



Research and Innovation Department report

By

Alain Aina

05 June 2015





Research and Innovation

- Officially started in September 2014
- 2.5 team members:



Alain Aina

Director Research and New
Technology



Amreesh Phokeer

Research & Development
Engineer



Logan Velvindron

Research & Development Support
Engineer



Department objectives

- RPKI v2.0 Project: New RPKI system
- DNSSEC v2.0 Project: New DNSSEC signer
- IETF activities: Identity, join and contribute to key WGs and RGs
- African Internet Resources and Routing Statistics (AIRRS)
- Internet measurements: Continue RIPE Atlas probes and anchors distribution.



RPKI V2.0

- Fix known issues with RPKI v.1
- Split TALs
- RFC7318 compliance
- HSM integration
- UP/Down operational
- Exhaustive monitoring in place
- Backing repository



Internet Measurements

- Distribution of RIPE atlas probes as per MoU between RIPE NCC and AFRINIC
- Online enrollment channel opened for AFRINIC members last November
- Only ten (10) members, which half of probes online
- Ambassador continues to distribute probes selectively with high probability to have them online.



Internet Measurements

- Two (2) entities have applied to host an Anchor, but all have failed meeting the native IPv6 connectivity requirement.
- We maintained and monitored the activity of the AFRINIC hosted anchor (mu-plu-as327681 #6059).



IETF activities

- To efficiently participate in IETF work, the department has adopted a strategy, which includes; identifying AFRINIC relevant IETF WGs and IRTF WGs by End of January 2015
- Align to the group work done and milestones by June 2015 and attending IETF-93 in July 2015.

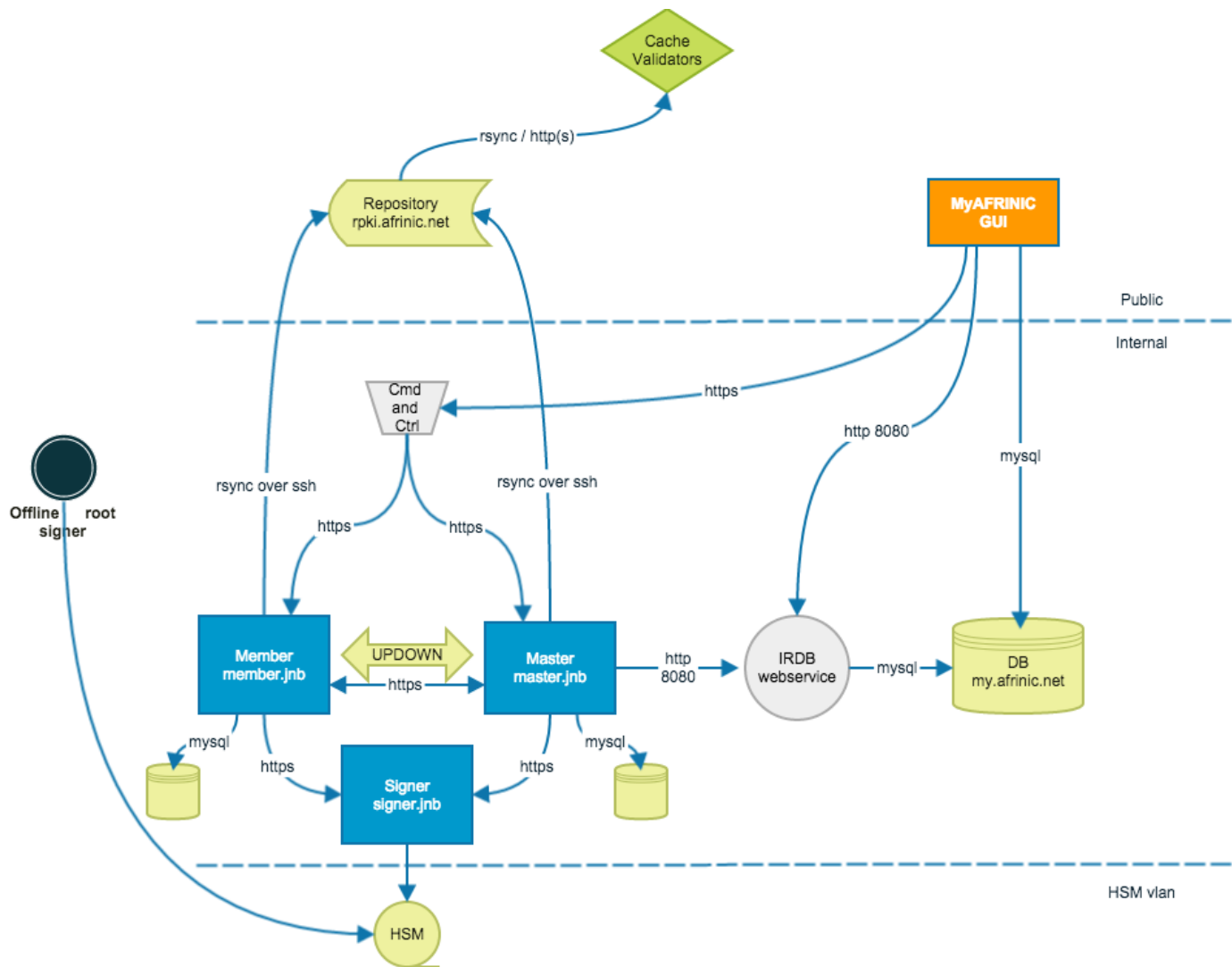


African Internet Resources and Routing Statistics - AIRRS

- AIRRS existing tools have been inventoried and shall be migrated to a new environment while we do the revamp.
- This project will be accelerated in Q3 after completion of ongoing activities



RPKI @ AFRINIC





| org_name | roaccount | valid |
|--|-----------|-------|
| African Network Information Center - (AfriNIC Ltd) | 53 | 3 |
| Access Communications Ltd | 0 | 0 |
| Wireless Business Solutions (Proprietary) Limited t.a iBurst | 0 | 0 |
| Beltone Financial | 3 | 1 |
| Sentech Ltd | 0 | 0 |
| University of Lagos | 0 | 0 |
| Internet Solutions | 17 | 17 |
| Clickatel PTY(LTD) | 0 | 0 |
| Satcom Networks Africa | 0 | 0 |
| African Network Operators' Group (AFNOG) | 0 | 0 |
| ISPA SA | 3 | 3 |
| ETISALAT MISR | 0 | 0 |
| Compute Corporate Technology Solutions | 0 | 0 |
| TATA Communications | 0 | 0 |
| MWEB CONNECT (PROPRIETARY) LIMITED | 0 | 0 |
| Libyan Telecom and Technology | 0 | 0 |
| General Post and Telecommunication Company (GPTC) | 0 | 0 |
| Posix Systems (Pty) Ltd | 1 | 0 |
| eNetworks cc | 10 | 6 |
| AFRINIC RPKI Test 2 | 24 | 0 |
| WIRELESS PROFESSIONELE NETWERKE | 2 | 1 |
| Cable & Wireless (Seychelles) Ltd | 1 | 1 |
| Sudatel (Sudan Telecom Co. Ltd) | 0 | 0 |
| Neology (Pty) Ltd | 7 | 2 |
| SEACOM Ltd | 8 | 6 |
| Info-Gro (PTY) Ltd | 1 | 1 |
| Millenium Outsourcing Ltd | 88 | 0 |
| iPi9 | 1 | 0 |
| Cape Connect Internet | 1 | 1 |
| Xtranet | 1 | 1 |
| Institut de la Gouvernance Numerique Universitaire | 0 | 0 |
| iConnectSA (Pty) Ltd | 1 | 0 |
| Workonline Communications(Pty) Ltd | 4 | 4 |
| Gamtel Co. | 0 | 0 |

435

route,
route6,
route sets
objects in
AFRINIC RR

34

members

47

ROAS



RPKI Adoption

| RIR | Total | Valid | Invalid | Unknown | Accuracy | RPKI Adoption Rate |
|----------|---------------|---------------|--------------|-----------------|----------|--------------------|
| AFRINIC | 12915 (100%) | 52 (0.4%) | 55 (0.43%) | 12808 (99.17%) | 48.6% | 0.83% |
| APNIC | 144012 (100%) | 1397 (0.97%) | 665 (0.46%) | 141950 (98.57%) | 67.75% | 1.43% |
| ARIN | 207276 (100%) | 1365 (0.66%) | 339 (0.16%) | 205572 (99.18%) | 80.11% | 0.82% |
| LACNIC | 73871 (100%) | 17803 (24.1%) | 870 (1.18%) | 55198 (74.72%) | 95.34% | 25.28% |
| RIPE NCC | 147902 (100%) | 13347 (9.02%) | 1291 (0.87%) | 133264 (90.1%) | 91.18% | 9.9% |

Source: <http://rpki.surfnet.nl>

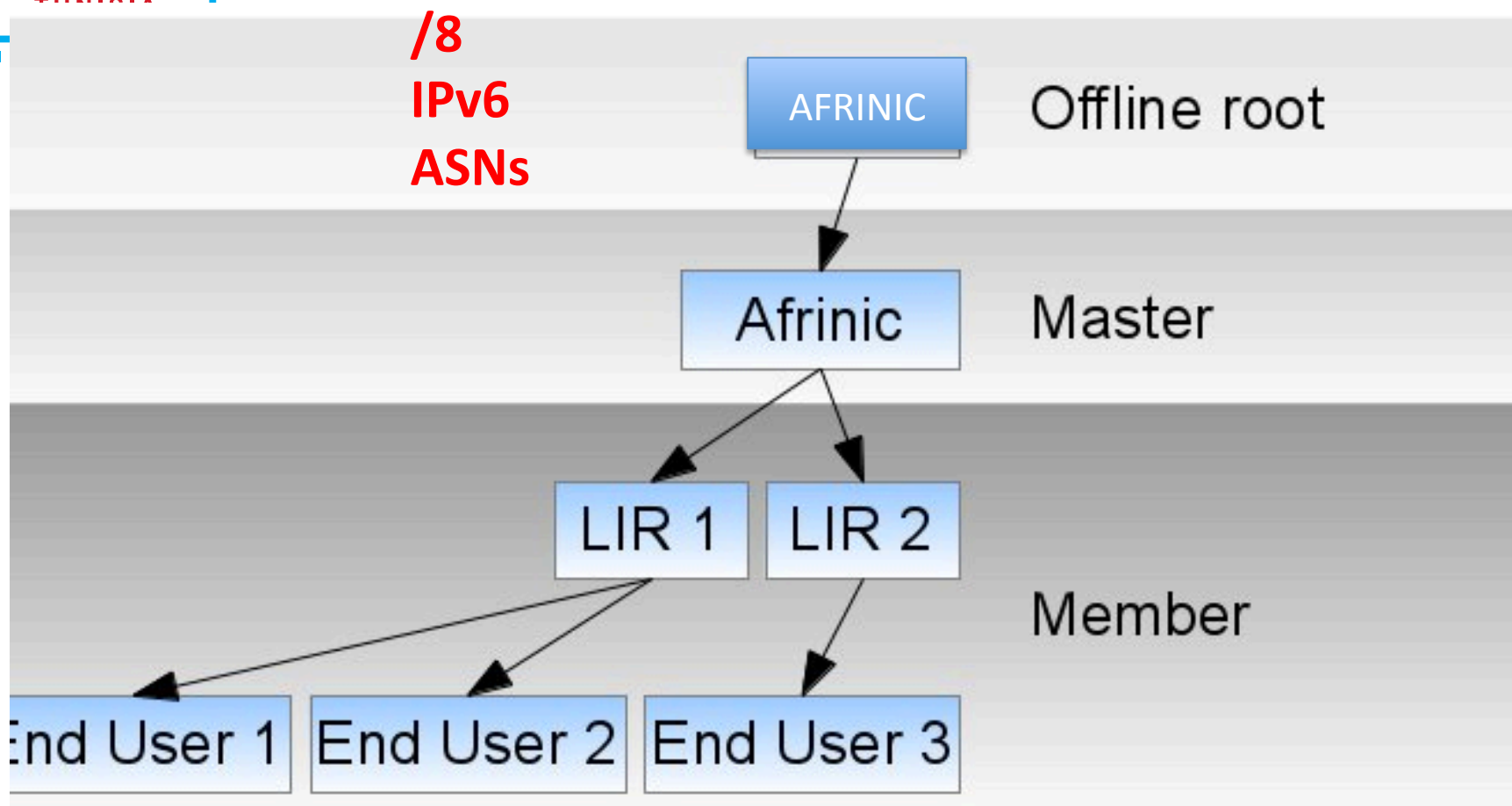


RPKI v1.0 issues

- ROA and MFT not compliant to ASN.1
- Repository structure (flat)
- Max-length not supported
- TA does not contain all resources
- Expired ROAs appearing in repo



Current TA model



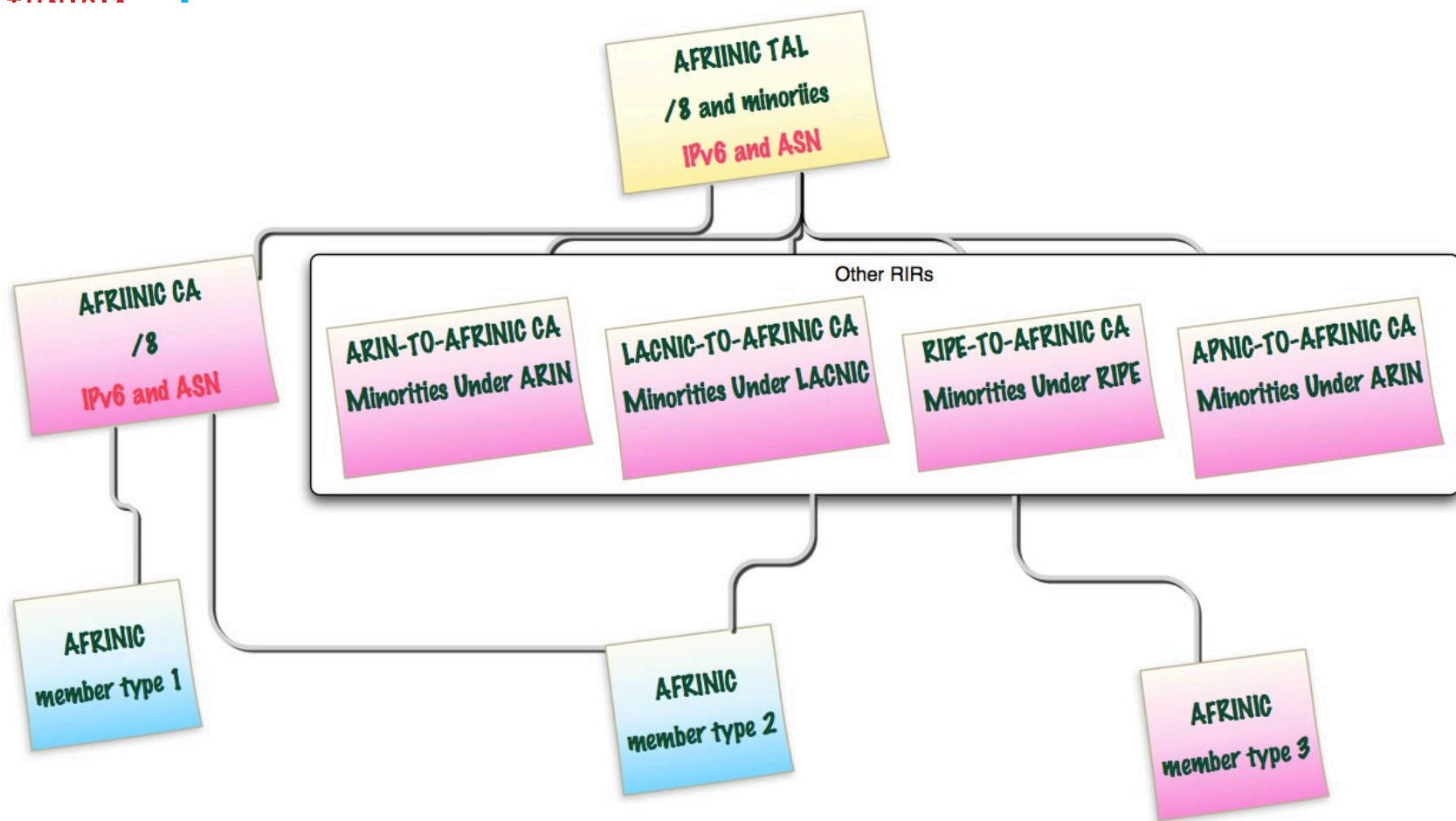


RPKI v2.0 improvements

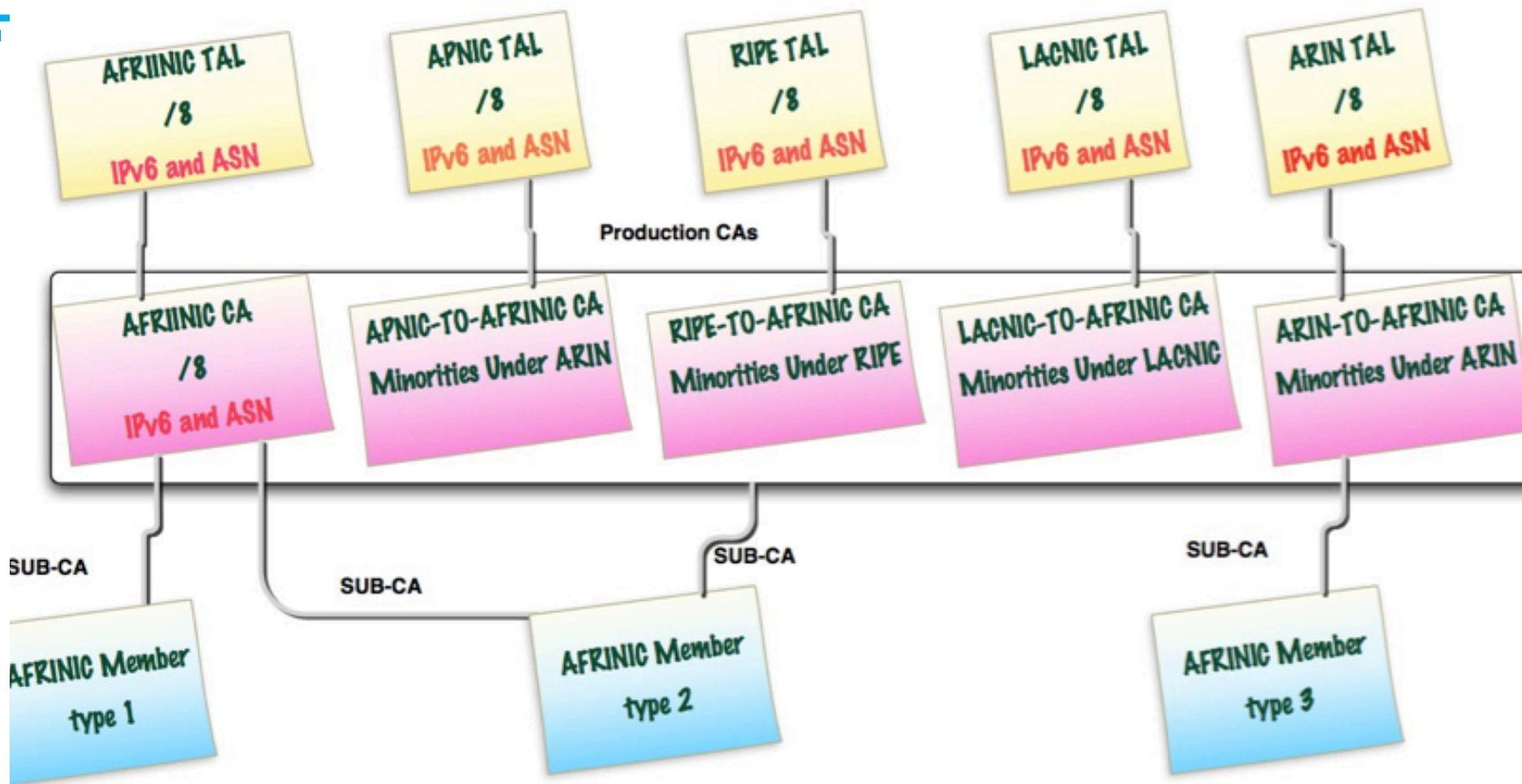
- Split AFRINIC CA certificates
- 'Split ROA' handling
- Changes to MyAFRINIC RPKI section
- Changes to IRDB
- Hierarchical repository
- CPS mentioned in certificates RFC7813
- Backing repository



Minority-Majority TA model



Minority-Majority TA model (future)





MyAFRINIC: RPKI

View Certificate
View ROAs
Issue ROA
Refresh Engine



List Certificates
View ROAs
Issue ROA
Refresh Engine(s)

| Certificate | Resources Covered |
|----------------------------|--|
| F36ED442AP | 163.195.0.0/16,163.202.0.0/16 |
| F36ED442AF | 41.144.0.0/13,41.246.0.0/15,105.184.0.0/14,105.224.0.0-105.229.255.255,154.69.0.0/16,196.4.79.0/24,196.15.128.0/17,196.25.0.0/16,196.43.0.0/18,196.192.124.0/24,197.228.0.0/15,197.236.0.0/16 2c0e:2000::/28 5713,5734,37118,37167,37251,37457 |
| F36ED442AR | 155.239.0.0/16,165.143.0.0-165.149.255.255,165.165.0.0/16,168.142.0.0/16,169.202.0.0/16,198.54.202.0-198.54.209.255,198.54.247.0-198.54.248.255 |

Back



MyAFRINIC: View ROA v1

Name: test expiry

Revoked: No

Product-url: rsync://rpki.afrinic.net/member_repository/F3634D22/92EF8890119911E0A59E

As-number: 37095

Not Valid Before: 2015-03-31 06:28:02

Not Valid After: 2015-04-01 06:28:02

IPv4 Prefixes: 196.2.3.0/24

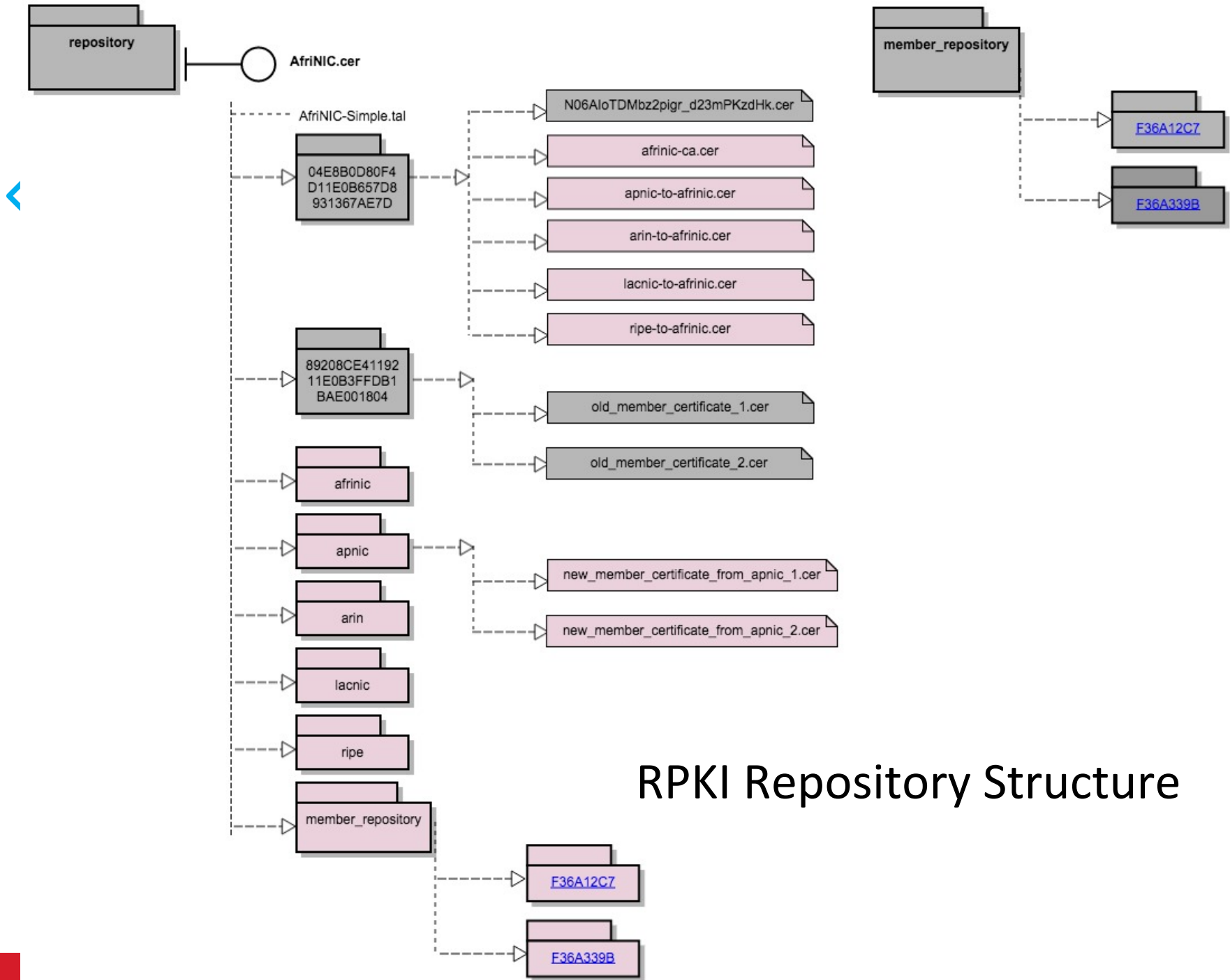


MyAFRINIC: View ROA v2

View ROA

| | |
|--------------------------|---|
| Name: | roa1 |
| Revoked: | No |
| As-number: | 37457 |
| Not Valid Before: | 2015-05-08 07:50:24 |
| Not Valid After: | 2015-05-21 07:50:24 |
| Product-url: | rsync://rpki.dev.mu.afrinic.net/repository/member_repository/F36ED442/680560A0F4BB11E4AFBBAC536B3D5AAC/E91FB794F55611E48156ACBE12631E07.roa |
| IPv4 Prefixes: | 163.195.0.0/16-22 |
| Product-url: | rsync://rpki.dev.mu.afrinic.net/repository/member_repository/F36ED442/73F9202CF4BB11E4B08FAEA37D55DE7F/EBCFFD64F55611E4A9ACC39BFFB52925.roa |
| IPv4 Prefixes: | 196.192.124.0/24-28 |
| IPv6 Prefixes: | 2c0e:2000::/28-32 |
| Product-url: | rsync://rpki.dev.mu.afrinic.net/repository/member_repository/F36ED442/7FA1B43EF4BB11E489E6A14EFD62703A/EE882360F55611E49C2591308D96E248.roa |
| IPv4 Prefixes: | 155.239.0.0/16-22 |

- Resources scattered on 3 different majority holders (AFRINIC, ARIN, APNIC)
- 3 individual ROAs created for each set of resources
- Revoke 1 roa will actually revoke 3 roas (in reality)
- No difference on the relying party side





RPKI transition

- Old engines and ROAs still active
- Enable new Engine and reissue your ROAs
- Revoke your old ROAs
- Please help us complete this transition by end of june
- Enable your engine.....

Thank you for your Attention

Questions?



[twitter.com/ AIS_Africa](https://twitter.com/AIS_Africa)



[flickr.com/ afrinic](https://www.flickr.com/photos/afrinic/)



[facebook.com/ afrinic](https://www.facebook.com/afrinic)



[linkedin.com/company/ afrinic](https://www.linkedin.com/company/afrinic)



[youtube.com/ afrinic media](https://www.youtube.com/afrinicmedia)



[www. afrinic .net](http://www.afrinic.net)