

Welcome to the AfriNIC Member Training Course

Cell phones:



Smoking:



Breaks/Lunch:



Toilets:





Let's get to know each other

- Attendees:
 - Full Names & Nationality
 - Organization/Company
 - Position/Title
 - Experience with AfrinIC/the RIR System.

- Attendance Sheet :
 - Please Complete and Send back to the presenter(s).



Audience, Objectives

Audience:

- ✓ You are a current or prospective AfriNIC member
- ✓ You want to know how to request IP number resources.
- ✓ You want to familiarize yourself and be up-to-date with policies.
- ✓ You want to know about the whois database and MyAfriNIC.

Objectives:

- ✓ AfriNIC membership.
- ✓ How to request IP number resources from AfriNIC.
- ✓ Keep you up-to-date with latest policies
- ✓ Interaction with the whois database, MyAfriNIC portal.
- ✓ Outreach, Liaison with members
- ✓ Faces behind the e-mails from AfriNIC



Schedule

0900-1030:

- ✓ Introduction
- ✓ AfriNIC & the Community
- ✓ Policies and the Policy Development Process

1030-1100: COFFEE BREAK

- ✓ The Membership Process
- ✓ Requesting IP Addresses
- ✓ Introduction to the whois DB
- ✓ Introduction to MyAfriNIC

12:30 - 13:30: LUNCH

1330-1500:

- ✓ The whois db - security
- ✓ The whois db - advanced queries
- ✓ The whois db - bulk data, uses and how to request a copy

1500-1530: COFFEE BREAK

- ✓ MyAfriNIC - A closer Look.
- ✓ Reverse DNS
- ✓ AS Numbers
- ✓ IPv6

1700: END OF SESSION



QUESTIONS



AfriNIC and the Community



What is AfrinIC?

- A Regional Internet Registry (RIR) serving Africa and part of the Indian Ocean region.
 - One of the 5 RIRs
 - Not for Profit
 - Open Membership (from entities located legally within countries in the AfrinIC service region)
 - Responsible for managing and distributing IP number resources in the AfrinIC service region.



The AfrINIC Service Region





Services provided by AfrinIC

- Allocation & Assignment of internet numbers:
 - IPv4 and IPv6 addresses
 - 2-byte, 4-byte AS Numbers
 - Number Resource Registration:
 - *whois.afrinic.net port 43*
 - Management of reverse DNS
 - *ip6.arpa.*
 - *in-addr.arpa.*
 - Coordination of policy development
 - F2F Meetings (bi-annual)
 - Involvement with the ASO, ICANN.
 - Training: IPv6, DNS and Member Courses



Services NOT provided by AfrinIC

- Not a network operator or ISP
 - Have a MoU with AfNOG.

- We do not develop technical standards or protocols
 - Work with the IETF in some areas requiring our input to standards development. (Recent examples: 4-byte ASNs and IPv6)

- Registration of domain names.
 - Refer any domain name related inquiry to the appropriate body or organization.

 - Only in-addr.arpa. and ip6.arpa. domains.



The “Community”

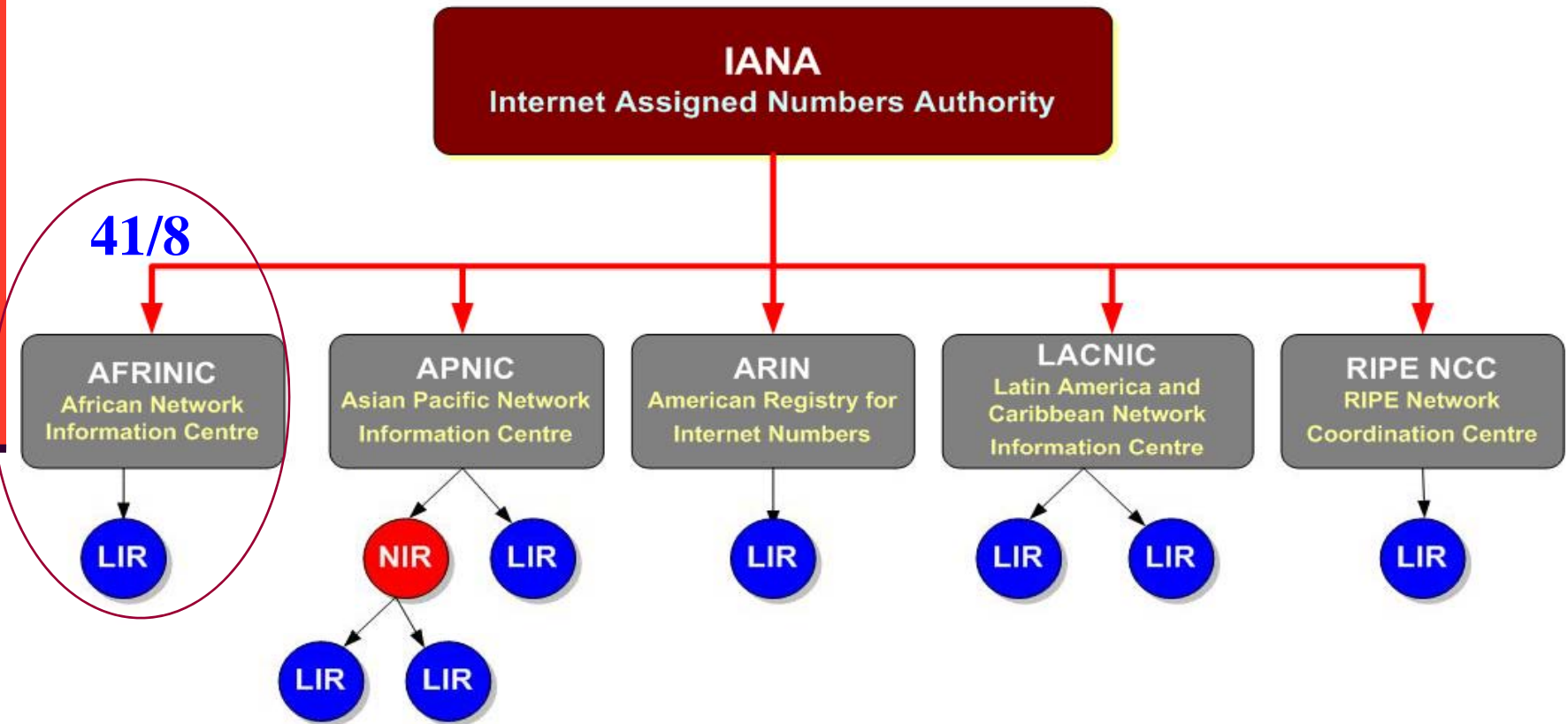
- **Open “forum” in the AfriNIC service region**
 - Voluntary participation
 - Anyone can be in the forum
 - Decides based on consensus

- **Meetings - biannual open policy meetings and annual technology workshop with hands-on drills.**

- **Mailing lists:**
 - Policy discussions (rpd) - archived.
 - Anti-spam, IPv6 discussions, etc

Global Registry Hierarchy

Internet Resources Allocation



QUESTIONS

Policy and the Policy Development Process



Policy Development

- IP numbers are a public resource for which the RIR is the custodian.
- The 'public' (community) develops policies that the RIR uses to manage these resources.
 - Policies are developed by the community mainly to suit the needs of the region.
 - Afrinic staff facilitates in policy development
- Afrinic implements the developed policies:
 - The policies may have an impact on:
 - The RIR processes
 - ISPs and network operators
 - The operation of the internet

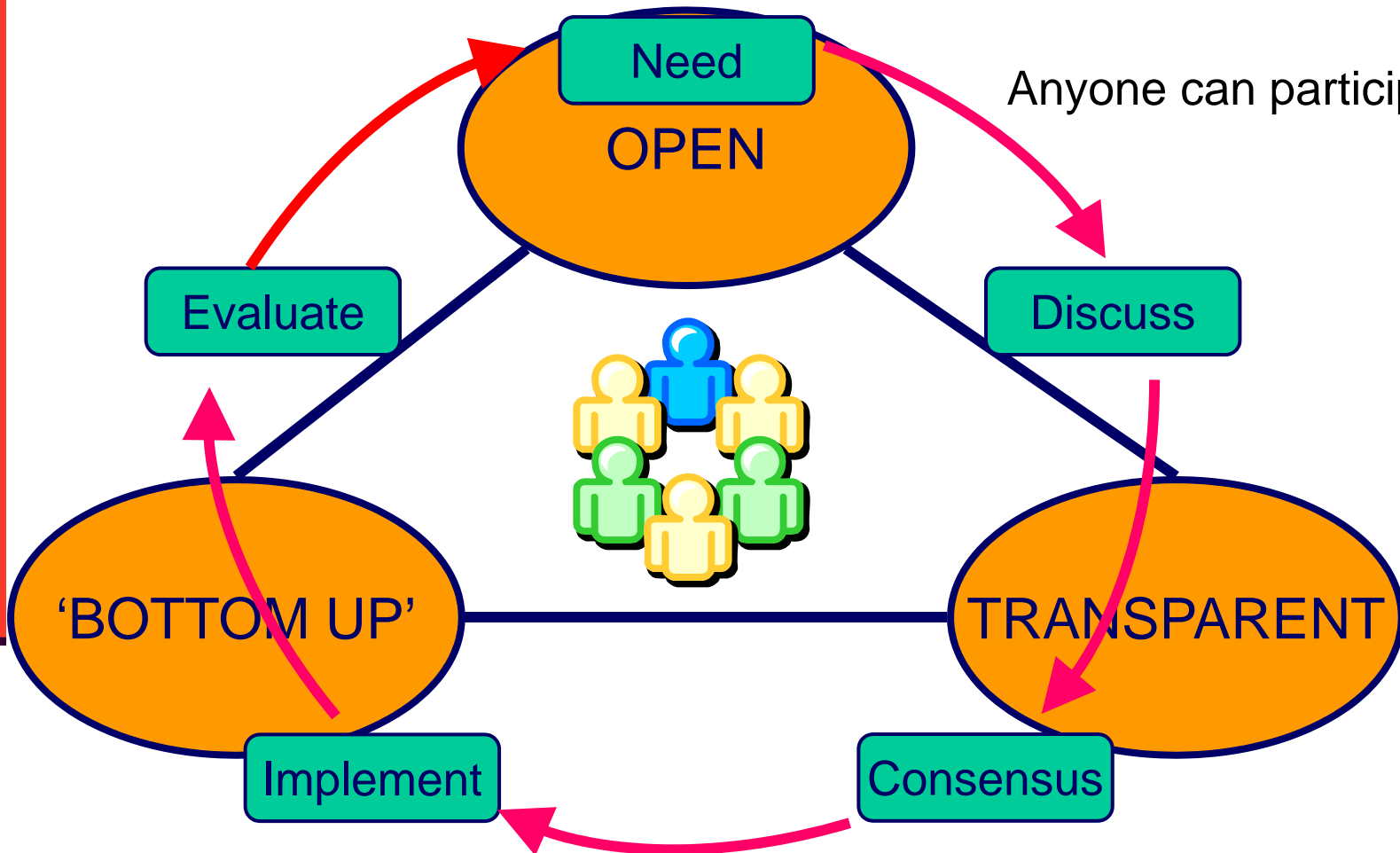


Why Participate in Policy Development

- Be aware of the policies in use for managing the allocation and assignment of IP number resources
 - Procedure for requesting and evaluating IP number requests is usually based on and adheres to current policies.
- Ensure that your requirements/needs are properly addressed.
- Implemented policies may have an effect on the way you do your business.
- Knowledge sharing and learning - policy discussions can at times involve imparting knowledge about latest technology, protocols and standards.
- Staying abreast with “best practices”.

Policy development cycle

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Internet community proposes and approves policy

All decisions & policies documented & freely available to anyone



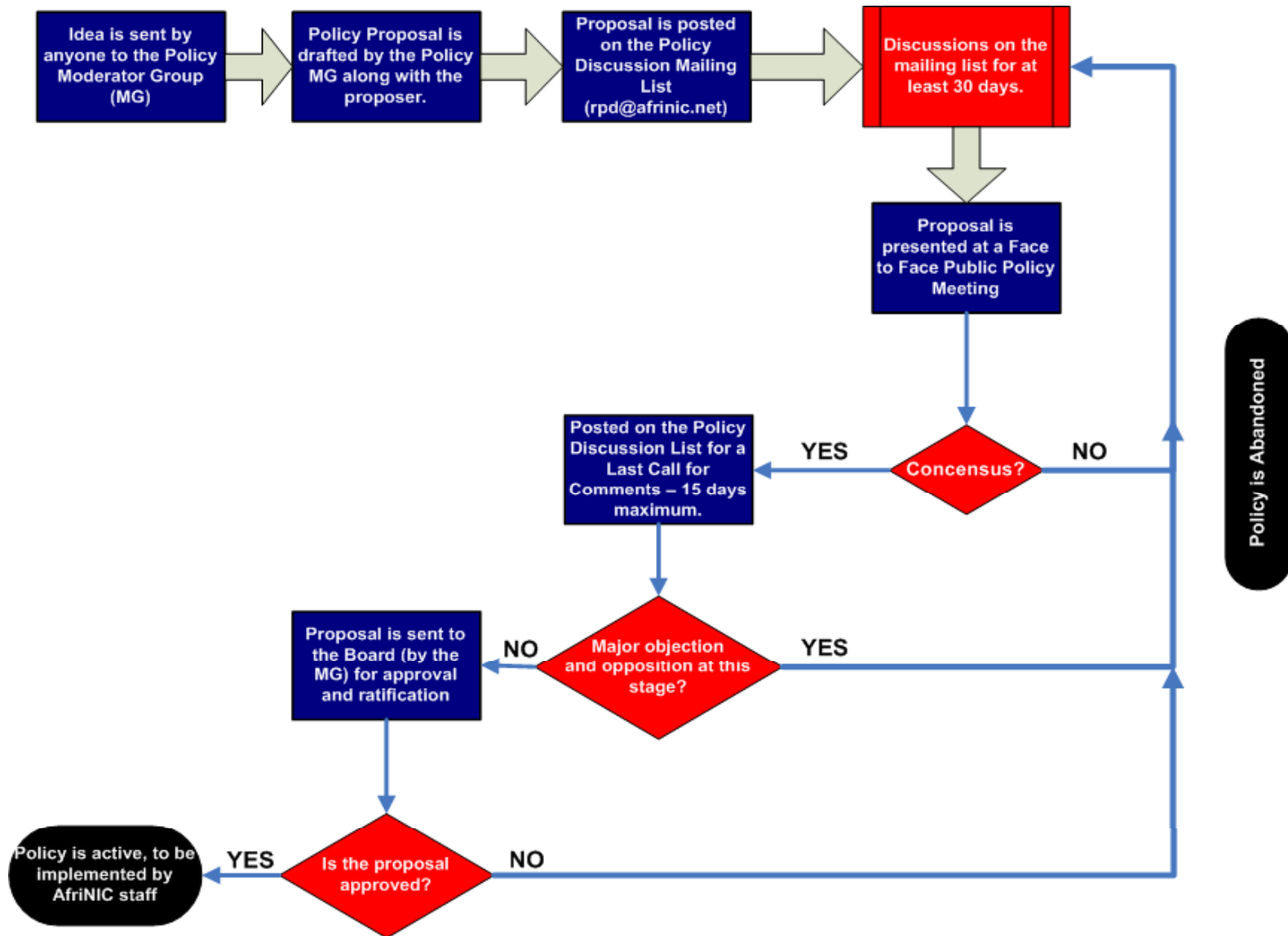
Key elements in policy development

- **The Open Policy Face to Face Meetings:**
 - Organized by AfriNIC
 - Open to anyone

- **Mailing Lists:**
 - Hosted by AfriNIC
 - Open to anyone
 - *rpd@afrinic.net*
 - Publicly archived

- **Working Groups:**
 - The policy working group, etc

The Policy Development Process





Make your voice heard!

- Participate to various online discussions, especially on the policy mailing list.
 - <https://lists.afrinic.net/mailman/listinfo.cgi>
 - *rpq*: Policy Discussions
 - *afripv6-discuss*: IPv6
 - *anti-spam*: Technical spam talk
 - Etc!

- Attend meetings:
 - AfrINIC Public Policy Meetings
 - Send a representative!
 - AfNOG meetings
 - ISPA i-week, IETF, ICANN, etc*

- Give feedback:
 - Training, Meetings & Other events.

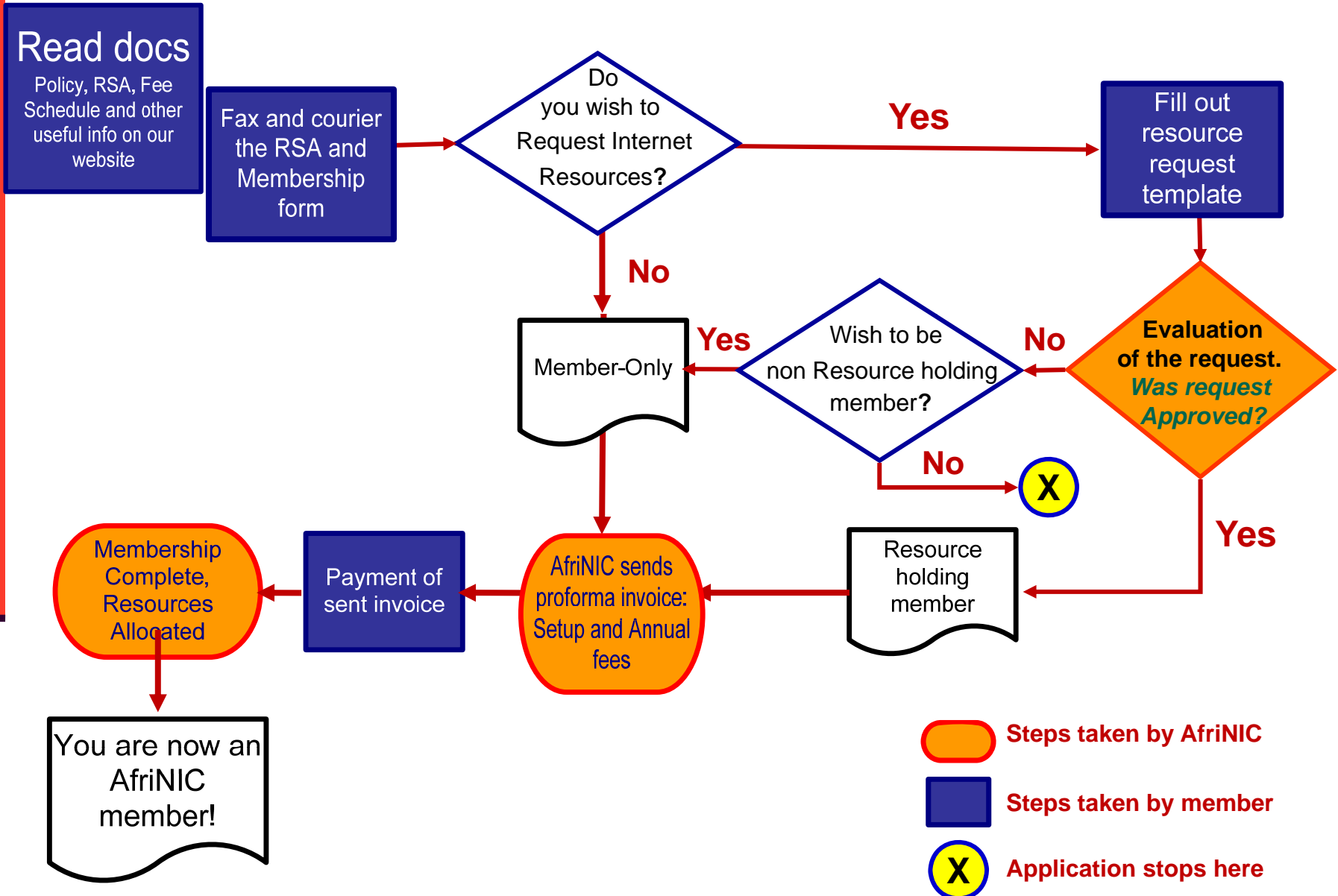
QUESTIONS



AfriNIC Membership

Membership process

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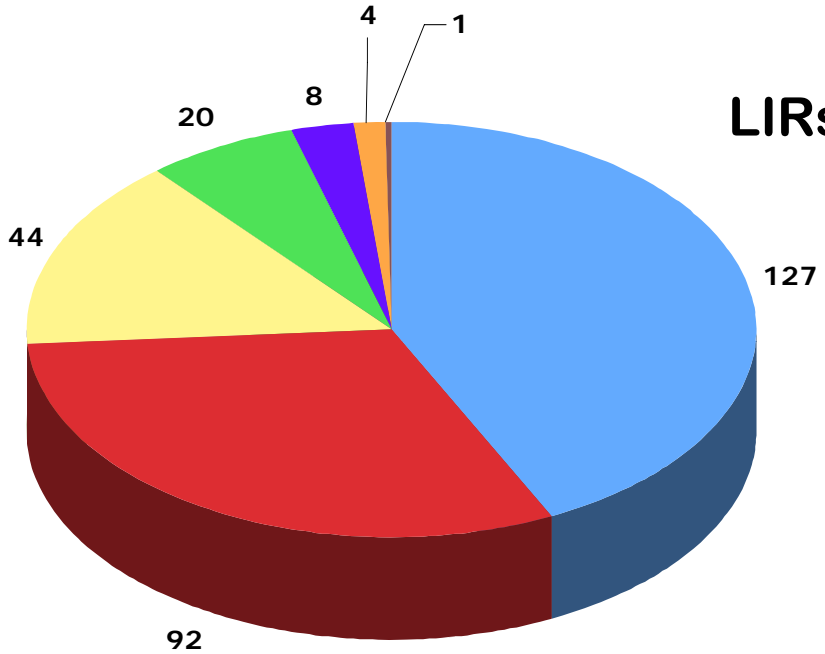
Benefits of Afrinic Membership

- **Internet Number Resources:**
 - IPv4/IPv6 addresses
 - AS Numbers
 - in-addr.arpa and ip6.arpa delegation

- **Training:**
 - IPv6 and DNS Workshops
 - Member Training

- **Free attendance of Afrinic public policy meetings**
- **Voting at Afrinic meetings**
- **Participation and influence to new and ongoing activities in the community.**

Membership Distribution



LIRs: as of 31-12-2007

- Very Small
- Extra Small
- Small
- Medium
- Large
- Very Large
- Extra Large

Others:

End Users	
Small	50
Medium	3
Large	2
Extra Large	1
AS-Only	47
Legacy	399

Extra Small	/22 - /21+
Very Small	>=/20 - /19+
Small	>=/18 - /17+
Medium	>=/16 - /15+
Large	>=/14 - /13+
Very Large	>=/12 - /11+
Extra Large	>=/10

Category Computation based on the table above.

QUESTIONS



Requesting IP addresses

Definitions

■ Allocation:

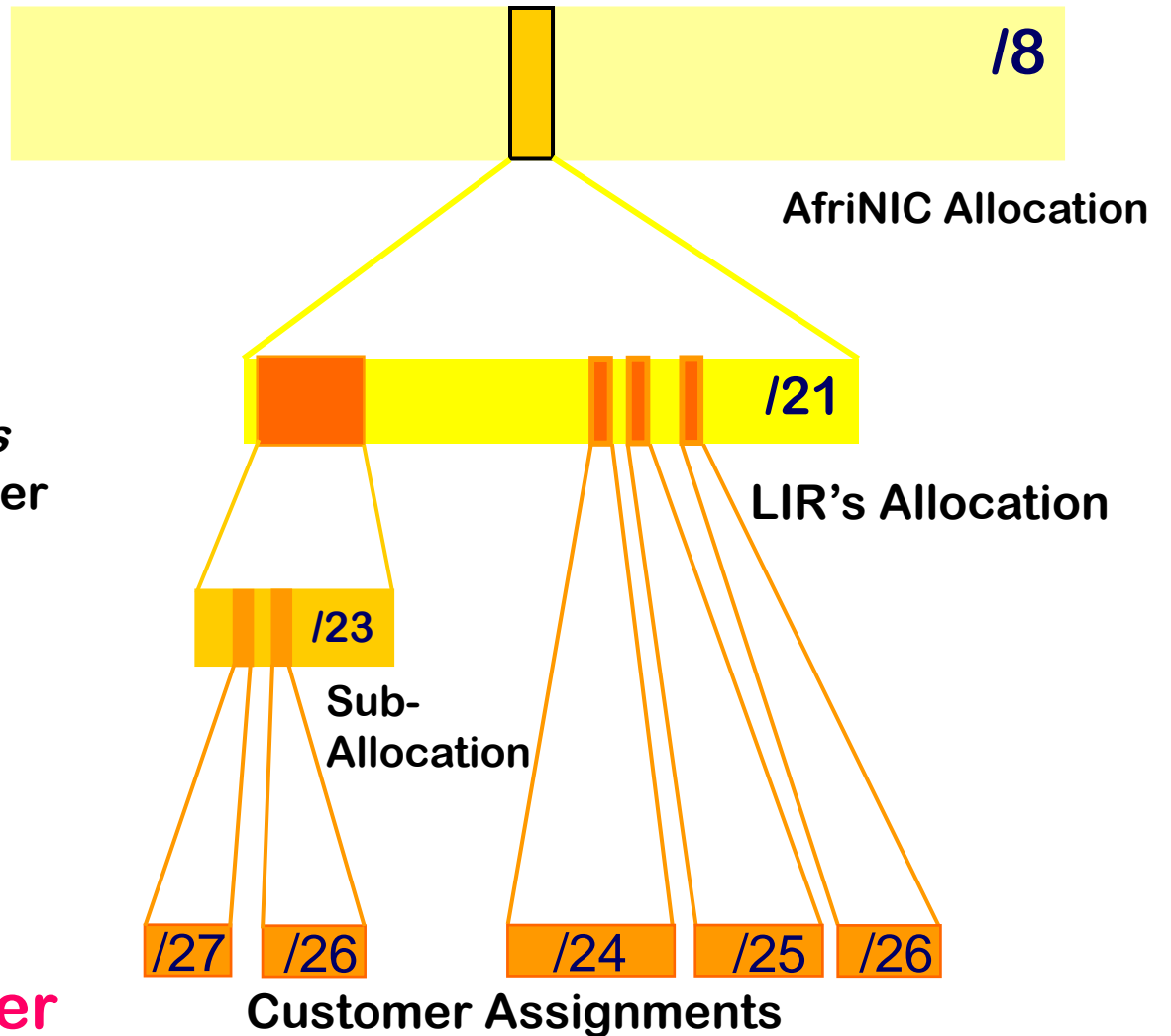
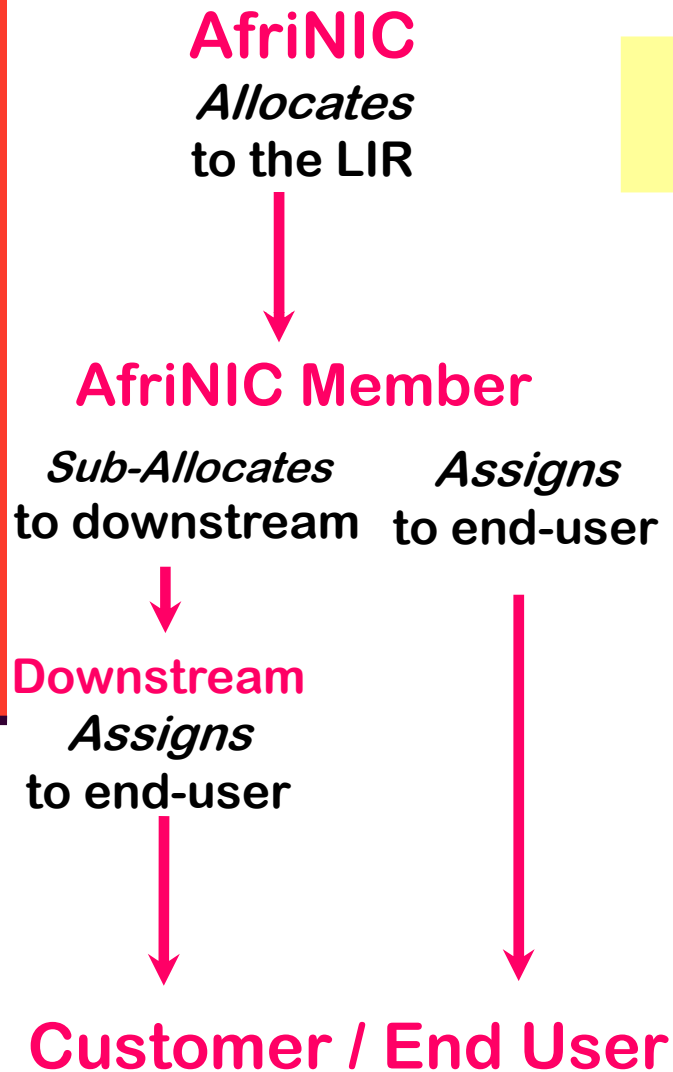
- A range (or block) of IP addresses held by an LIR for subsequent sub-allocation or assignment.
- “Issued” by Afrinic to the LIR.
- “Parent block”, should not be used to address any networks.*

■ Assignment:

- A range (or block) of IP addresses used to address an “operational network”.
- Issued from the LIR’s allocation.
- May be given to the LIR’s customers, or used for an LIR’s network infrastructure.

Allocation and Assignment

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PA and PI Assignments

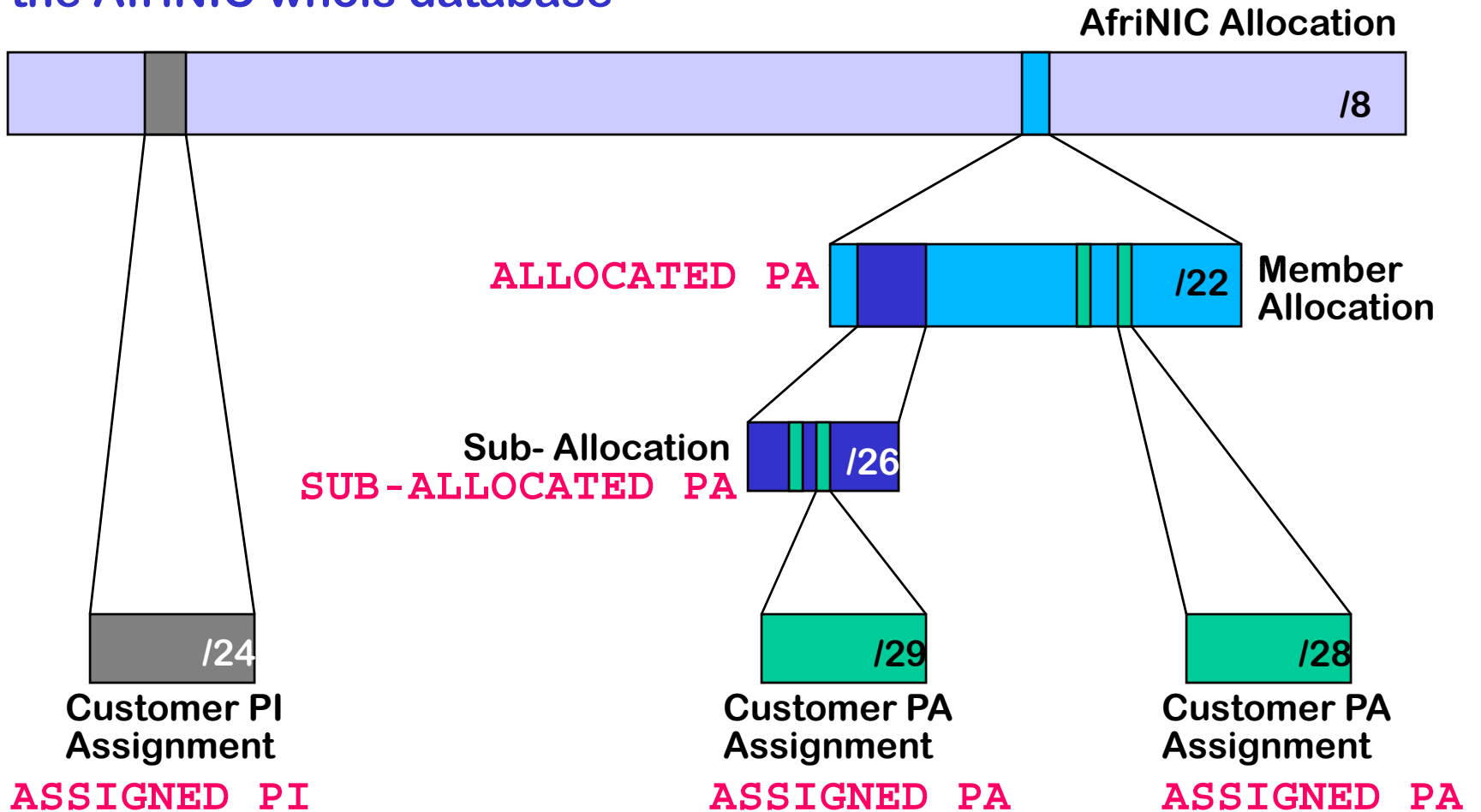
PI Assignments:

- Customer addresses independent from ISP
 - Keeps addresses when changing ISP
 - Bad for size of routing tables (/24 minimum).
 - Routes may be filtered.
 - Routing and announcement may not be guaranteed.

PA Assignments

- Customer uses ISP's address space (allocation)
 - Must renumber if changing ISP
- Good way to effectively scale the Internet.

Terms used for the “status:” field in the AfriNIC whois database



Address management objectives

Conservation

- Efficient use of resources
- Based on demonstrated need

Aggregation

- Limit routing table growth
- Support provider-based routing

Registration

- Ensure uniqueness
- Facilitate troubleshooting

Uniqueness, fairness and consistency

Once issued, *IP addresses are not members' property*

- Assignments & allocations are made on “lease” basis.
 - Internet resources are public resources
 - Addresses *cannot* be bought or sold
 - ‘Ownership’ is therefore contrary to management goals.

“Confidentiality & security”

- Afrinic observes and protects a trust relationship
 - Non-disclosure agreement clauses in the Registration Services Agreement.



First IPv4 Allocation

Criteria as stated in the policy:

<http://www.afrinic.net/docs/policies/afpol-v4200407-000.htm>

Section 8.2:

- a) Minimum allocation = /22.
- b) Requestor must be an AfrinIC member in good standing
- c) Must show an existing efficient utilization of IP addresses from their upstream provider.
- d) Justification may also be based on immediate need.
- e) Justification can also be based on existing usage if the existing upstream-provider assigned IP addresses will be returned and renumbered into the LIR's new allocation.
- f) Justification can also be a combination of (d) and (e).

AfrinIC allocates enough resources to last a member's 1 year need/requirements!

PA Assignments

- **Assignments should be based on real requirements**
 - Need can be demonstrated through detailed documentation from customer
 - Assignment should maximise utilisation and minimize wastage.

- **Classless assignments (CIDR).**
 - showing use of VLSM
 - Classful = wastage!



PI Assignments

Criteria for applying for PI address space from AfriNIC:

- a) Be an AfriNIC member in good standing
 - b) Current efficient utilization of at least one /25 from their upstream provider, OR
 - c) Show that at least 50% of total requested size is needed immediately.
- Minimum PI assignment = /24
 - AfriNIC assigns enough to last a 12 month need.



Private Addresses & NAT

Private Addresses - RFC1918

10/8: 10.0.0.0 - 10.255.255.255

172.16/12: 172.16.0.0 - 172.31.255.255

192.168/16: 192.168.0.0 - 192.168.255.255

- Do not request these from AfriNIC
- Use on a network that will not connect to the internet.

NAT - RFC1631

- Use of NAT is up to each entity's needs
- Problems of NAT : *See RFC2993 Chapter 6*
- AfriNIC discourages the abusive use of NAT wherever possible.
- It is possible to request IP addresses to renumber a NAT'ted network.

PI assignments to critical infrastructure

- **What is Critical Internet Infrastructure?**
 - Internet Exchange Points
 - Core DNS operators
 - Root Server Infrastructure.
 - **Does NOT include ccTLDs.**
 - Address Registry Infrastructure
 - RIRs, IANA
- **Why a specific policy ?**

Protect the stability of core Internet function
- **Assignment sizes:**
 - IPv4: /24
 - IPv6: /48

The addressing plan

The “addressing plan” is essential .

- Analyze the requirements of the entire network:
 - Corporate LAN/WAN requirements,
 - Network infrastructure
 - Customer services and networks

- Identify the requirements at different phases of deployment: Immediate, 6 months and 12 months

- Network topology changes, redundancy, etc

Example of a completed addressing plan “template” as would appear in the submitted IPv4 address request.

```
# ADDRESSING PLAN:
#
# Addressing Plan: (List in CIDR Notation):
# _____
# size    Immediate 1yr Purpose
# -----
# /23     /24     /24    WIMAX Service in Polo City
# /23     /24     /24    DSL pool for Lopo District
# /22,/21 /22     /21    Leased Line/Corporates
# -----
# /20     /22,/23 /21,/23
# _____
```



Renumbering from upstream-provider IP address space

It is possible to request IP address space for a one-to-one renumbering out of your current upstream-provider assigned IP addresses, whatever the quantity.

The policy allows for a renumbering period of 3 months, but additional time can be provided if justified.

At the time of requesting for more IP address space, AfriNIC verifies that the upstream provider's IP addresses were indeed returned, else - delays, etc

QUESTIONS



Introduction to the AfrinIC whois database

Covered in the Overview:

- What is the AfrinIC whois database?
- Uses of the whois database.
- Performing queries/searching for information from the whois database.
- Process for updating the whois database.



What is the AfrinIC whois database?

- Database used for “public network management”
 - It is operated by Regional Internet Registries and other similar entities (NIRs and TLDs for domain names)
 - Contains publicly accessible information. **MUST NOT** contain confidential information.
 - in-addr.arpa and ip6.arpa delegation

- Contains IP Number resource registrations:
 - IPv4 and IPv6 address allocations + assignments
 - AS numbers

- Contains contact information for any registered number resource:
 - Company name, address and phone/email contacts
 - Administrative, Technical and Abuse Contacts.



Information storage in the whois database

- Information is stored in “objects”.
- There are different “object types” depending on the information stored in an object.

Name of Object	Information Stored
person, role	Contacts for persons
organisation	A company's contact details
inetnum	A range of IPv4 addresses + details
inet6num	A range of IPv6 addresses + details
aut-num	An autonomous system number
mntner	Data protection information
domain	Reverse delegation information
keycert	Data protection using PGP

<http://www.afrinic.net/docs/db/afsup-obj200502.htm>

- An object is made up of a set of attributes and values
- Each attribute of an object...
 - Has a value
 - Has a specific syntax
 - Is mandatory or optional
 - Is single- or multi-valued (spans more than one line in the object).
- Some attributes ...
 - Are primary (unique) keys
 - Are lookup keys for queries
 - Are inverse keys for queries

The “person” object

A person object contains information about a technical or administrative contact responsible for the registration where it is referenced. Once the object is created, the value of the "person:" attribute cannot be changed.

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

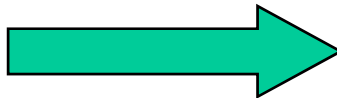
Attribute: Value

```
person: Alex Kaka
address: 02 Kaka Lane
address: Muskat Avenue
address: Venus District
phone: +908 987 987 6786
fax-no: +909 876 564 7788
e-mail: alex@kaka.vy
nic-hdl: AK9-AFRINIC
remarks: Do not send me spam!
notify: abuse@kaka.vy
mnt-by: ALEX-KAKA
changed: john@kaka.vy
source: AFRINIC
```

Person objects contain contact information about an individual (usually a human).

What is a nic-hdl? □

- Unique identifier for a “person”
- Represents a person object
- Referenced in objects for contact reference
(inetnum, inet6num, aut-num, domain...)
format: AB123-AFRINIC, AB123, etc



```
person:   John Kaka
address:  KAKA Data Services
address:  09 Kaka Avenue
address:  Kampala, Uganda
phone:    +988 8776 5444
fax-no:   +987 6765 4567
e-mail:   john@kaka.vy
nic-hdl: JK98-AFRINIC
mnt-by:   KAKA-JJ
changed:  john@kaka.vy 20080930
source:   AFRINIC
```



Choosing a nic-hdl

Automatic generation of nic-hdls:

```
person: John Kaka  
...  
nic-hdl: JK1-AFRINIC
```

Manually specifying a nic-hdl:

```
role: Sasa NetAdmins  
...  
nic-hdl: SN1-AFRINIC
```



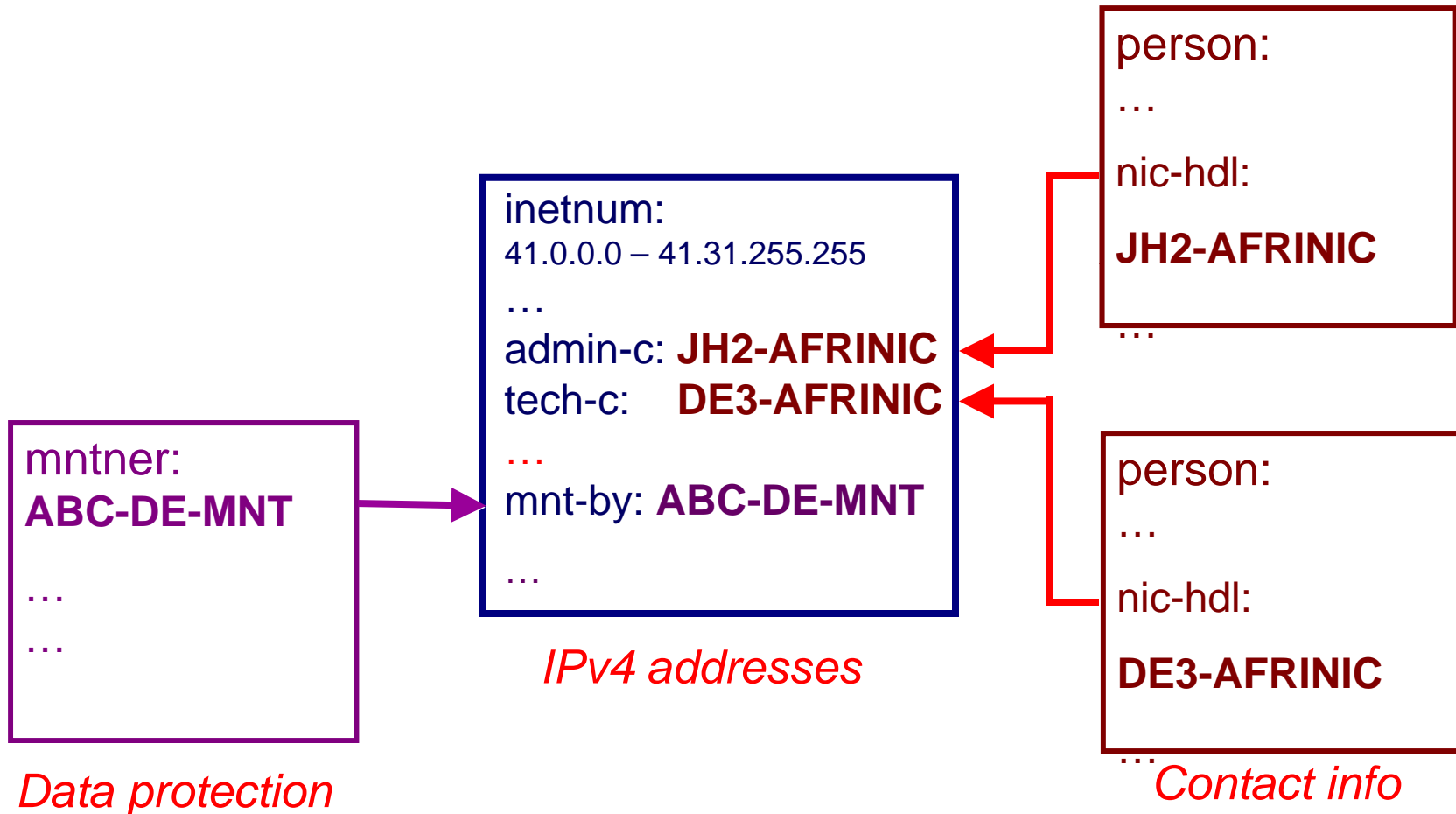
The “inetnum” object

Contains a range of allocated, sub-allocated or assigned IPv4 addresses.

```
inetnum:          196.0.0.0 - 196.0.255.255
netname:        UGANDA-TELECOM-01
descr:          Uganda Telecom
country:       UG
org:            ORG-UTL1-AFRINIC
admin-c:       RM2-AFRINIC
tech-c:        RM2-AFRINIC
status:        ALLOCATED PA
mnt-by:         RM2-MNT
mnt-lower:     RM2-MNT
notify:        noc@utlonline.co.ug
changed:       hostmaster@afriNIC.net 20050919
source:        AFRINIC
parent:        196.0.0.0 - 196.255.255.255
```

Object inter-relation

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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

Querying the whois db

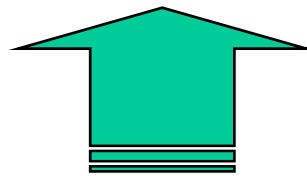
Server

whois.afrinic.net

whois.ripe.net

whois.arin.net

WHOIS



Queries & responses

Client

Unix Client

Linux Client

Web Browser

Shell / Prompt / Web Interface

Query clients

- **Standard whois client**
 - Included with many Unix and Linux distributions
 - RIPE whois client (for Unix/Linux systems)
<http://whois.sourceforge.net/>
- **Query via the AfrinIC website**
www.afrinic.net
<http://whois.afrinic.net>
- **Microsoft Windows:**
 - No known freely available clients.
 - Possibly many commercial tools.

- **Register the use of Internet Resources**
 - **Public Records:**
 - Reverse DNS information
 - IPv6 and IPv4 address assignments, sub-allocations and allocations
 - AS numbers
 - Ascertain custodianship of a resource
- **Obtain details of technical contacts for a number resource**
 - Investigate security incidents
 - Track source of network abuse, “spam” email, *phishing* servers, etc



Basic whois database queries

- From a Unix or Linux shell:

`whois -h whois.afrinic.net <lookup key>`

- Web interface

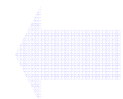
<http://whois.afrinic.net>

<http://www.afrinic.net>

- Look-up keys

- Usually the object name

- Check the template for look-up keys





Querying from Unix/Linux

```
whois -h whois.afrinic.net mcoetzee@csir.co.za
```

```
whois -h whois.afrinic.net MC5-AFRINIC
```

```
whois -h whois.afrinic.net "Mike Coetzee"
```

```
person: Mike Coetzee
address: Council for Scientific and Industrial Research
address: Meiring Naude Road
address: Brummeria, Pretoria
address: 0001
address: ZA
phone: +27 12 841 3660
fax-no: +27 12 841 4109
e-mail: MCoetzee@csir.co.za
nic-hdl: MC5-AFRINIC
source: AFRINIC # Filtered
```



Querying from Unix/Linux

```
whois -h whois.afrinic.net 196.21.232.0/24
whois -h whois.afrinic.net 196.21.232.3
whois -h whois.afrinic.net CSIR-BMIC-196-21-232-0
```

```
inetnum:      196.21.232.0 - 196.21.232.255
netname:      CSIR-BMIC-196-21-232-0
descr:        Council for Scientific and Industrial Research
descr:        Meiring Naude Road
descr:        Brummeria,Pretoria
descr:        0001
country:      ZA
admin-c:      MC5-AFRINIC
tech-c:       MC5-AFRINIC
status:       ASSIGNED PA
mnt-by:       TF-192-96-MNT
mnt-lower:    TF-192-96-MNT
source:       AFRINIC # Filtered
```

Type The Search Key Here.

January 2008

[french](#) | [home](#) | [about](#) | [sitemap](#) | [faq](#) | [contact](#)

[whols](#)

[site search](#)

[meetings](#) | [document store](#) | [registration services](#) | [database](#) | [policies](#) | [training](#) | [mailing lists](#) | [tools](#) | [statistics](#)

Query the AfrinIC Whois Database

Search for

Query Options: IP address Lookups

-d Reverse Delegations

Query Options: Inverse Lookups

-i Inverse attributes:

Query Options: IP address Lookups

Search level:

Query Support Tools

-r Turn off recursive lookups

-K Primary keys only

-R Disable domain name referral

-S Alternative database:

-T Objects types:

Click "Search"

Add Query Options (Flags)

Turn off "recursive" lookups if necessary.

Further Information

[The AfrinIC Whois Database Reference Manual](#)

[Object Types In AfrinIC Whois](#)

[RPSL Information](#)

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For website comments, email webmaster@afinic.net. For general inquiries, email contact@afinic.net

Creating a person object

- **Get a person object template:**
 - `whois -h whois.afrinic.net -t person`
 - `whois -h whois.afrinic.net -v person`
 - <http://www.afrinic.net/docs/db/afsup-obj200502.htm#210>
- **Copy the template into a new e-mail message**
 - MUA must be set to send email in plain text
 - Only the object must be in the body. Multiple objects to be separated by white-space
 - Leave the subject blank
- **Send the e-mail to auto-dbm@afrinic.net and wait for an immediate reply. Observe the subject:**
 - **SUCCESS:** See body for nic-hdl
 - **FAILED:** See body for error message, ammend and retry.
 - E-mail afrinic-dbm@afrinic.net if help needed. Include the full error report in message.



QUESTIONS



MyAfrinIC : Introduction



What is MyAfrinIC

- Web-based 'portal' from which AfrinIC members can manage their registration information.
 - Available only to AfrinIC members in good standing.
 - Not available to organizations holding only legacy resources.

- Point the browser to <https://my.afrinic.net>
 - Need to be a registered contact for your organization.
 - Must have a nic-hdl (person object) in the whois db.
 - Write to myafrinic-activate@afrinic.net to request access to MyAfrinIC.



What you can do with MyAfrinIC

- View and manage contact information
- View allocated IPv4/IPv6 addresses & ASNs
- Create and manage reverse delegation (in-addr.arpa and ip6.arpa domains).
- Register and manage customer and own IPv4 and IPv6 address assignments
- Request and/or manage sub-allocations
- View your financial account status and detailed statement and balances
- Pay any bills (membership fees, etc) online
- Request for additional IPv4/IPv6 addresses and ASNs
- View up-to-date status and all history of open e-mail correspondence to hostmaster@afriNIC.net and other resource related email accounts.



MyAfrinIC Introductory Demo

- Brief Demo of MyAfrinIC's functions
- Detailed Demonstration later in the day.

<https://my.afrinic.net>

QUESTIONS

The AfrinIC Whois DB: Object Security

Object protection: Maintainer object



```
whois -h whois.afrinic.net -r -B DATANET-MNT
```

```
mntner: DATANET-MNT
descr:  DATANET LLC
admin-c: BN1-AFRINIC
tech-c:  RM8-AFRINIC
upd-to:  noc@data.co.ug
mnt-nfy: support@data.co.ug
auth:    MD5-PW $1$gKDC3fV8$YXm6c/QmCjuwcEhHqbvE4/
mnt-by:  DATANET-MNT
changed: hostmaster@afrinic.net 20080129
source:  AFRINIC
```

- Protects other objects in the whois database



To Create a “mntner” object:

- **Get the object template:**
 - `whois -h whois.afrinic.net -t mntner`
 - <http://www.afrinic.net/docs/db/afsup-obj200502.htm#29>
- **Copy template into a new email message.**
- **Complete and send to auto-dbm@afrinic.net**

- **What you need before-hand:**
 - **Your nic-hdls for admin and/or tech contacts (person objects)***
 - **A tool to encrypt a plain text password using the supported encryption methods ****
 - **Please see:**
https://www.afrinic.net/tools/whois_crypt.htm

<http://www.afrinic.net/Registration/mntner.htm>

Object 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 the authentication rule specified by its maintainer object

Authorisation mechanism

```
inetnum: 41.220.208.0 - 41.220.223.255
netname: DATANET-2
descr: DATANET LLC
.....
mnt-by: DATANET-MNT
```

```
mntner: DATANET-MNT
descr: DATANET LLC
admin-c: BN1-AFRINIC
tech-c: RM8-AFRINIC
upd-to: noc@data.co.ug
mnt-nfy: support@data.co.ug
auth: MD5-PW $1$gKDC3fV8$YXm6c/QmCjuwcEhHqbvE4/
mnt-by: DATANET-MNT
changed: hostmaster@afriNIC.net 20080129
source: AFRINIC
```



Maintainer specific attributes

mnt-nfy:

Sends notification of any changes to maintained objects to email address specified

mnt-by:

Maintainers must also be protected!
(Normally by themselves)

auth:

Authentication mechanism for this maintainer object.

Authentication Methods

■ CRYPT-PW:

- The CRYPT-PW authentication scheme uses an 8 bit UNIX crypt routine, which is also used for login passwords under UNIX
- Currently, an average personal computer is capable of quickly and successfully cracking a CRYPT-PW encrypted password.
- This method takes an argument consisting of a CRYPT encrypted password.
 - auth: CRYPT-PW 6668YGInY6jno

■ MD5-PW:

- This method takes an argument consisting of an MD5 encrypted password.
 - auth: MD5-PW \$1\$CdzU0svH\$/kPcuBXWZId/LkiZUSDWX0
 - Harder to crack than CRYPT-PW
- Online tool: https://www.afrinic.net/tools/whois_crypt.htm

Authentication Methods

■ PGP:

- One of the strongest protection methods available.
- Uses private/public key pair.
- User specifies a PGP key-id pointing to a key-cert object that stores a PGP public key.
- When sending e-mail updates to the database, the user must sign the email using his/her PGP private key.
- The whois db checks the signature using the public key stored in the key-cert object referenced in the "auth:" attribute of the relevant "mntner" object.
- If the cryptographic signature is correct, the update will proceed, otherwise it will be refused.

■ Soon to come: X509

‘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 a mntner object
- Hierarchical authorisation for inetnum, domain inet6num and aut-num objects
- The creation of ‘child’ objects must satisfy this mntner
- Protects against unauthorised updates to all child objects, and use is highly recommended.

Member Allocation: Created and maintained by AfriNIC

```
inetnum:      196.146.96.0 - 196.146.127.255
netname:      MCHOMO-NET1
descr:        Mchomo Consultants Inc
descr:        304 Kaguta Road
country:      RW
admin-c:      MCI5-AFRINIC
tech-c:       GHY9-AFRINIC
mnt-by:       AFRINIC-HM-MNT
mnt-lower:    MCHOMO-MNT
status:       ALLOCATED PA
changed:      hostmaster@afrinic.net 20080714
source:       AFRINIC
```

①



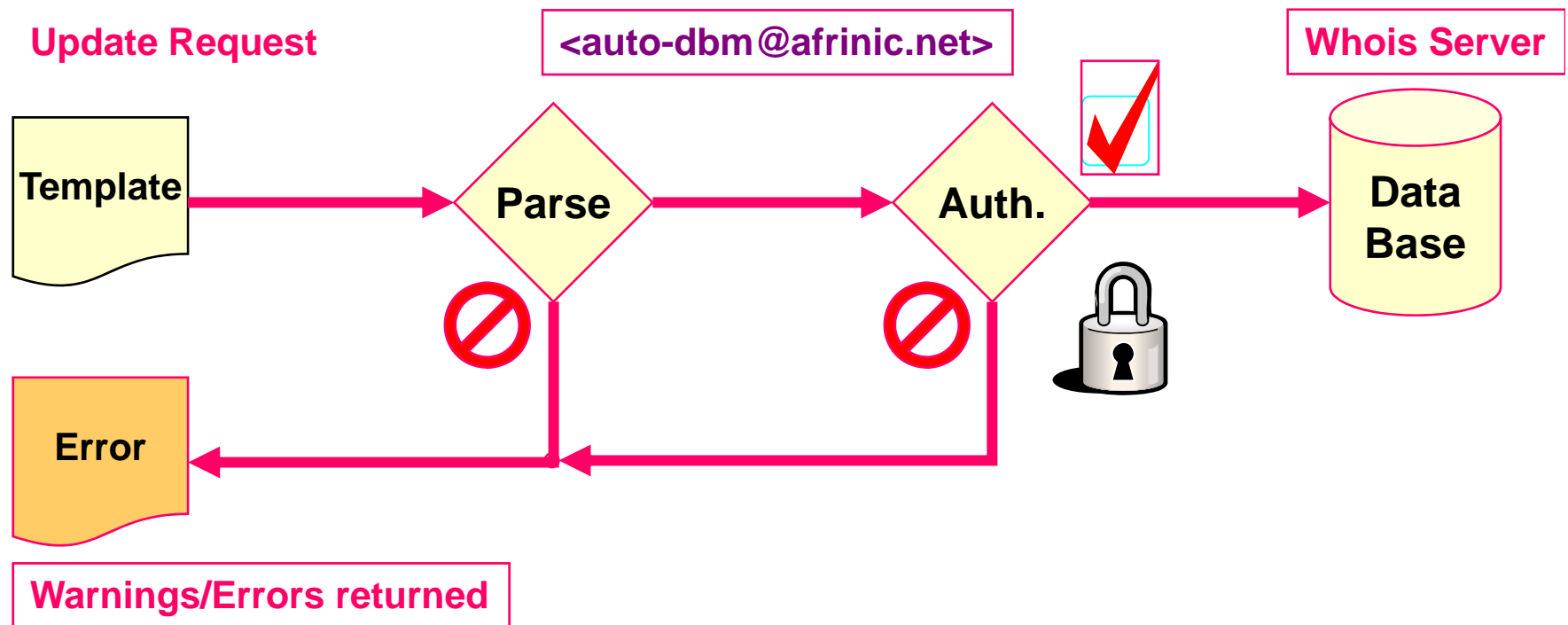
②



1. Only AfriNIC can change this object
2. Only MCHOMO-MNT can create assignments and reverse delegation.

Whois Database update process

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



Authorization

- **“Parser/robot” checks the maintainer object referenced in “mnt-by” attribute or mnt-lower in case of child object creation.**

- **Failed Authorisation**
 - **Template NOT corrected**
 - **Object NOT accepted**
 - Automatic email notification sent to requestor
 - Automatic email notification sent to “notify” address



Whois Database update process

- **Successful update**
 - If Parse and Auth. steps succeed, database is updated
 - Confirmation by email to requestor

- **Mirrored to public whois server**
 - Updates mirrored to “whois.afrinic.net”
 - May take up to 5 minutes.



Updating an existing object

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

`<auto-dbm@afrinic.net>`

- **Note**
 - **Primary keys cannot be modified !**
 - Please look at object template to see primary keys:

Deleting an object

- Copy object as-is in database into email
- Add your maintainer password
- Leave the changed attribute
- Add “delete:” attribute and brief comments.
- Add “password:” if object is protected.

```
inetnum:      196.182.224.0 - 196.182.225.255
netname:      ISP1-NET
...
mnt-by:       KAKA-MNT
changed:      kk@vodoo.kk 20090617
source:       AFRINIC
password:   x34zky
delete:     object no longer required by ISP1
```

Note: Referenced objects cannot be deleted!



Forgotten Password?

- You can request for a new password:
- E-Mail hostmaster@afrinic.net.
 - You must be the registered contact.
 - AfrinIC will ask you to fax a letter, on company letterhead, sealed/stamped and signed by an administrative authority (or you).
 - State the maintainer object affected, and the new plain text password.
- AfrinIC updates the maintainer with the requested password and notifies you.
- You could simply straight away fax the request to +230 466 6758



QUESTIONS

The whois DB: Advanced Querrying



“-r” : Omitting Contact Info

- By default, a query returns the following contact information:
 - Administrative and Contact Persons
 - Organization (if referenced in resultant query)
- This can make results rather long if:
 - You're not interested in seeing contact info
 - There are many person objects in the returned query.
- Solution: Use the “-r” flag:

```
whois -h whois.afrinic.net -r 196.0.0.0/16
```

- Whois server blocks source IP that send many queries lacking the “-r” flag (E-Mail harvesting check)

“-i” : Inverse Queries

- To locate all objects in which a certain object is referenced.
 - Find all objects where a person is listed.
 - Return all objects protected by a certain “mntner”
 - See all objects belonging to a certain organization

whois -h whois.afrinic.net -i person EMB2-AFRINIC

whois -h whois.afrinic.net -i org ORG-MU1-AFRINIC

whois -h whois.afrinic.net -i mnt-lower ABC-MNT

whois -h whois.afrinic.net -i notify abc@eb.kk

- Results can be long depending on the number of returned objects!

- Given an object, it is possible to see its children objects or parent object(s).
 - Child object examples:
 - IP address assignments and sub-allocations
 - Domain Objects
 - Parent object example:
 - Allocations (*inetnum*, *inet6num*)

whois -h whois.afrinic.net -M 41.230.0.0/17

(return all assignments and sub-allocations from the specified allocation)

whois -h whois.afrinic.net -L 41.10.0.0/29

(return the parent allocation or sub-allocation from which 41.10.0.0/29 was made)



Combining flags in a single query

Examples:

whois -h whois.afrinic.net -r -M 196.10.0.0/17

returns all assignments and sub-allocations under 196.10.0.0/17 (and omits any associated contact information)

whois -h whois.afrinic.net -r -d 196.0.0.0/16

returns all **domain** objects under a given allocation.

whois -h whois.afrinic.net -r -T inetnum -i person EMB2-AFRINIC

returns all **inetnum type** objects where EMB2-AFRINIC is referenced as a contact (admin or tech-c)

whois -h whois.afrinic.net -r -B -d 2001:42d0::/32

returns all domain objects under the given IPv6 allocation **with e-mail filtering turned off.**



Adv. Query from the Web UI

- <http://whois.afrinic.net>
- Click on “Advanced”
- Select a combination of flags to use for the query.

- For Unix/Linux whois clients, the supported client is at <http://whois.sourceforge.net>
- Some distributions like Ubuntu and FreeBSD have this client pre-loaded.

QUESTIONS

Whois Data in “bulk” format.



'Bulk' Whois Data

- In certain circumstances, AfriNIC is requested to provide WHOIS data to some organisations in “bulk” format.
- General Uses include:
 - Internet Operations
 - Technical Research Activities and Stats
- Data not to be used for:
 - Advertizing
 - Marketing
 - Data/E-Mail harvesting and spam
 - Other illegal activities
- Redistribution of the data is strictly forbidden

'Bulk' Whois Data

- If you frequently query the whois db, there is a chance that your source IP could be blocked (*unless -r flag is used*)
- Request a copy of the whois data for doing queries locally.
- How to request the data:
 - PDF request form:
<http://www.afrinic.net/forms/affrm-blk200509-new.pdf>
 - Fax to +230 4666758 or email to hostmaster@afrinic.net
 - Access to the private FTP area will be granted if we are satisfied that all mentioned criteria have been met and provided info is satisfactory.



QUESTIONS



MyAfrinIC - A closer look.

Creating IP Address Assignments

Creating Sub-Allocations

in-addr.arpa and ip6.arpa

Managing Contact Information

Viewing Utilization

Additional IP Address Requests

View Status & history of tickets

View statement (financial)

Pay fees online

QUESTIONS

Reverse DNS

Reverse DNS

- Set up the in-addr.arpa or ip6.arpa zones (on your nameservers)
- Either:
 - Create domain object(s) in the whois db (see next slide), or
 - Use MyAfriNIC to update the parent zone with the delegation information.
 - Possible sizes: /24, /16, multiple /24-s.
- Reverse delegation can be fully managed from MyAfriNIC.

A Domain Object

```
domain:      32.3.196.in-addr.arpa
descr:      Reverse delegation for iServices Ltd.
admin-c:    JJ231-AFRINIC
tech-c:     SULU-AFRINIC
zone-c:    WF2121-AFRINIC
nserver:    ns.karibu.ke
nserver:    ns2.mtn.za
mnt-by:     KARIBU-MNT
changed:    badru@jambo.ug 20050417
source:     AFRINIC
```

names instead of IP addresses

***Must Pass Auth for
this
maintainer***

The domain object is created either manually (via e-mail updates) or when the information has been entered via myAfrinIC.



QUESTIONS

AS Numbers

AS Numbers

- **AS Number: A globally unique identifier for an Autonomous System or IP Network.**
- **ASNs are assigned by RIRs to organizations that need them.**
- **Types:**
 - **2-byte: (0 - 65535)**
 - AfriNIC Block: 36864 - 37887
 - Soon running out !
 - **4-byte: (65536 - 4294967296)**
 - AfriNIC Block: 5.1 - 5.1023
 - Nomenclature defined at

<http://ietfreport.isoc.org/idref/draft-michaelson-4byte-as-representation/>



Getting an ASN

- ***Criteria:***
 - Need to be an AfrinIC member,
 - Must be planning to be multi-homed.
 - Must have IP addresses that will be announced by that ASN.

- **Once the above are met:**
 - Request an ASN via MyAfrinIC, or
 - Use request template (copy from website to your email, complete and email to `hostmaster@afrinic.net`).

- **If requesting a 4-byte ASN, check with peers to ensure their router firmware is ready.**
 - Check your routers too.



ASN db object:

```
aut-num:      AS33764
as-name:      AFRINIC-ZA-AS
descr:        Traffic to AfrinIC-ZA
admin-c:      TEAM-AFRINIC
tech-c:        TEAM-AFRINIC
mnt-by:        AFRINIC-DB-MNT
changed:      hostmaster@arin.net 20041102
changed:      hostmaster@arin.asn 20041102
changed:      hostmaster@afrinic.net 20050221
changed:      kurup@afrinic.net 20070902
source:       AFRINIC
```



4-byte ASN db object:

```
aut-num:      AS5.2
as-name:      Edgenet
descr:        Edgenet
org:          ORG-EL2-AFRINIC
admin-c:      EDL
tech-c:       EDL
mnt-by:       AFRINIC-HM-MNT
changed:      hostmaster@afrinic.net 20070514
source:       AFRINIC
```

Routing Registry?

- Globally distributed database for sharing routing information between network operators.
- All RIRs, other than AfrinIC have a RR (Routing Registry)
- There are two public RRs where any ISP can publish their routing information and policies:
 - RADB
 - RIPE
- These RRs mirror each other. It is necessary to use just one, and all others will be updated.
- AfrinIC does not have own RR yet. We redirect our members to use the RIPE db for now.

QUESTIONS

IPv6



Need IPv6 addresses?

- If you meet the policy criteria:
 - Obtain own /32 (or more) allocation .
 - Get one or more /48 PI Assignments from AfrinIC.
- If your (upstream) ISP has native IPv6 connectivity:
 - ISP can assign you one (or more) /48s from their allocation.
- If you have public IPv4 addresses on your network:
 - Get IPv6 connectivity from a tunnel broker.
 - This is usually temporary depending on broker.
 - Use the “2002:” prefix on an IPv4-only network/uplink and the "6to4" mechanism to derive v6 addresses from existing (public) v4 addresses.



Need IPv6 addresses?

- **Policy Requirements:**
- **/32 initial allocation:**
 - Be an LIR (and not an 'end-site')
 - Show plan to provide v6 connectivity
 - Plan to assign /48s to organizations within 12 months.
- **/48 PI Assignment:**
 - Not be an IPv6 LIR
 - Either:
 - Be a holder of IPv4 PI address space,
 - Or:
 - Qualify for IPv4 PI space under current policy.
 - Must justify the need for the address space
 - Announce space to v6 internet within 12 months.



Need IPv6 addresses?

Note:

- Reverse Delegation:
 - ip6.arpa. Please see:
<http://www.faqs.org/rfcs/rfc3152.html>
- Whois database:
 - inet6num objects contain IPv6 address space:

```
inet6num:          2001::42d0::/32  
netname:          NET4-6  
descr:           Net4 V6 Network  
...
```

QUESTIONS