APNIC Internet Resource Management (IRM) Tutorial

PACNOG 17

Apia, Samoa

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APNIC

Agenda

- IP Resource Allocation Policies
- Requesting IP Addresses
- Requesting AS Numbers
- APNIC Whois Database
- Reverse DNS
- MyAPNIC Address Management Tool

APNIC

Agenda

- **IP Resource Allocation Policies**
- Requesting IP Addresses
- Requesting AS Numbers
- APNIC Whois Database
- Reverse DNS
- MyAPNIC Address Management Tool

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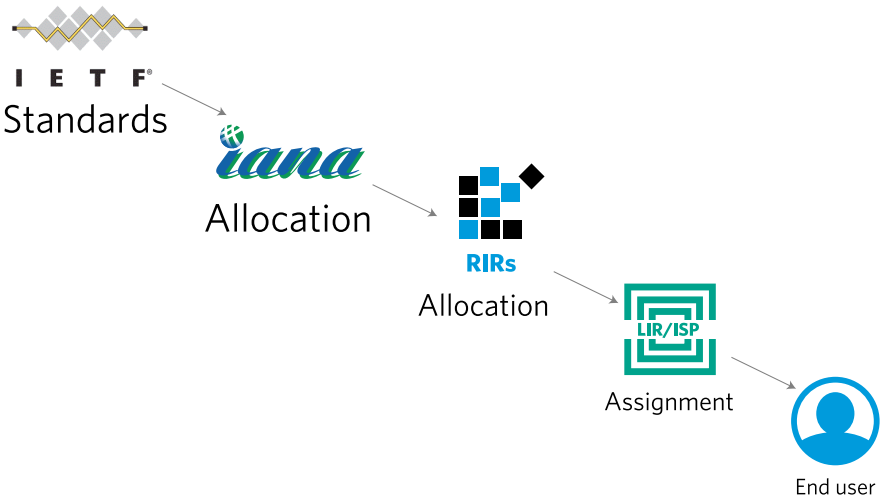
Where do IP Addresses come from?



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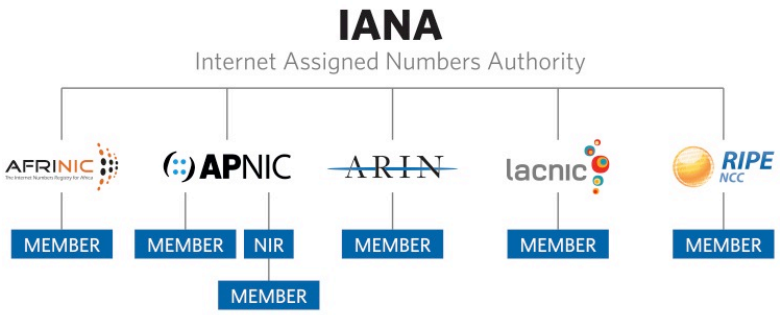
Internet Registry Structure

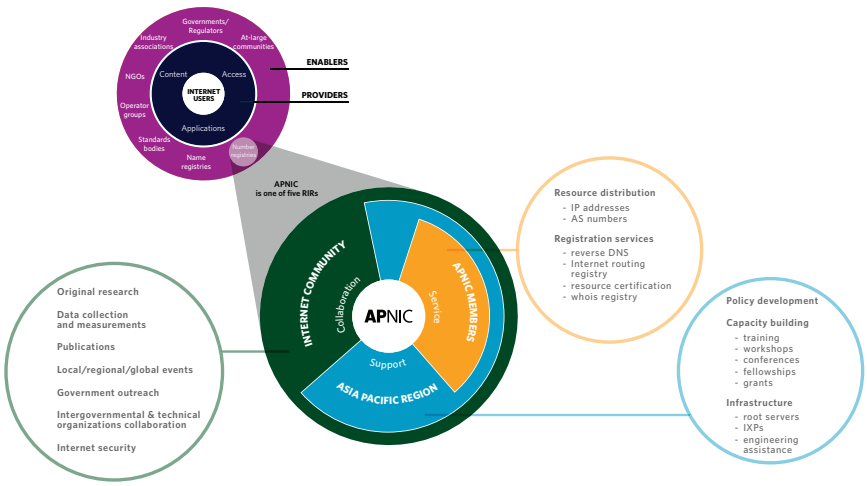


APNIC

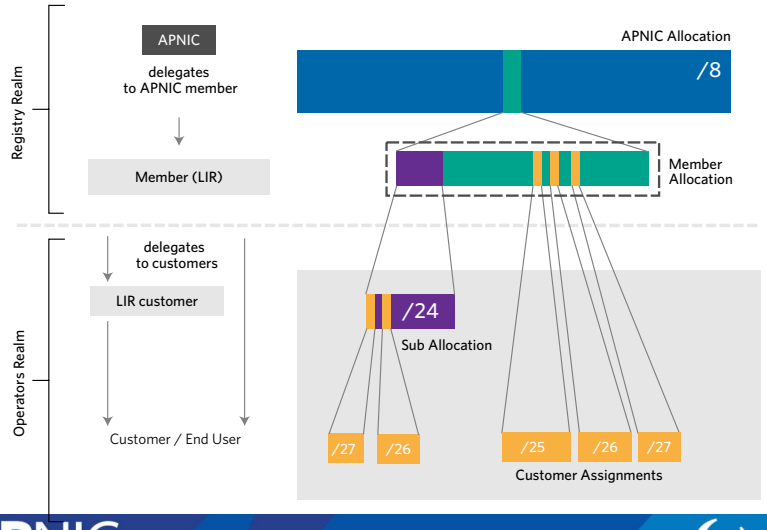
- Asia-Pacific Network Information Centre
- One of five Regional Internet Registry (RIRs) charged with ensuring the fair **distribution and responsible management of IP addresses** and related resources
- A membership-based, not-for-profit organization
- Industry self-regulatory body
  - Open
  - Consensus-based
  - Transparent

Where is the APNIC Region?

APNIC in the Internet Ecosystem

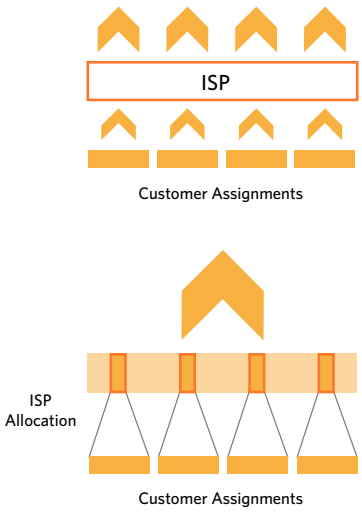


How IP Addresses are Delegated

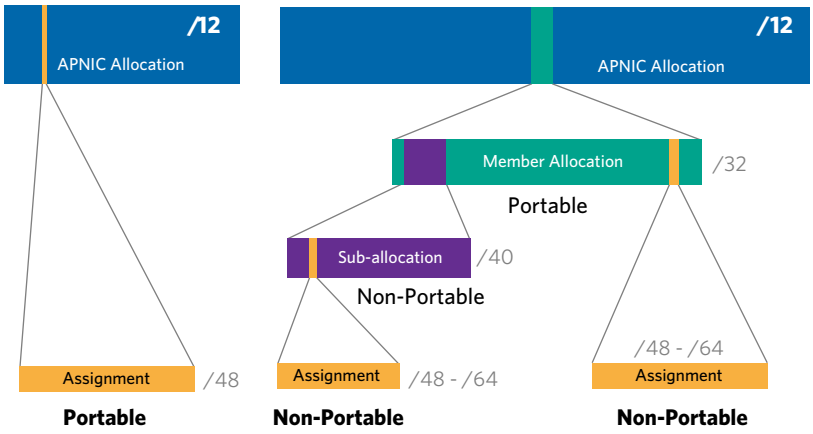


Portable and Non-Portable

- Portable Address
  - Provider-Independent (PI)
  - Assigned by RIR to end-user
  - Keeps addresses when changing ISP
  - Increases the size of routing tables
- Non-portable Address
  - Provider-aggregatable (PA)
  - End-user gets address space from LIR
  - Must renumber if changing upstream provider
  - Can be aggregated for improved routing efficiency

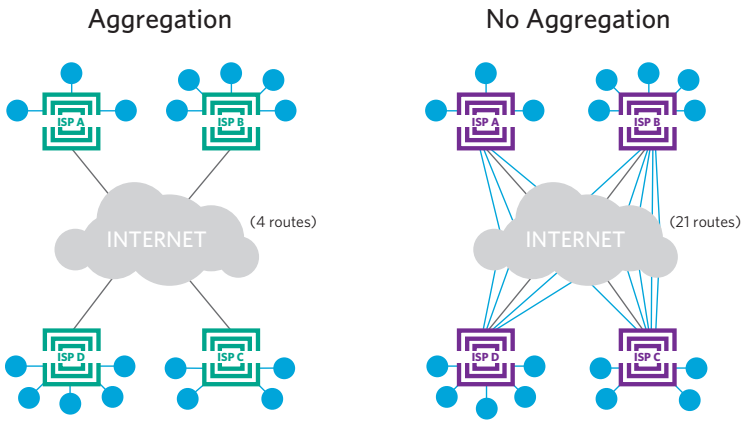


IPv6 Address Management Hierarchy



Describes "portability" of the address space

Aggregation and Portability



(non-portable assignments)

(portable assignments)

IRM Objectives

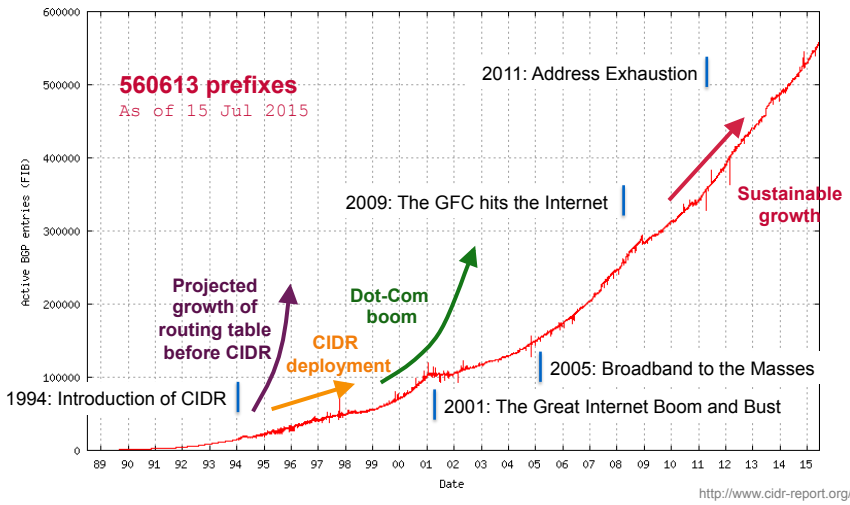
Conservation
- Efficient use of resources
- Based on demonstrated need

Aggregation
- Limit routing table growth
- Support provider-based routing

Registration
- Ensure uniqueness
- Facilitate trouble shooting

Uniqueness, fairness and consistency

Growth of the Global Routing Table



http://www.cidr-report.org/as2.0/

APNIC Policy Environment

- Internet resources are delegated on a license basis
  - Limited duration (usually one year)
  - Renewable on the following conditions:
    - Original basis of delegation remains valid, and
    - Address space is properly registered at the time of renewal
- Security and confidentiality
  - APNIC to maintain systems and practices that protect the confidentiality of Members' information and their customers

https://www.apnic.net/policy/policy-environment

Allocation Policies

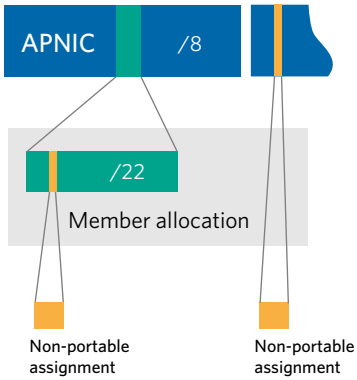
- Aggregation of allocation
  - Provider responsible for aggregation
  - Customer assignments /sub-allocations must be non-portable
- Allocations based on demonstrated need
  - Detailed documentation required
- All address space held to be declared

IPv4 Allocation Policies

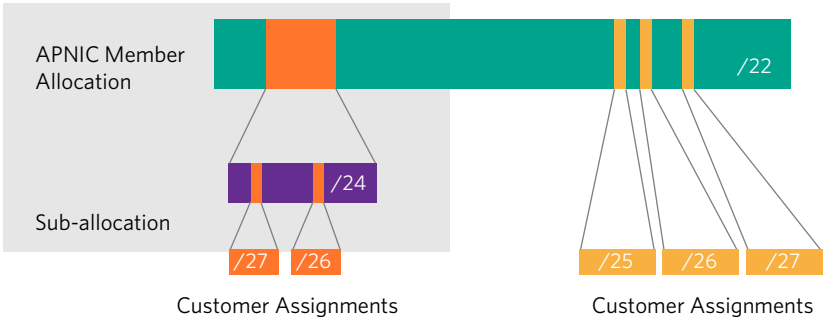
- APNIC IPv4 allocation size per account holder
  - Minimum /24
  - Maximum /21

  /22 from final /8 block

  /22 from the recovered block
- According to current allocation from the final /8 block
  - Allocation is based on demonstrated need



IPv4 Sub-allocation



- No max or min size
  - Max 1 year requirement
- Assignment Window & 2nd Opinion
  - applies to both sub-allocation & assignments
  - Sub-allocation holders don't need to send in 2nd opinions

What is an Assignment Window?

"The amount of address space a member may assign without a 'second opinion'"

- All members have an Assignment Window
  - 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 member's Assignment Window

Assignment Window

- Size of Assignment Window
  - Evaluated after about three 2nd-opinion requests
  - Increased as member gains experience and demonstrates understanding of policies
    - Assignment Window may be reduced, in rare cases
- Why an Assignment Window?
  - Monitoring ongoing progress and adherence to policies
  - Mechanism for member education

IPv6 Allocation Policies

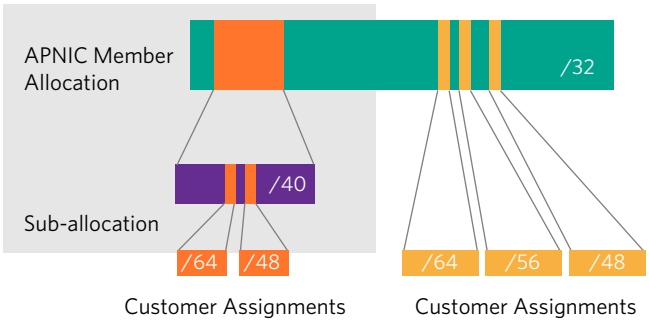
- Initial allocation criteria
  - Minimum of /32 IPv6 block
  - Larger than /32 may be justified
- For APNIC members with existing IPv4 space
  - One-click Policy (through MyAPNIC)
- Without existing IPv4 space
  - Must meet initial allocation criteria
- Subsequent allocation
  - Based on HD ratio (0.94)
  - Doubles the allocated address space

IPv6 Utilisation (HD = 0.94)

IPv6 Prefix	Site Address Bits	Total site address in /56	Threshold (HD = 0.94)	Utilisation %
/42	14	16,384	9,153	55.9%
/36	20	1,048,576	456,419	43.5%
/35	21	2,097,152	875,653	41.8 %
/32	24	16,777,216	6,185,533	36.9%
/29	27	134,217,728	43,665,787	32.5 %
/24	32	4,294,967,296	1,134,964,479	26.4 %
/16	40	1,099,511,627,776	208,318,498,661	18.9 %

RFC 3194 “In a hierarchical address plan, as the size of the allocation increases, the density of assignments will decrease.”

IPv6 Sub-allocation



- All /48 assignments to end sites must be registered
- LIR must submit a second opinion request for assignments greater than /48

IPv6 Assignment Policies

- Assignment address space size
  - Minimum of /64 (only 1 subnet)
  - Normal maximum of /48
- Assignment of multiple /48s to a single end site
  - Documentation must be provided
  - Will be reviewed at the RIR/NIR level
- Assignment to operator's infrastructure
  - /48 per Point-of-Presence of an IPv6 service operator

Portable Assignments

- Small multi-homing assignment
  - For (small) organisations who require a portable assignment for multi-homing purposes
- Criteria
  - Currently multi-homed, or demonstrate a plan to multi-home within 1 month
  - Demonstrate need to use 25% of requested space immediately, and 50% within 1 year

IXP Assignments

- APNIC has a reserved block of space from which to make IXP assignments
- To be used exclusively to connect IXP participant devices to the exchange point
- Criteria:
  - 3 or more peers
  - Demonstrate “open peering policy”
- Assignment size:
  - IPv4: /24
  - IPv6: /48 minimum

Portable Critical Infrastructure

- What is Critical Internet Infrastructure?
  - Domain registry infrastructure
    - Root DNS operators, gTLD operators, ccTLD operators
  - Address Registry Infrastructure
    - RIRs & NIRs, IANA
- Why a specific policy?
  - To protect the stability of core Internet functions
- Assignment sizes:
  - IPv4: /24
  - IPv6: /32 (Maximum)

Sub-allocation Guidelines

- Sub-allocate cautiously
  - Seek APNIC advice if in doubt
  - If customer requirements meet min allocation criteria, customers can approach APNIC for portable allocation
- Efficient assignments
  - ISPs responsible for overall utilisation
- Database registration (WHOIS database)
  - Sub-allocations & assignments to be registered in the database

IPv4 Transfer Policies

- Between APNIC members
  - Minimum transfer size of /24
  - Source entity must be the currently registered holder of the IPv4 resources
  - Recipient entity will be subject to current APNIC policies
- Inter-RIR IPv4 Transfers
  - Minimum transfer size of /24
  - Conditions on the source and recipient RIR will apply

Historical Resources

- Internet resources registered under early registry policies without formal agreements and include:
  - Registrations transferred to APNIC as part of the AUNIC to APNIC migration
  - Registrations transferred as part of the Early Registration Transfer (ERX) project
  - Historical APNIC resources

https://www.apnic.net/policy/historical-resource-policies

Historical Resource Transfer

- Bring historical resource registrations into the current policy framework
  - Allow transfers of historical resources to APNIC members
  - The recipient of the transfer must be an APNIC member
  - No technical review or approval
  - Historical resource holder must be verified
  - Resources will then be considered "current"
- Address space subject to current policy framework

Agenda

- IP Resource Allocation Policies
- **Requesting IP Addresses**
- Requesting AS Numbers
- APNIC Whois Database
- Reverse DNS
- MyAPNIC Address Management Tool

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How do I get addresses?

- Decide what kind of number resources you need
  - IPv4, IPv6
- Check your eligibility
  - On the website www.apnic.net
  - Contact the helpdesk helpdesk@apnic.net
- Become familiar with the policies
  - www.apnic.net/policy
- Apply for membership and resources

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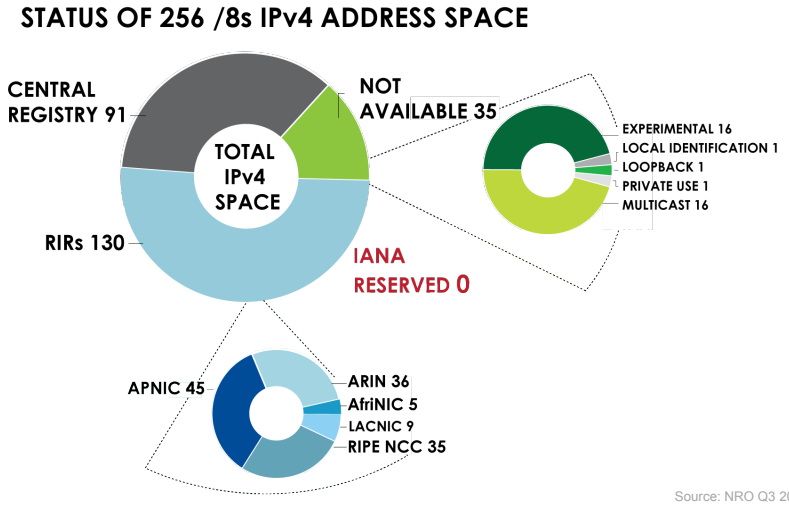
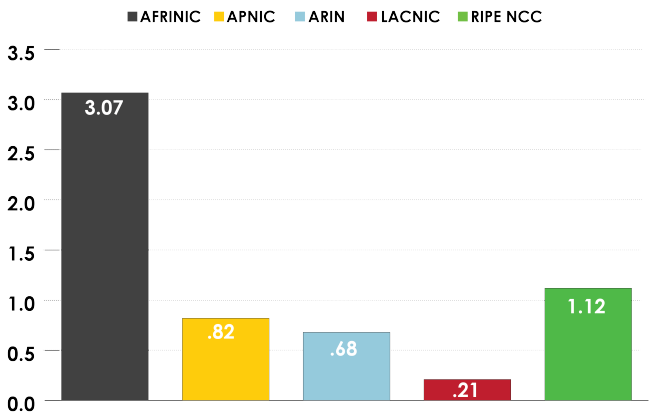
IPv4 Address Space



Source: NRO Q3 2014

Available IPv4 /8s in Each RIR



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Check for Eligibility – IPv4

- Initial LIR delegation:
  - Have used a /24 from their upstream provider or demonstrate an immediate need for a /24,
  - Have complied with applicable policies in managing all address space previously delegated to it (including historical delegations), and
  - Demonstrate a detailed plan for use of a /23 within a year
- Small multihoming delegation:
  - Currently multihomed with provider-based addresses, or demonstrates a plan to multihome within one month
  - Demonstrate that they are able to use 25% of the requested addresses immediately and 50% within one year

Check for Eligibility – IPv4

- Internet Exchange Points:
  - Eligible to receive a delegation from APNIC to be used exclusively to connect the IXP participant devices to the Exchange Point.
- Critical Infrastructure:
  - If operating in the Asia Pacific region, are eligible to receive a delegation
  - Available only to the actual operators of the network infrastructure performing such functions

Check for Eligibility – IPv6

- APNIC members with IPv4 but no IPv6 automatically qualify for an appropriately sized block of IPv6 addresses.
  - Members with an IPv4 allocation are eligible for a /32 of IPv6
  - Members with an IPv4 assignment are eligible for a /48 of IPv6
- Minimum initial allocation
  - Must be an LIR
  - Not be an end site
  - Plan to announce IPv6 within two years
  - Must meet one of these:
    - Have a plan for making at least 200 assignments to other organizations within two years
    - Be an existing LIR with IPv4 allocations from an APNIC or an NIR, which will make IPv6 assignments or sub-allocations within two years.

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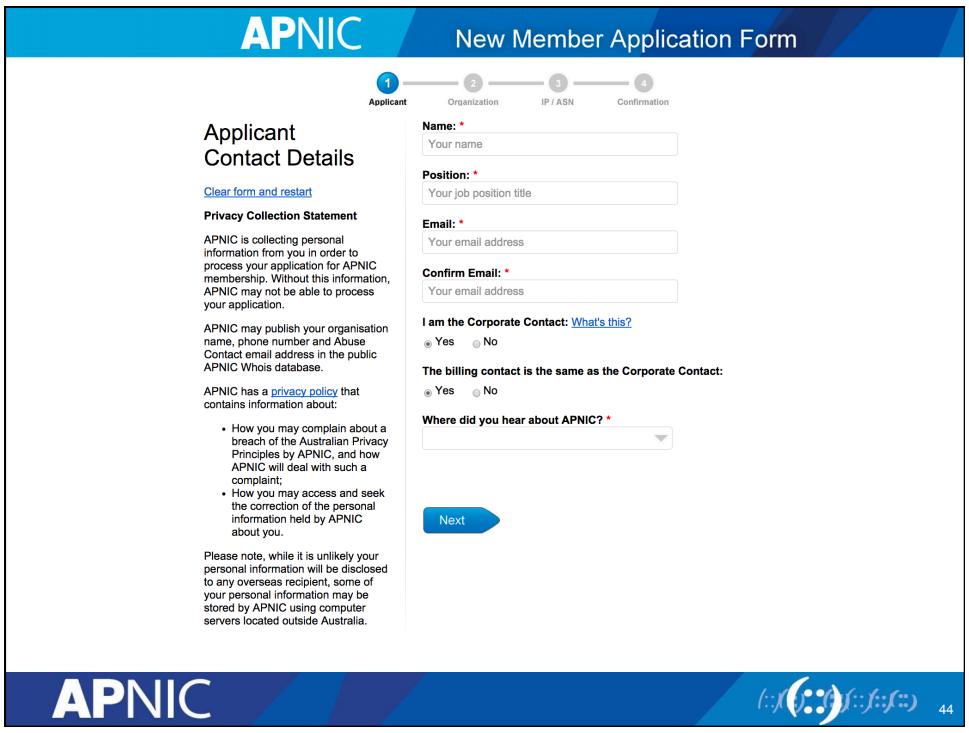
Initial IP Address Request

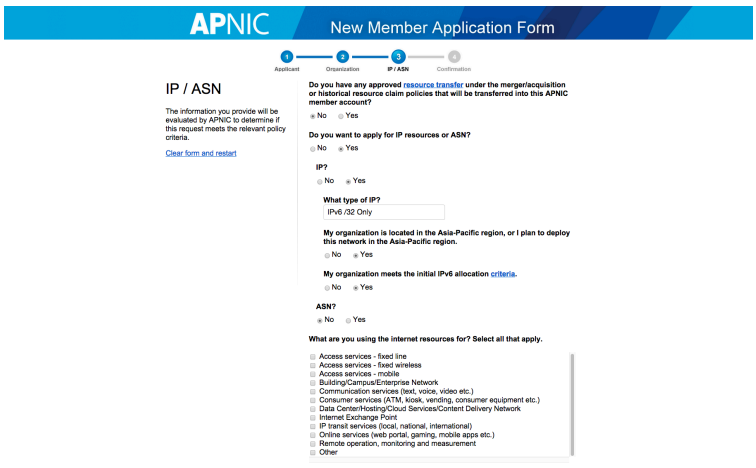
- You are required to be an APNIC member in order to initiate your IP address request.
- However, you can apply for membership and request an initial address allocation at the same time.
- http://www.apnic.net/services/become-a-member



New Member Application Form

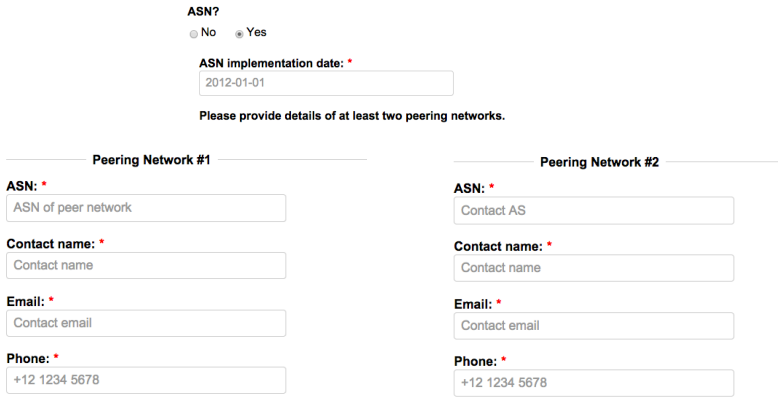
- More user-friendly, interactive, and informative
- Member receives quote after application. Invoice issued after approval
- Contacts Management
- Kickstart IPv6 integration
- Essential Whois objects will be created automatically

Applying for Resources - IP



Select IPv4 or IPv6 and the block size. Make sure you meet the criteria.

Applying for Resources - ASN

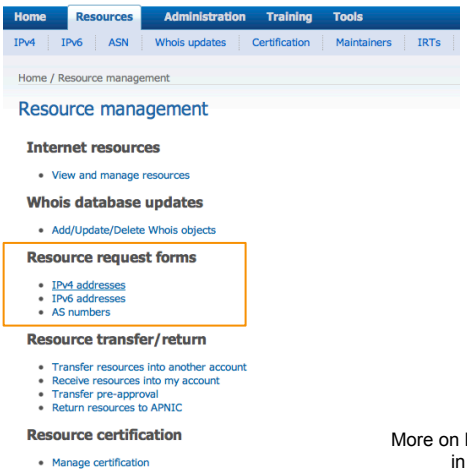


Provide details of two peering networks,
and whether you require 2-byte or 4-byte ASN

First Allocation

- APNIC IPv4 allocation size per account holder
  - Minimum of /24
  - Maximum of /21
    - /22 from final /8 block
    - /22 from the recovered block
- Initial IPv6 allocation criteria
  - Minimum of /32 IPv6 block
  - Larger than /32 may be justified

Requesting for Additional Resources



More on how to use MyAPNIC in later sections

Agenda

- IP Resource Allocation Policies
- Requesting IP Addresses
- **Requesting AS Numbers**
- APNIC Whois Database
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What is an AS Number?

- Autonomous System Number (ASN)
- Globally unique identifiers for IP networks
  - uniquely identifies each network on the Internet
- Allocated to each Autonomous System (AS) for use in BGP routing
- Used in the exchange of exterior routing information (between neighboring AS) and as an identifier of the AS itself

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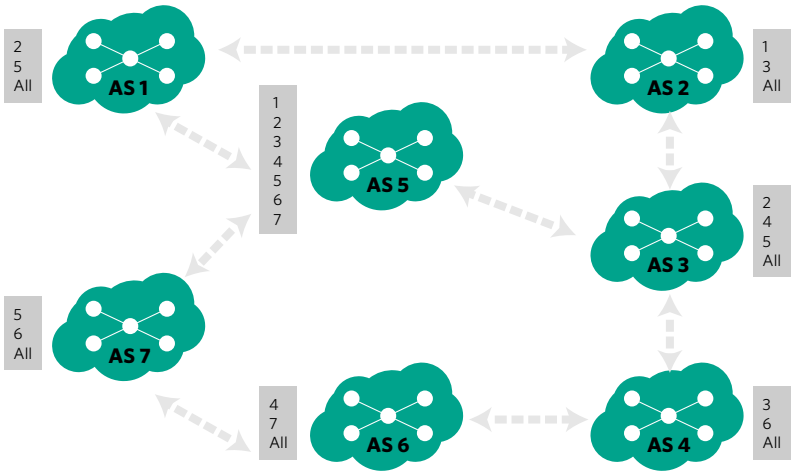
AS and AS numbers

- **Autonomous System (AS)** - group of IP-based networks with the same routing policy, usually under single ownership, trust or administrative control
- **Autonomous System Number (ASN)** - globally unique identifiers for IP networks, used in the exchange of exterior routing information (BGP)

How do Autonomous Systems work?



When do I need an ASN?

- ASN is needed if you have a
  - Multi-homed network to different providers, and
  - Routing policy different to external peers
- RFC1930: Guidelines for creation, selection and registration of an Autonomous System

ASN Representation

ASN Range	Usage
0 - 65535	16-bit AS number
0 and 65535	Reserved
1 - 64495	Public Internet
64496 - 64511	Documentation and sample code (RFC5398)
64512 - 65534	Reserved for private use (RFC6996)
23456	AS_TRANS (RFC6793)
65536 - 4294967295	32-bit AS number
65536 - 65551	Documentation and sample code (RFC5398)
65552 – 131071	Reserved (RFC5398)
131072 - 4199999999	Public Internet
4200000000 - 4294967294	Reserved for private use (RFC6996)
4294967295	Reserved (RFC7300)

http://www.iana.org/assignments/as-numbers/as-numbers.xhtml

16-bit and 32-bit ASN

- With the introduction of the “new” 32-bit AS Numbers, and the continuation of use of “old” 16-bit AS Numbers, a method was needed to get them to work together
- The solution is known as **AS23456**, which allows BGP to either convert or truncate the AS number if it detects an “old” 16-bit number as part of the exchange

Requesting an ASN

- Eligibility
  - Should be multihomed
  - Has a single, clearly defined routing policy that is different from its providers’ routing policies
- Request Process: Complete the request form
  - Check with peers if they can handle 4-byte ASN
  - Existing members send the request from MyAPNIC
  - New Members can send AS request along with membership application

Requesting an ASN

- If a member requests an ASN for their own network
  - AS number is **portable**
  - Member responsible for registration
- If a member requests an ASN for its customer
  - AS number is **non-portable**
  - Customer must meet criteria
  - Member responsible for registration
  - AS number is returned if customer changes provider

From 2-byte to 4-byte Delegation

- January 2007
  - 2-byte ASN by default, process 4-byte ASN as requested
- January 2009
  - 4-byte ASN by default, process 2-byte ASN as requested
- July 2009
  - 4-byte ASN by default, process requests for 2-byte through demonstrated need
- January 2010
  - No distinction between two-byte and four-byte only AS numbers
  - Will operate AS number assignments from an undifferentiated four-byte AS number pool

ASN Transfers

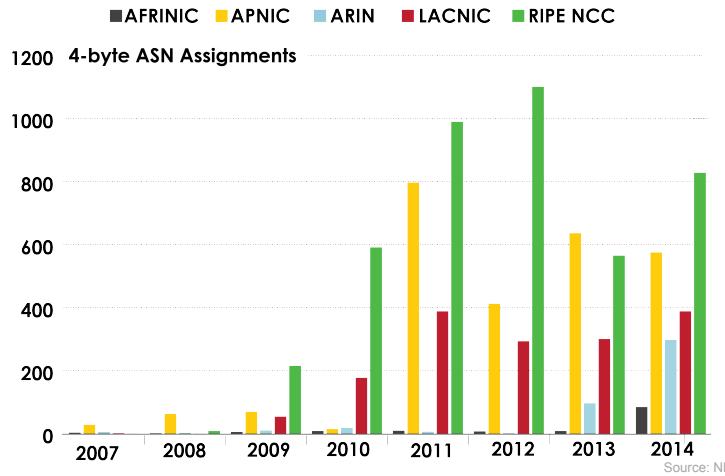
- Transfers of ASNs
  - Within the APNIC region and
  - Between regions with compatible inter-regional ASN transfer policies

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

Four-byte ASN Global Distribution



Source: NRO Q3 2014

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- **APNIC Whois Database**
- Reverse DNS
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APNIC

What is the APNIC Database?

- Public network management database
  - Operated by Internet Registries
  - APNIC maintains the database of resources for the AP region
- Tracks network resources
  - IP addresses, ASNs, Reverse DNS delegations, Routing policies
- Records administrative information
  - Contact information (persons/roles) of relevant resource holders
  - Authorization for updating these info
  - Network abuse handling (IRT)

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Resource Registration

As part of the membership agreement with APNIC, all members are required to register their resources in the APNIC database.

- Members must keep records up to date
  - ✓ When ever there is a change in contacts
  - ✓ When new resources are received
  - ✓ When resources are sub-allocated or assigned

Whois Object Types

OBJECT	PURPOSE
person	Technical or administrative contacts responsible for an object
role	Technical or administrative contacts represented by a role, performed by one or more people
inetnum	Allocation or assignment of IPv4 address space
inet6num	Allocation or assignment of IPv6 address space
aut-num	Registered holder of an AS number and corresponding routing policy
domain	in-addr.arpa (IPv4) or ip6.arpa (IPv6) reverse DNS delegations
route / route6	Single IPv4/IPv6 route injected into the Internet routing mesh
mntner	Authorized agent to make changes to an object
irt	Dedicated abuse handling team

Objects for New Members

- If you are receiving your first allocation or assignment, APNIC will create the following objects for you:
  - role object
  - inetnum or inet6num object
  - maintainer object (to protect your data)
  - aut-num object (if you received an ASN)
  - irt object
- Information is taken from your application for resources and membership

How to Use APNIC Whois

- Using a web browser
  - http://www.apnic.net/whois
- Whois client or query tool
  - whois.apnic.net
- Identify network contacts from the registration records
  - IRT (Incident Response Team) if present
  - Contact persons: “tech-c” or “admin-c”

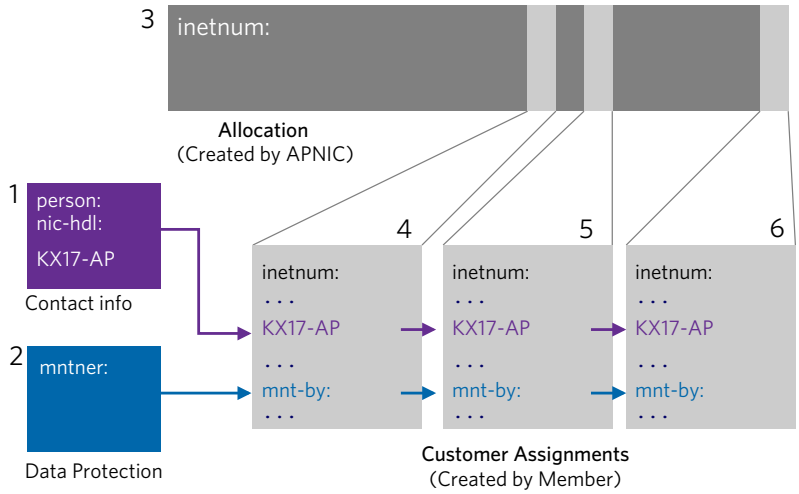
What if Whois information is invalid?

- Members (LIRs) are responsible for reporting changes to APNIC
  - Under formal membership agreement
- Report invalid ISP contacts to APNIC
  - http://www.apnic.net/invalidcontact
  - APNIC will contact member and update registration details

What if Whois information is invalid?

- Customer assignment information is the responsibility of the LIR
  - LIR must update their customer network registrations
- Tools such as *traceroute*, *looking glass* and RIS may be used to track the upstream provider if needed

Using the Whois – Step by Step



Inetnum / Inet6num Objects

- Contains IP delegation information
- APNIC creates an *inetnum* or *inet6num* object for each delegation they make to the Member
- All members must create *inetnum* or *inet6num* objects for each sub-allocation or assignment they make to customers

Inet6num Object

```
inet6num:       2406:6400::/32
netname:        APNIC-TRAININGIPv6-Lab-AP
descr:          APNIC TRAINING Lab
descr:          LEVEL 1, 33 PARK RD
country:        AU
admin-c:        AT480-AP
tech-c:         AT480-AP
mnt-by:         APNIC-HM
mnt-lower:      MAINT-AU-APNICTRAINING
mnt-routes:     MAINT-AU-APNICTRAINING
status:         ALLOCATED PORTABLE
remarks:        -+-+-+-+-+-+-+-+-+-+-++-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
remarks:        This object can only be updated by APNIC hostmasters.
remarks:        To update this object, please contact APNIC
remarks:        hostmasters and include your organisation's account
remarks:        name in the subject line.
remarks:        -+-+-+-+-+-+-+-+-+-+-++-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
changed:        hm-changed@apnic.net 20100216
changed:        hm-changed@apnic.net 20100818
source:         APNIC
```

Role and mntner object reference

Status shows the type of delegation

Person Object

- Represents a contact person for an organization
  - Every Member must have at least one contact person registered
  - Large organizations often have several contacts for different purposes
- Is referenced in other objects
- Has a **nic-hdl** – a unique identifier for a person or role object
  - Format: [A-Z][0-9]-AP

Person Object

```
person:         Nurul Islam Roman
nic-hdl:        NR97-AP
e-mail:         nurul@apnic.net
address:        6 Cordelia Street
address:        South Brisbane
address:        QLD 4101
phone:          +61 7 3858 3100
fax-no:         +61 7 3858 3199
country:        AU
changed:        nurul@apnic.net 20061128
mnt-by:         MAINT-AU-APNICTRAINING
changed:        hm-changed@apnic.net 20100818
changed:        hm-changed@apnic.net 20110624
source:         APNIC
```


Role Object

- Contains details of technical or administrative contacts as represented by a role performed by one or more people within an organization
- Also has a nic-hdl
- Preferred over *person* object as reference in other objects
  - Eases administration

Role Object

```
role:           APNIC Training
address:        6 Cordelia Street
address:        South Brisbane
address:        QLD 4101
country:        AU
phone:          +61 7 3858 3100
fax-no:         +61 7 3858 3199
e-mail:         training@apnic.net
admin-c:        NR97-AP
tech-c:         NR97-AP
nic-hdl:        AT480-AP
mnt-by:         MAINT-AU-APNICTRAINING
changed:        hm-changed@apnic.net 20080424
changed:        hm-changed@apnic.net 20100818
changed:        hm-changed@apnic.net 20110624
source:         APNIC
```

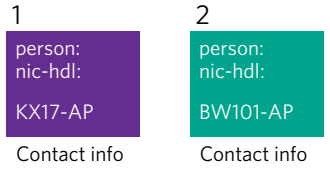
Points to a person object

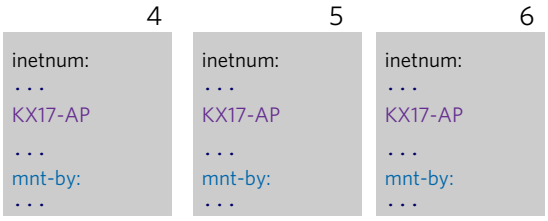
Replacing Contacts – Person Object

KX17-AP is the original contact
Referenced by three (or more) objects

BW117-AP is replacing him
Update all three (or more) objects
with new contact one by one

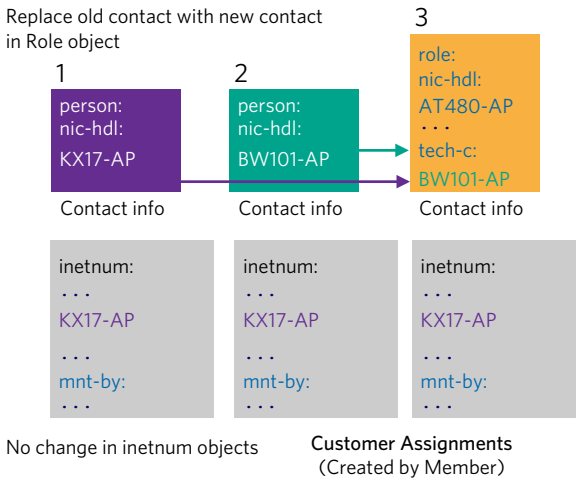
Delete old contact KX17-AP



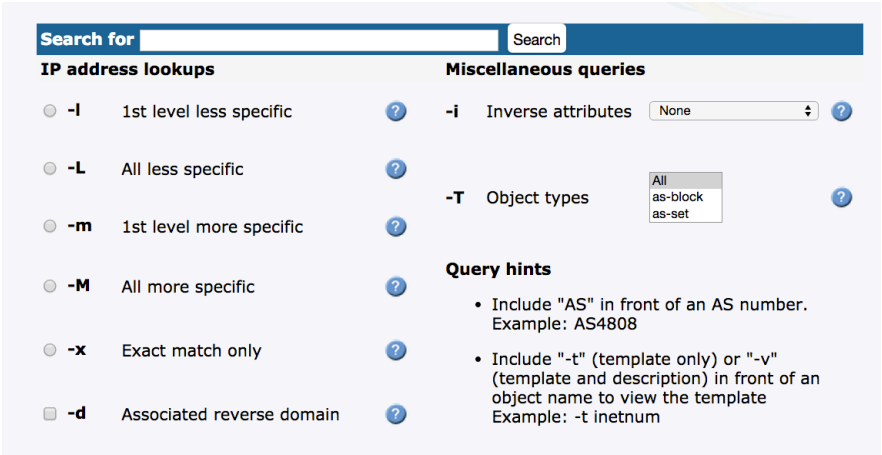


Customer Assignments
(Created by Member)

Replacing Contacts – Role Object



APNIC Whois Web Query



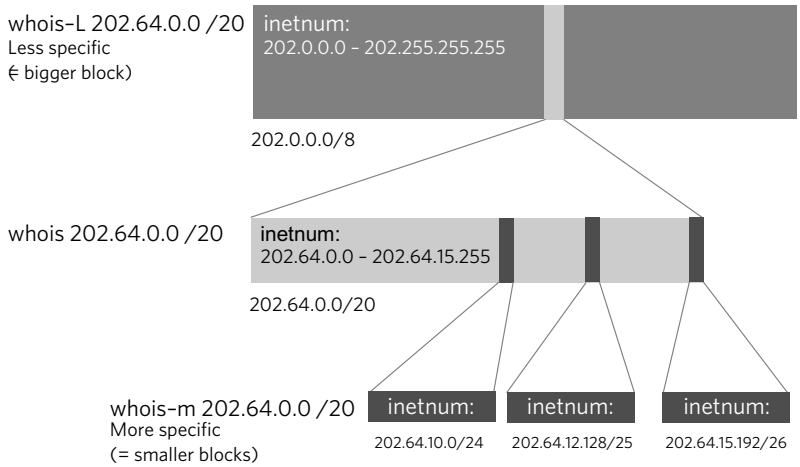
Whois Database Queries

– Flags used for inetnum queries

None one level less specific matches

- L find all less specific matches
- m find first level more specific matches
- M find all More specific matches
- x find exact match (if no match, nothing)
- d enables use of flags for reverse domains
- r turn off recursive lookups

Whois Database Query - inetnum



Recursive Lookups

whois 202.12.29.0

recursion enabled by default

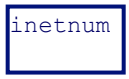
whois -r 202.12.29.0

recursion turned off

whois -T inetnum 202.12.29.0

'type' of object specified

whois -r -T inetnum 202.12.29.0



'type' of object specified & recursion turned off

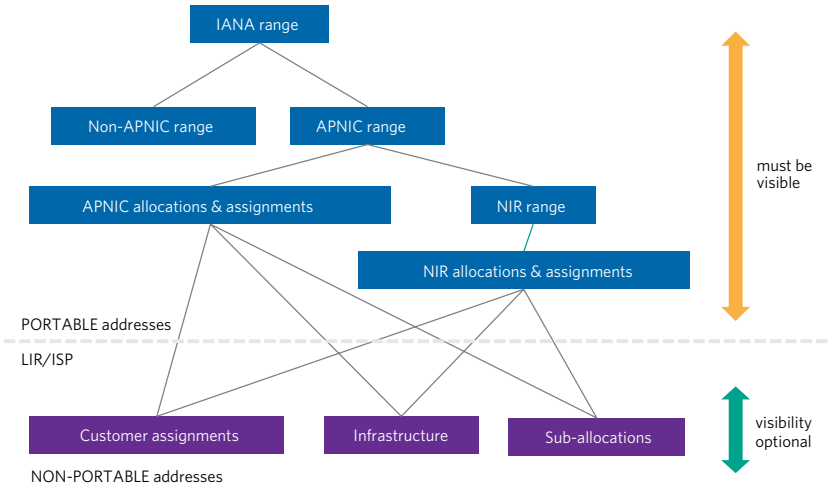
Inverse Queries

- Inverse queries are performed on inverse keys
  - *See object template (whois –t)*
- Returns all public objects that reference the object with the key specified as a query argument
  - Practical when searching for objects in which a particular value is referenced, such as your nic-hdl
- Syntax: whois -i <attribute> <value>

Customer Privacy

- Public data
  - Includes portable addresses (inetnum objects), and other objects e.g.route objects
  - must be visible
- Private data
  - Can include non-portable addresses (inetnum objects)
  - Members have the option to make private data visible
- Customer assignments
  - Can be changed to be public data (public data is an optional choice)

What needs to be visible?



What is a Maintainer?

- Protects objects in the APNIC Whois Database
- Applied to any object created directly below that maintainer object
- Why do we need Maintainer?
  - To prevent unauthorized persons from changing the details in the Whois DB
  - As parts of a block are sub-allocated or assigned, another layer of maintainers is often created to allow the new users to protect their (sub)set of addresses
- Authentication options: CRYPT-PW, MD5, PGPKEY

Maintainer Object

```
mntner:         MAINT-AU-APNICTRAINING
descr:          APNIC Training
country:        AU
admin-c:        NR97-AP
tech-c:         NR97-AP
auth:           # Filtered
mnt-by:         MAINT-AU-APNICTRAINING
upd-to:         nurul@apnic.net
referral-by:    APNIC-HM
changed:        hm-changed@apnic.net 20091111
changed:        hm-changed@apnic.net 20091217
changed:        hm-changed@apnic.net 20100528
changed:        hm-changed@apnic.net 20110124
changed:        hm-changed@apnic.net 20131129
source:         APNIC
```

Mnt-by and Mnt-Lower Attributes

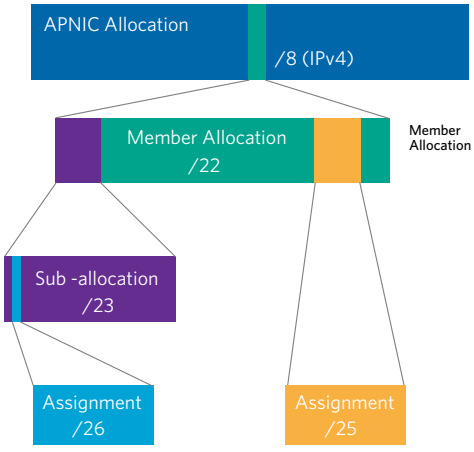
- Mnt-by
  - Can be used to protect any object
  - Changes to protected object must satisfy authentication rules of *mntner* object
- Mnt-lower
  - Also references *mnt-by* object
  - Hierarchical authorization for *inetnum* & *domain* objects
  - The creation of child objects must satisfy this maintainer
  - Protects against unauthorized updates to an allocated range - highly recommended!
- Mnt-routes

Maintainer Hierarchy Diagram

Allocated to APNIC:
Maint-by can only be changed by IANA

Allocated to Member:
Maint-by can only be changed by APNIC

Sub-allocated to Customer:
Maint-by can only be changed by Member



Authentication / Authorization

```
inetnum:        203.176.189.0 - 203.176.189.255
netname:        APNIC-TRAINING-IPv4-DATA-CENTRE
descr:          APNIC Training IPv4 Address for data centre
country:        AU
admin-c:        AT480-AP
tech-c:         AT480-AP
status:         ASSIGNED PORTABLE
mnt-by:         MAINT-AU-APNICTRAINING        ←
mnt-routes:     MAINT-AU-APNICTRAINING        ←
remarks:        -+-+-+-+-+-+-+-+-+-+-+-++-+-+-+-+-+-+-+-+-+-+-+-+-
+-+-+
remarks:        This object can only be updated by APNIC
hostmasters.
remarks:        To update this object, please contact APNIC
remarks:        hostmasters and include your organisation's
account
remarks:        name in the subject line.
remarks:        -+-+-+-+-+-+-+-+-+-+-+-++-+-+-+-+-+-+-+-+-+-+-+-+-
+-+-+
changed:        hm-changed@apnic.net 20080424
changed:        hm-changed@apnic.net 20100818
source:         APNIC
```

Only APNICTRAINING-AU can create assignments within this allocation

Only APNIC can change this object

APNIC

Whois IRT Contact

- Incident Response Team (IRT)
  - Dedicated abuse handling teams (not netops)
- IRT objects are mandatory when creating *inetnum*, *inet6num* and *aut-num* objects
- Provide an abuse contact email
  - Dedicated team to resolve incidents
  - Efficient and accurate response
  - Stops the tech-c and admin-c from getting abuse reports

APNIC

IRT Object

```
irt:              IRT-MYAPNIC-TEST-AP
address:          6 Cordelia Street test
address:          South Brisbane
address:          QLD 4101
e-mail:           helpdesk@apnic.net
e-mail:           tamya@apnic.net
abuse-mailbox:    helpdesk@apnic.net
admin-c:          VN61-AP
tech-c:           VN61-AP
auth:             # Filtered
mnt-by:           MAINT-AU-VIVEK
changed:          helpdesk@apnic.net 20101108
changed:          hm-changed@apnic.net 20110624
source:           APNIC
```


Whois Database Geolocation

- A latitude/longitude coordinate indicating where users of this network are located. Provides a hint to content and geolocation service providers.

Whois Object with Geolocation

```
inetnum:        61.45.248.0 - 61.45.255.255
netname:        APNIC-SERVICES-V4
descr:          APNIC Pty Ltd
country:        AU
geoloc:         -27.473057 153.014199
language:       en
admin-c:        AMS11-AP
tech-c:         AH256-AP
status:         ALLOCATED PORTABLE
notify:         helpdesk@apnic.net
mnt-by:         APNIC-HM
mnt-lower:      MAINT-MYAPNIC-AP
mnt-lower:      MAINT-AU-VIVEK
mnt-routes:     MAINT-MYAPNIC-AP
mnt-irt:        IRT-MYAPNIC-TEST-AP
remarks:        -+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
changed:        hm-changed@apnic.net 20140114
changed:        hm-changed@apnic.net 20150106
source:         APNIC
```


Agenda

- IP Resource Allocation Policies
- Requesting IP Addresses
- Requesting AS Numbers
- APNIC Whois Database
- **Reverse DNS**
- MyAPNIC Address Management Tool

APNIC

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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

APNIC

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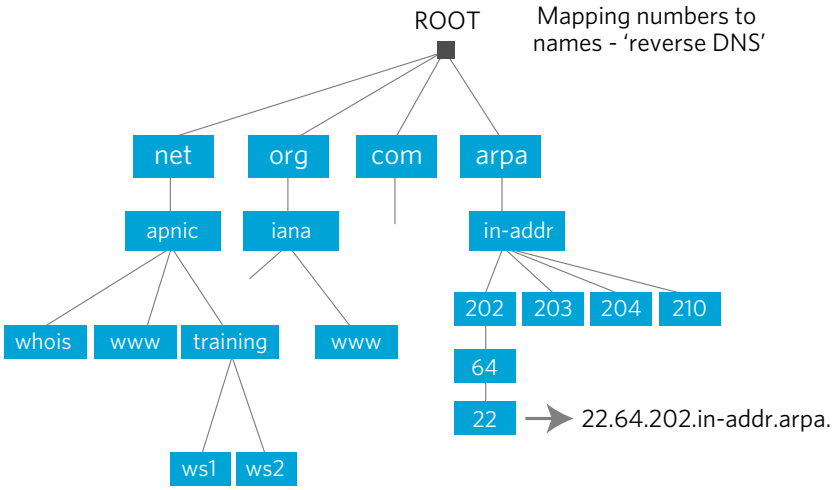
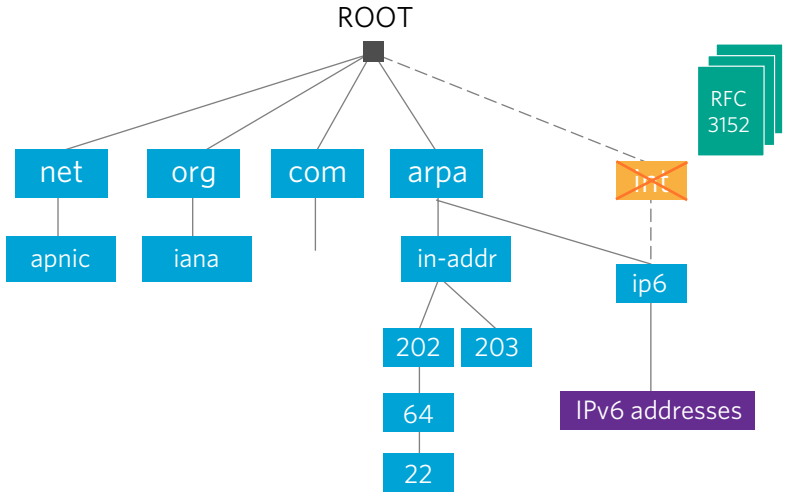
Uses of Reverse DNS

- Service denial
  - That only allow access when fully reverse delegated eg. anonymous ftp
- Diagnostics
  - Assisting in network troubleshooting (ex: traceroute)
- Spam identifications
  - Reverse lookup to confirm the source of the email
  - Failed lookup adds to an email's spam score

Reverse DNS Tree



Reverse DNS Tree – with IPv6



Reverse Zone Example

```
$ORIGIN 1.168.192.in-addr.arpa.
@       3600   IN SOA test.company.org. (
                      sys\.admin.company.org.
                      2002021301    ; serial
                      1h            ; refresh
                      30M           ; retry
                      1W            ; expiry
                      3600 )        ; neg. answ. ttl

        NS      ns.company.org.
        NS      ns2.company.org.

1       PTR     gw.company.org.
                router.company.org.

2       PTR     ns.company.org.
;auto generate:  65 PTR host65.company.org
$GENERATE 65-127 $ PTR host$.company.org.
```

Managing Reverse DNS

- APNIC manages reverse delegation for both IPv4 and IPv6
- Before you register your domain objects, you need to ensure that your reverse zones have been configured and loaded in your DNS name servers.
- APNIC does not host your DNS name servers or configure your reverse zone files.
- APNIC only delegates the authority of your reverse zones to the DNS name servers you provide through your domain objects.

Reverse Delegation Requirements

- /24 Delegations
  - Address blocks should be delegated
  - At least one name server
- /16 Delegations
  - Same as /24 delegations
  - APNIC delegates entire zone to member
- < /24 Delegations
  - Read “classless in-addr.arpa delegation”
  - Not supported

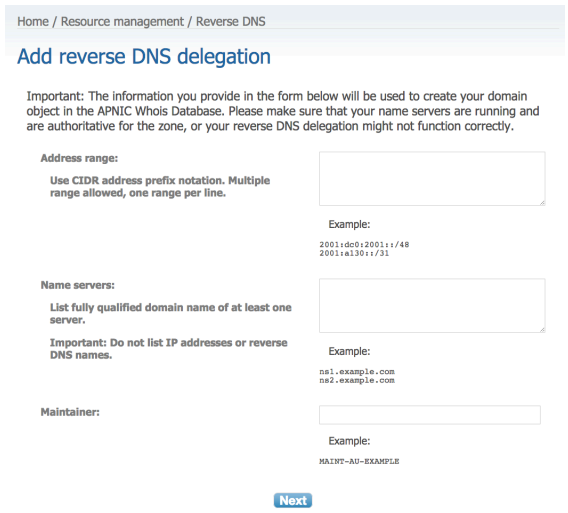
APNIC & LIR Responsibilities

- APNIC
  - Manage reverse delegations of address block distributed by APNIC
  - Process organisations requests for reverse delegations of network allocations
- Organisations
  - Be familiar with APNIC procedures
  - Ensure that addresses are reverse-mapped
  - Maintain nameserver(s) for allocations
  - Keep accurate records in the database
  - Keep reverse DNS current with the Whois DB

Reverse Delegation Procedures

- Standard APNIC database object
  - Can be updated through myAPNIC
- Nameserver/domain set up verified before being submitting to the database.
- Protection by maintainer object
  - Current authentication options: CRYPT-PW, MD5

Reverse Delegation Procedures



Input your IP address block here

At least one DNS server (FQDN)

Maintainer password

Whois Domain Object

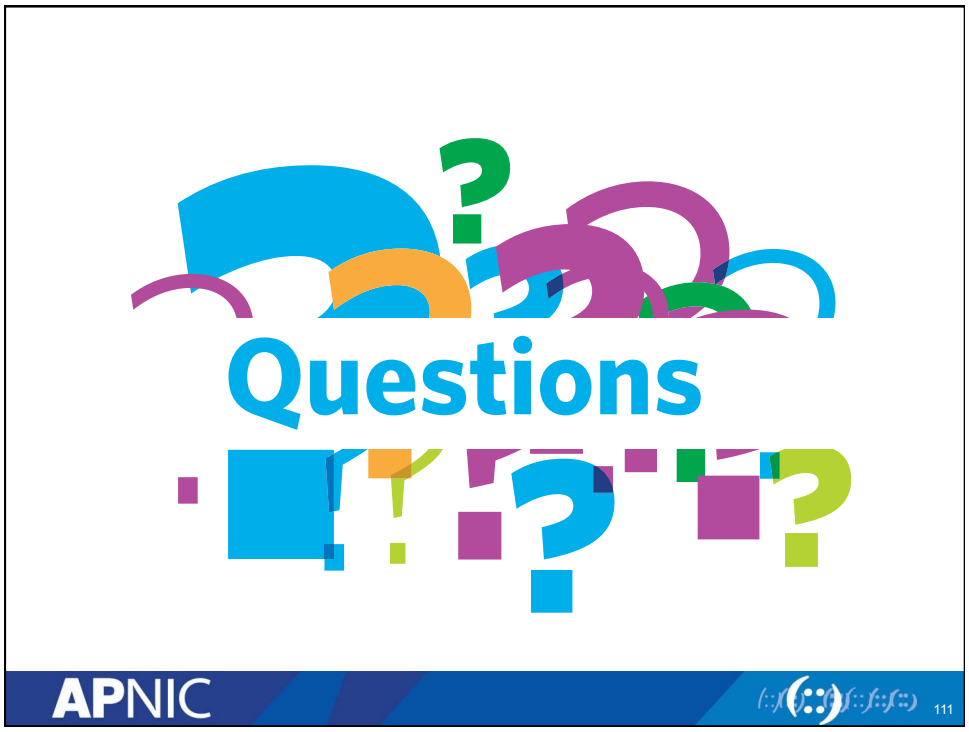
```
domain:     28.12.202.in-addr.arpa
Descr:      in-addr.arpa zone for 28.12.202.in-addr.arpa
admin-c:    NO4-AP
tech-c:     AIC1-AP
zone-c:     NO4-AP
nserver:    cumin.apnic.net
nserver:    tinnie.apnic.net
nserver:    tinnie.arin.net
mnt-by:     MAINT-APNIC-AP
mnt-lower:  MAINT-AP-DNS
changed:    inaddr@apnic.net 20021023
changed:    inaddr@apnic.net 20040109
changed:    hm-changed@apnic.net 20091007
changed:    hm-changed@apnic.net 20111208
source:     APNIC
```

Reverse Zone

Contacts

Nameservers

Maintainers



Agenda

- IP Resource Allocation Policies
- Requesting IP Addresses
- Requesting AS Numbers
- APNIC Whois Database
- Reverse DNS
- **MyAPNIC Address Management Tool**

APNIC

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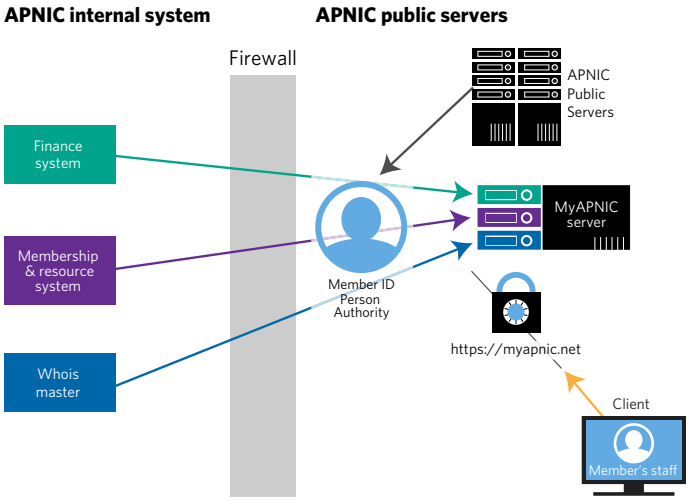
What is MyAPNIC?

- A secure website that enables Members to manage Internet resources and account interactions with APNIC online
- https://myapnic.net

MyAPNIC

How it Works

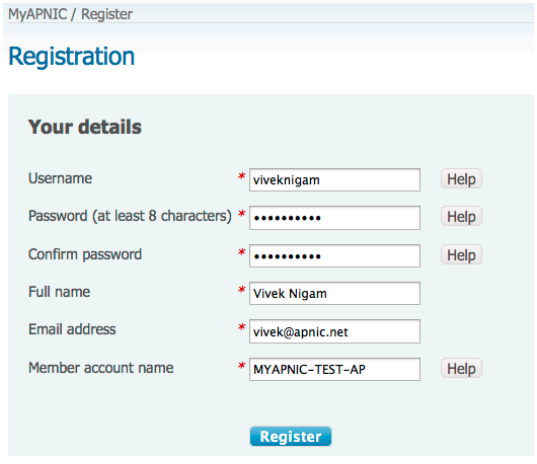


Access to MyAPNIC

- Available to all authorized contacts of APNIC accounts by registering your username and password
- Corporate Contacts can register and get instant access

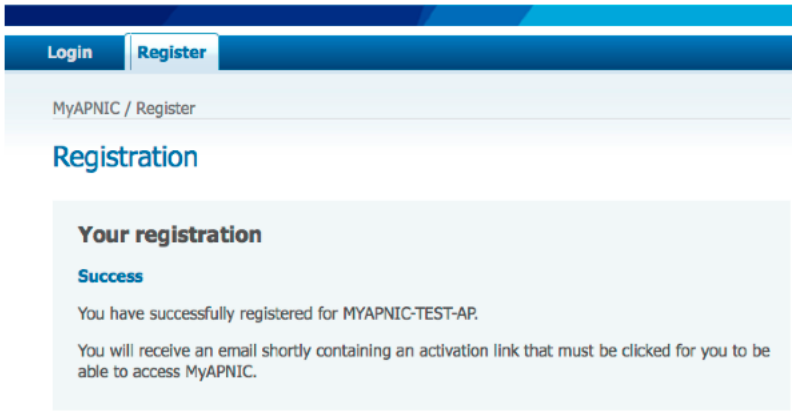
  www.apnic.net/corporate_contacts
- Other contacts need their registration approved by their Corporate Contact

MyAPNIC Registration

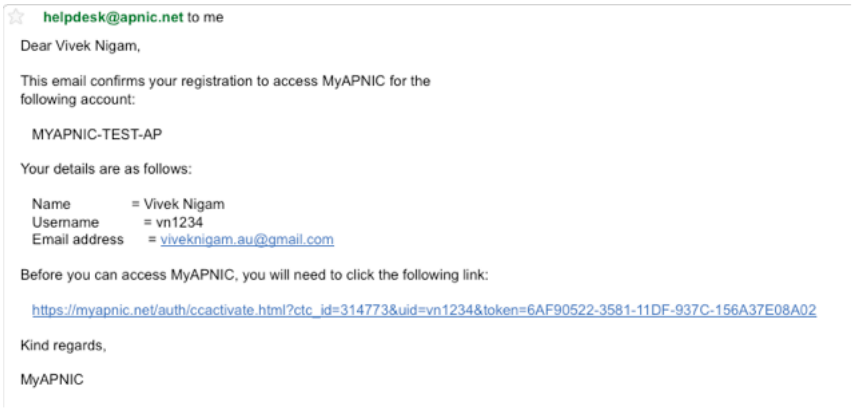


https://myapnic.net/register

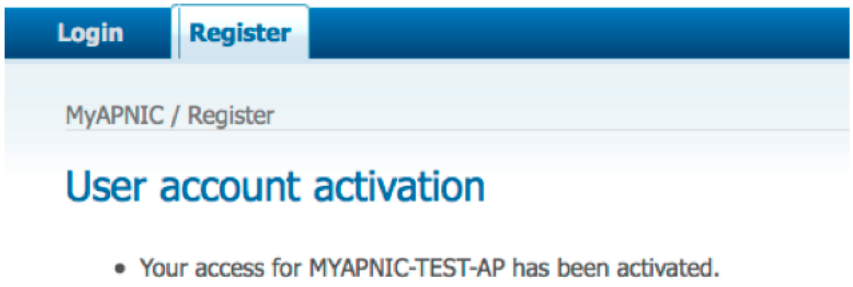
Registration – Corporate Contact



Registration – Corporate Contact



Registration – Corporate Contact

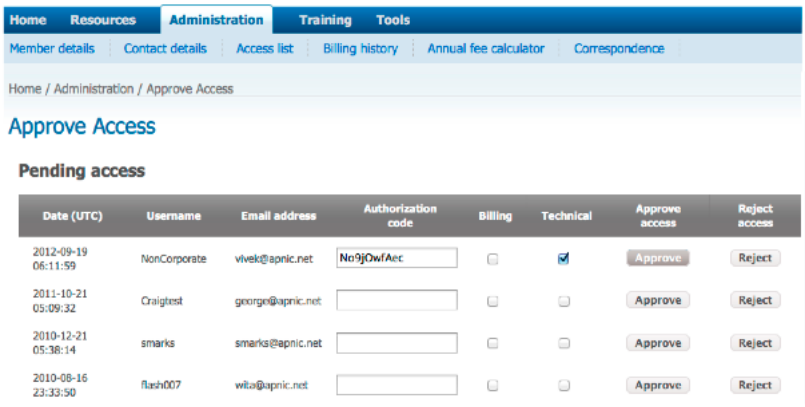


Registration – Other Contacts

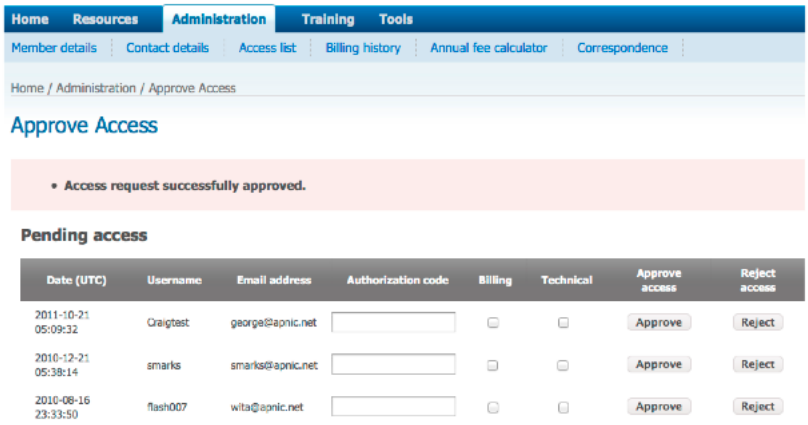
Subject: **MyAPNIC Registration**
From: helpdesk@apnic.net
Date: 9:11 AM
To: vivek@apnic.net

```
Dear Vivek Nigam,

This email confirms your security code to access MyAPNIC
for the following account:

    MYAPNIC-TEST-AP

Your details are as follows:

Name          = Vivek Nigam
Username      = viv4
Email address = vivek@apnic.net
Token         = wZpmI9iC5P

Before you can access MyAPNIC, you will need to provide your
token to one of the following corporate contact(s) to approve your
access.

  * Tom H
  * George K


Kind regards,

MyAPNIC
```

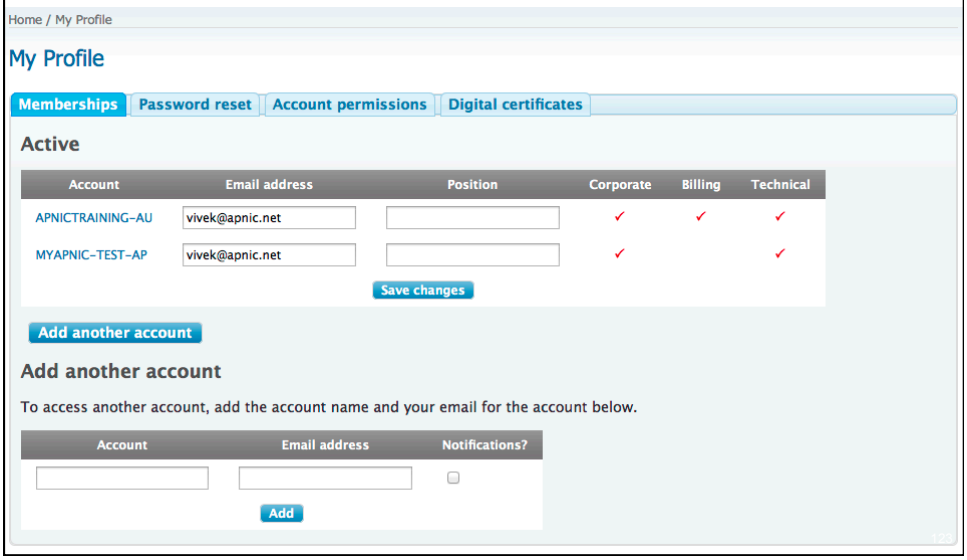
Registration – Other Contacts



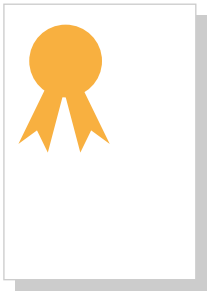
Registration – Other Contacts



Multiple Account Access



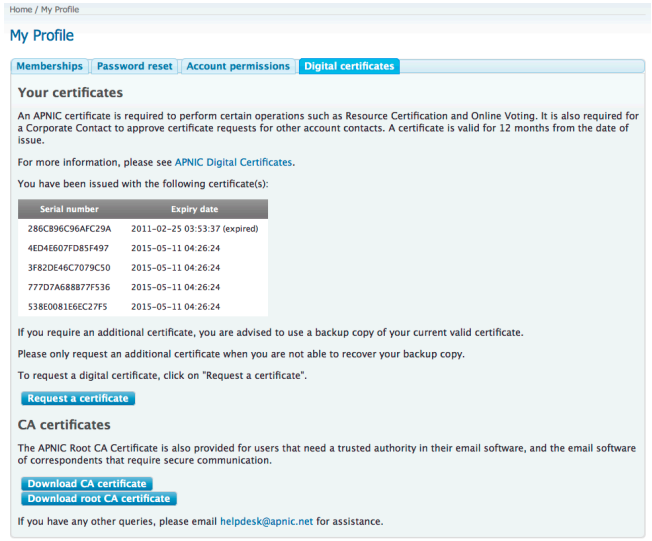
MyAPNIC Digital Certificate



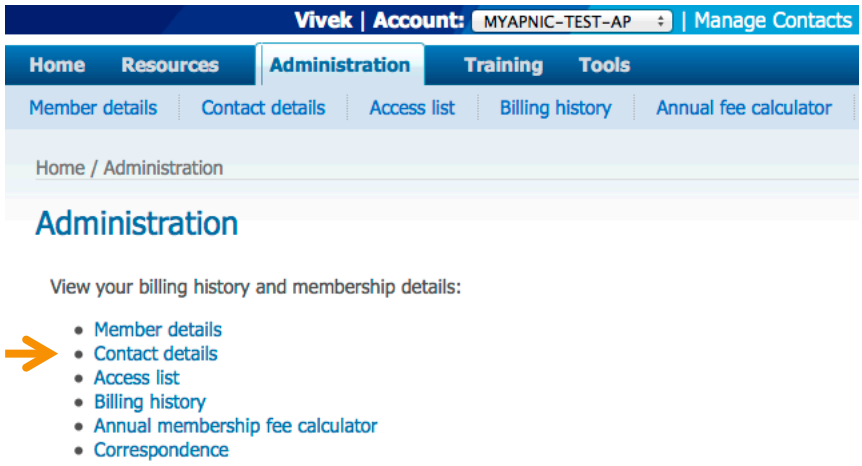
Required for:

- Online voting
- Resource certification
- Approve other contacts' certificate request

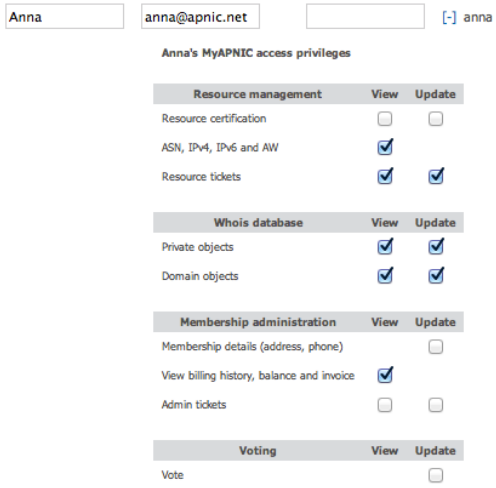
Request Certificate



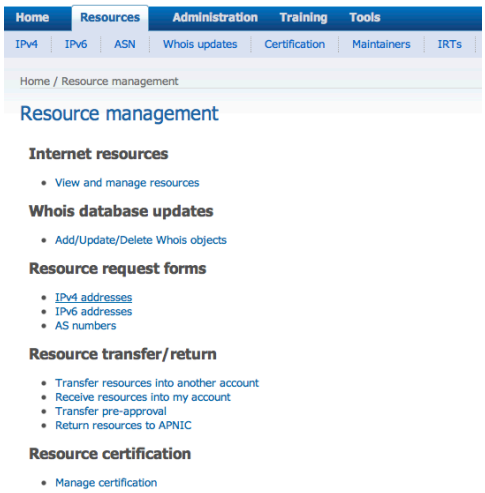
Administration Features



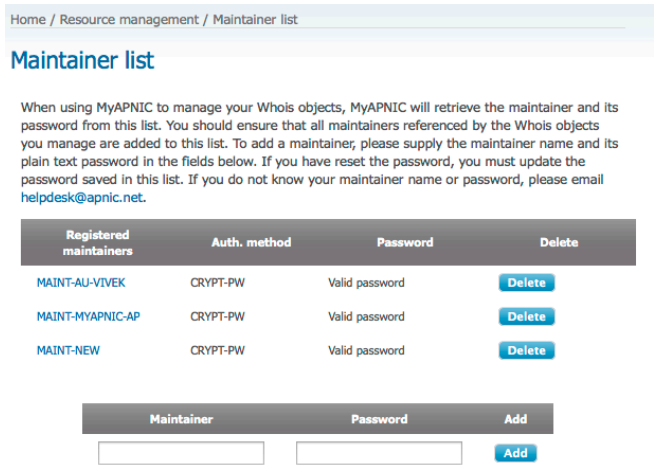
Contact Management



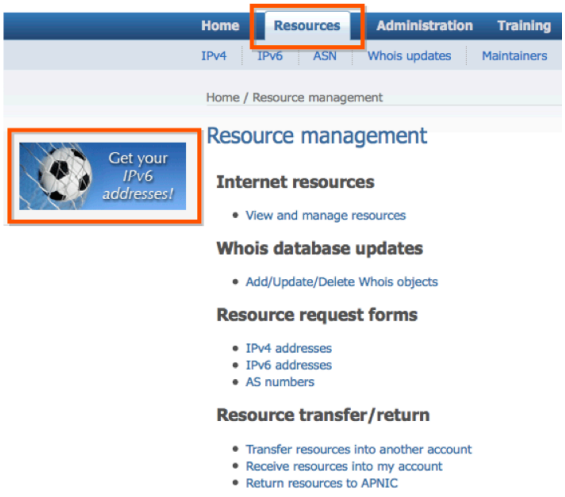
Resource Management



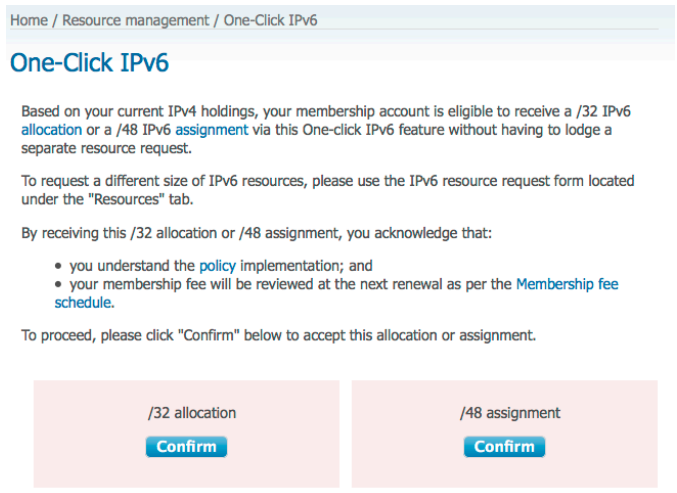
Maintainer Page



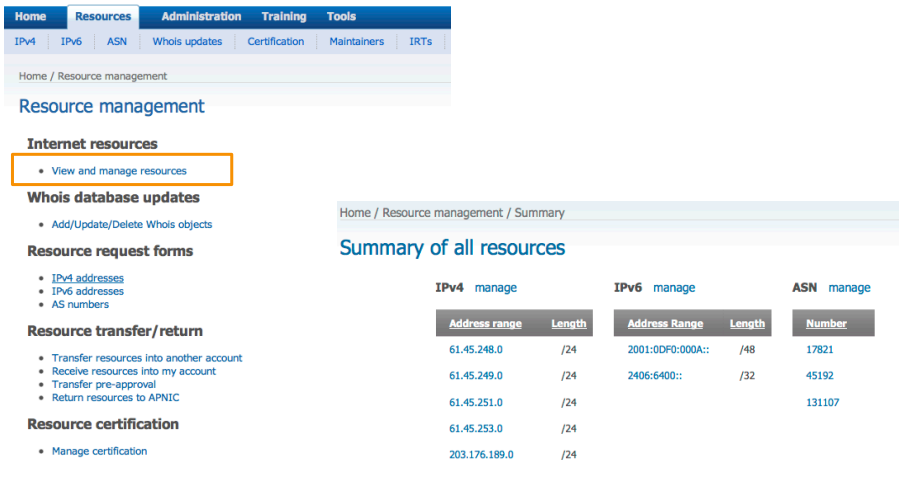
One-Click IPv6



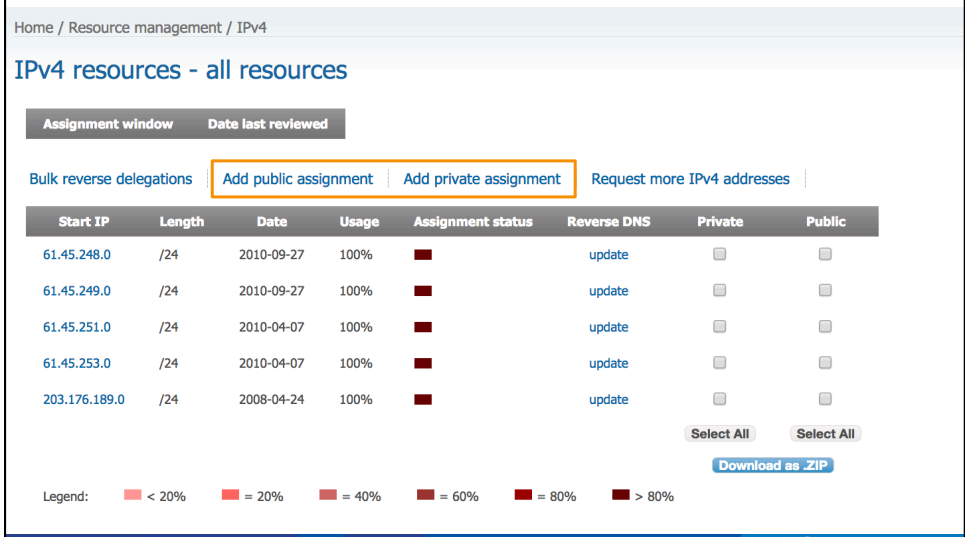
One-Click IPv6



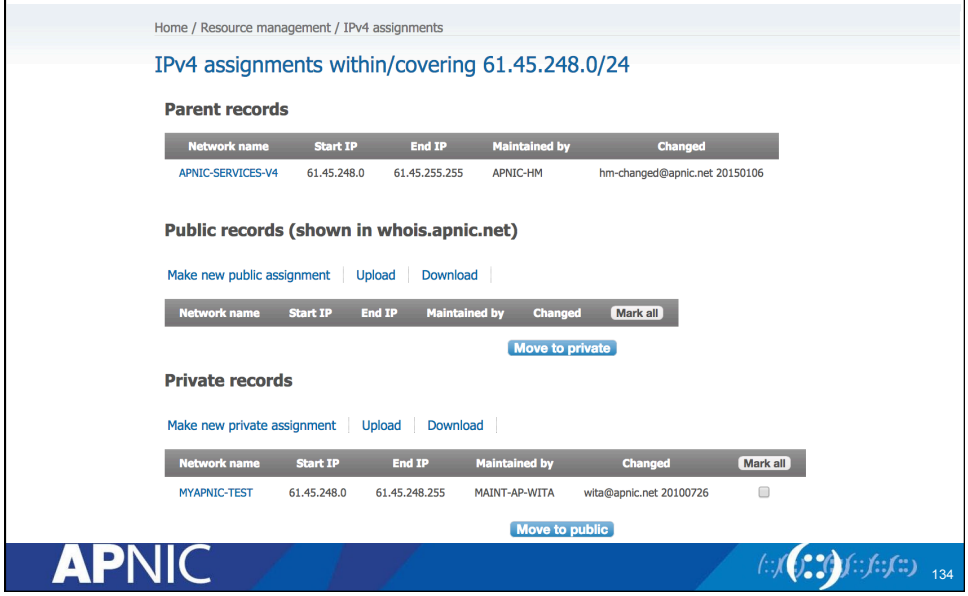
Manage Resources



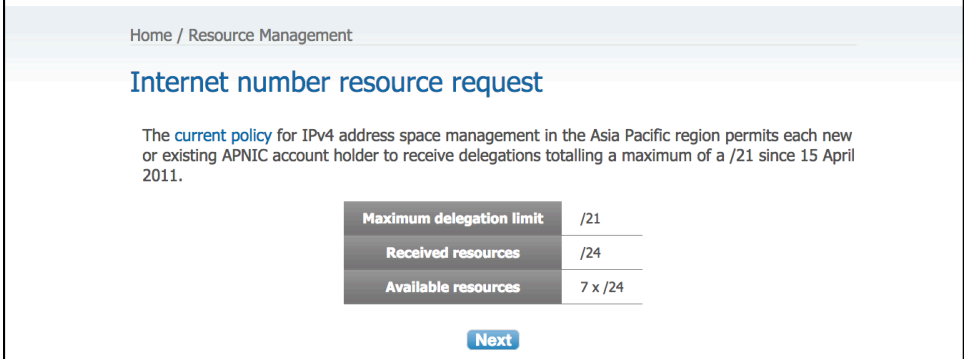
Sub-allocation



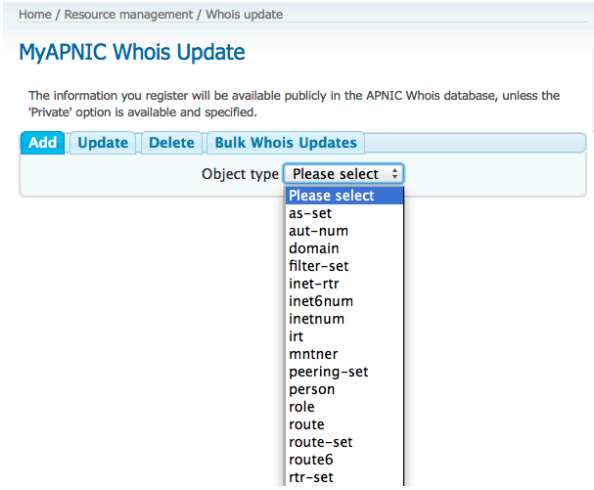
Updating Attributes in Parent Object



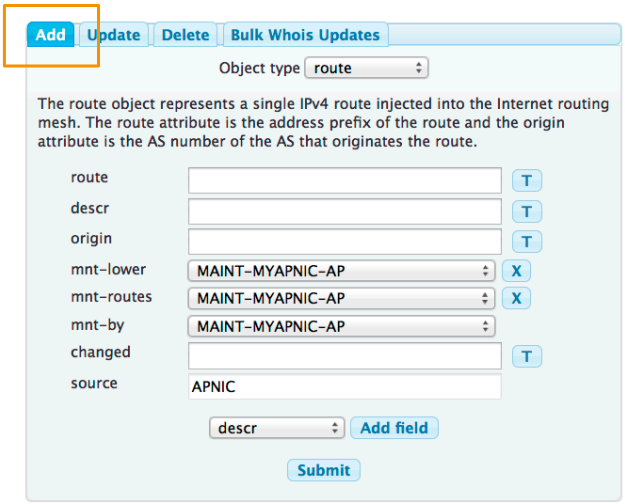
Requesting Resources



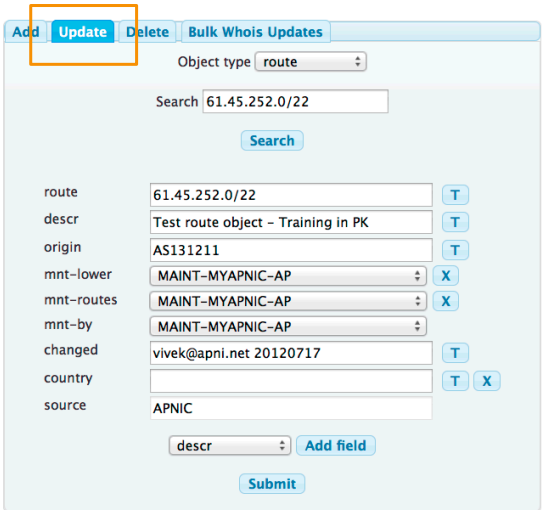
Whois Updates



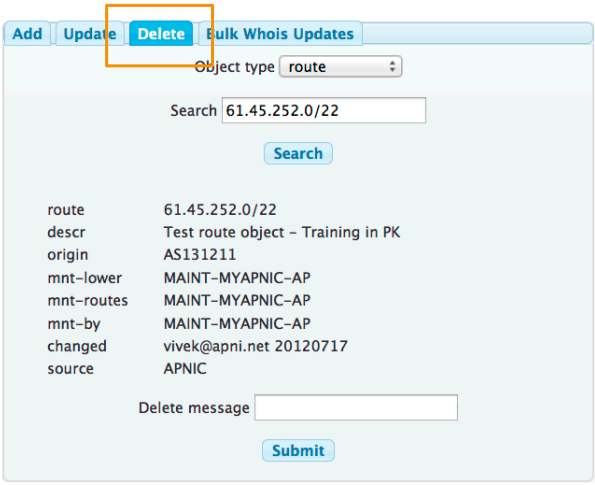
Adding Objects



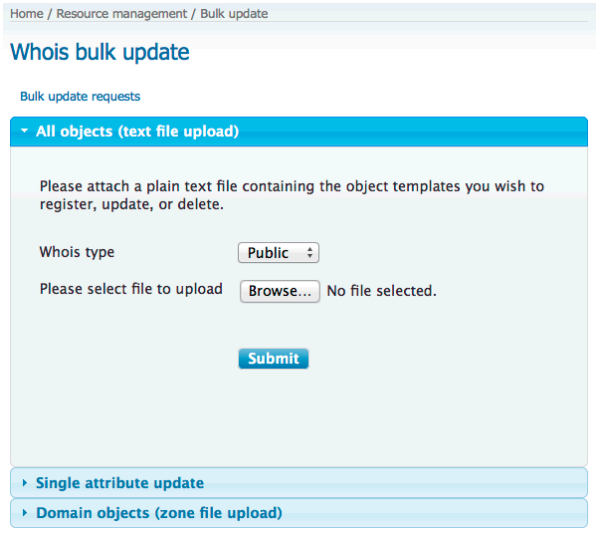
Updating Objects



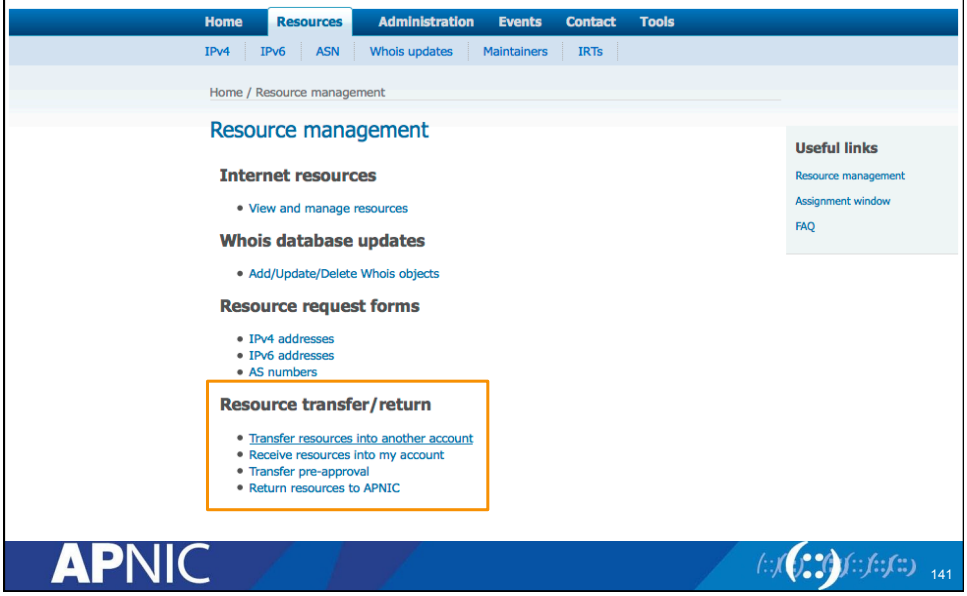
Deleting Objects

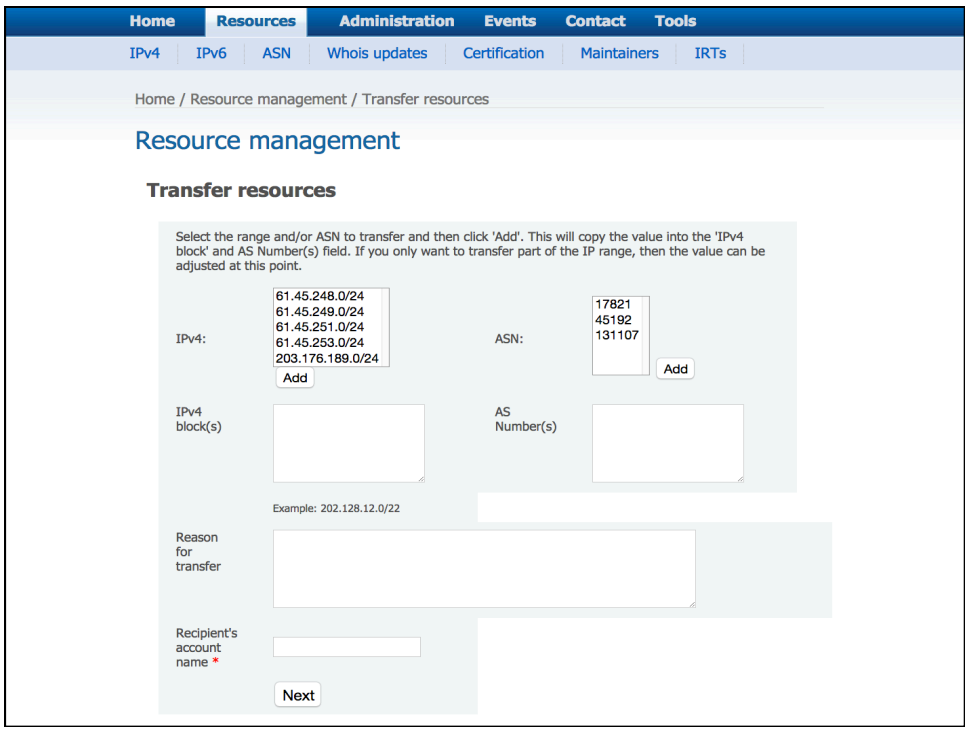


Bulk Updates

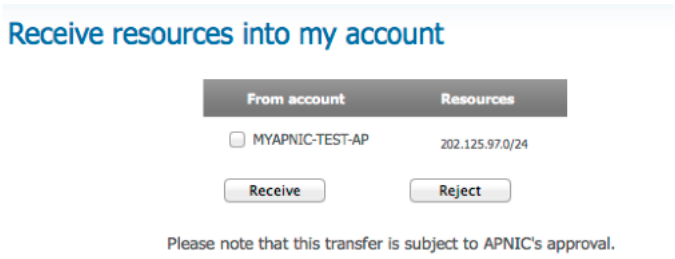


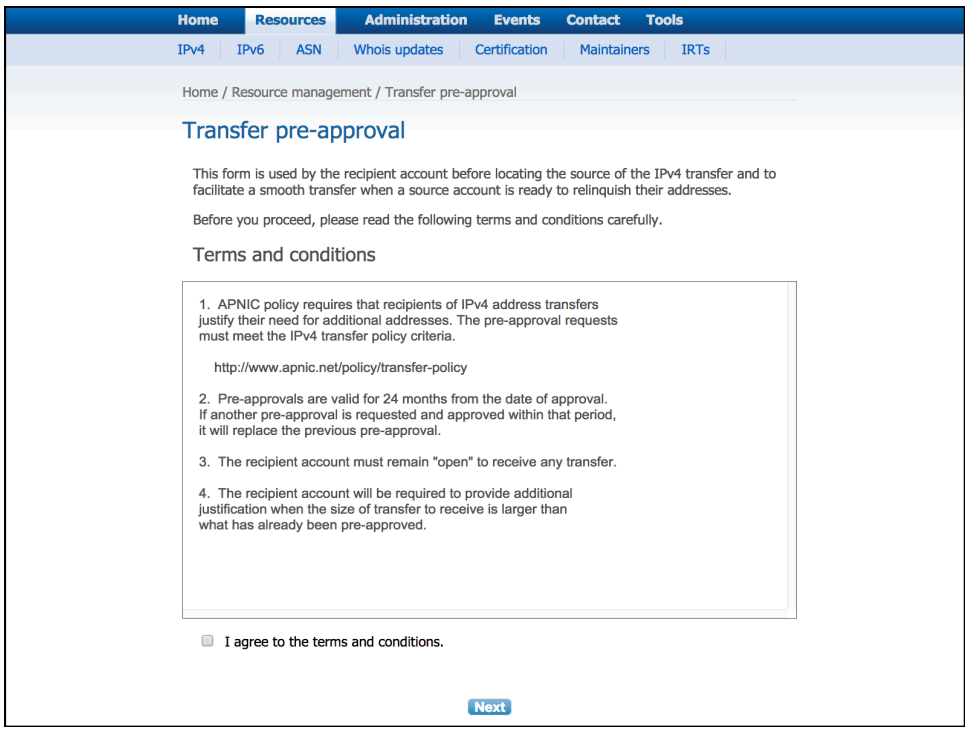
Resource Transfer / Return



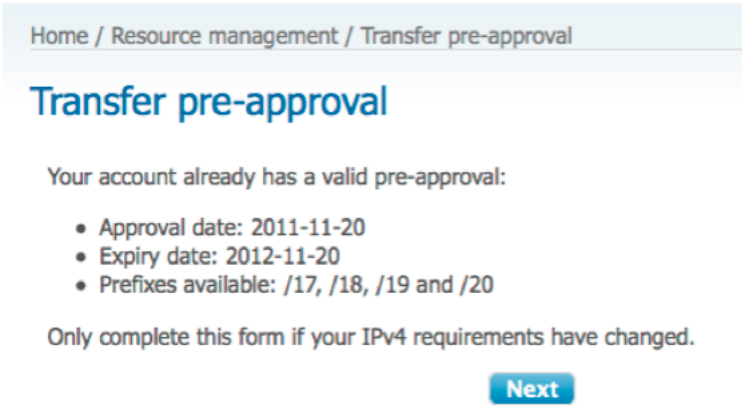


Receiving Resources

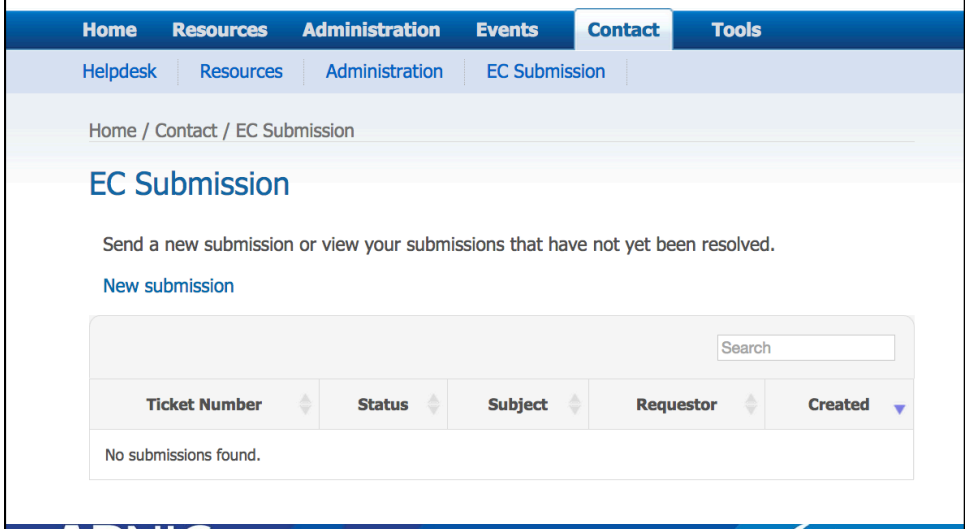




Transfer Pre-approval



MyAPNIC EC Submission

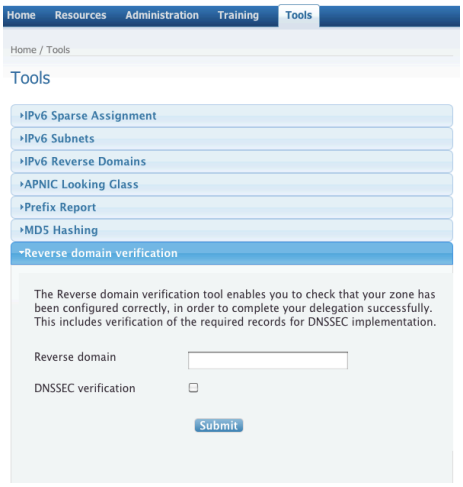


Referral Application

What can I do?

- Complete a referral application for a customer
- View and update your resource information for IPv4, IPv6, AS numbers and Whois updates
- Manage your resource certificates
- View your Member details and Contact details.
- Use the Events section to view training and events history
- Use the APNIC looking glass or generate a prefix report

Available Utilities



Tools – IPv6 Sparse Assignment

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Tools

IPv6 Sparse Assignment

The IPv6 Sparse Assignment tool enables you to create assignments that are spaced apart from one another, ensuring assignments can grow as needed while maintaining route aggregation.

Enter an IPv6 address of a block where the assignments will come from (beginning address & prefix length), number of assignments you need to make, and the minimum size of the assignment (optional).

Beginning address *	2406:6400::	
Prefix length *	32	e.g. 32
Number of assignments *	8	e.g. 5
Minimum assignment size		e.g. 35

Submit

```
------------------------------------------------------
Prefix entered                => 2406:6400::/32
Block count                   => 8
Required minimum block length => 128
Actual minimum block length   => 35
------------------------------------------------------
Beginning address
------------------------------------------------------
2406:6400::
2406:6400:8000::
2406:6400:4000::
2406:6400:c000::
2406:6400:2000::
2406:6400:a000::
2406:6400:6000::
2406:6400:e000::
```

Tools – IPv6 Subnet

IPv6 Subnets

The IPv6 subnet calculator allows you to subnet any given IPv6 prefix with a specified subnet length. Enter an IPv6 prefix and click on 'Submit' to view subnets based on the subnet length selected.

Address prefix * 2406:6400::/32 e.g. 2001::/32

Subnet length * 48 e.g. 48

Submit

```
----------------------------------------
Prefix entered     => 2406:6400::/32
Subnet mask        => FFFF:FFFF:FFFF::
Subnet length      => 48
Number of subnets => 65,536
----------------------------------------
/48 prefixes
----------------------------------------
2406:6400::/48
2406:6400:1::/48
2406:6400:2::/48
2406:6400:3::/48
2406:6400:4::/48
2406:6400:5::/48
2406:6400:6::/48
2406:6400:7::/48
2406:6400:8::/48
2406:6400:9::/48
2406:6400:A::/48
2406:6400:B::/48
2406:6400:C::/48
2406:6400:D::/48
2406:6400:E::/48
2406:6400:F::/48
2406:6400:10::/48
2406:6400:11::/48
2406:6400:12::/48
2406:6400:13::/48
2406:6400:14::/48
```


Tools – Reverse Domain Verification

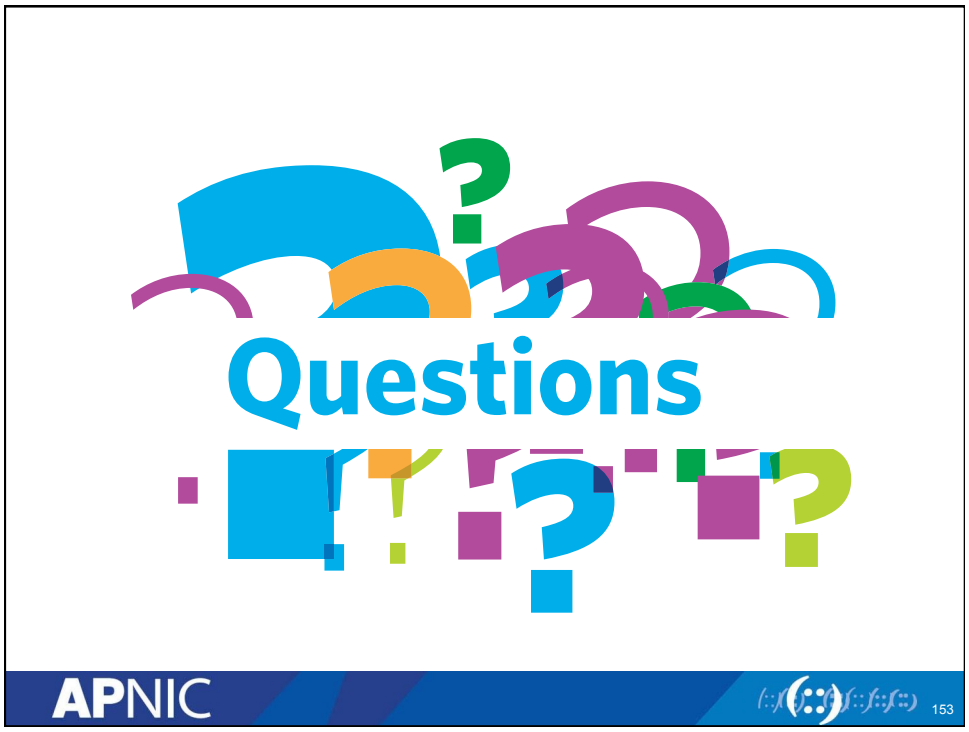
Reverse domain verification

The Reverse domain verification tool enables you to check that your zone has been configured correctly, in order to complete your delegation successfully. This includes verification of the required records for DNSSEC implementation.

Reverse domain 42.119.203.in-addr.arpa.

DNSSEC verification ☐

IP address	Name	Accessible	SOA found	AA bit set	Zones match	SOA serial
202.12.29.59	cumin.apnic.net	Yes	Yes	Yes	Yes	2014051168
2001:dc0:2001:a:4608::59	cumin.apnic.net	Yes	Yes	Yes	Yes	2014051168
202.12.28.140	sec3.apnic.net	Yes	Yes	Yes	Yes	2014051168
2001:dc0:1:0:4777::140	sec3.apnic.net	Yes	Yes	Yes	Yes	2014051168
202.12.29.60	tinnie.apnic.net	Yes	Yes	Yes	Yes	2014051168
2001:dc0:2001:a:4608::64	tinnie.apnic.net	Yes	Yes	Yes	Yes	2014051168


Questions
APNIC
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Thank You!
END OF SESSION
APNIC
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