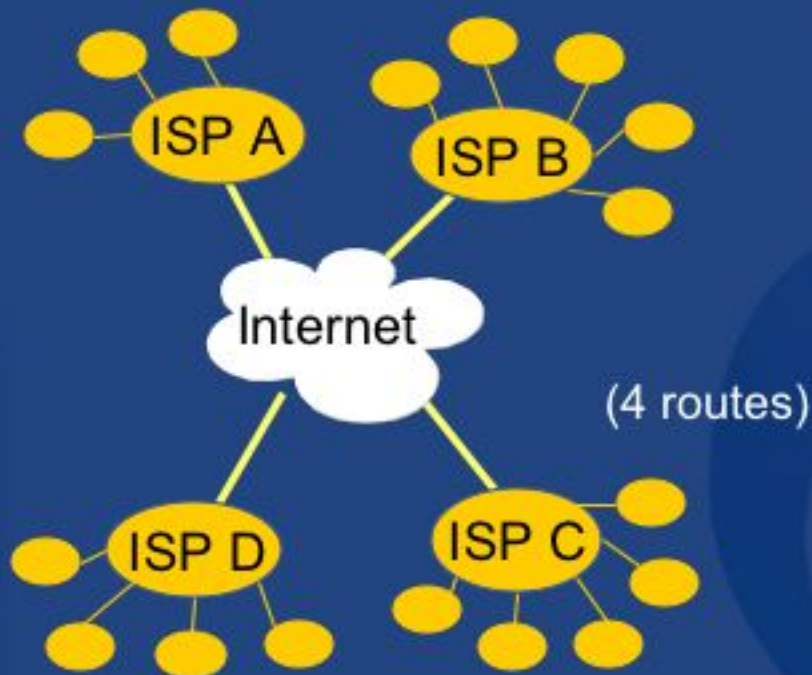


(Portable Assignments)



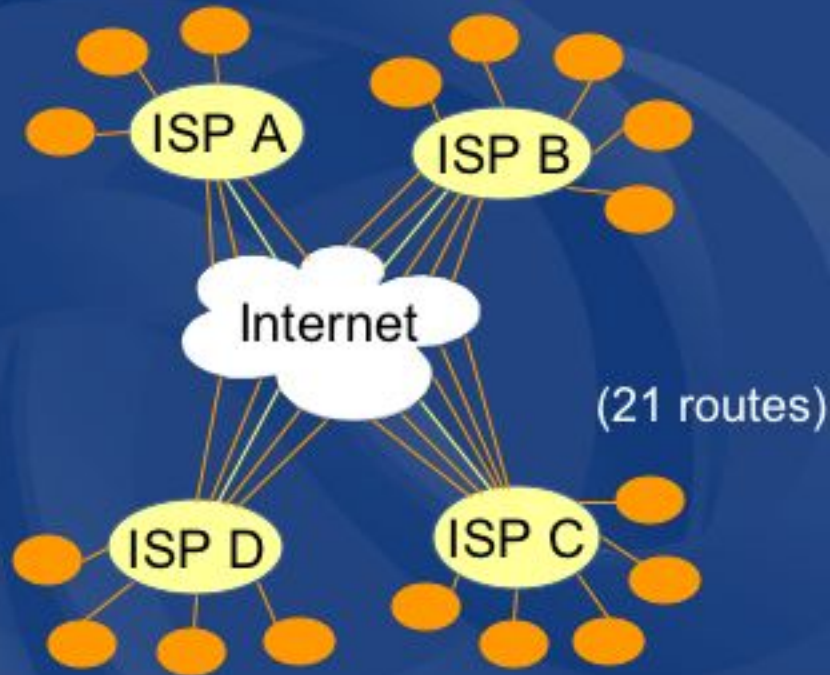
# Aggregation and “portability”

## Aggregation



(Non-portable Assignments)

## No Aggregation



(Portable Assignments)

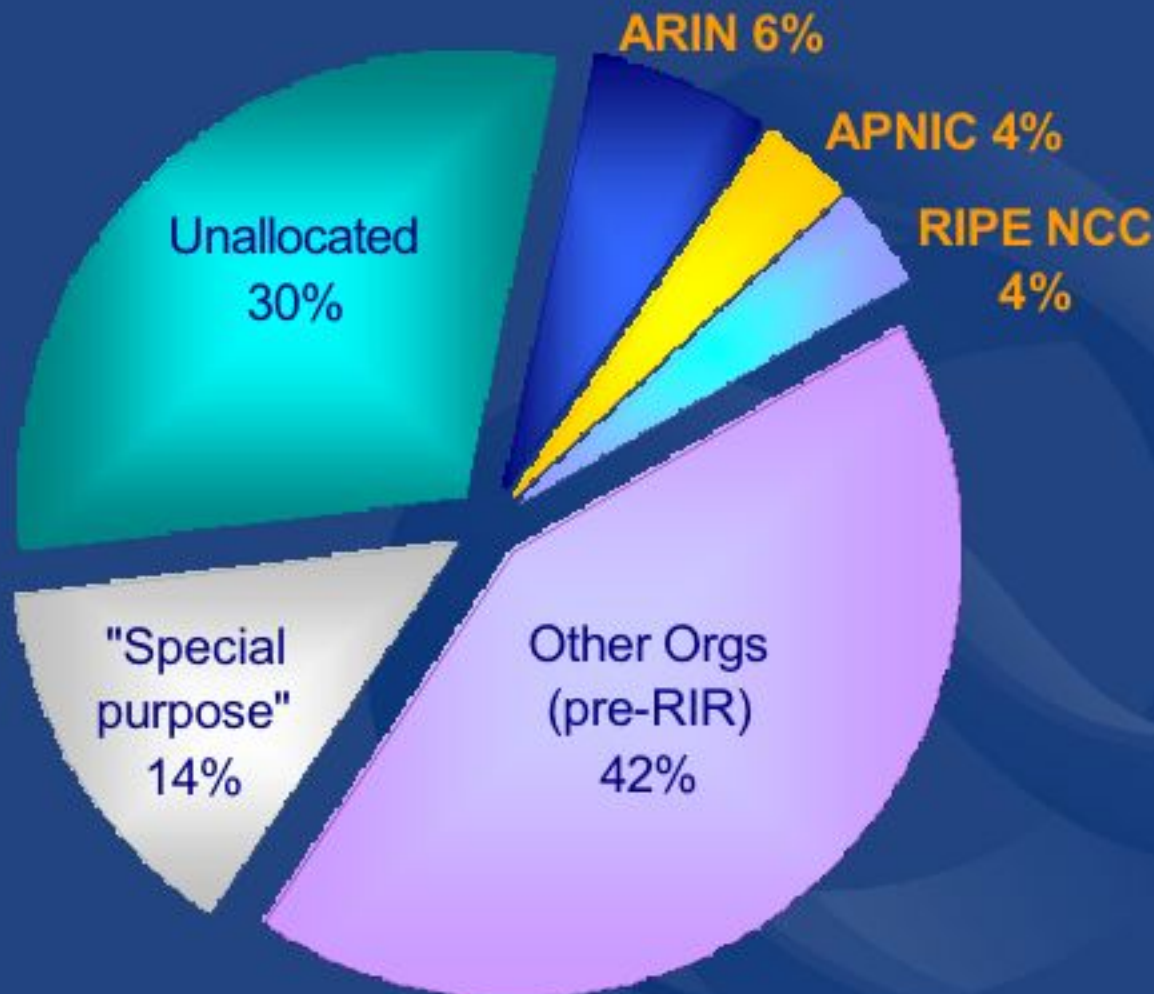
# APNIC policies - objectives

- Conservation
  - *Ensuring efficient use and conservation of resources*
- Aggregation
  - *Limiting growth of routable prefixes*
- Registration
  - *Registering the Internet resources in a public db*
- Uniqueness
  - *Global visibility*
- Fairness and consistency
  - *Equal consideration irrespective of external factors*



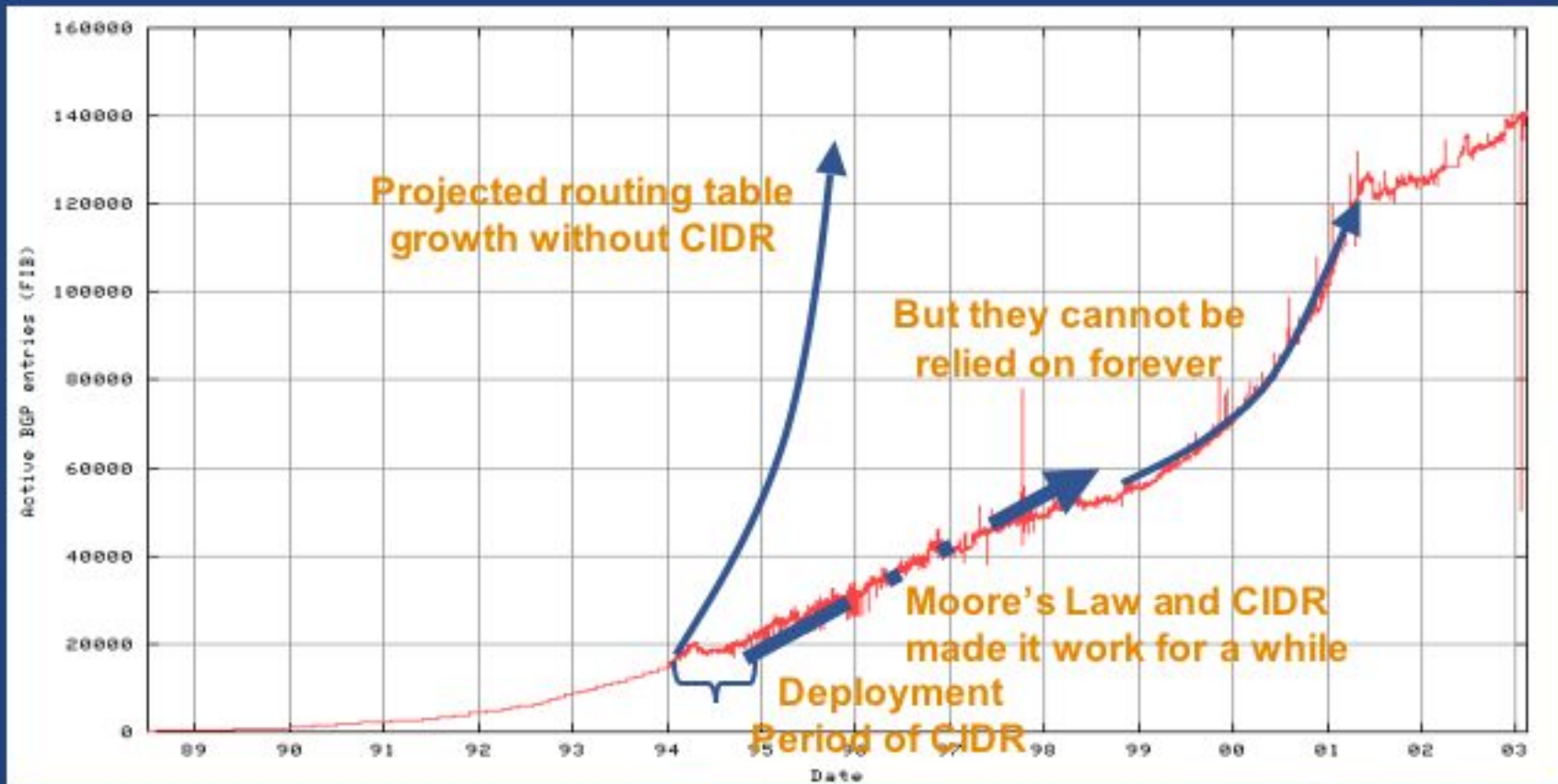
# Why do we need policies ?

## - Global IPv4 Delegations





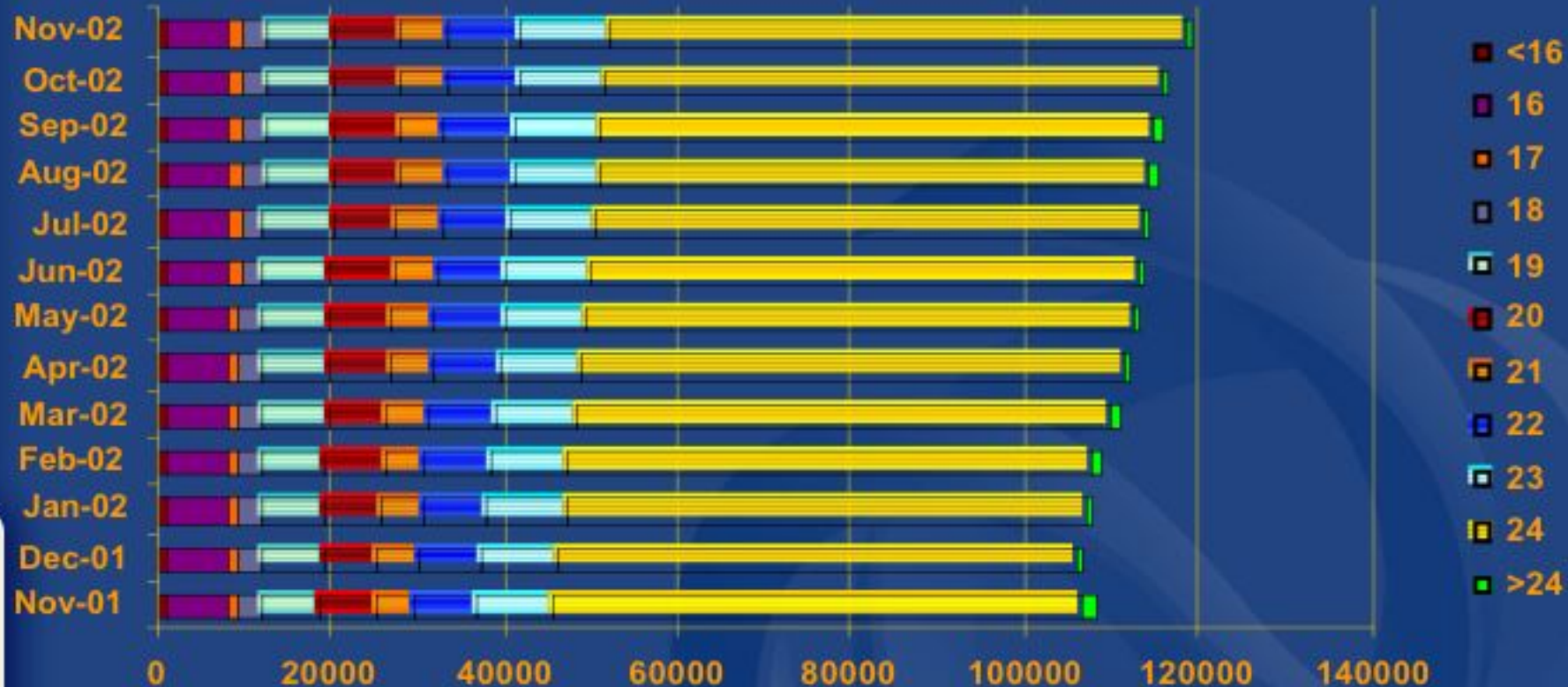
# Growth of global routing table



<http://bgp.potaroo.net/as1221/bgp-active.html>

# Routing table prefix distribution

Policies



# APNIC policy environment

## *“IP addresses not freehold property”*

- Assignments & allocations on license basis
  - Addresses *cannot* be bought or sold
  - Internet resources are public resources
  - ‘Ownership’ is contrary to management goals

## *“Confidentiality & security”*

- APNIC to observe and protect trust relationship
  - Non-disclosure agreement signed by staff



# APNIC allocation policies

- Aggregation of allocation
  - Provider responsible for aggregation
  - Customer assignments /sub-allocations must be non-portable
- Allocations based on demonstrated need
  - Detailed documentation required
    - All address space held to be declared
  - Address space to be obtained from one source
    - routing considerations may apply
  - Stockpiling not permitted

# Initial IPv4 allocation criteria

- 1a. Have used a /22 from upstream provider
  - Demonstrated efficient previous address usage
- OR
- 1b. Show immediate need for /22
  - Can include customer projections & infrastructure equipment
2. Detailed plan for use of /21 within a year
3. Renumber to new space within 1 year
  - Meet all policy requirements
    - Applicants may be required to show purchase receipts



# APNIC allocation policies

- Transfer of address space
  - Not automatically recognised
    - Return unused address space to appropriate IR
- Effects of mergers, acquisitions & take-overs
  - Will require contact with IR (APNIC)
    - contact details may change
    - new agreement may be required
  - May require re-examination of allocations
    - requirement depends on new network structure



# Address assignment policies

- Assignments based on requirements
  - Demonstrated through detailed documentation
  - Assignment should maximise utilisation
    - minimise wastage
- Classless assignments
  - showing use of VLSM
- Size of allocation
  - Sufficient for up to 12 months requirement

# Small multihoming assignment policy

1a. Applicants currently multihomed

OR

1b. Demonstrate a plan to multihome within 1 month

2. Agree to renumber out of previously assigned space

- Demonstrate need to use 25% of requested space immediately and 50% within 1 year
- Meet all policy requirements or have the assignment revoked

# IPv4 policy for IXPs

*IXPs can apply for an assignment of /24 for Transit LAN*

## Criteria

- 3 or more peers
  - Demonstrate “open peering policy”
  - Not announce assignment to global routing table
- 
- APNIC has a reserved block of space from which to make IXP assignments



# Portable assignments for critical infrastructure

- What is Critical Internet Infrastructure?
  - Domain registry infrastructure
    - Root DNS operators,
    - Generic Top Level Domain (gTLD) operators
    - Country Code Top Level Domain (ccTLD) operators
  - Address Registry Infrastructure
    - RIRs & NIRs
    - IANA
- Why a specific policy ?
  - Protect stability of core Internet function
- Assignment sizes:
  - IPv4: /24
  - IPv6: /32

New Policy  
1 Dec 2002

# Questions ?

# The APNIC Database

## Introduction and Usage



# Overview

- What is the APNIC database?
- Why use it?
- Database query
- Database updating process

# What is the APNIC database?

- Public network management database
  - Operated by IRs
- Tracks network resources
  - IP addresses, ASNs, Reverse Domains, Routing policies
- Records administrative information
  - Contact information (persons/roles)
  - Authorisation

# Object types

## OBJECT

person

role

inetnum

inet6num

aut-num

domain

route

mntner

## PURPOSE

contact persons

contact groups/roles

IPv4 addresses

IPv6 addresses

Autonomous System number

reverse domains

prefixes being announced

(maintainer) data protection

<http://www.apnic.net/db/>



# Object templates

To obtain template structure\*, use :  
`whois -t <object type>`

```
% whois -h whois.apnic.net -t person
```

```

person: [ mandatory] [ single] [ primary/look-up key]
address: [ mandatory] [ multiple] [ ]
country: [ optional] [ single] [ ]
phone: [ mandatory] [ multiple] [ ]
fax-no: [ optional] [ multiple] [ ]
e-mail: [ mandatory] [ multiple] [ look-up key]
nic-hdl: [ mandatory] [ single] [ primary/look-up key]
remarks: [ optional] [ multiple] [ ]
notify: [ optional] [ multiple] [ inverse key]
mnt-by: [ mandatory] [ multiple] [ inverse key]
changed: [ mandatory] [ multiple] [ ]
source: [ mandatory] [ single] [ ]

```

\*Recognised by the RIPE whois client/server



# Person object example

- Person objects contain contact information

Attributes

Values

<b>person:</b>	Ky Xander
address:	ExampleNet Service Provider
address:	2 Pandora St Boxville
address:	Wallis and Futuna Islands
country:	WF
phone:	+680-368-0844
fax-no:	+680-367-1797
e-mail:	kxander@example.com
nic-hdl:	KX17-AP
mnt-by:	MAINT-WF-EX
changed:	kxander@example.com 20020731
source:	APNIC



# What is a nic-hdl?

- Unique identifier for a person
- Represents a person object
  - Referenced in objects for contact details
    - (inetnum, aut-num, domain...)
  - format: <XXXX-AP>
    - Eg: KX17-AP



```
person: Ky Xander
address: ExampleNet Service Provider
address: 2 Pandora St Boxville
address: Wallis and Futuna Islands
country: WF
phone: +680-368-0844
fax-no: +680-367-1797
e-mail: kxander@example.com
nic-hdl: KX17-AP
mnt-by: MAINT-WF-EX
changed: kxander@example.com 20020731
source: APNIC
```



# Inetnum object example

- Contain IP address allocations / assignments

## Attributes

## Values

<b>inetnum:</b>	202.51.64.0 - 202.51.95.255
netname:	CCNEP-NP-AP
descr:	Communication & Communicate Nepal Ltd
descr:	VSAT Service Provider, Kathmandu
country:	NP
admin-c:	AS75-AP
tech-c:	AS75-AP
mnt-by:	APNIC-HM
mnt-lower:	MAINT-NP-ARUN
changed:	hostmaster@apnic.net 20010205
source:	APNIC

# Inter-related objects

mntner:  
**MAINT-WF-EX**  
...  
...

*Data protection*

inetnum:  
202.64.10.0 – 202.64.10.255  
...  
admin-c: **KX17-AP**  
tech-c: **ZU3-AP**  
...  
mnt-by: **MAINT-WF-EX**  
...

*IPv4 addresses*

person:  
...  
nic-hdl: **KX17-AP**  
...

*Contact info*

person:  
...  
nic-hdl: **ZU3-AP**  
...

*Contact info*

# Admin-c and tech-c

- Responsibility – ‘admin’ contacts
  - Legal authority
  - Technical management
  - Network planning, backbone design
  - Deployment, capacity, and upgrade planning
- Expertise - ‘tech’ contacts
  - Routing, aggregation, BGP, etc
  - Addressing, subnetting, CIDR, etc



# Database query - architecture

## Server

whois.apnic.net

whois.ripe.net

whois.arin.net

WHOIS



Queries & responses

## Client

Unix Client

'X' Client

Windows Client

HTTP/CGI

Command Prompt / Web Interface



# Database query - clients

- Standard whois client
  - Included with many Unix distributions
  - RIPE extended whois client
    - <http://ftp.apnic.net/apnic/dbase/tools/ripe-dbase-client.tar.gz>
- Query via the APNIC website
  - <http://www.apnic.net/apnic-bin/whois2.pl>
- Query clients - MS-Windows etc
  - Many available

# Why use the database?

- Register use of Internet Resources
  - IP assignments, reverse DNS, etc
  - Ascertain custodianship of a resource
  - Fulfill responsibilities as resource holder
- Obtain details of technical contacts for a network
  - Investigate security incidents
  - Track source of network abuse or “spam” email



# Basic database queries

- Unix
  - `whois -h whois.apnic.net <lookup key>`
- Web interface
  - <http://www.apnic.net/apnic-bin/whois2.pl>
- Look-up keys
  - usually the object name
  - Check template for look-up keys



# Database query – look-up keys

## OBJECT TYPE

## ATTRIBUTES – LOOK-UP KEYS

```
person  
role  
mntner  
inetnum  
domain  
aut-num  
as-macro  
route  
inet6num
```

```
name, nic-hdl, e-mail  
name, nic-hdl, e-mail  
maintainer name  
network number, name  
domain name  
as number  
as-macro name  
route value  
network number, name
```

whois supports queries on any of these objects/keys

# Database query - UNIX

```
% whois zulrich@example.com
```

```
% whois zu3-ap
```

```
% whois "zane ulrich"
```

```
person:      Zane Ulrich
address:     ExampleNet Service Provider
address:     2 Pandora St Boxville
address:     Wallis and Futuna Islands
country:     WF
phone:       +680-368-0844
fax-no:      +680-367-1797
e-mail:      zulrich@example.com
nic-hdl:     ZU3-AP
mnt-by:      MAINT-WF-EX
changed:     zulrich@example.com 20020731
source:      APNIC
```



# Database query - web

<http://www.apnic.net/apnic-bin/whois2.pl>

1. Type in search key

## Search the APNIC Whois database

3. 'Search Whois'

2. Search options (flags)

Search for:

### Advanced Whois search options

- Type of object:
- Source database:
- Inverse lookup:

### Brief descriptions below

- Fast raw output
- No recursive lookup
- No 'syntactic sugar'
- APNIC objects only

### Level of specificity:

- Less specific
- 1st level more specific
- All more specific

[\[About the database\]](#)

### Common whois options

Option	Brief description
-F	Gives a faster result, but with attributes in short form.
-i	Provides reverse/inverse lookups of objects associated with the specified attribute.
-L	Finds all less specific matches.
-m	Finds first level more specific matches.

# Database query - inetnum

```
% whois 203.127.128.0 - 203.127.159.255  
% whois 203.127.128.0/19  
% whois SINGNET-SG
```

```
inetnum:      203.127.128.0 - 203.127.159.255  
netname:      SINGNET-SG  
descr:        Singapore Telecommunications Ltd  
descr:        31, Exeter Road, #02-00, Podium Block  
descr:        Comcentre, 0923  
country:      SG  
admin-c:      CWL3-AP  
tech-c:       CWL3-AP  
mnt-by:       APNIC-HM  
changed:      hostmaster@apnic.net 19990803  
source:       APNIC
```

## Notes

- Incomplete addresses padded with ".0"
- Address without prefix interpreted as "/32"



# Creating a person object

## Whois Database Guide:

[http://www.apnic.net/services/whois\\_guide.html](http://www.apnic.net/services/whois_guide.html)

### 1. Fill out person object form on web

- Name, e-mail, phone, address etc
- Tick 'MNT-NEW' for temporary protection




### 2. Completed template is sent to you

### 3. Forward template to `<auto-dbm@apnic.net>`

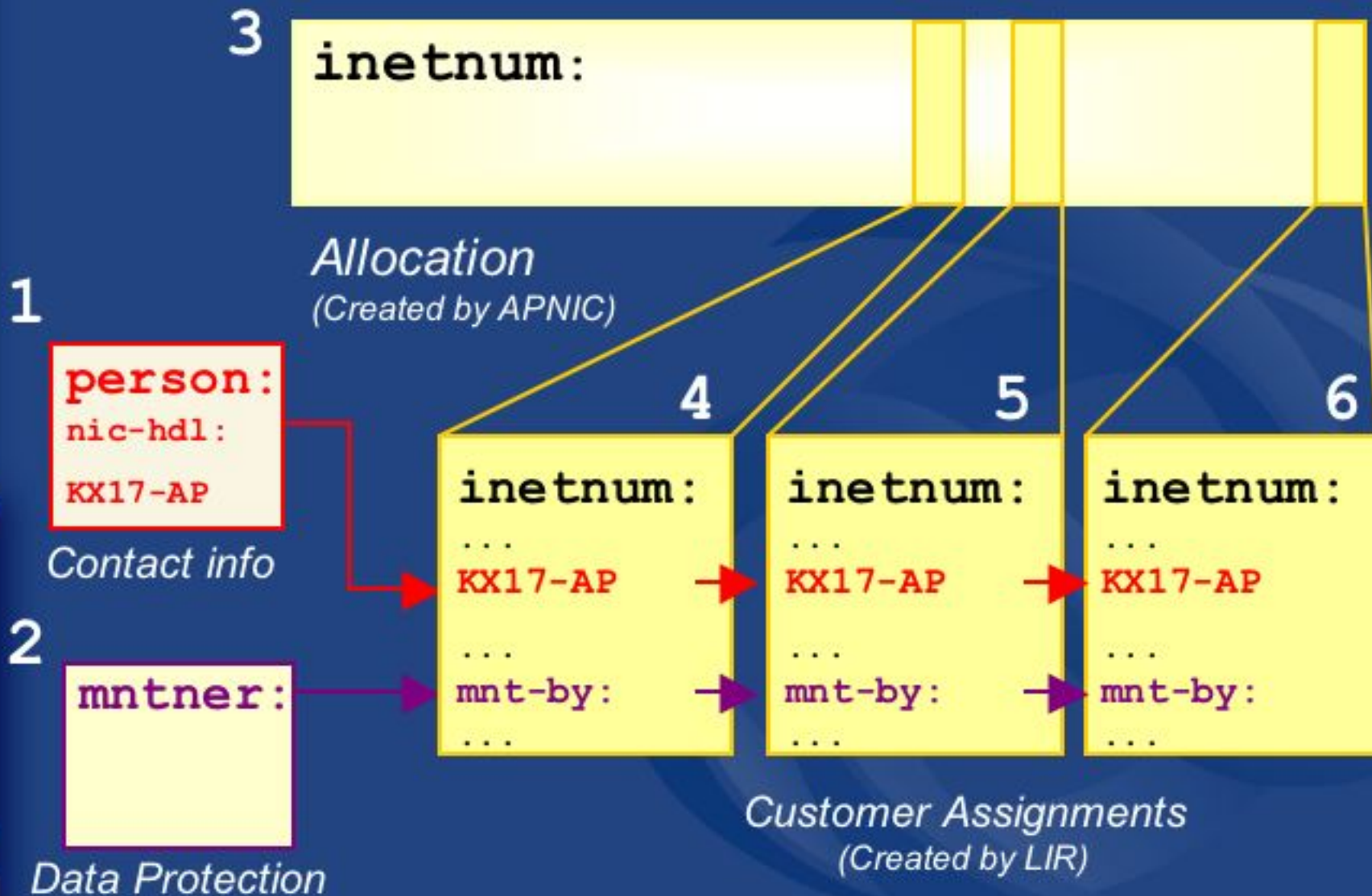
### 4. Person object created and nic-hdl is generated



# LIR registration – reminder!

1. Create person objects for contacts
  - To provide contact info in other objects
2. Create mntner object
  - To provide protection of objects 
    - (To be discussed later)
3. *Create inetnum objects for all customer address assignments and sub-allocations*
  - (Allocation object created by APNIC)

# Using the db – step by step





# Database auto-responses

- Successful update
  - Objects accepted
- Warnings
  - Objects accepted but ambiguous
  - Objects corrected and accepted
- Errors
  - Objects NOT accepted

*Don't understand the error message?*

- Contact the APNIC helpdesk!
  - Include the error message





# Database mailboxes

- Automatic request processing



`<auto-dbm@apnic.net>`

- Automatic “robot” for all db updates
- Email template for create/update/delete

- Database service support



`<helpdesk@apnic.net>`

- E-mails answered by APNIC staff
- 1 day response time

# Summary

- Use the APNIC whois database
  - To register information
  - To search information
- Create a person object
- Register all your assignments!
  - Fulfill your responsibility as a resource holder

`<auto-dbm@apnic.net>`

*- for all updates!*

# Questions ?

- Want to learn more about advanced queries?
  - *Come to the IRR tutorial tomorrow!*



# Internet Registry Procedures

## Addressing Plan

# Addressing plan

- To complete documentation
  - First need a technical PLAN
    - 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)

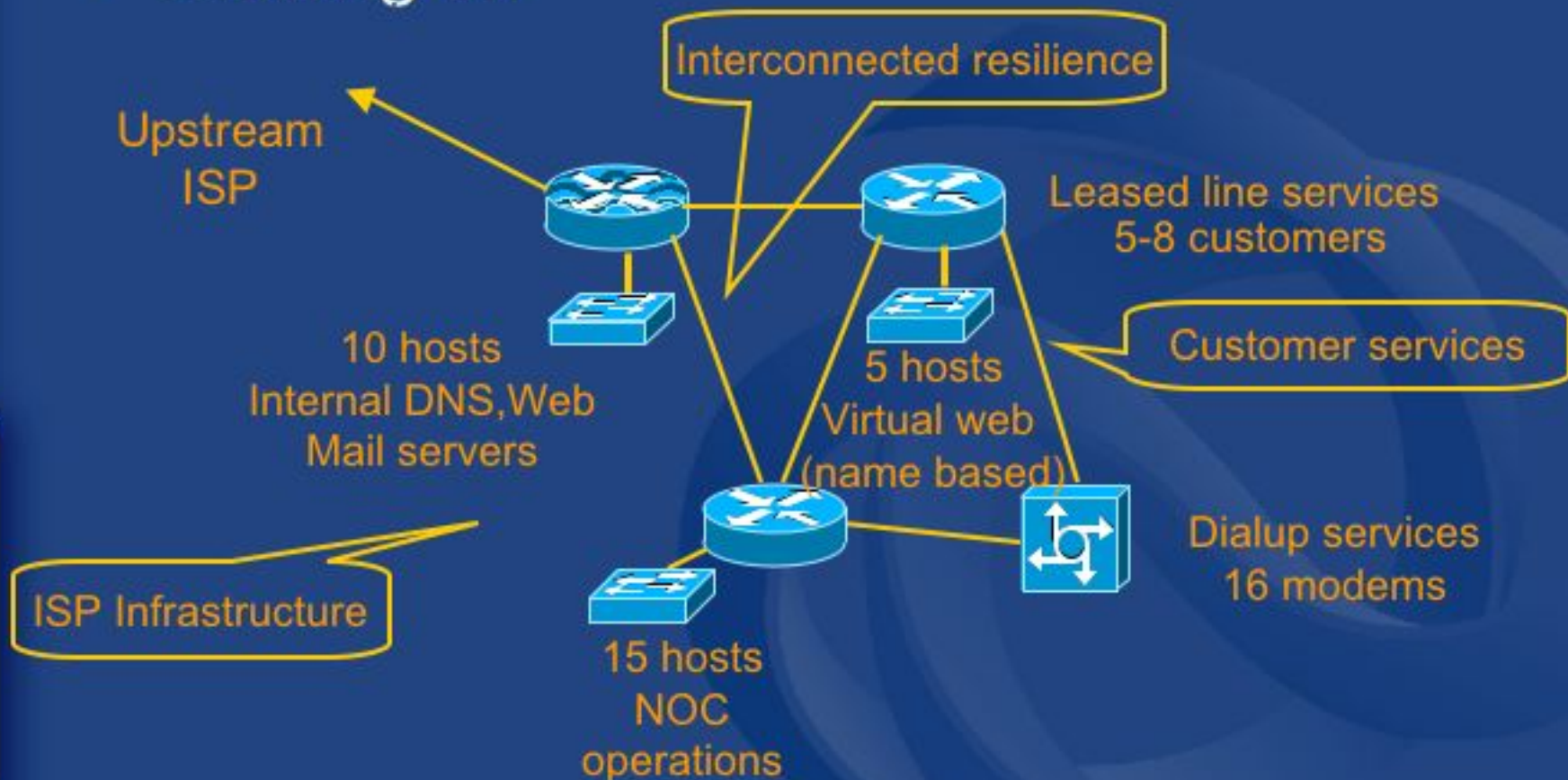


# Addressing plan

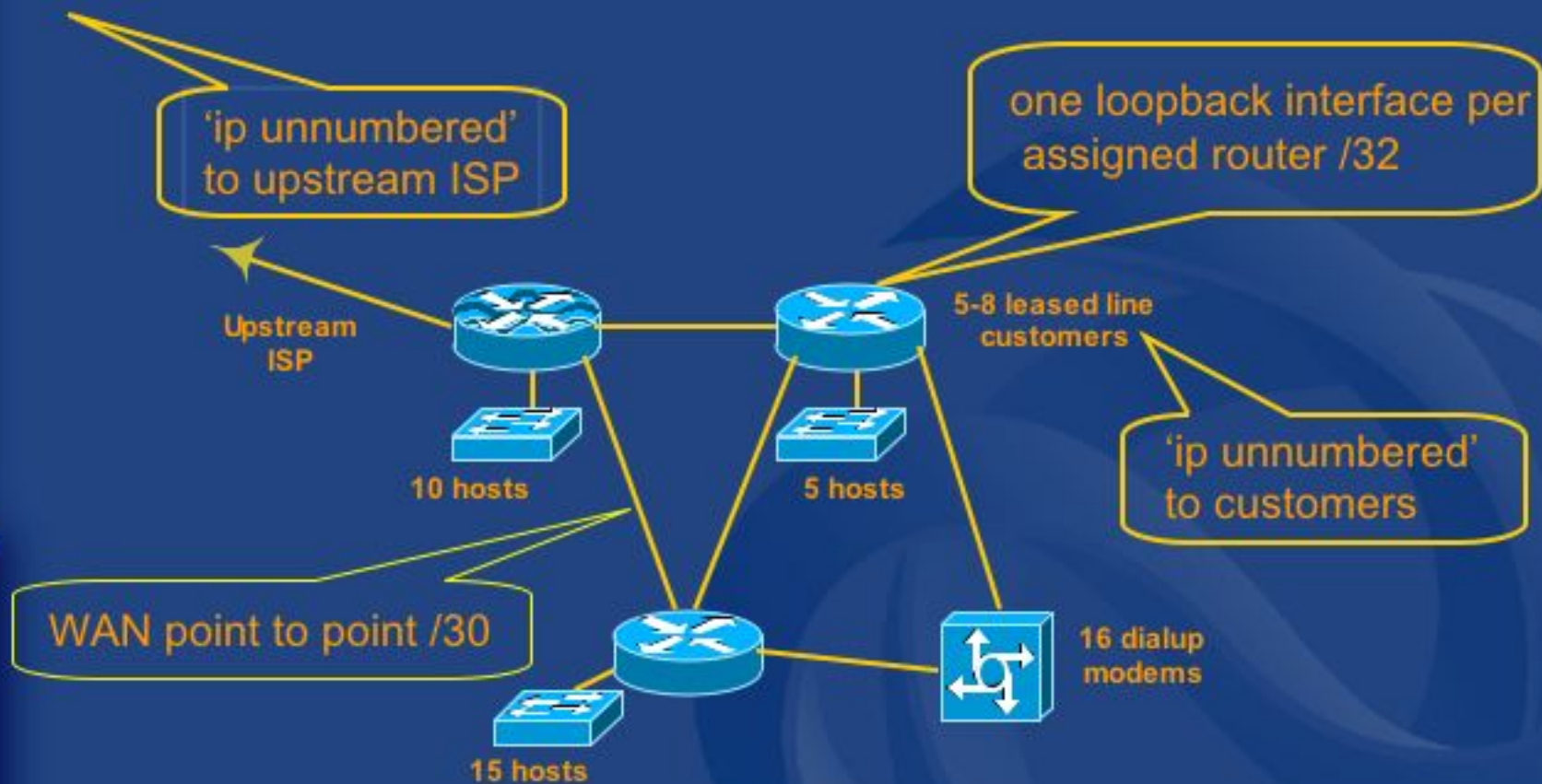
- Identify components of network
  - Customer services
  - ISP internal infrastructure
- Identify phases of deployment
  - Starting off, 6 months, 12 months
- Identify equipment and topology changes
  - Need for redundancy
  - Need for increased scale

# Network plan

- Starting off



# Network plan





# Addressing plan

- Initial addressing plan

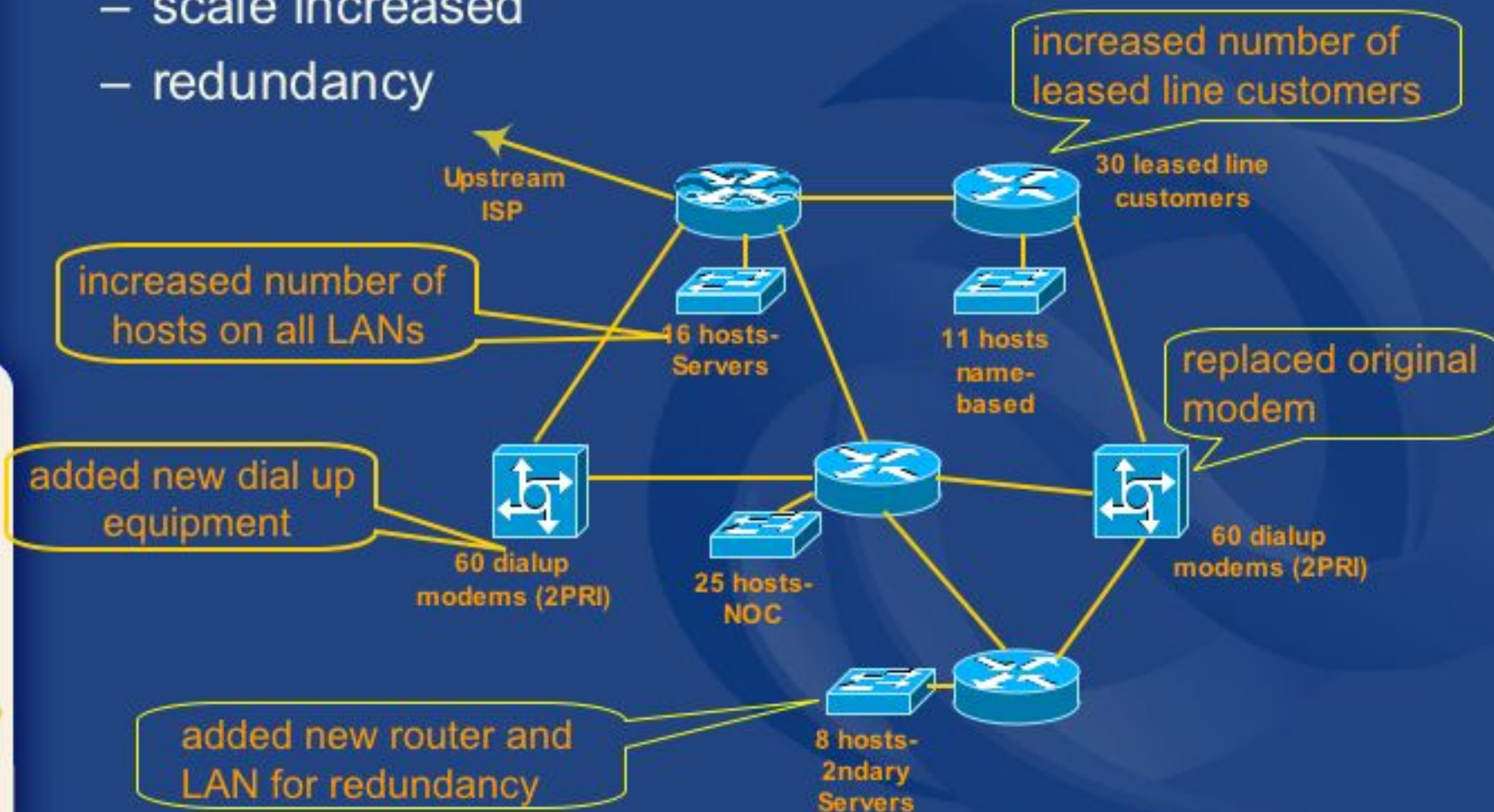
- numbers of host addresses (interfaces)



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

# Network plan – 6 months

- 6 months later
  - scale increased
  - redundancy





# Addressing Plan – 6 months

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

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

Changed description

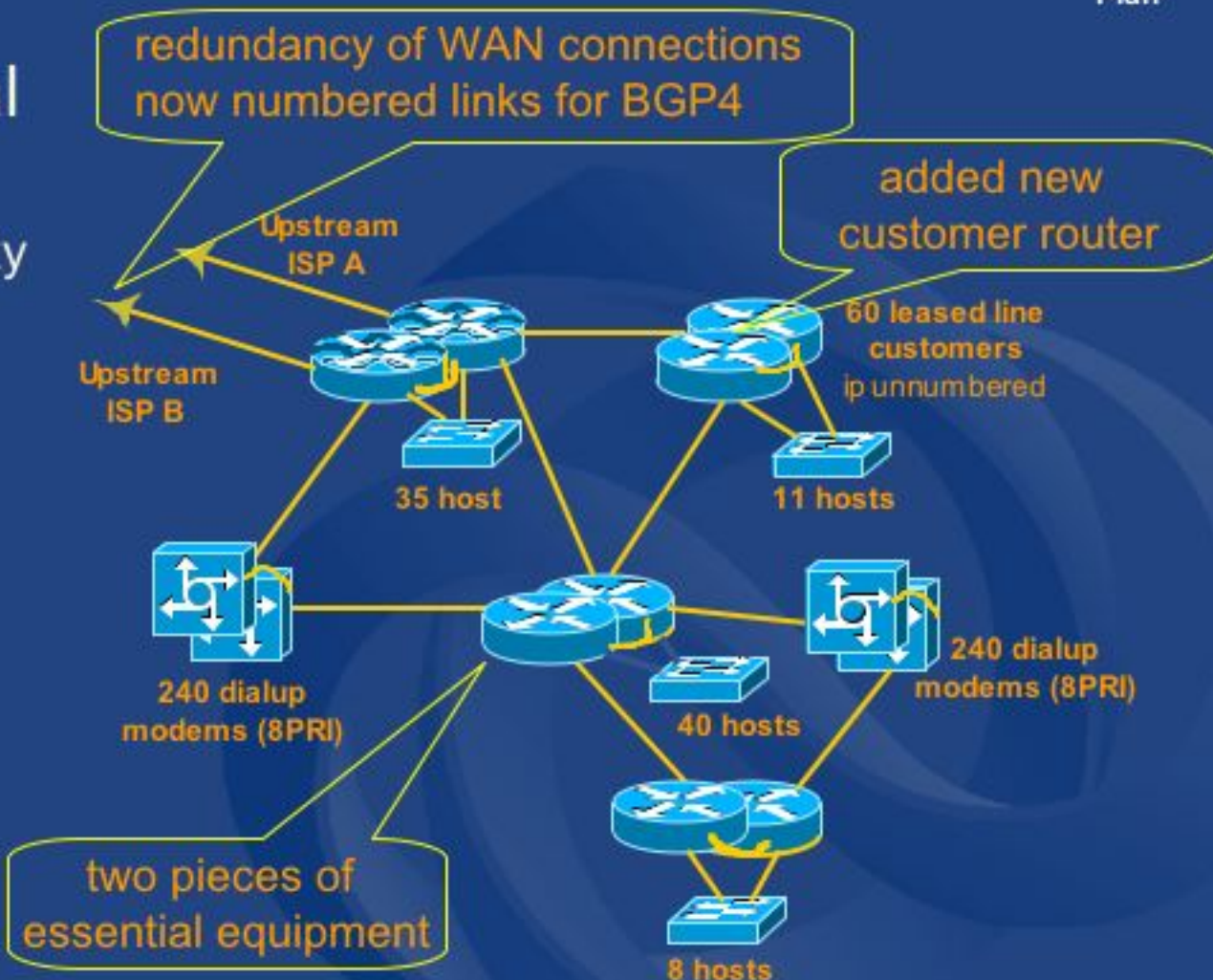
New hardware



# Network Plan – 12 months

12 months total

- site redundancy
- greater complexity
- *efficiency*



# Addressing Plan – 12 months

- Network plan at 12 months

-increases in hosts (interfaces)  
-one year total

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





# Addressing Plan

- Can now determine subnet sizes

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

– cumulative total 0.0.6.208

# 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	<b>YES</b>	1024	128/512/1020	60 leased customers
network-plan:	0.0.4.0	255.255.255.0	<b>PART</b>	256	16/60/240	8 PRI dial up modems..
network-plan:	0.0.5.0	255.255.255.0	<b>PART</b>	256	0/60/240	8 PRI dial up modems..
network-plan:	0.0.6.0	255.255.255.192	<b>YES</b>	64	10/16/35	LAN -mail,DNS, web internal
network-plan:	0.0.6.64	255.255.255.192	<b>YES</b>	64	15/25/40	LAN -NOC & Ops mgmt
network-plan:	0.0.6.128	255.255.255.240	<b>YES</b>	16	5/11/11	LAN -web hosting (Name-based)
network-plan:	0.0.6.144	255.255.255.240	<b>YES</b>	16	0/8/8	LAN -secondary servers
network-plan:	0.0.6.160	255.255.255.240	<b>YES</b>	16	4/6/12	loopback router interfaces
network-plan:	0.0.6.176	255.255.255.252	<b>YES</b>	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	128/512/1024	60 leased line customers 8 PRI dial up modems.. 8 PRI dial up modems.. LAN -mail,DNS, web internal LAN -NOC & Ops mgmnt LAN -web hosting (Name-based) LAN -secondary servers loopback router interfaces router WAN ports (x8 lines )
network-plan:	0.0.4.0	255.255.255.0	PART	256	16/60/240	
network-plan:	0.0.5.0	255.255.255.0	PART	256	0/60/240	
network-plan:	0.0.6.0	255.255.255.192	YES	64	10/16/35	
network-plan:	0.0.6.64	255.255.255.192	YES	64	15/25/40	
network-plan:	0.0.6.128	255.255.255.240	YES	16	5/11/11	
network-plan:	0.0.6.144	255.255.255.240	YES	16	0/8/8	
network-plan:	0.0.6.160	255.255.255.240	YES	16	4/6/12	
network-plan:	0.0.6.176	255.255.255.252	YES	4	2/2/2	

## – detailed, efficient and accurate



# Questions ?

# Internet Registry Procedures

## ISP Request

# ISP address request

- Hostmaster Administrivia
  - <hostmaster@apnic.net> mailbox filtered
    - Requires member account name
      - Subject: IP Address Request [CONNECT-AU]
- Ticketing system
  - Every request is assigned a ticket
    - Please keep # in subject line of email eg.
      - [APNIC #14122] [CHINANET-CN]
- New staff at ISP
  - Require an 'introduction' to APNIC
    - To ensure confidentiality

members  
only



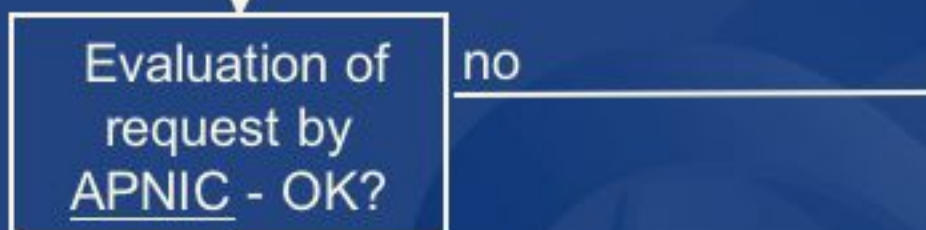
# ISP address request

## Life Cycle

Step 1



Step 2



Step 3



# ISP address request

## - overview

- Contact Details
- Network Information
- Existing Customer Network Information
- Existing Infrastructure Network Information
- Future Network Plan
- Additional Information

# ISP address request

APNIC - ISP Address Request - 1 - Microsoft Internet Explorer

Address: <http://www.apnic.net/services/ipv4/>

APNIC - ISP Address Request

APNIC – ISP Address Request

Applicant information

APNIC will use these contact details for all correspondence relating to this request. Please enter the APNIC account name of the organisation that requires the address space.

You must be [registered with APNIC](#) as a contact person for this organisation.

Your name:  Name

Your email address:  E-mail address

APNIC account name:  APNIC Account name  
Example: SPARKYNET-ID

Create password for this request (8 characters):  Password

Confirm password:

[ [Help](#) ] | [ [Error messages](#) ] | [ [Text Only Version](#) ]

1. applicant 2. contact 3. network 4. connect 5. config 6. customer 7. infra 8. plan 9. comments 10. c

Must be current member to receive service



# ISP address request instructions

- Complete the documentation
  - ISP Address Request Form
    - Web Form:
      - <http://www.apnic.net/services/ipv4/>
    - Plain text
      - <http://ftp.apnic.net/apnic/docs/isp-address-request>
- The more detailed and precise
  - Fewer iterations with APNIC
    - Quicker resolution time
- *Read the quick tips!*  
<http://www.apnic.net/faq/isp-request-tips.html>



# Contact details

APNIC - ISP Address Request - 2 - Microsoft Internet Explorer

Address: http://www.apnic.net/apnic-bin/isp-request-form.pl

## APNIC – ISP Address Request

### Contact details

The details you enter here will be used as the network contact and security information for the address allocation.

**Administrative contacts (NIC handles):**  
Example: KK9-AP

JB46-AP

**Technical contacts (NIC handles):**  
Example: XA7-AP

JB46-AP

**Maintainer object:**  
Example: MAINT-SPANIC-AP

MAINT-AU-JEFFBRIGHT

Save Cancel Previous Next

[ Help ] | [ Error messages ] | [ Text Only Version ]

1. applicant 2. contact 3. network 4. connect 5. config 6. customer 7. infra 8. plan 9. comments 10. confirm

Need to create person objects

Need to create mntner objects

Admin contact

Tech contact

help file!

Administrative & Technical contacts, Maintainer



# Network name

APNIC - ISP Address Request - 3 - Microsoft Internet Explorer

Address: http://www.apnic.net/apnic-bin/isp-request-form.pl

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## APNIC – ISP Address Request

### Network name

The details you provide here will be used to identify the proposed network in the APNIC Whois database.

**Name of network:**  ← **Name of network**

**Description of organisation:**  ← **Description of Organisation**

**Country:**   ← **Country**

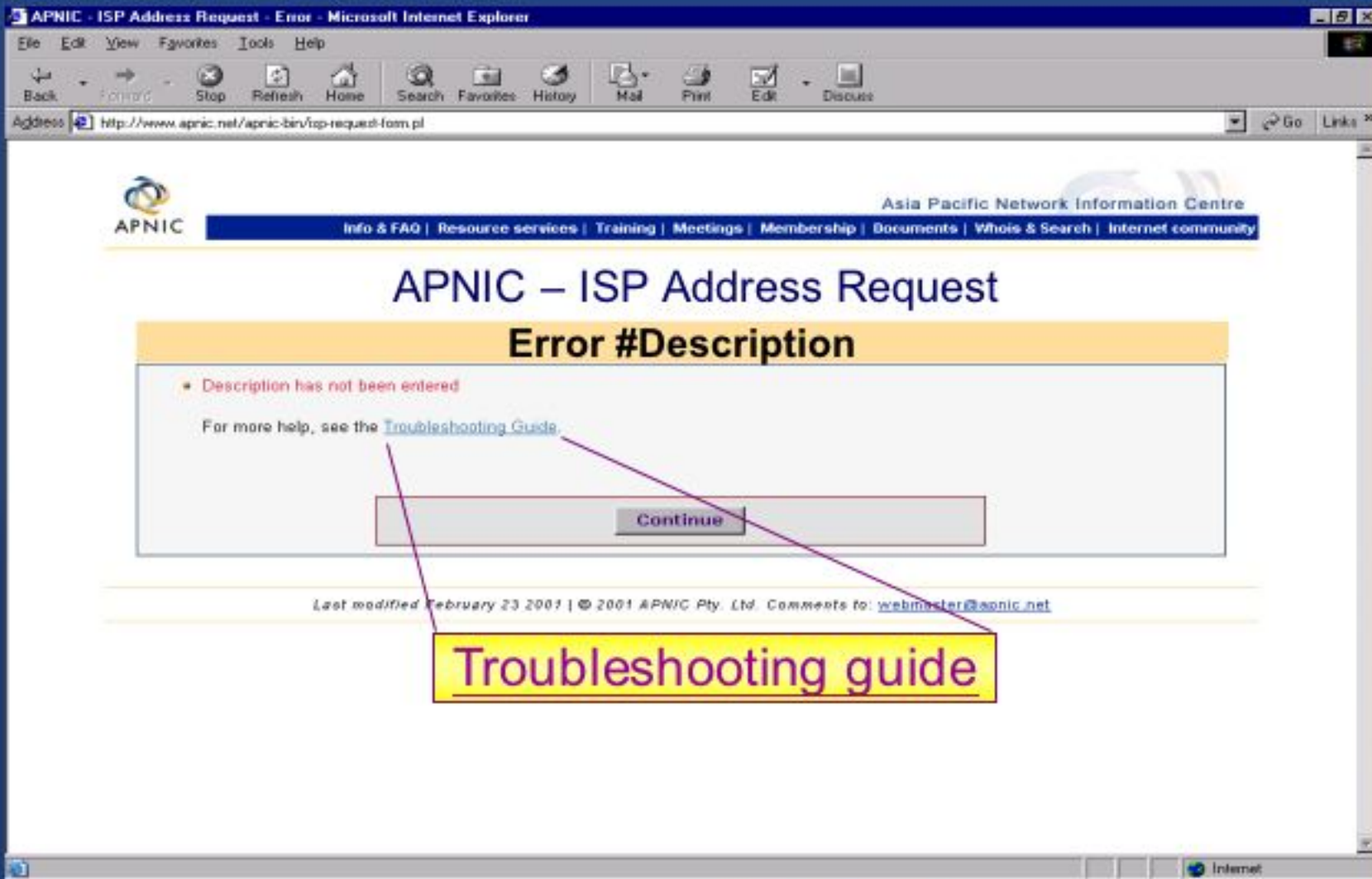
[| Help](#) | [| Error messages](#) | [| Text Only Version](#)

1. applicant | 1.1 initial criteria | **2. contact** | 3. network | 4. connect | 5. config | 6. customer | 7. infra | 8. cable | 9. future | 10. comments | 11. confirm

Description of organisation not entered...



# Error description



APNIC - ISP Address Request - Error - Microsoft Internet Explorer

Address <http://www.apnic.net/apnic-biv/top-request-form.pl>

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## APNIC – ISP Address Request

### Error #Description

- Description has not been entered

For more help, see the [Troubleshooting Guide](#).

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**Troubleshooting guide**

Error: "Description has not been entered"

# Troubleshooting guide

APNIC - 065 ISP IP Address Request Form : Troubleshooting guide - Microsoft Internet Explorer

Address <http://www.apnic.net/info/faq/troubleshooting.html>

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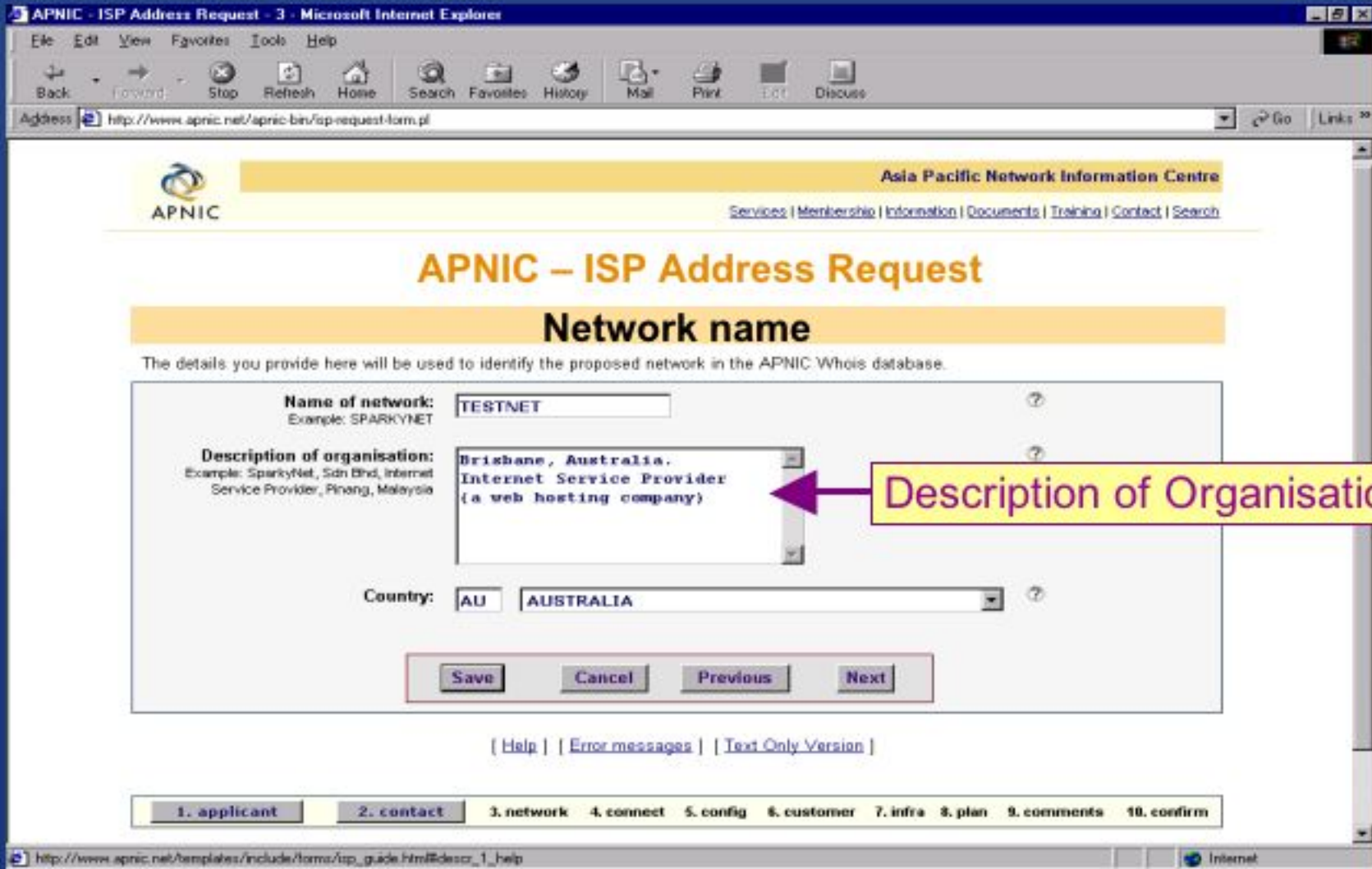
You're here: [Home](#) - [Info & FAQ](#) - [APNIC FAQs](#)

Quick Links

## Troubleshooting guide for the APNIC IPv4 ISP Request Form

Error Message	How to fix the error
Overlaps found within whois cust-networks	Overlaps were found within entries in the APNIC Whois Database inetnum objects that you registered. You need to fix either the whois entry or the <b>cust-network</b> line.
Error parsing address and netmask	The IP address or subnet mask you have provided is not in the correct format. You need to fix the incorrect IP address field or the incorrect subnet mask field. <a href="#">[more]</a>
Overlaps found within cust-networks	Overlaps were found within the two <b>cust-networks</b> mentioned in the error message. You need to fix the incorrect line.
Overlaps found within infrastructure	Overlaps found within the two <b>infrastructure</b> lines mentioned in the error message. You need to fix the incorrect line.
Overlaps founds within cust-network and infrastructure	Overlaps found between a <b>cust-network</b> line and an infrastructure line provided. You need to fix the incorrect line.
Could not find inetnum object in whois database	<b>Cust-network</b> line provided has not been updated into the APNIC Database. You need to update the database entry for that customer assignment.
More than one inetnum object found in whois database	Overlaps found within whois entries within the database. You need to fix the database entries.
Problem retrieving inetnum object in whois database	System error accessing the APNIC Whois Database. Please try again later or contact APNIC staff if you experience this error message.
Netname mismatches against	<b>Cust-network</b> netname provided is not the same as the netname registered in the

# Description of organisation



APNIC - ISP Address Request - 3 - Microsoft Internet Explorer

Address <http://www.apnic.net/apnic-bin/isp-request-form.pl>

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## APNIC - ISP Address Request

### Network name

The details you provide here will be used to identify the proposed network in the APNIC Whois database.

Name of network:  ?

Description of organisation:  ?

Country:   ?

[ [Help](#) ] | [ [Error messages](#) ] | [ [Text Only Version](#) ]

1. applicant 2. contact 3. network 4. connect 5. config 6. customer 7. infra 8. plan 9. comments 10. confirm

[http://www.apnic.net/templates/include/forms/isp\\_guide.html#descr\\_1\\_help](http://www.apnic.net/templates/include/forms/isp_guide.html#descr_1_help) Internet

Description of Organisation

Name of network, Description of Org., Country



# Internet connectivity

APNIC - ISP Address Request - 4 - Microsoft Internet Explorer

Address: http://www.apnic.net/apnic-bin/isp-request-form.pl

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## APNIC - ISP Address Request

### Internet connectivity

The information you provide here describes certain aspects of how the network connects to the Internet.

**Internet connectivity type:**

- Peering-point
- Service-provider
- Other

**Connection providers:**

Connect-Provider-1  
Connect-Provider-2

Save Cancel Previous Next

[Help](#) | [Error messages](#) | [Text Only Version](#)

1. applicant 2. contact 3. network 4. connect 5. config 6. customer 7. infra 8. plan 9. comments 10. confirm

Topological information

Connection providers

# Network configuration

APNIC - ISP Address Request - 5 - Microsoft Internet Explorer

Address: <http://www.apnic.net/apnic-bin/isp-request-form.pl>

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## APNIC – ISP Address Request

### Planned network configuration

The information you provide here will help APNIC to understand certain aspects of the planned network. Depending on the options selected, APNIC may require more information to ensure compliance with the best current practice.

Indicate the following configurations to be supported by this network:

<input checked="" type="checkbox"/>	Supernets	?
<input checked="" type="checkbox"/>	Subnets	?
<input checked="" type="checkbox"/>	All 0s subnet	?
<input checked="" type="checkbox"/>	All 1s subnet	?

Save Cancel Previous Next

[Help](#) | [Error messages](#) | [Text Only Version](#)

1. applicant 2. contact 3. network 4. connect 5. config 6. customer 7. infra 8. plan 9. comments 10. confirm

Expectation is 'classless'

Supernets, Subnets, All 0s subnet, All 1s subnet...

# Existing customer network

APNIC - ISP Address Request - 6 - Microsoft Internet Explorer

Address: http://www.apnic.net/apnic-bin/isp-request-form.pl

## Existing customer network

If this organisation has existing customer networks, then you must use the fields below to provide a description of all assignments made to those networks.

*If this organisation has not received an IP allocation previously and has not made assignments to customers, then you should skip this section.*

**Name**

**Address**

**Mask**

**Hosts now**

**Hosts in 6 months**

**Hosts in 1 year**

**Subnets now**

**Subnets in 6 months**

**Subnets in 1 year**

**Date assigned**

**How to complete this page**

There are two options for completing this section:

- Use the form to build up your information, line by line**
  - Use the fields on the left of the form to specify the required elements for each line.
  - When you have completed the fields, click "Add Information" to transfer that line to the text box in the correct format.
  - Repeat this process for each line required.
- Upload a text file**
  - If you have a text file on a local drive, which describes this information in the correct format, you may click "Upload Text File".
  - Follow the prompts to locate the file and attach it to this request form.
  - Only text files** may be uploaded in this section.

CUST-NET1 203.108.131.8 255.255.255.248 4/6/6 1/1/1 20030101

Instructions

Add information

Upload text file



# ISP address request evaluation

- 'Customer network' fields

## Registration

- Check all customer assignments are in the APNIC 'whois' database accurately

## Policy

- Prefix distribution of all customer assignments
- 'Classless' assignments NOT on /24 boundaries

# Existing network infrastructure

APNIC - ISP Address Request - 7 - Microsoft Internet Explorer

Address http://www.apnic.net/apnic-bin/isp-request-form.pl

## Existing network infrastructure information

This section is used to describe the address assignments you are currently using for your network infrastructure, that is, the addresses that you did not assign to customers and which do not appear in the APNIC Whois database and the CUST-NETWORK field.

<b>Address</b>	<input type="text" value="211.12.29.160"/>
<b>Mask</b>	<input type="text" value="255.255.255.240"/>
<b>Connect</b>	<input type="radio"/> None <input checked="" type="radio"/> Perm <input type="radio"/> Transient
<b>Max</b>	<input type="text" value="14"/>
<b>Hosts now</b>	<input type="text" value="10"/>
<b>Hosts in 6m</b>	<input type="text" value="10"/>
<b>Hosts in 1 yr</b>	<input type="text" value="14"/>
<b>Detailed descr of subnet</b>	<input type="text" value="LAN Web Hosting"/>

**How to complete this page**

There are two options for using this page to provide details of your network infrastructure:

- Use the form to build your assignment details**
  - Use the fields on the left of the form to specify the required elements for each assignment to your network infrastructure.
  - When you have completed the fields, click "Add Information" to transfer that assignment information to the text box in the correct format.
  - Repeat this process for each assignment to your network infrastructure.
- Upload a text file**
  - If you have a text file on a local drive describing your network infrastructure assignments in the correct format, you may click "Upload Text File"
  - Follow the prompts to locate the file and attach it to this request form.

```

211.12.29.0 255.255.255.192 YES 62 30/62/62 PRI Dialup Modems
211.12.29.64 255.255.255.192 YES 62 30/50/62 NOC & Ops mgmt PCs
211.12.29.128 255.255.255.224 YES 30 20/25/25 R & D LAN
    
```

Address  
Mask  
Connect  
Max  
Hosts now  
Hosts in 6m  
Hosts in 1 yr  
Detailed descr of subnet

Add information  
Upload text file

Address, Mask, Connect, Max, Hosts now, 6m, 1yr, description



# New cable/DSL services



APNIC - ISP Address Request - Microsoft Internet Explorer

Address: http://www.apnic.net/apnic-bin/isp-request-form.pl

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## APNIC – ISP Address Request

### Allocations for cable/DSL service providers

Use this section to indicate whether you are establishing a new cable or DSL service.

Is the address space you are requesting now required for establishing a new cable or DSL service?  Yes  No

Save Cancel Previous Next

new cable or DSL service?

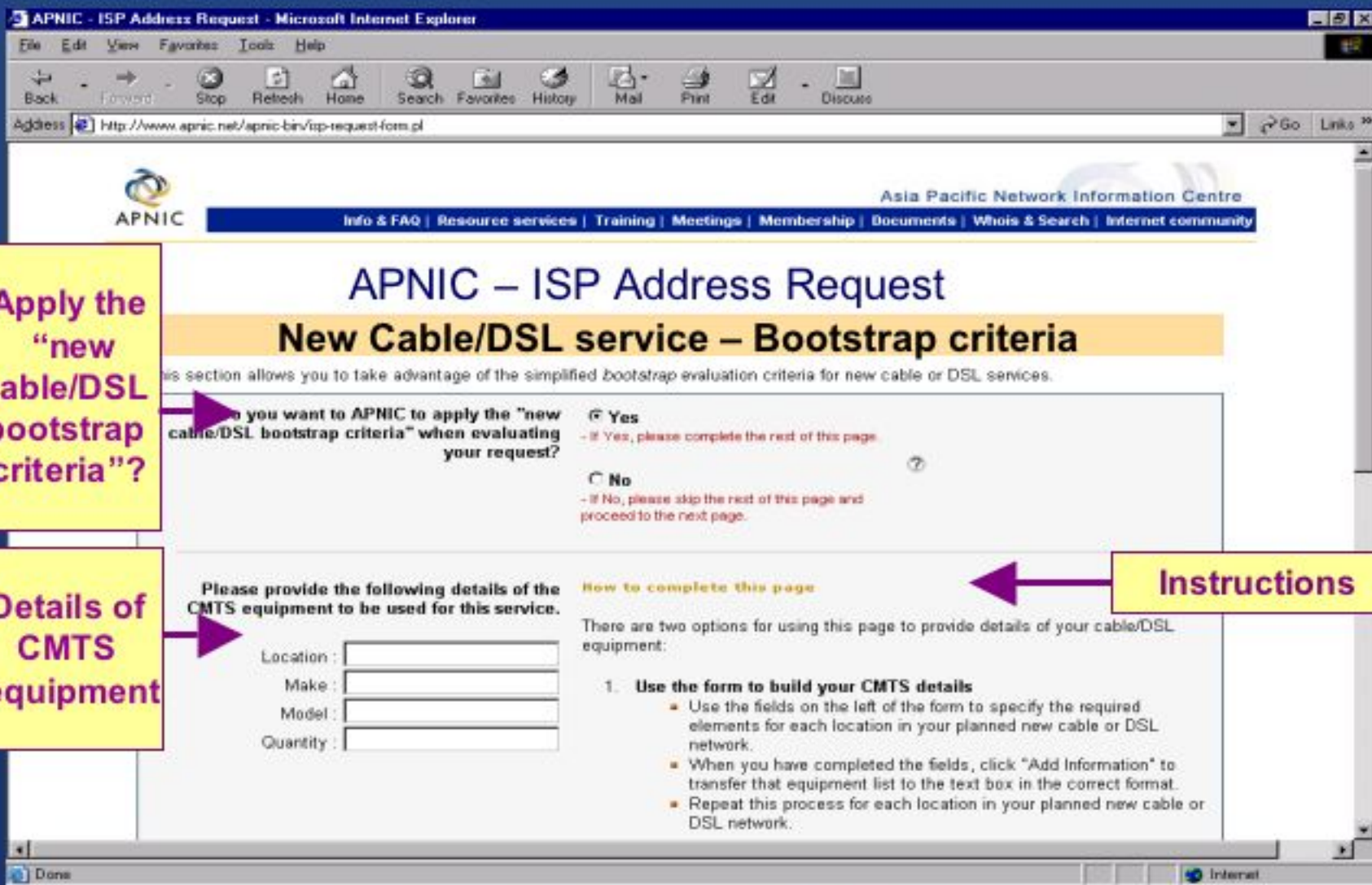
1. applicant 1.1 initial criteria 2. contact 3. network 4. connect 5. config 6. customer 7. infra 8. cable future 9. comments 10. confirm 11. confirm

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Done Internet



# New cable/DSL services



APNIC - ISP Address Request - Microsoft Internet Explorer

Address: http://www.apnic.net/apnic-bin/top-request-form.pl

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## APNIC – ISP Address Request

### New Cable/DSL service – Bootstrap criteria

This section allows you to take advantage of the simplified bootstrap evaluation criteria for new cable or DSL services.

Do you want to APNIC to apply the "new cable/DSL bootstrap criteria" when evaluating your request?

Yes  
- If Yes, please complete the rest of this page.

No  
- If No, please skip the rest of this page and proceed to the next page.

Please provide the following details of the CMTS equipment to be used for this service.

Location:

Make:

Model:

Quantity:

How to complete this page

There are two options for using this page to provide details of your cable/DSL equipment:

1. Use the form to build your CMTS details
  - Use the fields on the left of the form to specify the required elements for each location in your planned new cable or DSL network.
  - When you have completed the fields, click "Add Information" to transfer that equipment list to the text box in the correct format.
  - Repeat this process for each location in your planned new cable or DSL network.

Apply the "new cable/DSL bootstrap criteria"?

Details of CMTS equipment

Instructions

Use the form to build your CMTS details...

# Future network plan

IP require-  
ment  
(max, now,  
in 6 months  
in 1 year



Infra-  
structure &  
Projections

APNIC - ISP Address Request - 8 - Microsoft Internet Explorer

Address: http://www.apnic.net/apnic-bin/isp-request-form.pl

## Future network plan

This section is used to describe the plans for using the requested address space in the network infrastructure over the next year. Planned assignments to customers are not to be described in this section.

**Address**

**Mask**

**Connect**

NO (No connection to the Internet)

YES (Permanent connection to the Internet)

PART (Transient connection to the Internet)

**Max**

**Hosts now**

**Hosts in 6 months**

**Hosts in 1 year**

**Detailed description of subnet**

```

0.0.0.0 255.255.255.0 YES 254 40/120/240 8 PRI Dialup Modems
0.0.1.0 255.255.255.192 YES 62 20/35/60 Ops Mgmt Servers LAN
0.0.1.64 255.255.255.192 YES 62 20/40/60 Mail, DNS, Web servers
    
```

Address, Mask, Connect, IP requirement, description



# ISP request evaluation

- 'Infrastructure' & 'network-plan' fields
  - Policy
    - Technical descriptions are detailed enough so APNIC can understand why subnet size was chosen
    - Do customer projections match infrastructure plans?
    - Efficient subnet assignments
  - 'Best current practice'
    - Name based virtual web hosting
    - Dynamic dial up
      - More on this to follow...



# Additional comments

APNIC - ISP Address Request - 9 - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites History Mail Print Edit Discuss

Address http://www.apnic.net/apric-bin/isp-request-form.pl

## Additional Comments

This section is used to provide more information on any unclear aspects of your request. In particular, refer to the sections "Internet connectivity information" and "Network configuration details". You should also use this section to explain why you are not able to obtain the required address space from your upstream ISP.

### How to complete this section

There are two options for using this section to provide additional comments:

1. **Enter your comments directly into the text field**
2. **Upload a text file**
  - If you have a text file on a local drive setting out your additional comments, you may select "Upload Text File"
  - Follow the prompts to locate the file and have it automatically attached to this request form.

**Additional comments** including:

- network topology diagrams
- additional information on any other aspect of this request

Done Internet

Upload Text File

# Additional Info - Topology, Deployment, Equipment & Services

- POP topology
  - Diagrams showing network / POP design
- Deployment plan
  - Give details of phases of deploying equipment
- Equipment and services
  - Specifications, number of ports
  - Details of how implement services
    - explain acronyms or special services
- Miscellaneous
  - Anything not covered by the form, anything unusual

# Additional info

## - Renumbering & return policy

- Renumbering?
  - one-for-one exchange to assist renumbering
  - needs confirmation from upstream ISP to confirm renumbering will take place
- 'No Questions Asked' return prefix policy
  - swap 3 or more discontinuous prefixes (ISP or customers) for single prefix, no charge
    - <ftp://ftp.apnic.net/apnic/docs/no-questions-policy>
  - Form for returning addresses
    - <ftp://ftp.apnic.net/apnic/docs/address-return-request>



# Confirm details

APNIC - ISP Address Request - 10 - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites History Mail Print Edit Discuss

Address: http://www.apnic.net/apnic-bin/isp-request-form.pl

## APNIC – ISP Address Request

### Confirm details

Please check your information:

<b>Your Name:</b>	Test Person
<b>Your Email Address:</b>	test_person@company.com
<b>Account Name:</b>	APNIC-AP
<b>Admin Contact Handles:</b>	JB46-AP
<b>Technical Contact Handles:</b>	JB46-AP
<b>Maintainer:</b>	MAINT-AU-JEFFBRIGHT
<b>Netname:</b>	TESTNET
<b>Description:</b>	Brisbane, Australia. Internet Service Provider (a web hosting company)
<b>Country:</b>	AU
<b>Connectivity:</b>	Peering-point No Service-provider Yes Other No
<b>Connection Providers:</b>	Connect-Provider-1 Connect-Provider-2
<b>Do you support:</b>	Supernets Yes Subnets Yes All Ds Yes All ts Yes

Check your information!

Done Internet

# ISP address request

## - Checklist

- ✓ All fields are syntactically correct
- ✓ Supplied documentation correct
  - format defined in the APNIC-084
- ✓ Provided all IP addresses currently held
- ✓ Updated all customer assignments in DB
  - Deleted objects that are no longer valid

# ISP address request - parsing


webmaster@apnic.net'." data-bbox="75 190 952 929"/>

APNIC - ISP Address Request - 11 - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites History Mail Print Edit Discuss

Address <http://www.apnic.net/apnic-bin/isp-request-form.pl> Go Links

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## APNIC - ISP Address Request

\*\*warnings\*\* below 80% utilization of available IP addresses

You have successfully parsed and analysed your ISP Request.

Save Cancel Previous Submit

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Done Internet

Successful parsing of ISP Request




# ISP address request - submission

APNIC - ISP Address Request - Submit - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites History Mail Print Edit Discuss

Address <http://www.apnic.net/apnic-bin/isp-request-form.pl> Go Links



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## APNIC – ISP Address Request

### Submit ISP Request

**Your ISP Request has been submitted**

**Feedback on new ISP request form**

Thank you for using APNIC's new ISP request form. We are very interested in hearing about your experiences with the form. We designed this form to help all our members and want to know how we can improve it. Please submit any suggestions or thoughts about this form to [webmaster@apnic.net](mailto:webmaster@apnic.net).

---

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Done Internet

# Questions ?

# Evaluation by APNIC

## - Virtual web hosting

- Name based hosting
  - ‘*Strongly recommended*’
    - Use ‘infrastructure’ field to describe web servers
- IP based hosting
  - Permitted on technical grounds
    - SSL, virtual ftp..
    - Use ‘infrastructure’ field to describe web servers
  - Special verification for IP based
    - If more than /22 used for this purpose
    - Requestor must send list of URLs of virtual domain and corresponding IP address



# Cable, DSL services

- 1:1 contention ratio
  - Can be either statically or dynamically assigned
  - Means 1 IP address per customer
- Greater than 1:1 contention ratio
  - Preferred because conserves address space
- Choice of addressing is optional for members
  - dynamic addressing is encouraged
- Verification for DSL Services
  - Equipment details
    - Ex: BRAS, Number of ports
  - Purchase requests

# New Cable services

- Bootstrapping criteria for new cable service
  - Applies to startup providers commencing new cable service
  - Allocation size based on assumption that requestor will assign a /24 to each CMTS in their network
  - Complete additional information with make, model & quantity information
  - Purchase requests for equipments may be asked



# New Cable services

- Through 'infrastructure' description
  - Additional information needed
    - Head-end location, # Homes passed , Devices(CMTS), Capacity of CMR per CMTS , # Current Users # Assigned IP's for each CMTS, Additional CMTS in 6 months time, Growth rate/month
    - Example:

Headend	Homespassed	Device	Capacity
Brisbane	15000	Motorola	1000

Current Users	IP	Device-Added	G-rate/Month
750	800	1	1254



# Customer assignments

- Customer growth estimation
  - The invoice for the additional CMTS purchased for the expansion
- Required to report customer assignments greater than /30
  - Through second opinion process
  - Register the assignment in APNIC whois database

# Evaluation by APNIC

## - summary

- All address space held should be documented
  - Check other RIR, NIR databases for historical allocations
- 'No reservations' policy
  - Reservations may never be claimed
  - Fragments address space
  - Customers may need more or less address space than is actually reserved

# First allocation

- Must meet criteria
  - (discussed in policy section)
- Requires clear detailed and accurate request
- Implementation of 'Best Current Practice'
- Efficient assignments planned
- Always a /20 'slow start'
  - Exceptions made for very large networks but not common





# Subsequent allocations

- 80% overall utilisation
  - Unless large assignment pending
- Demonstrated conservative assignments
- Correct customer registrations in db
  - Need to fix inconsistencies before next allocation
- Allocation size to cover 1 year need
  - Based on previous utilisation rate
- Contiguous allocation not guaranteed
  - But every effort made

# APNIC approval

Dear xxxx

I am pleased to advise you that in response to your request for Internet resources, APNIC has allocated the following range of IPv4 addresses to the organisation below.

**\*\* IMPORTANT THINGS TO KNOW \*\***

1. The address range allocated to your organisation is portable  
If you change transit providers, the address range remains with your organisation.

2. Assignments and sub-allocations from this address range to customers are non-portable

Customers who cease connectivity with your organisation must return any addresses your organisation has assigned or sub-allocated to them.

3. Assignment Window (AW)

If the amount of address space your organisation wishes to assign or sub-allocate to a customer is greater than your assignment window then please email <hostmaster@apnic.net> for approval.

For more information on APNIC's new policy on sub-allocating space to customers, see: <http://www.apnic.net/meetings/14/results.html>

4. Aggregation

This new allocation should, wherever technically possible, be aggregated with any other address ranges the organisation announces to its upstream or transit ISP.

5. No guarantee of routability

APNIC cannot guarantee that any address space will be globally routable.

**Assignments  
& sub-allocations  
are non-portable**

**APNIC  
expectation:  
Announce  
allocation as  
single  
aggregate**



# Allocation object & contacts

```
inetnum: 202.60.128.0 - 202.60.159.255
netname: ROLTANET
descr: Rolta India Limited
descr: Rolta Center II
descr: MIDC Marol
descr: Andheri(East)- Mumbai-400 093
country: IN
admin-c: VS9-AP
tech-c: SD34-AP
mnt-by: APNIC-HIM
mnt-lower: MAINT-IN-SANTOSHDESAI
changed: hostmaster@apnic.net 19990323
status: ALLOCATED PORTABLE
source: APNIC
```

```
person: Vinay Sawarkar
address: Rolta Center II, MIDC, Andheri,
address: Mumbai-400 093
country: IN
phone: +91-22-832 7708
fax-no: +91-22-836 5992
e-mail: vinay@rolta.com
nic-hdl: VS9-AP
mnt-by: MAINT-IN-SANTOSHDESAI
changed: vinay@rolta.com 20000526
source: APNIC
```

```
person: Santosh Desai
address: Rolta Center II, MIDC, Andheri,
address: Mumbai-400 093
country: IN
phone: +91-22-832 7708
fax-no: +91-22-836 5992
e-mail: santosh@rolta.com
nic-hdl: SD34-AP
mnt-by: MAINT-IN-SANTOSHDESAI
changed: santosh@rolta.com 20000526
source: APNIC
```

Contacts for network



# Questions ?

# Internet Registry Procedures

## IP Address Management

# Revision of routing protocols

- Interior Gateway Protocol (IGP)
  - Examples are OSPF, EIGRP, ISIS
  - Used to find optimum route to a host in ISP network
  - Convergence becomes important with scaling
- Border Gateway Protocol (BGP)
  - Can be interior (iBGP) and exterior (eBGP)
  - Used to carry traffic across your network and to/from the Internet
  - Can use BGP attributes for routing policy



# Principles of addressing

- Separate customer & infrastructure address pools
  - Manageability
    - Different personnel manage infrastructure and assignments to customers
  - Scalability
    - Easier renumbering - customers are difficult, infrastructure is relatively easy

# Principles of addressing

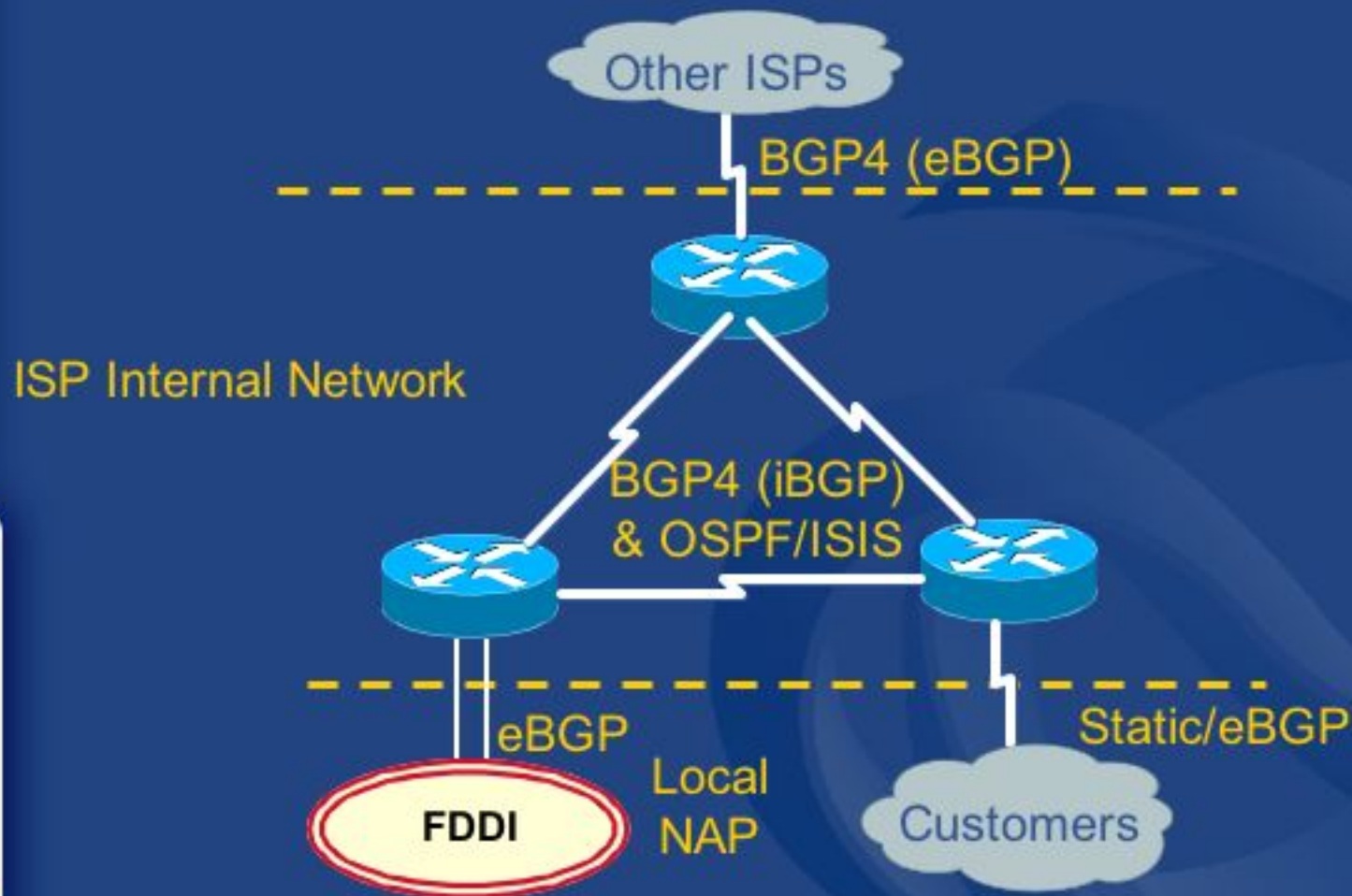
- Further separate infrastructure
  - ‘Dynamic’ infrastructure for IGP
    - Carrying network infrastructure addresses used by a routing protocol where alternate paths to host exist
    - Eg. p2p addresses of backbone connections
    - Eg. router loopback addresses
  - ‘Static’ infrastructure
    - Static routing of infrastructure (where no alternative path exists)
    - Carry in iBGP

# Principles of addressing

- Further separate infrastructure
  - ‘Static’ infrastructure examples
    - RAS server address pools, CMTS
    - Virtual web and content hosting LANs
    - Anything where there is no dynamic route calculation
- Customer networks
  - Carry in iBGP , do not put in IGP
    - No need to aggregate address space carried in iBGP
    - Can carry in excess of 100K prefixes



# Hierarchy of routing protocols



# Management - simple network

- First allocation from APNIC
  - Infrastructure is known, customers are not
  - 20% free is trigger for next request



- Grow usage of blocks from edges
- Assign customers sequentially

# Management - simple network

- If second allocation is contiguous

→ 1st allocation ← → 2nd allocation ←

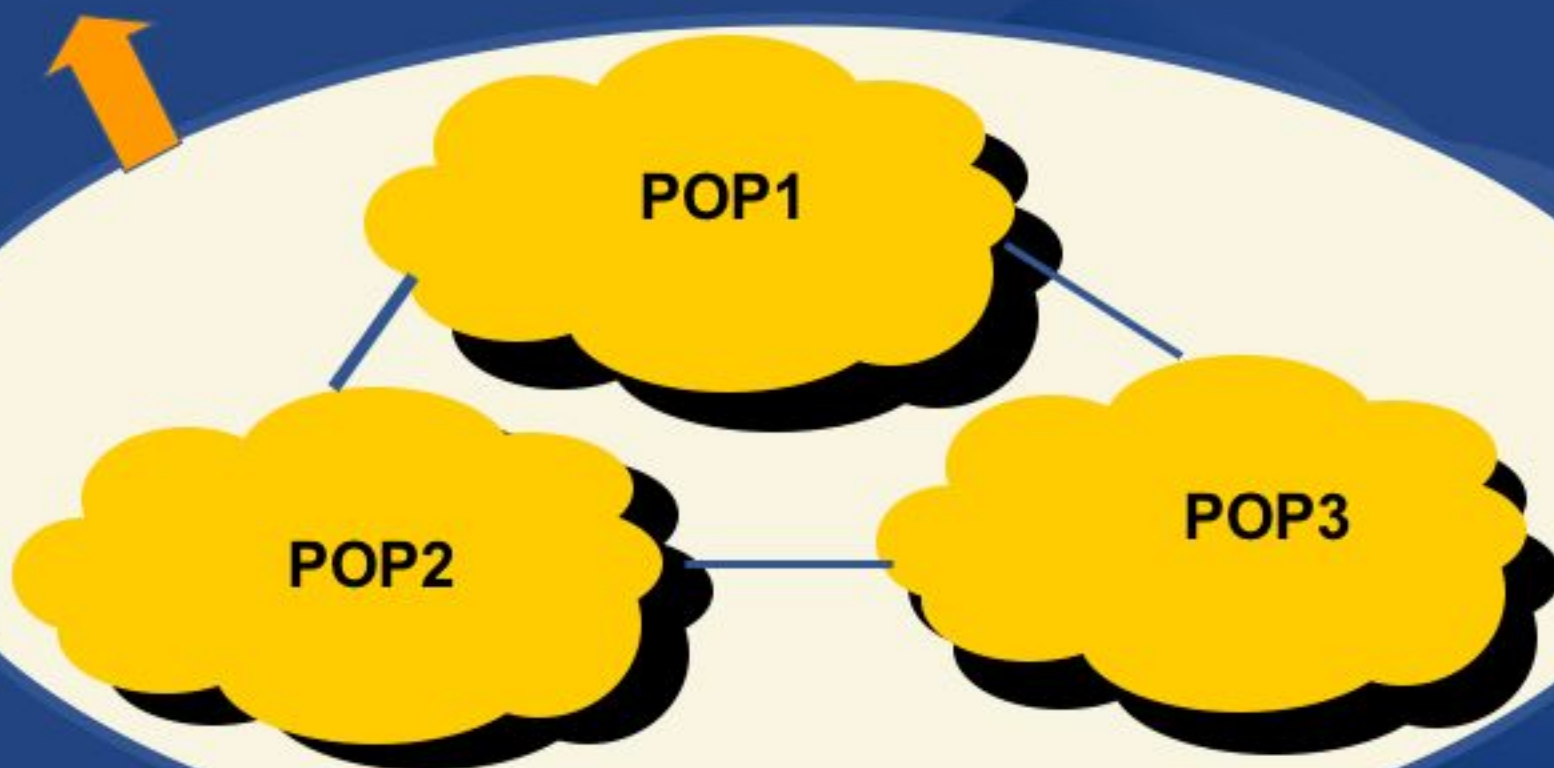


- Reverse order of division of first block
- Maximise contiguous space for infrastructure
  - Easier for debugging
- Customer networks can be discontinuous



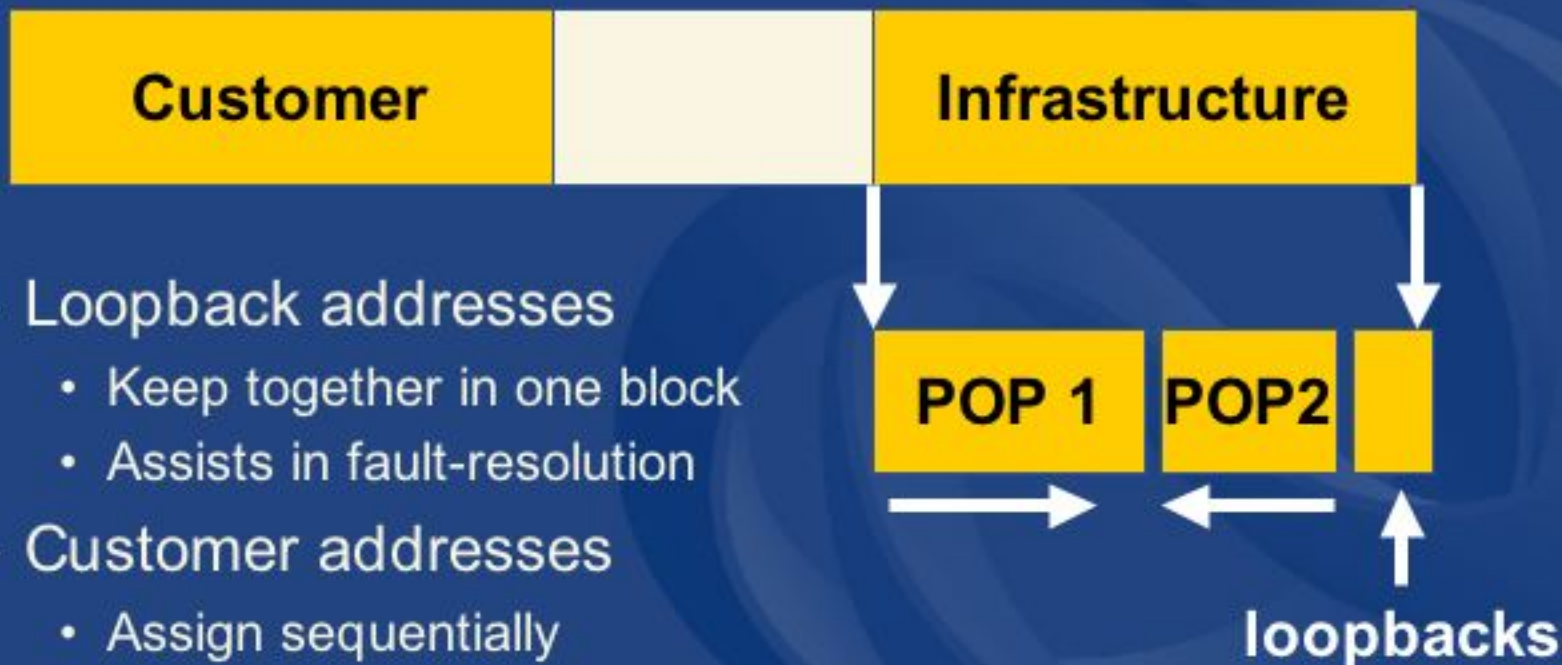
# Management - many POPs

- WAN link to single transit ISP



# Management - many POPs

- POP sizes
  - Choose address pool for each POP according to need



# Management - many POPs

- /20 minimum allocation not enough for all your POPs?
  - Deploy addresses on infrastructure first
- Common mistake:
  - Reserving customer addresses on a per POP basis
- Do not constrain network plans due to lack of address space
  - Re-apply once address space has been used



# Questions ?

# Second opinion request

- Assignment Window
- Second Opinion Request Form
- Evaluation

# What is an assignment window?

*“The amount of address space a member may assign without a ‘second opinion’”*

- All members have an AW
  - Starts at zero, increases as member gains experience in address management
- Second opinion process
  - Customer assignments require a ‘second-opinion’ when proposed assignment size is larger than members AW



# Assignment window

- Size of assignment window
  - Evaluated after about 5 2nd-opinion requests
  - Increased as member gains experience and demonstrates understanding of policies
    - Prefix length normally reduced by 1 bit at a time
    - Assignment window may be reduced, in rare cases
- Why an assignment window?
  - Monitoring ongoing progress and adherence to policies
  - Mechanism for member education

# Why assignment window?

- Motivation
  - Support the LIR during start up
  - Standardise criteria for request evaluation
  - Familiarise the LIR with APNIC policies
  - Ensure accurate data is being kept
  - Treat everyone fairly

## FAQ

- <http://www.apnic.net/faq/awfaq.html>

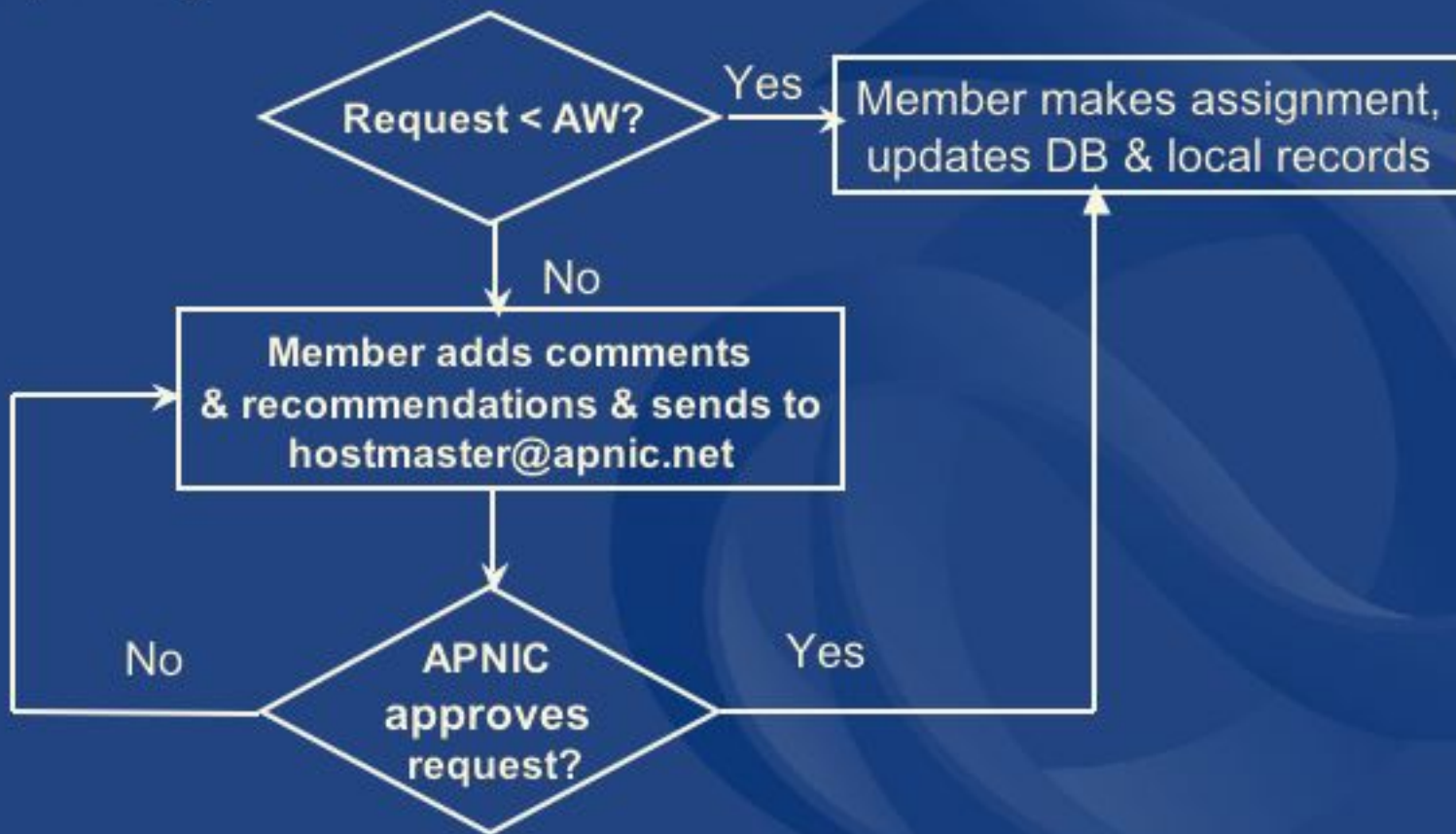
# Assignment window process

Step 1 - Member and customer complete 2nd Opinion Request form

Step 2 - Member evaluates customers requirements

Step 3 - Assignment Window procedure

↕ iteration





# Second opinion request form

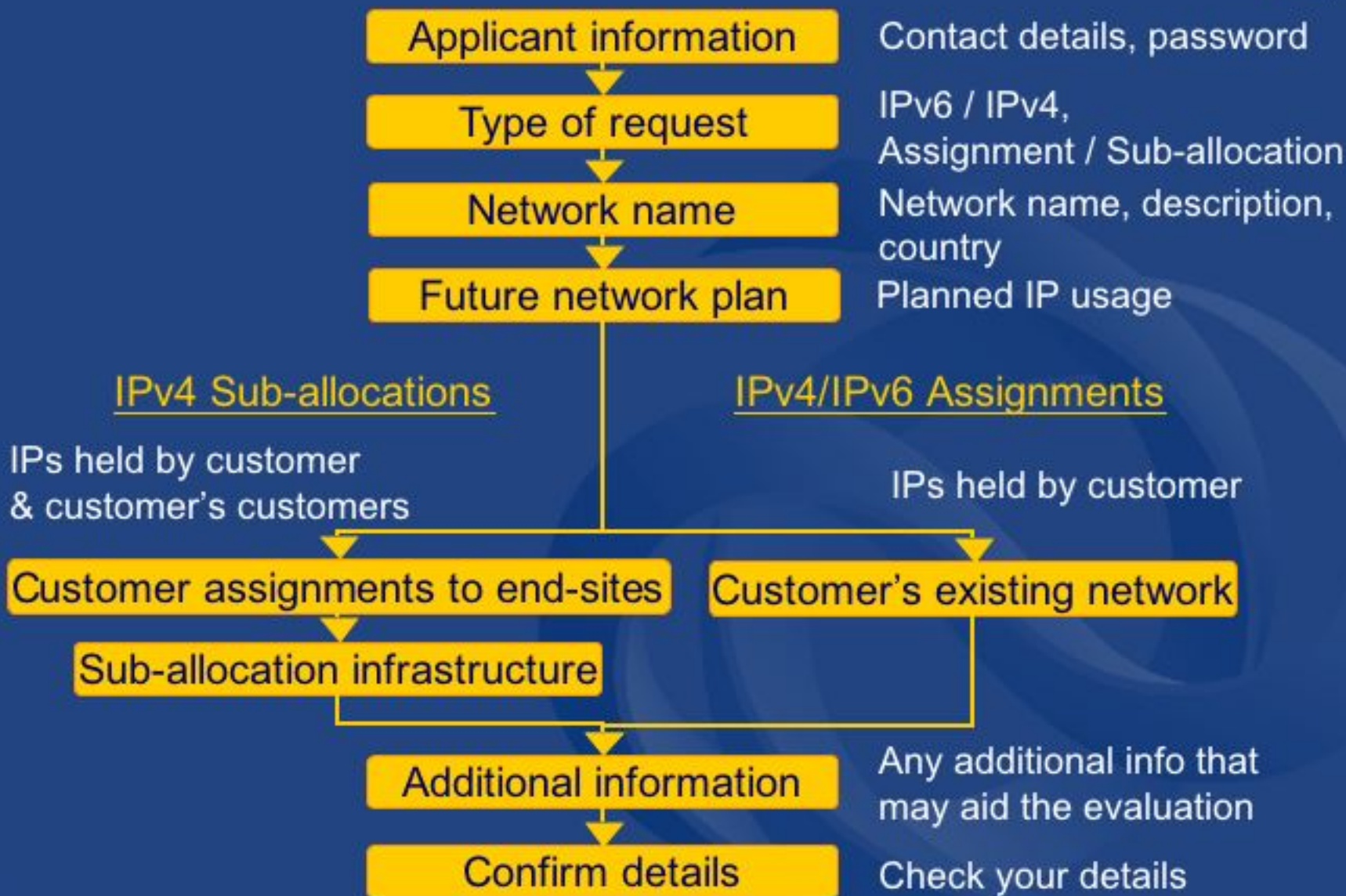
Used to seek approval for:

- IPv4 assignments & sub-allocations
- Multiple/additional IPv6 /48s to a single customer

Before you start:

- Separate form for each request
- Help buttons available
- Form can be saved by use of password

# Overview of 2nd opinion form





# Applicant information

APNIC second opinion request - Microsoft Internet Explorer

Address <http://www.apnic.net/apnic-bin/second-opinion-form.pl>

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## APNIC second opinion request

### Applicant information

APNIC will use these contact details for all correspondence relating to this request. Please enter the APNIC account name of the organisation that requires the address space assignment.

**Your name:**  ?

**Your email address:**  ?

**APNIC account name:**  ?

Examples:  
 Non-member: SPARKYNET-NON-ID  
 Member example: SPARKYNET-ID

**Your relationship to organisation applying for membership:**  ?

Please choose one

**Create a password for this request:**  ?  
 (min. 8 characters)

**Confirm password:**

Cancel Next

Help buttons

Password allows saving work



# Type of 2nd opinion request

2<sup>nd</sup> Op



APNIC second opinion request - Microsoft Internet Explorer

Address <http://www.preview.apnic.net/apnic-bin/second-opinion-form.pl> Go

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## APNIC second opinion request

### Type of second opinion request

This provides information about the type of second opinion you are requesting.

**Which IP version do you wish to request?**

IPv4 ?  
 IPv6

---

**Which type of second opinion are you requesting?**

Assignment (IPv4 or IPv6) ?  
 Select this if you are distributing IP addresses for the end user's infrastructure

Sub-allocation (IPv4 only)  
 Select this if you are distributing IP addresses to an organisation that will further distribute the address space to their end users.

---

**Address prefix requested:**  ?  
 IPv4 example: /26  
 IPv6 example: /47

# Network name

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## APNIC second opinion request

### Network name

The details you provide here will be used to identify the proposed network in the APNIC Whois Database

**Name of network:**  ?  
Example: SPARKYNET

**Description of organisation:**  ?  
Example: SparkyNet, Sdn Bhd, Indonesia

**Country:** Select a country ?

Internet

# Future network plan

APNIC second opinion request - Microsoft Internet Explorer

Address: http://www.preview.apnic.net/apnic-bin/second-opinion-form.pl

## APNIC second opinion request

### Future network plan

The information you provide here summarizes how the customer will use the IPv4 address space within the next year.

**Size of planned subnet:**   
Example: 0.0.0.0/28

**Deploy now:**   
Example: /29

**Deploy within 6 months:**   
Example: /29

**Deploy within 1 year:**   
Example: /28

**Detailed description of subnet:**   
Example: web hosting facility

**0.0.0.0/28 /29 /29 /28 web hosting facility**

#### How to complete this page

There are two options for using this page to provide details of your customer's network infrastructure:

Use the form to build your assignment details

- Use the fields on the left of the form to specify the required elements for each assignment to your network infrastructure.
- When you have completed the fields, click "Add information" to transfer that assignment information to the text box in the correct format.
- Repeat this process for each assignment to your customer's network infrastructure.

Upload a text file

- If you have a text file on a local drive describing your network infrastructure assignments in the correct format, you may click "Upload text file".
- Follow the prompts to locate the file and attach it to this request form.

Instructions

Add information

Upload text file



# Customer's existing network

## - IPv4 assignment request

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### APNIC second opinion request

#### Customer's existing network

If the end site you are requesting a second opinion for has received any addresses in the past, please specify the actual addresses assigned on each network.

**Actual start address assigned:**  Example: 202.5.10.0

**Total prefix size of subnet:**  Example: /29

**Description of subnet:**  Example: 1 router and 4 workstations

**How to complete this page**

There are two options for using this page to provide details of your customer's network infrastructure:

Use the form to build your assignment details

- Use the fields on the left of the form to specify the required elements for each assignment to your customer's network.
- When you have completed the fields, click "Add information" to transfer that assignment information to the text box in the correct format.
- Repeat this process for each assignment to your customer's network infrastructure.

**Upload a text file**

- If you have a text file on a local drive describing your network infrastructure assignments in the correct format, you may click "Upload text file".
- Follow the prompts to locate the file and attach it to this request form.

**202.5.10.0 /29 1 router and 4 workstations**

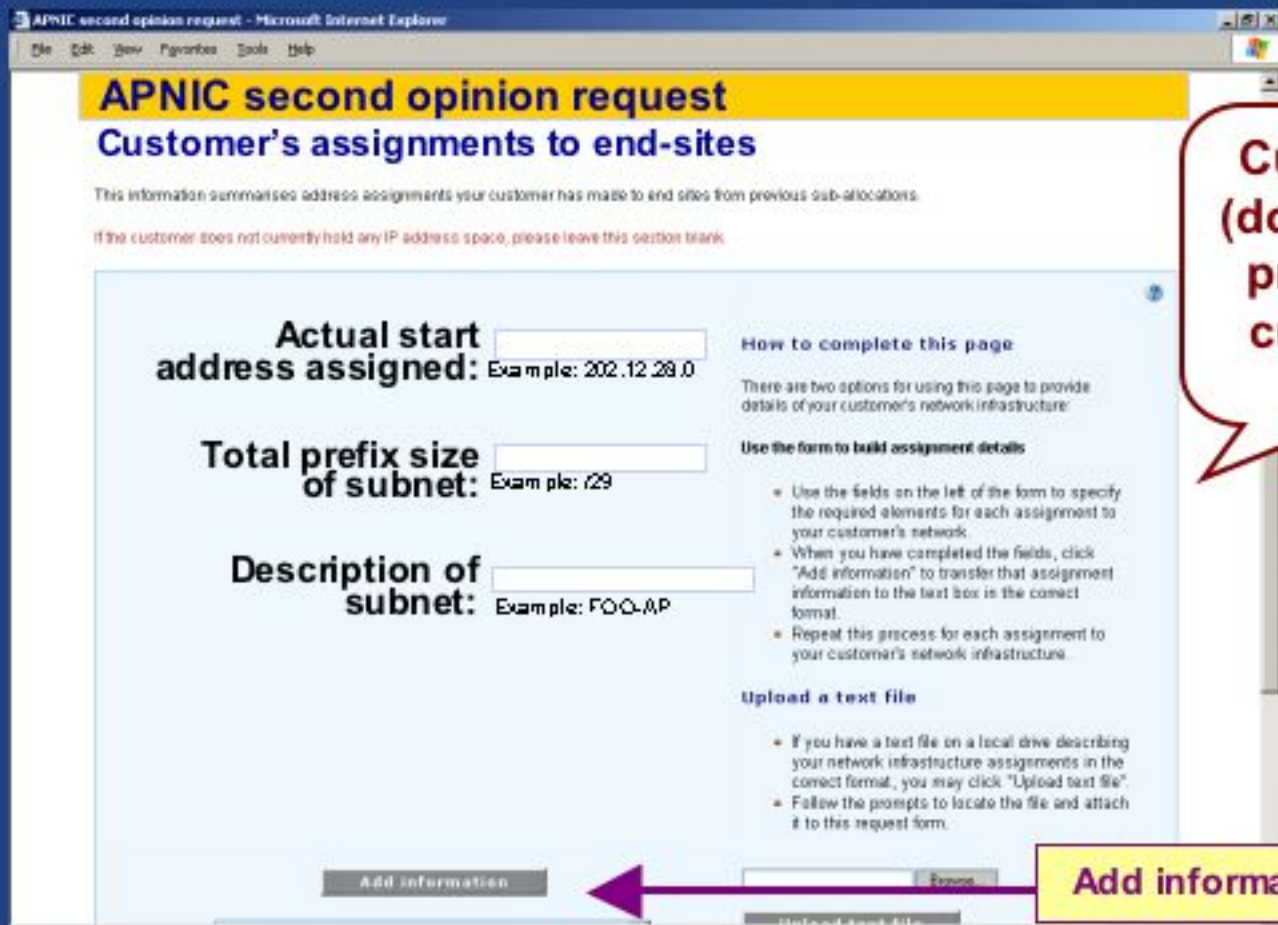
**All previous assignments - Check whois db**

**Add information**

**Upload text file**

# Customer's assignments to end-sites

- Sub Allocation Request



**APNIC second opinion request**  
**Customer's assignments to end-sites**

This information summarises address assignments your customer has made to end sites from previous sub-allocations.

*If the customer does not currently hold any IP address space, please leave this section blank.*

**Actual start address assigned:**  Example: 202.12.28.0

**Total prefix size of subnet:**  Example: /29

**Description of subnet:**  Example: FOO.AP

**How to complete this page**

There are two options for using this page to provide details of your customer's network infrastructure:

**Use the form to build assignment details**

- Use the fields on the left of the form to specify the required elements for each assignment to your customer's network.
- When you have completed the fields, click "Add information" to transfer that assignment information to the text box in the correct format.
- Repeat this process for each assignment to your customer's network infrastructure.

**Upload a text file**

- If you have a text file on a local drive describing your network infrastructure assignments in the correct format, you may click "Upload text file".
- Follow the prompts to locate the file and attach it to this request form.

**Customer's (downstream provider's) customers**

**Add information**



# Sub-allocation infrastructure

- Sub-Allocation Request

APNIC second opinion request - Microsoft Internet Explorer

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## APNIC second opinion request Sub-allocation infrastructure

This information summarizes the actual address prefixes used for the infrastructure of the customer network receiving the sub-allocation.

If the customer does not currently hold any IP address space, please leave this section blank.

**Actual start address assigned:**  Example: 202.12.28.0

**Total prefix assigned to the infrastructure:**  Example: /27

**Description of subnet:**  Example: server farm

**How to complete this page**

There are two options for using this page to provide details of your customer's network infrastructure:

**Use the form to build assignment details**

- Use the fields on the left of the form to specify the required elements for each assignment to your customer's network.
- When you have completed the fields, click "Add information" to transfer that assignment information to the text box in the correct format.
- Repeat this process for each assignment to your customer's network infrastructure.

**Upload a text file**

- If you have a text file on a local drive describing your network infrastructure assignments in the correct format, you may click "Upload text file".
- Follow the prompts to locate the file and attach it to this request form.

**Customer's  
(downstream  
provider's)  
infrastructure**

**Add information**





# Additional information

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## APNIC second opinion request

### Additional information

This section is for you to provide whatever other details you feel may help justify your IPv4 second opinion request. In particular, it will help APNIC evaluate the request if you can provide:

- network topology diagrams
- detailed explanations of the address space usage and subnetting plans

#### How to complete this page

There are two options for using this section to provide additional comments:

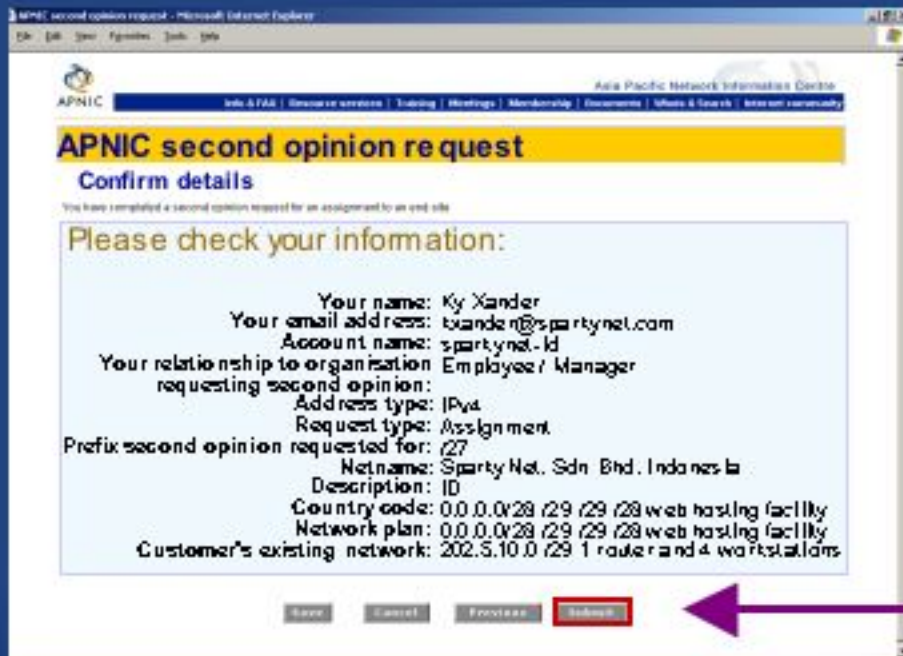
- Enter your comments directly into the text field
- Upload a file of any type
  - If you have a file on a local drive setting out your additional comment, you may select "Upload file"
  - Follow the prompts to locate the file and have it automatically attached to this request form.

**Network design**  
**Network topology**  
**Deployment plan**  
**Equipment**  
**Services**  
**Renumbering**  
**Explanations**  
**etc**

**Upload File**



# Confirm details & submit



APNIC second opinion request - Microsoft Internet Explorer

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## APNIC second opinion request

### Confirm details

You have completed a second opinion request for an assignment to an end site

Please check your information:

Your name: Ky Xander  
 Your email address: kxander@sparty.net.com  
 Account name: sparty.net-id  
 Your relationship to organisation requesting second opinion: Employee / Manager  
 Address type: IPv4  
 Request type: Assignment  
 Prefix second opinion requested for: /27  
 Netname: Sparty Net. Sdn Bhd. Indonesia  
 Description: ID  
 Country code: 0.0.0.0/28 /29 /29 /28 web hosting facility  
 Network plan: 0.0.0.0/28 /29 /29 /28 web hosting facility  
 Customer's existing network: 202.5.10.0 /29 1 router and 4 workstations

Save Cancel Proceed **Submit**

- Check your request
- Click Submit
- Confirmation is also sent via email

**Submit**

- Request submitted!



APNIC second opinion request - Microsoft Internet Explorer

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## APNIC second opinion request

### Submit request

Your request has been submitted

# 2<sup>nd</sup> opinion evaluation (policy)

- Efficiency
  - More than 50% used in any one subnet?
  - Can different subnet sizes be used?
  - More than 80% used for previous assignment?
- Stockpiling
  - Is all address space held declared on form?
  - Has organisation obtained address space from more than one member/ISP?
- Registration
  - Is previous assignment in APNIC database and are they correct and up to date?



# 2<sup>nd</sup> opinion evaluation

- APNIC & Member evaluation
  - Should be the same
    - If NO, APNIC will ask member to obtain more information
      - iterative process
    - If YES, APNIC approves 2nd opinion request

# 2<sup>nd</sup> opinion request approval

Dear XXXXXXX,

APNIC has approved your "second opinion" request to make the following assignment:

[netname]

[address/prefix]

\* Please ensure that you update the APNIC whois database to register this assignment before informing your customer or requesting reverse DNS delegation. Do this using the form at:

<http://www.apnic.net/apnic-bin/inetnum.pl>

**Important:**

Unregistered assignments are considered as "unused"



# Customer assignment

- Member updates internal records
  - Select address range to be assigned
  - Archive original documents sent to APNIC
  - Update APNIC database
- Clarify 'status' of address space
  - APNIC requirement is 'Non portable'
  - 'Portable' assignments are made by APNIC only with the end-user request form
    - Organisation must have technical requirement



# Questions ?

# The APNIC Database

## Protection and Updating



# Database protection

## - maintainer object

```
mntner:          MAINT-WF-EX
descr:           Maintainer for ExampleNet Service Provider
country:         WF
admin-c:         ZU3-AP
tech-c:          KX17-AP
upd-to:          kxander@example.com
mnt-nfy:         kxander@example.com
auth:            CRYPT-PW apHJ9zF3o
mnt-by:          MAINT-WF-EX
referral-by:     MAINT-APNIC-AP
changed:         kxander@example.com 20020731
source:          APNIC
```

- protects other objects in the APNIC database





# Creating a maintainer object

## 1. Fill out webform

- Provide:
  - Admin-c & tech-c
  - password
  - email address etc



## 2. Completed form will be sent to you

## 3. Forward request to [maint-request@apnic.net](mailto:maint-request@apnic.net)

## 4. Maintainer will be created manually

- Manual verification by APNIC Hostmasters

## 5. Update your person object with mntner

[http://www.apnic.net/services/whois\\_guide.html](http://www.apnic.net/services/whois_guide.html)

# Database protection



- Authorisation
  - “mnt-by” references a mntner object
    - Can be found in all database objects
    - “mnt-by” should be used with every object!
- Authentication
  - Updates to an object must pass authentication rule specified by its maintainer object



# Authorisation mechanism

DB 2

```
inetnum:      202.137.181.0 – 202.137.185.255
netname:      EXAMPLENET-WF
descr:        ExampleNet Service Provider
.....
mnt-by:      MAINT-WF-EX
```

```
mntner:     MAINT-WF-EX
descr:        Maintainer for ExampleNet Service Provider
country:      WF
admin-c:      ZU3-AP
tech-c:       KX17-AP
upd-to:       kxander@example.com
mnt-nfy:      kxander@example.com
auth:         CRYPT-PW apHJ9zF3o
mnt-by:       MAINT-WF-EX
changed:      kxander@example.com 20020731
source:       APNIC
```



# Authentication methods



- 'auth' attribute
  - <none>
    - Strongly discouraged!
  - Crypt-PW
    - Crypt (Unix) password encryption
    - Use web page to create your maintainer
  - PGP – GNUPG
    - Strong authentication
    - Requires PGP keys
  - MD5
    - Soon available

# Mnt-by & mnt-lower

- 'mnt-by' attribute
  - Can be used to protect any object
  - Changes to protected object must satisfy authentication rules of 'mntner' object.
- 'mnt-lower' attribute
  - Also references mntner object
  - Hierarchical authorisation for inetnum & domain objects
  - The creation of child objects must satisfy this mntner
  - Protects against unauthorised updates to an allocated range - highly recommended!

# Authentication/Authorisation

- APNIC allocation to member
  - Created and maintained by APNIC

```
Inetnum:      203.146.96.0 - 203.146.127.255
netname:      LOXINFO-TH
descr:        Loxley Information Company Ltd.
Descr:        304 Suapah Rd, Promprab, Bangkok
country:      TH
admin-c:      KS32-AP
tech-c:       CT2-AP
mnt-by:       APNIC-HM
mnt-lower:    LOXINFO-IS
changed:      hostmaster@apnic.net 19990714
source:       APNIC
```

Only APNIC can change this object



# Authentication/Authorisation

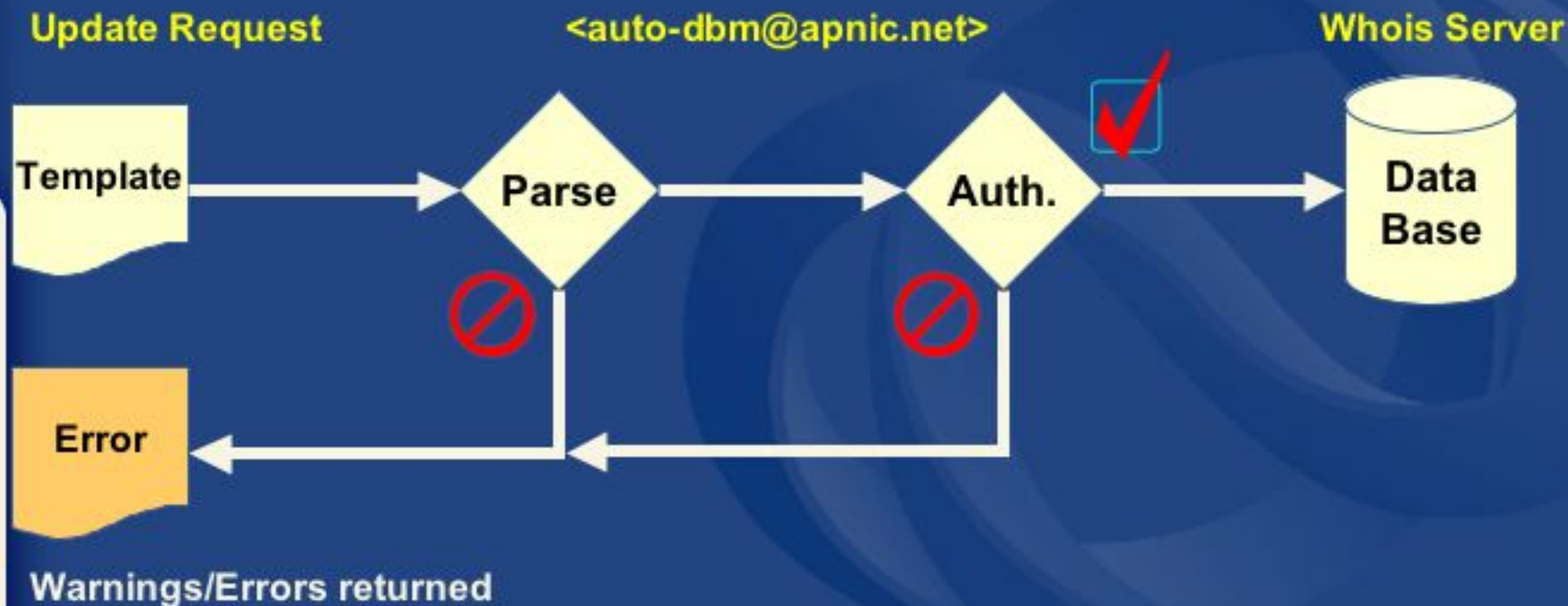
- Member assignment to customer
  - Created and maintained by APNIC member

```
Inetnum:      203.146.113.64 - 203.146.113.127
netname:      SCC-TH
descr:        Sukhothai Commercial College
Country:      TH
admin-c:      SI10-AP
tech-c:       VP5-AP
mnt-by:       LOXINFO-IS
changed:      voraluck@loxinfo.co.th 19990930
source:       APNIC
```

Only LOXINFO-IS can change this object

# Database update process

- Email requests to `<auto-dbm@apnic.net>`
- Each request contains an object template



# Database update process

- Update transactions
  - Create a new object
  - Change an object
  - Delete an object
- Updates are submitted by email
  - E-mail to: `<auto-dbm@apnic.net>`
- Email message contains template representing new or updated object

Template



# Database update - web

- Creates a template through the web form

Template

- Template will be sent to you by email
- This should be forwarded to:

`<auto-dbm@apnic.net>`

– Common error

- to reply to the email 
  - (Adds extra character in front of each line)

[http://www.apnic.net/services/whois\\_guide.html](http://www.apnic.net/services/whois_guide.html)

# Authorisation



- Parser checks the maintainer object referenced in “mnt-by” attribute
- Failed Authorisation
  - Template NOT corrected
  - object NOT accepted
    - Automatic email notification sent
      - to requestor
    - Automatic email notification sent
      - to “notify” address



# Database update process

- Successful update
  - If Parse and Auth. steps succeed, database is updated
  - Confirmation by email to requestor
- Mirror to public server
  - Updates mirrored to “whois.apnic.net”
    - may take up to 60 minutes





# Updating an existing object

- Change relevant fields
- Add your maintainer password
- Update the changed attribute
- Email updated object to:

`<auto-dbm@apnic.net>`

- Note
  - Primary keys cannot be modified

# Deleting an object

- Copy object as-is in database into email
- Add your maintainer password
- Leave the changed attribute

```
inetnum:      202.182.224.0 - 202.182.225.255
netname:      SONY-HK
...
mnt-by:       MAINT-CNS-AP
changed:      ph@macroview.com 19990617
source:       APNIC
password:   x34zky
delete:     no longer required me@company.com
```

Note: Referenced objects cannot be deleted (02/99)



# Forgotten the password ?

## Requires legal documentation

Unfortunately we cannot change the password for the maintainer until we have received a fax with your company's letterhead confirming the request to modify the password.

In the fax, please include the following:

0. Attention: APNIC Database Administration Department
1. The APNIC Account name of your company and your personal nic handle. If you do not have an APNIC account, then please state 'NON-MEM'.
2. The current maintainer object which is to be modified, as obtained from 'whois -h whois.apnic.net MAINTAINER-OBJECT'
3. The new password/authorisation for the maintainer.
4. The signature of a contact for the maintainer.

**Confirmation  
by fax  
required on  
company  
letter head**

We do not recommend using personal names for maintainer objects



# Questions ?

# Reverse DNS Delegation

## Registry Procedures

# Overview

- Reverse DNS Delegation
- APNIC & Member responsibilities
- Reverse network delegations (/16)
- Reverse network delegations (/24)
- Subnet delegations
- Delegation procedures



# What is 'Reverse DNS'?

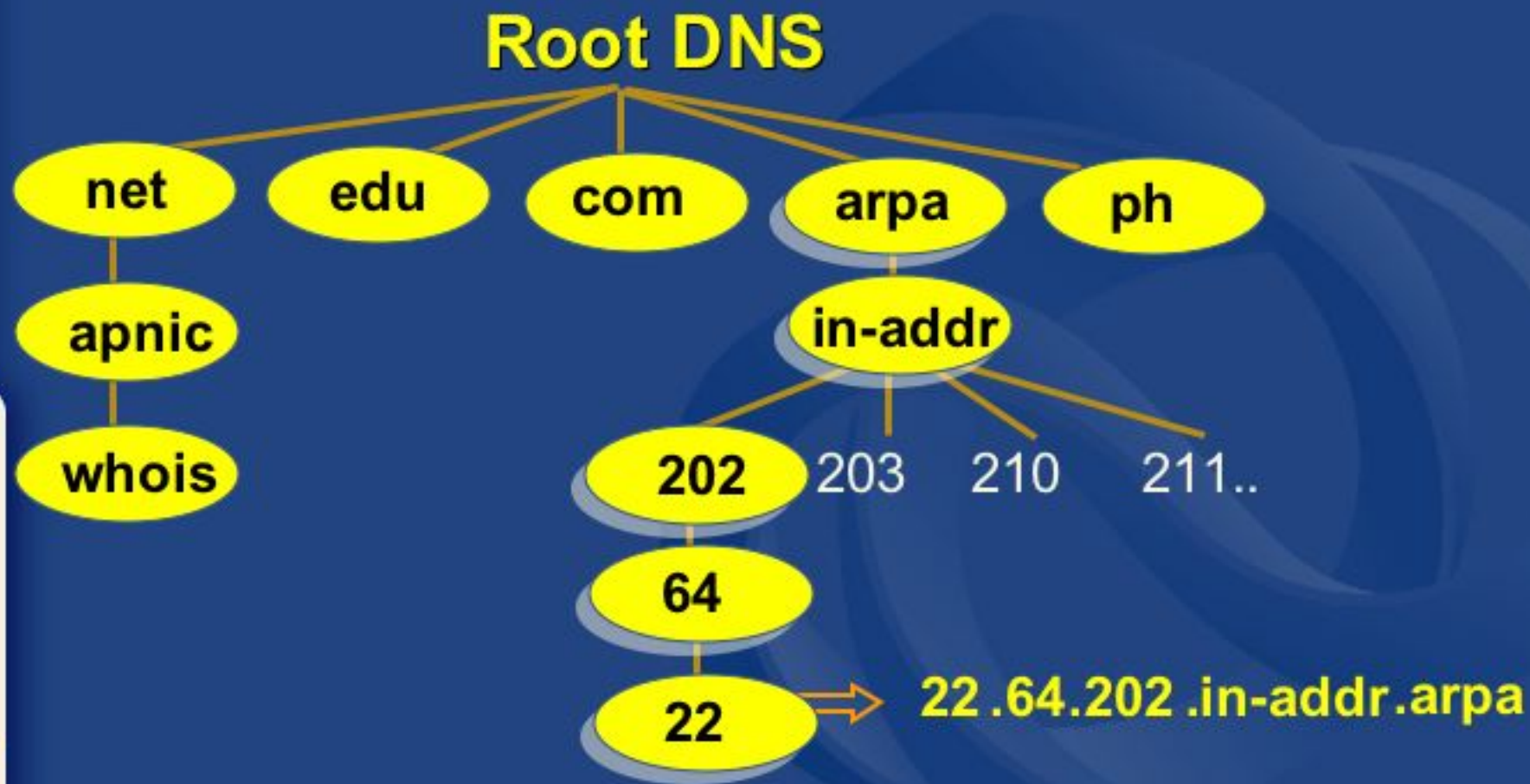
- 'Forward DNS' maps names to numbers
  - svc00.apnic.net -> 202.12.28.131
- 'Reverse DNS' maps numbers to names
  - 202.12.28.131 -> svc00.apnic.net

# In-addr.arpa

- Hierarchy of IP addresses
  - Uses 'in-addr.arpa' domain
    - INverse ADDRess
- IP addresses:
  - Less specific to More specific
    - 210.56.14.1
- Domain names:
  - More specific to Less specific
    - delhi.vsnl.net.in
  - Reversed in in-addr.arpa hierarchy
    - 14.56.210.in-addr.arpa

# Reverse DNS delegation

- Mapping numbers to names - 'reverse DNS'





# Reverse DNS - why bother?

- Service denial
  - That only allow access when fully reverse delegated eg. anonymous ftp
- Diagnostics
  - Assisting in trace routes etc
- Registration
  - Responsibility as a member and Local IR

# Member responsibilities

- Are to
  - Be familiar with APNIC procedures
  - Ensure that addresses are reverse-mapped
  - Maintain nameservers for allocations
  - Minimise “pollution” of DNS
    - syntax or configuration errors
- Are not to
  - Manage reverse delegation of zones for addresses not (yet) assigned or allocated

# /16 network delegations

If a member has a /16 allocated, APNIC will delegate the entire zone to the member

- APNIC requirements are
  - Entire /16 is allocated to organisation
  - Member manages network delegations to customers
  - Member's NS is primary
  - Other secondary servers are recommended
    - Recommend asking APNIC to secondary zone



# /24 network delegations

If a member has an allocation smaller than a /16 (eg. /19) then APNIC delegates each /24 separately

- APNIC requirements are
  - Each /24 address is assigned or allocated
  - One NS set up as primary
  - At least one other NS set up as secondary

# Subnet delegations

Reverse delegation is also possible for a /24 shared by more than one customer

- APNIC requirements
  - Same as for network delegations; we reverse delegate the entire /24
  - Read “classless in-addr.arpa delegation”
    - <http://ftp.apnic.net/ietf/rfc/rfc2000/rfc2317.txt>

A yellow rectangular logo with a slight 3D effect, containing the text "RFC 2317" in purple. The logo is positioned to the right of the main text, partially overlapping the "classless in-addr.arpa delegation" bullet point.

RFC  
2317



# Delegation procedures

- Upon allocation, member is asked if they want /24 place holder domain objects with member maintainer
  - Gives member direct control
- Standard APNIC database object,
  - can be updated through online form or via email.
- Nameserver/domain set up verified before being submitted to the database.
- Protection by maintainer object
  - (current auths: NONE, CRYPT-PW, PGP).
- Zone file updated 2-hourly



# Example 'domain' object

```
domain:      124.54.202.in-addr.arpa
descr:      co-located server at mumbai
country:    IN
admin-c:    VT43-AP
tech-c:     IA15-AP
zone-c:     IA15-AP
nserver:    dns.vsnl.net.in
nserver:    giasbm01.vsnl.net.in
mnt-by:     MAINT-IN-VSNL
changed:    gpsingh@vsnl.net.in 20010612
source:     APNIC
```

# Delegation procedures

- Complete the documentation
  - <http://www.apnic.net/db/domain.html>
- On-line form interface
  - Real time feedback
  - Gives errors, warnings in zone configuration
    - serial number of zone consistent across nameservers
    - nameservers listed in zone consistent
  - Uses database 'domain' object
    - examples of form to follow..

# Reverse DNS request form

Create Domain Object - Microsoft Internet Explorer

Address: http://www.apnic.net/apnic-bin/creform.pl

APNIC Asia Pacific Network Information Centre  
[Info & FAQ](#) | [Resource services](#) | [Training](#) | [Meetings](#) | [Membership](#) | [Documents](#) | [Whois & Search](#) | [Internet community](#)

## Create Domain Object

### Domain Object

**What is this form to be used for?**  
 This form assists in the creation and maintenance of domain objects. The domain class:

(\* indicates mandatory field)

\*Domain:

\*Descr:

Country:

\*Admin-c:

An admin-c must be someone physically located at the site of the network.



# Request form

Create Domain Object - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address <http://www.apnic.net/apnic-bin/creform.pl> Go

\*Nserver: dns.vsnl.net.in  
 giasbm01.vsnl.net.in

Remarks:

Notify: This email address will be notified by the APNIC database when this object changes

\*Mnt-by: MAINT-WF-EX

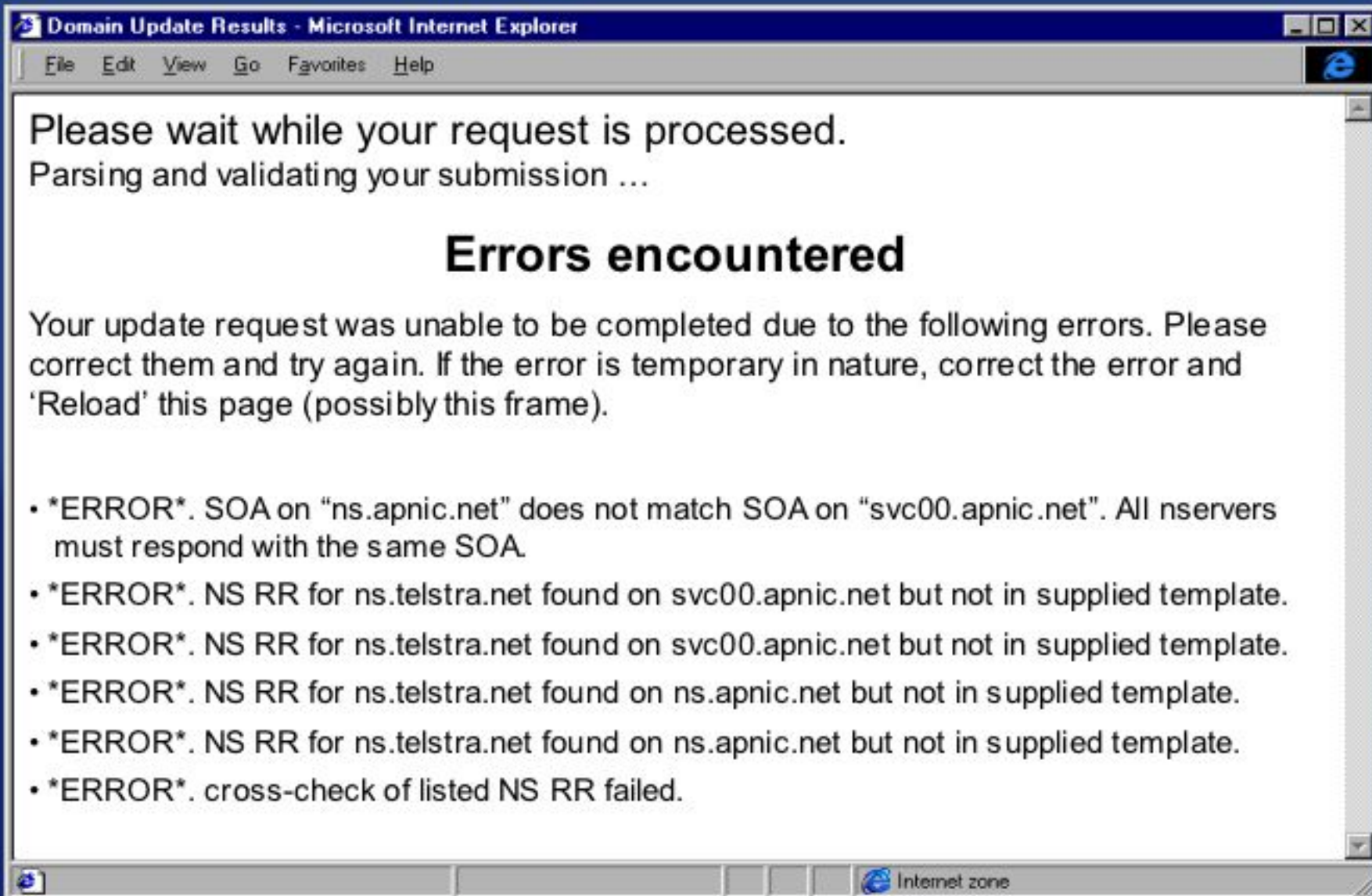
\*Password:  
 You must supply a password for one of the maintainers listed in this field

Mnt-lower: This stops ad-hoc additions beneath this zone.

# Evaluation

- Parser checks for
  - ‘whois’ database
    - IP address range is assigned or allocated
    - Must be in APNIC database
  - Maintainer object
    - Mandatory field of domain object
  - Nic-handles
    - zone-c, tech-c, admin-c

# Online errors (also via email)



Domain Update Results - Microsoft Internet Explorer

File Edit View Go Favorites Help

Please wait while your request is processed.  
Parsing and validating your submission ...

## Errors encountered

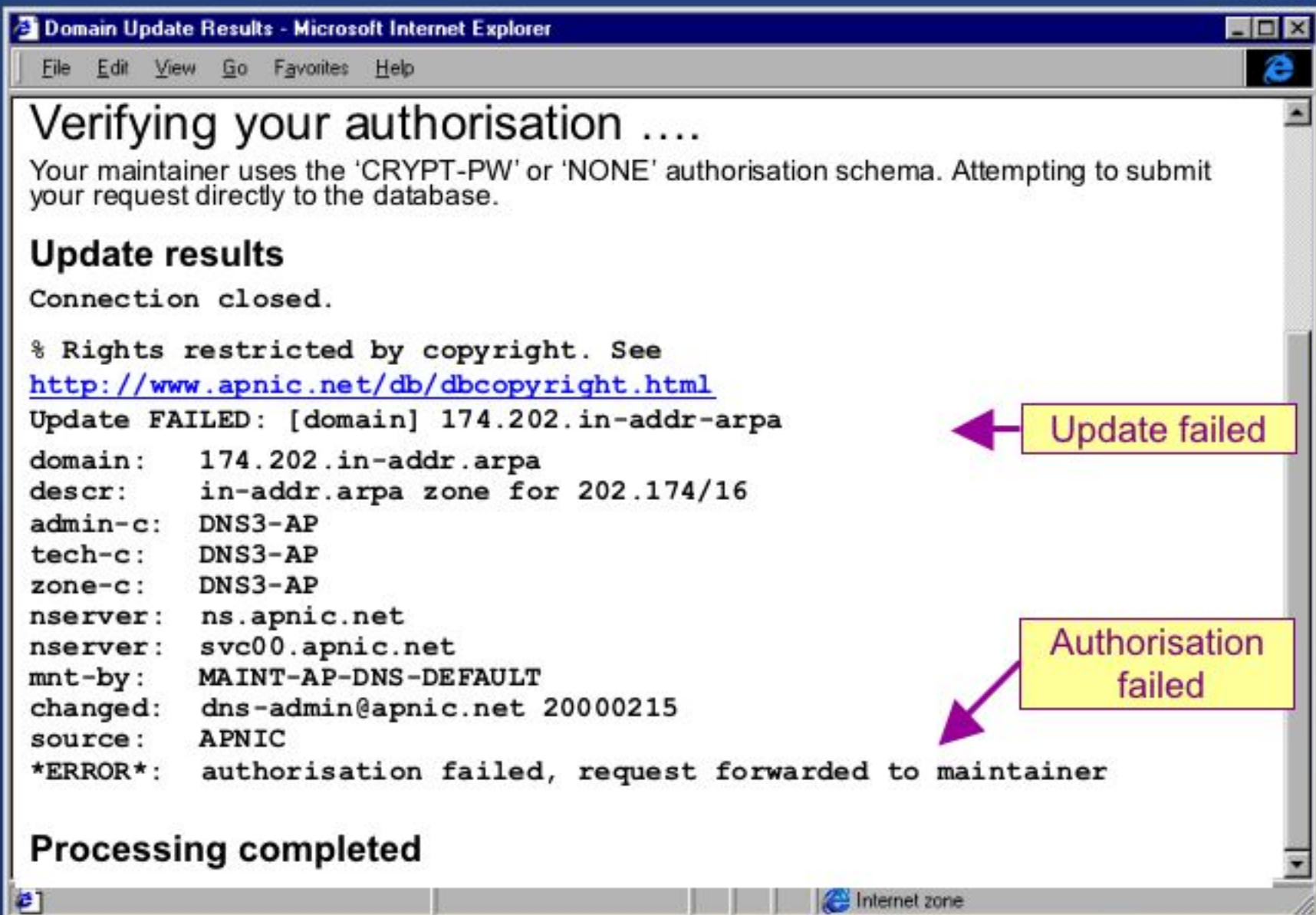
Your update request was unable to be completed due to the following errors. Please correct them and try again. If the error is temporary in nature, correct the error and 'Reload' this page (possibly this frame).

- \*ERROR\*. SOA on "ns.apnic.net" does not match SOA on "svc00.apnic.net". All nservers must respond with the same SOA.
- \*ERROR\*. NS RR for ns.telstra.net found on svc00.apnic.net but not in supplied template.
- \*ERROR\*. NS RR for ns.telstra.net found on svc00.apnic.net but not in supplied template.
- \*ERROR\*. NS RR for ns.telstra.net found on ns.apnic.net but not in supplied template.
- \*ERROR\*. NS RR for ns.telstra.net found on ns.apnic.net but not in supplied template.
- \*ERROR\*. cross-check of listed NS RR failed.

Internet zone



# Request submission error



Domain Update Results - Microsoft Internet Explorer

File Edit View Go Favorites Help

## Verifying your authorisation ....

Your maintainer uses the 'CRYPT-PW' or 'NONE' authorisation schema. Attempting to submit your request directly to the database.

### Update results

Connection closed.

% Rights restricted by copyright. See <http://www.apnic.net/db/dbcopyright.html>

Update FAILED: [domain] 174.202.in-addr-arpa

domain: 174.202.in-addr.arpa  
 descr: in-addr.arpa zone for 202.174/16  
 admin-c: DNS3-AP  
 tech-c: DNS3-AP  
 zone-c: DNS3-AP  
 nserver: ns.apnic.net  
 nserver: svc00.apnic.net  
 mnt-by: MAINT-AP-DNS-DEFAULT  
 changed: dns-admin@apnic.net 20000215  
 source: APNIC  
 \*ERROR\*: authorisation failed, request forwarded to maintainer

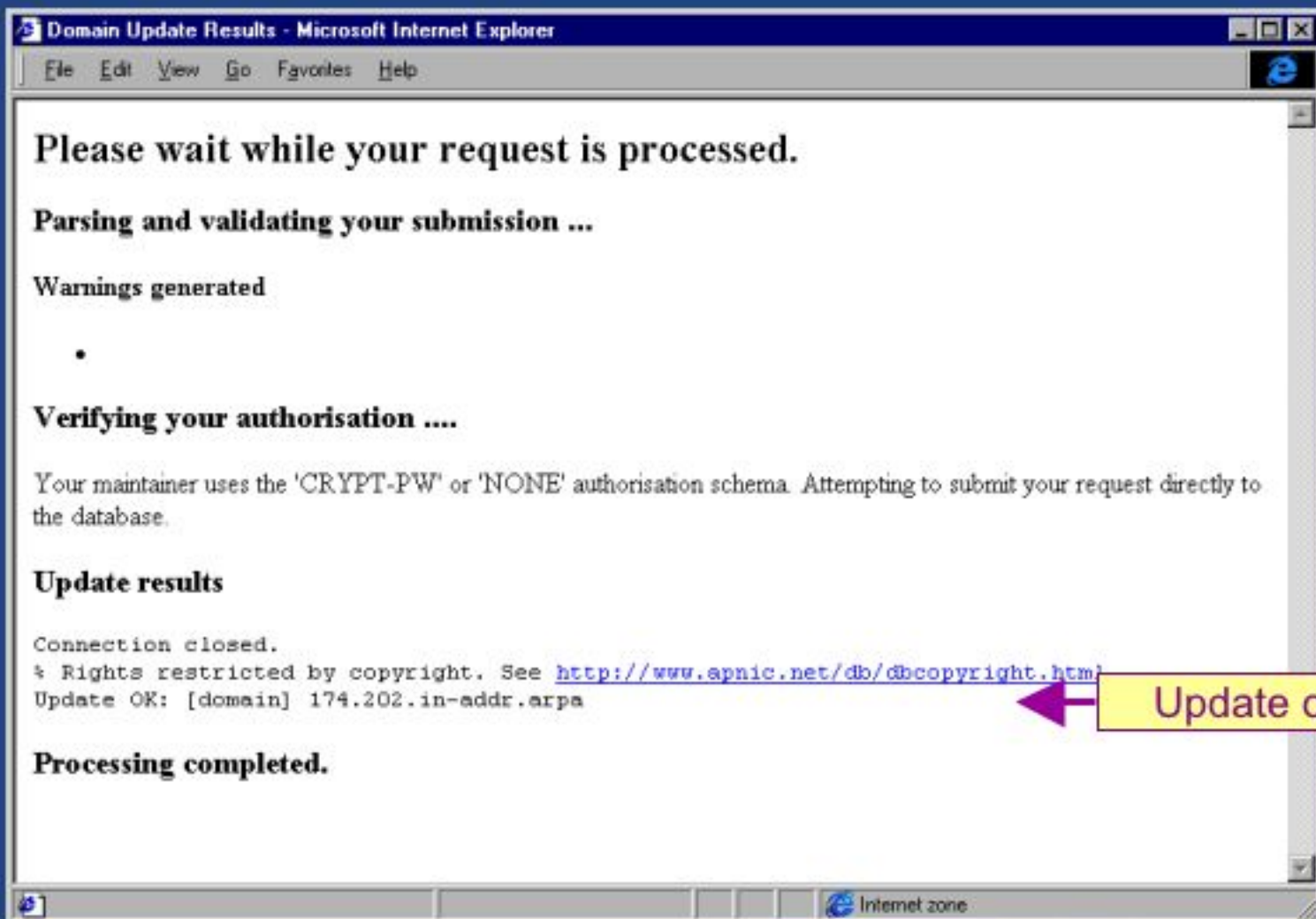
Processing completed

Internet zone

Update failed

Authorisation failed

# Successful update



Domain Update Results - Microsoft Internet Explorer

File Edit View Go Favorites Help

Please wait while your request is processed.

**Parsing and validating your submission ...**

Warnings generated

- 

**Verifying your authorisation ....**

Your maintainer uses the 'CRYPT-PW' or 'NONE' authorisation schema. Attempting to submit your request directly to the database.

**Update results**

Connection closed.  
 \* Rights restricted by copyright. See <http://www.apnic.net/db/@copyright.html>  
 Update OK: [domain] 174.202.in-addr.arpa

**Processing completed.**

Internet zone

Update ok!



## Questions?

- Are all your zones, and your customer zones registered?



# Database Administrivia

Role objects and advanced queries

# Role object

- Represents a group of contact persons for an organisation
  - Eases administration
  - Can be referenced in other objects instead of the person objects for individuals
- Also has a nic-hdl
  - More info on role objects:
    - <http://www.apnic.net/db/role.html>

# Role object - example

- Contains contact info for several contacts

Attributes

Values

<b>role:</b>	OPTUS IP ADMINISTRATORS
address:	101 Miller Street North Sydney
country:	AU
phone:	+61-2-93427681
phone:	+61-2-93420813
fax-no:	+61-2-9342-0998
fax-no:	+61-2-9342-6122
e-mail:	noc@optus.net.au
admin-c:	NC8-AP
tech-c:	NC8-AP
tech-c:	SC120-AP
nic-hdl:	OA3-AP
mnt-by:	MAINT-OPTUSCOM-AP
source:	APNIC



# Creating a role object

- Whois –t role
  - Gives role object template
- Complete all fields
  - With the nic-hdls of all contacts in your organisation
- Send to

<auto-dbm@apnic.net>

# Replacing contacts in the DB

## - Using person objects

*K. Xander is leaving my organisation. Z. Ulrich replaces him.*

1. Create a person object for new contact (Z. Ulrich).
2. Find all objects containing old contact (K. Xander).
3. Update all objects, replacing old contact (KX17-AP) with new contact (ZU3-AP).
4. Delete old contact's (KX17-AP) person object.

~~person:  
...  
KX17-AP~~

person:  
...  
ZU3-AP

inetnum:  
202.0.10.0  
...  
ZU3-AP

inetnum:  
202.0.12.127  
...  
ZU3-AP

inetnum:  
202.0.15.192  
...  
ZU3-AP



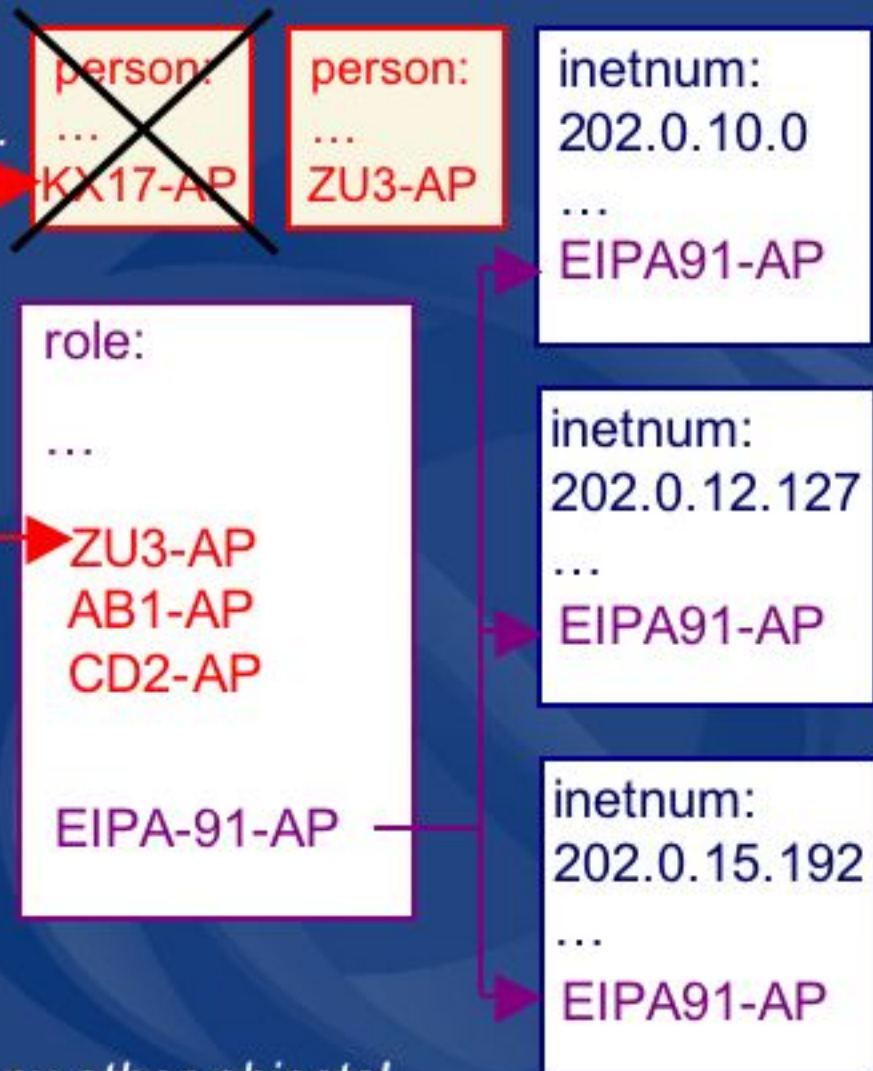
# Replacing contacts in the DB

## – Using a role object

*K. Xander is leaving my organisation. Z. Ulrich replaces him.*

*I am using a role object containing all contact persons, which is referenced in all my objects.*

1. Create a person object for new contact (Z. Ulrich).
2. Replace old contact (KX17-AP) with new contact (ZU3-AP) in role object
3. Delete old contact's person object.



*No need to update any other objects!*



# Summary

- Use **role objects** for all your contacts
  - Easier to administer your contacts
  - Keep the role object up-to-date

# Questions ?

# Autonomous System Numbers

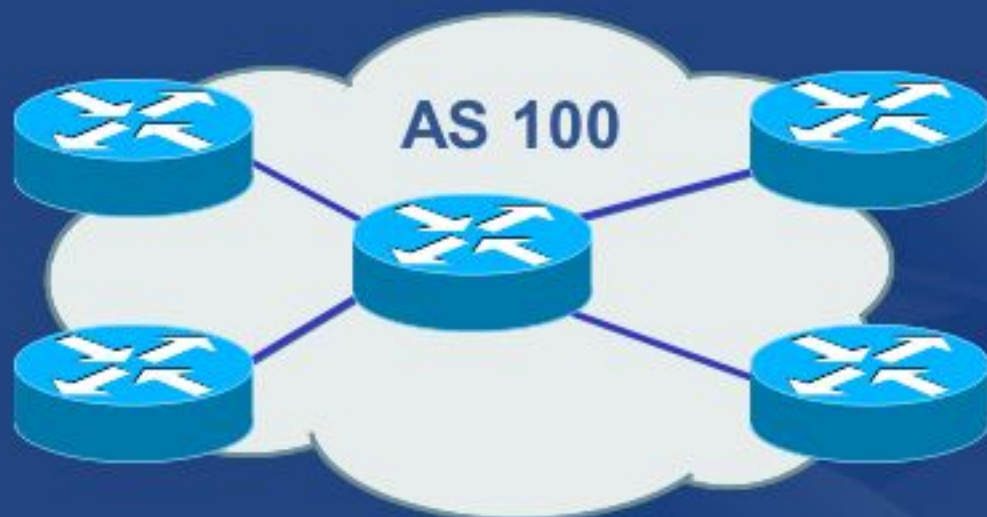
## Procedures



# Overview

- What is an AS?
- Guidelines and procedures
- Application form (documentation)
- Policy expression

# What is an Autonomous System?



- Collection of networks with same routing policy
- Usually under single ownership, trust and administrative control

# When do I need an ASN?

- When do I need an AS?
  - Multi-homed network to different providers and
  - Routing policy different to external peers

- Recommended reading!
  - RFC1930: Guidelines for creation, selection and registration of an Autonomous System





# When don't I need an ASN?

- Factors that don't count
  - Transition and 'future proofing'
  - Multi-homing to the same upstream
    - RFC2270: A dedicated AS for sites homed to a single provider
  - Service differentiation
    - RFC1997: BGP Communities attribute



RFC  
2270



RFC  
1997

# Requesting an ASN

- Complete the request form
  - web form available:
    - <http://www.apnic.net/db/aut-num.html>
- Request form is parsed - real time
  - Must include routing policy
    - multiple import and export lines
  - Is checked for syntactical accuracy
    - based on RPSL (rfc2622)
  - Peers verified by querying routing table
  - [NO-PARSE] will not send request to parser



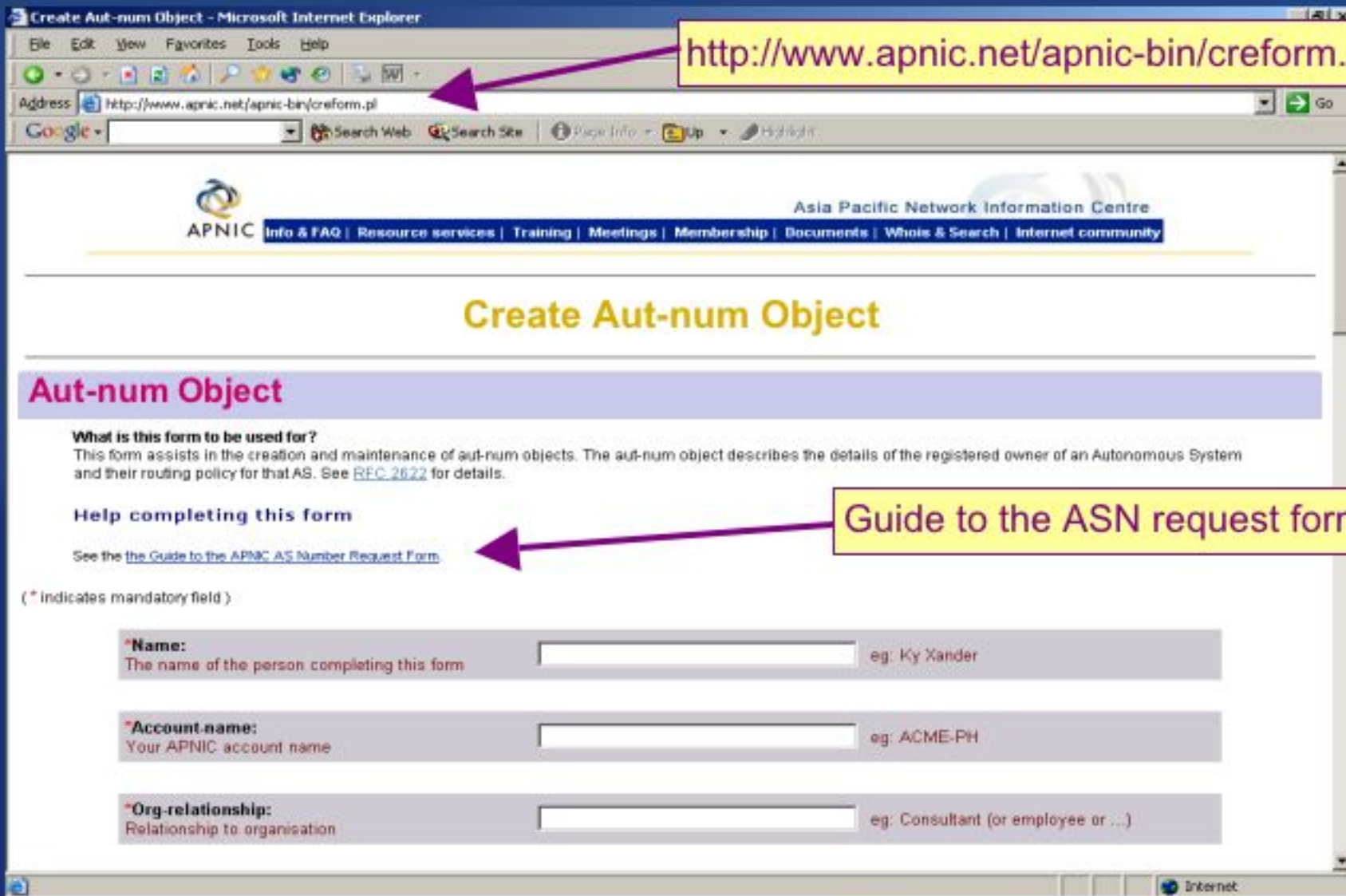


# Requesting an ASN - customers

1. Requested directly from APNIC
    - AS number is “portable”
  2. Requested via member
    - ASN is “non-portable”
    - ASN returned if customer changes provider
- New policy as of Nov-02
- Transfers of ASNs
    - Need legal documentation (mergers etc)
    - Should be returned if no longer required



# ASN request form



The screenshot shows a web browser window titled "Create Aut-num Object - Microsoft Internet Explorer". The address bar contains the URL <http://www.apnic.net/apnic-bin/creform.pl>, which is highlighted by a yellow box with a purple arrow pointing to the browser's address bar.

The page content includes the APNIC logo and navigation menu. The main heading is "Create Aut-num Object". Below this is a section titled "Aut-num Object" with a purple background. The text explains the form's purpose: "This form assists in the creation and maintenance of aut-num objects. The aut-num object describes the details of the registered owner of an Autonomous System and their routing policy for that AS. See [RFC 2622](#) for details."

A section titled "Help completing this form" contains a link: "See the [the Guide to the APNIC AS Number Request Form](#)". This link is highlighted by a yellow box with a purple arrow pointing to it.

Below the text, there is a note: "( \* indicates mandatory field )".

The form consists of three input fields:

- \*Name:** The name of the person completing this form. Example: eg. Ky Xander.
- \*Account name:** Your APNIC account name. Example: eg. ACME-PH.
- \*Org-relationship:** Relationship to organisation. Example: eg. Consultant (or employee or ...)

# Request form – routing policy

Create Aut-num Object - Microsoft Internet Explorer

Address: http://www.apnic.net/apnic-bin/creform.pl

System (AS):

**Descr:**  
A short description of this object and the name of the organisation associated with it.

**Country:**  
Name of the country of the admin-c

**Import:**  
Routing information your AS will accept from neighbouring Autonomous Systems  
Information regarding RPSL syntax can be found in [RFC 2622](#)

**Export:**  
generated routing information your AS will send to peer Autonomous Systems  
Information regarding RPSL syntax can be found in [RFC 2622](#)

**Default:**  
If applicable, a description of how default routing policy is applied.  
More information regarding RPSL syntax can be found in [RFC 2622](#)

from AS1 Action pref=100;  
accept ANY  
from AS2 Action pref=100;  
accept ANY

Import

to AS1 announce THIS-AS  
to AS2 announce THIS-AS

Export



# Aut-num object example

```

aut-num:          AS4777
as-name:          APNIC-NSPIXP2-AS
descr:            Asia Pacific Network Information Centre
descr:            AS for NSPIXP2, remote facilities site
import:           from AS2500 action pref=100; accept ANY
import:           from AS2524 action pref=100; accept ANY
import:           from AS2514 action pref=100; accept ANY
export:           to AS2500 announce AS4777
export:           to AS2524 announce AS4777
export:           to AS2514 announce AS4777
default:          to AS2500 action pref=100; networks ANY
admin-c:          PW35-AP
tech-c:           NO4-AP
remarks:          Filtering prefixes longer than /24
mnt-by:           MAINT-APNIC-AP
changed:          paulg@apnic.net 19981028
source:           APNIC
  
```

**POLICY  
RPSL**



# Questions ?

- Want to learn more about RPSL and routing policy?
  - *Come to the IRR tutorial tomorrow, Tuesday!*

# IPv6

## Overview, Policies & Procedures

# IPv6 address policy

## - goals

- Efficient address usage
  - Avoid wasteful practices
- Aggregation
  - Hierarchical distribution
  - Aggregation of routing information
  - Limiting no of routing entries advertised into the Internet
- Minimise overhead
  - Associated with obtaining address space
- Registration, Uniqueness, Fairness & consistency



# IPv6 initial allocation criteria

- Be an LIR
  - Not be an end site
- Plan for at least 200 /48 assignments to other organisations within 2 years
- Plan to provide IPv6 connectivity to organisations and to end sites

# IPv6 allocation policy

## - initial allocation

- First allocation size ('Slow start')
  - /32 if no previous assignment history
    - Large allocation facilitates the creation of hierarchy within allocation
  - Larger possible if technically justified
    - Previous assignment history taking into account
  - Existing /35 holders
    - Eligible to have /35 expanded to a /32

# IPv6 assignments

- /48s assignments per end site
  - /64 only one subnet
  - /128 only one device connecting
- Multiple /48s
  - Should be reviewed by RIR/NIR
  - Second opinion process follows
- ISP infrastructure
  - /48 per POP



# Portable IPv6 assignments for IXPs

- Demonstrate ‘open peering policy’
- 3 or more peers
- Portable assignment size: /48
  - All other needs should be met through normal processes
  - /64 holders can “upgrade” to /48
    - Through NIRs/ APNIC
    - Need to return /64

New policy  
as of Dec-02

# References

- IPv6 Resource Guide
  - [http://www.apnic.net/services/ipv6\\_guide.html](http://www.apnic.net/services/ipv6_guide.html)
- IPv6 Policy Document
  - <http://www.apnic.net/policies.html>
- IPv6 Address request form
  - <http://ftp.apnic.net/apnic/docs/ipv6-alloc-request>

## FAQ

- <http://www.apnic.net/info/faq/IPv6-FAQ.html>

# Questions ?

- *More IPv6 to be discussed in the IPv6 technical SIG on Wednesday*



# Summary

What we have covered today

# Summary - responsibilities

- As an APNIC member and custodian of address space
  - Be aware of your responsibilities
  - Register customer assignments in APNIC database
    - Keep this data up-to-date & accurate
  - Educate your customers
  - Document your network in detail
    - Keep local records
  - Register reverse DNS delegations

# Summary

- “Do the right thing”
  - Think about routing table size & scalability of Internet
  - Encourage renumbering
  - Announce aggregate prefixes
  - Think global not local



# Thank you !!

Your feedback is appreciated

# Supplementary Reading

# Introduction

- Regional Registry web sites
  - APNIC
    - <http://www.apnic.net>
  - ARIN
    - <http://www.arin.net>
  - RIPE NCC
    - <http://www.ripe.net>
- APNIC past meetings
  - <http://www.apnic.net/meetings>



# Introduction

- APNIC members
  - <http://www.apnic.net/members.html>
- Membership
  - Membership procedure  
<http://www.apnic.net/membersteps.html>
  - Membership application form  
<http://www.apnic.net/apnic-bin/membership-application.pl>
  - Membership fees  
<http://www.apnic.net/docs/corpdocs/FeeSchedule.htm>

# Member services helpdesk

- One point of contact for all member enquiries
  - Extended operating hours
    - 9:00 am to 7:00 pm (Australian EST, UTC + 10 hrs)
- More personalised service
  - Range of languages
    - including Cantonese, Filipino, Mandarin, Thai, Vietnamese etc.
- Faster response and resolution of queries
  - such as IP resource applications, status of requests, obtaining help in completing application forms, membership enquiries, billing issues & database enquiries



# Introduction to APNIC & IR Policies

- Classless techniques
- CIDR
  - <http://ftp.apnic.net/ietf/rfc/rfc1000/rfc1517-19.txt>
  - Network Addressing when using CIDR  
<ftp://ftp.uninett.no/pub/misc/eidnes-cidr.ps.Z>
  - Variable Length Subnet Table  
<http://ftp.apnic.net/ietf/rfc/rfc1000/rfc1878.txt>
- Private Address Space
  - Address Allocation for Private Internets
    - <http://ftp.apnic.net/ietf/rfc/rfc1000/rfc1918.txt>
  - Counter argument: Unique addresses are good
    - <http://ftp.apnic.net/ietf/rfc/rfc1000/rfc1817.txt>



# APNIC Mailing Lists

- apnic-talk
  - Open discussion relevant to APNIC community and members
    - e.g. policies, procedures etc
- apnic-announce
  - Announcements of interest to the AP community
- ipv6-registry
  - IPv6 allocation and assignment policies
- [http://www.apnic.net/net\\_comm/lists/](http://www.apnic.net/net_comm/lists/)
- subscribe via <majordomo@apnic.net>
- archives at <http://ftp.apnic.net/apnic/mailling-lists>

# The RIR System

- “Development of the Regional Internet Registry System”
  - Internet Protocol Journal
    - Short history of the Internet
  - [http://www.cisco.com/warp/public/759/ipj\\_4-4/ipj\\_4-4\\_regional.html](http://www.cisco.com/warp/public/759/ipj_4-4/ipj_4-4_regional.html)

# Policies & the Policy Environment

- Policy Documentation
  - Policies for address space management in the Asia Pacific region
    - <http://www.apnic.net/docs/policy/add-manage-policy.html>
  - RFC2050: Internet Registry IP allocation Guidelines
    - <http://ftp.apnic.net/ietf/rfc/rfc2000/rfc2050.txt>



# Address Request Procedures

- Addressing Guidelines
  - Designing Addressing Architectures for Routing & Switching Howard C. Berkowitz
- Address Request Forms
  - ISP Address Request Form  
<http://www.apnic.net/services/ipv4/>
  - Second-opinion Request Form
    - <http://cgi.apnic.net/apnic-bin/second-opinion-request.pl>
  - No Questions Asked  
<http://ftp.apnic.net/apnic/docs/no-questions-policy>

# APNIC Database

- APNIC Database Documentation
  - <http://ftp.apnic.net/apnic/docs/database-update-info>
  - <http://ftp.apnic.net/apnic/docs/maintainer-request>
  - <http://www.apnic.net/apnic-bin/maintainer.pl>
  - [http://www.apnic.net/services/whois\\_guide.html](http://www.apnic.net/services/whois_guide.html)
- RIPE Database Documentation
- Database 'whois' Client
  - <http://ftp.apnic.net/apnic/dbase/tools/ripe-dbase-client.tar.gz>
  - <http://www.apnic.net/apnic-bin/whois2.pl>



# Person Object Template

person:	[mandatory]	[single]	[lookup key]
address:	[mandatory]	[multiple]	[ ]
country:	[optional]	[single]	[ ]
phone:	[mandatory]	[multiple]	[ ]
fax-no:	[optional]	[multiple]	[ ]
e-mail:	[mandatory]	[multiple]	[lookup key]
nic-hdl:	[mandatory]	[single]	[primary/look-up key]
remarks:	[optional]	[multiple]	[ ]
notify:	[optional]	[multiple]	[inverse key]
mnt-by:	[mandatory]	[multiple]	[inverse key]
changed:	[mandatory]	[multiple]	[ ]
source:	[mandatory]	[single]	[ ]



# Role Object Template

role:	[mandatory]	[single]	[lookup key]
address:	[mandatory]	[multiple]	[]
country:	[optional]	[single]	[]
phone:	[mandatory]	[multiple]	[]
fax-no:	[optional]	[multiple]	[]
e-mail:	[mandatory]	[multiple]	[lookup key]
trouble:	[optional]	[multiple]	[]
admin-c:	[mandatory]	[multiple]	[inverse key]
tech-c:	[mandatory]	[multiple]	[inverse key]
nic-hdl:	[mandatory]	[single]	[primary/look-up key]
remarks:	[optional]	[multiple]	[]
notify:	[optional]	[multiple]	[inverse key]
mnt-by:	[mandatory]	[multiple]	[inverse key]
changed:	[mandatory]	[multiple]	[]
source:	[mandatory]	[single]	[]

# Maintainer Object Template

mntner:	[mandatory]	[single]	[primary/look-up key]
descr:	[mandatory]	[multiple]	[ ]
country:	[optional]	[single]	[ ]
admin-c:	[mandatory]	[multiple]	[inverse key]
tech-c:	[optional]	[multiple]	[inverse key]
upd-to:	[mandatory]	[multiple]	[inverse key]
mnt-nfy:	[optional]	[multiple]	[inverse key]
auth:	[mandatory]	[multiple]	[ ]
remarks:	[optional]	[multiple]	[ ]
notify:	[optional]	[multiple]	[inverse key]
mnt-by:	[mandatory]	[multiple]	[inverse key]
referral-by:	[mandatory]	[single]	[inverse key]
changed:	[mandatory]	[multiple]	[ ]
source:	[mandatory]	[single]	[ ]



# Inetnum Object Template

inetnum:	[mandatory]	[single]	[primary/look-up key]
netname:	[mandatory]	[single]	[lookup key]
descr:	[mandatory]	[multiple]	[ ]
country:	[mandatory]	[multiple]	[ ]
admin-c:	[mandatory]	[multiple]	[inverse key]
tech-c:	[mandatory]	[multiple]	[inverse key]
rev-srv:	[optional]	[multiple]	[inverse key]
status:	[mandatory]	[single]	[ ]
remarks:	[optional]	[multiple]	[ ]
notify:	[optional]	[multiple]	[inverse key]
mnt-by:	[mandatory]	[multiple]	[inverse key]
mnt-lower:	[optional]	[multiple]	[inverse key]
mnt-routes:	[optional]	[multiple]	[inverse key]
mnt-irt:	[optional]	[multiple]	[inverse key]
changed:	[mandatory]	[multiple]	[ ]
source:	[mandatory]	[single]	[ ]



# Aut-num Object Template

aut-num:	[mandatory]	[single]	[primary/look-up key]
as-name:	[mandatory]	[single]	[ ]
descr:	[mandatory]	[multiple]	[ ]
country:	[optional]	[single]	[ ]
member-of:	[optional]	[multiple]	[ ]
import:	[optional]	[multiple]	[ ]
export:	[optional]	[multiple]	[ ]
default:	[optional]	[multiple]	[ ]
remarks:	[optional]	[multiple]	[ ]
admin-c:	[mandatory]	[multiple]	[inverse key]
tech-c:	[mandatory]	[multiple]	[inverse key]
cross-mnt:	[optional]	[multiple]	[inverse key]
cross-nfy:	[optional]	[multiple]	[inverse key]
notify:	[optional]	[multiple]	[inverse key]
mnt-lower:	[optional]	[multiple]	[inverse key]
mnt-routes:	[optional]	[multiple]	[inverse key]
mnt-by:	[mandatory]	[multiple]	[inverse key]
changed:	[mandatory]	[multiple]	[ ]
source:	[mandatory]	[single]	[ ]

# Domain Object Template

domain:	[mandatory]	[single]	[primary/look-up key]
descr:	[mandatory]	[multiple]	[ ]
country:	[optional]	[single]	[ ]
admin-c:	[mandatory]	[multiple]	[inverse key]
tech-c:	[mandatory]	[multiple]	[inverse key]
zone-c:	[mandatory]	[multiple]	[inverse key]
nserver:	[mandatory]	[multiple]	[inverse key]
sub-dom:	[optional]	[multiple]	[inverse key]
dom-net:	[optional]	[multiple]	[ ]
remarks:	[optional]	[multiple]	[ ]
notify:	[optional]	[multiple]	[inverse key]
mnt-by:	[mandatory]	[multiple]	[inverse key]
mnt-lower:	[optional]	[multiple]	[inverse key]
refer:	[optional]	[single]	[ ]
changed:	[mandatory]	[multiple]	[ ]
source:	[mandatory]	[single]	[ ]



# Reverse DNS

- Request Forms
  - <http://www.apnic.net/db/revdel.html>
  - <http://www.apnic.net/db/domain.html>
- Classless Delegations
  - <http://ftp.apnic.net/ietf/rfc/rfc2000/rfc2317.txt>
- Common DNS configuration errors
  - <http://ftp.apnic.net/ietf/rfc/rfc1000/rfc1537.txt>



# Reverse DNS

- Domain name structure and delegation
  - <http://ftp.apnic.net/ietf/rfc/rfc1000/rfc1591.txt>
- Domain administrators operations guide
  - <http://ftp.apnic.net/ietf/rfc/rfc1000/rfc1033.txt>
- Taking care of your domain
  - <ftp://ftp.ripe.net/ripe/docs/ripe-114.txt>
- Tools for DNS debugging
  - <http://ftp.apnic.net/ietf/rfc/rfc2000/rfc2317.txt>

# AS Assignment Procedures

- Guidelines for the creation, selection, and registration of an AS
  - <http://ftp.apnic.net/ietf/rfc/rfc1000/rfc1930.txt>
- Routing Policy Specification Language (RPSL)
  - <http://ftp.apnic.net/ietf/rfc/rfc2000/rfc2280.txt>

# IPv6

- IPv6 Address Allocation & Assignment Policy
  - <http://ftp.apnic.net/apnic/docs/ipv6-address-policy>
- IPv6 Address request form
  - <http://ftp.apnic.net/apnic/docs/ipv6-alloc-request>
- FAQ
  - <http://www.apnic.net/info/faq/IPv6-FAQ.html>



# IPv6: HD Ratio 0.8

IPv6 prefix	Site addr bits	Total site addrs in /48s	Threshold	Util%
42	6	64	28	43.5%
36	12	4096	776	18.9%
35	13	8192	1351	16.5%
<b>32</b>	<b>16</b>	<b>65536</b>	<b>7132</b>	<b>10.9%</b>
29	19	524288	37641	7.2%
24	24	16777216	602249	3.6%
16	32	4294967296	50859008	1.2%
8	40	1099511627776	4294967296	0.4%
3	45	35184372088832	68719476736	0.2%

RFC3194 "The Host-Density Ratio for Address Assignment Efficiency"

# Other Supplementary Reading

- Operational Content Books
  - ISP Survival Guide - Geoff Huston
- BGP Table
  - <http://www.telstra.net/ops/bgptable.html>
  - <http://www.merit.edu/ipma/reports>
  - [http://www.merit.edu/ipma/routing\\_table/mae-east/prefixlen.990212.html](http://www.merit.edu/ipma/routing_table/mae-east/prefixlen.990212.html)
  - <http://www.employees.org/~tbates/cidr.hist.plot.html>
- Routing Instability
  - <http://zounds.merit.net/cgi-bin/do.pl>



# Other Supplementary Reading

- Routing & Multihoming
  - Internet Routing Architectures - Bassam Halabi
  - BGP Communities Attribute
    - <http://ftp.apnic.net/ietf/rfc/rfc1000/rfc1997.txt>
    - <http://ftp.apnic.net/ietf/rfc/rfc1000/rfc1998.txt>
  - Multihoming
    - Using a Dedicated AS for Sites homed to a Single Provider  
<http://ftp.apnic.net/ietf/rfc/rfc2000/rfc2270.txt>



# Other Supplementary Reading

- Filtering
  - Egress Filtering  
<http://www.cisco.com/public/cons/isp>
  - Network Ingress Filtering: Defeating Denial of Service Attacks which employ IP Source Address Spoofing  
<http://ftp.apnic.net/ietf/rfc/rfc2000/rfc2267.txt>
- Dampening
  - case studies at  
<http://www.cisco.com/warp/public/459/16.html>
- Traceroute Server
  - <http://nitrous.digex.net>

# Other Supplementary Reading

- Renumbering
  - Network Renumbering Overview: Why Would I Want It and What Is It Anyway?
    - <http://ftp.apnic.net/ietf/rfc/rfc2000/rfc2071.txt>
  - Procedures for Enterprise Renumbering
    - <http://www.isi.edu/div7/pier/papers.html>
- NAT
  - The IP Network Address Translator
    - <http://ftp.apnic.net/ietf/rfc/rfc1000/rfc1631.txt>