IPv6 Deployment Update

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UIGF

AFRINIC
The Internet Numbers Registry for Africa

About AFRINIC

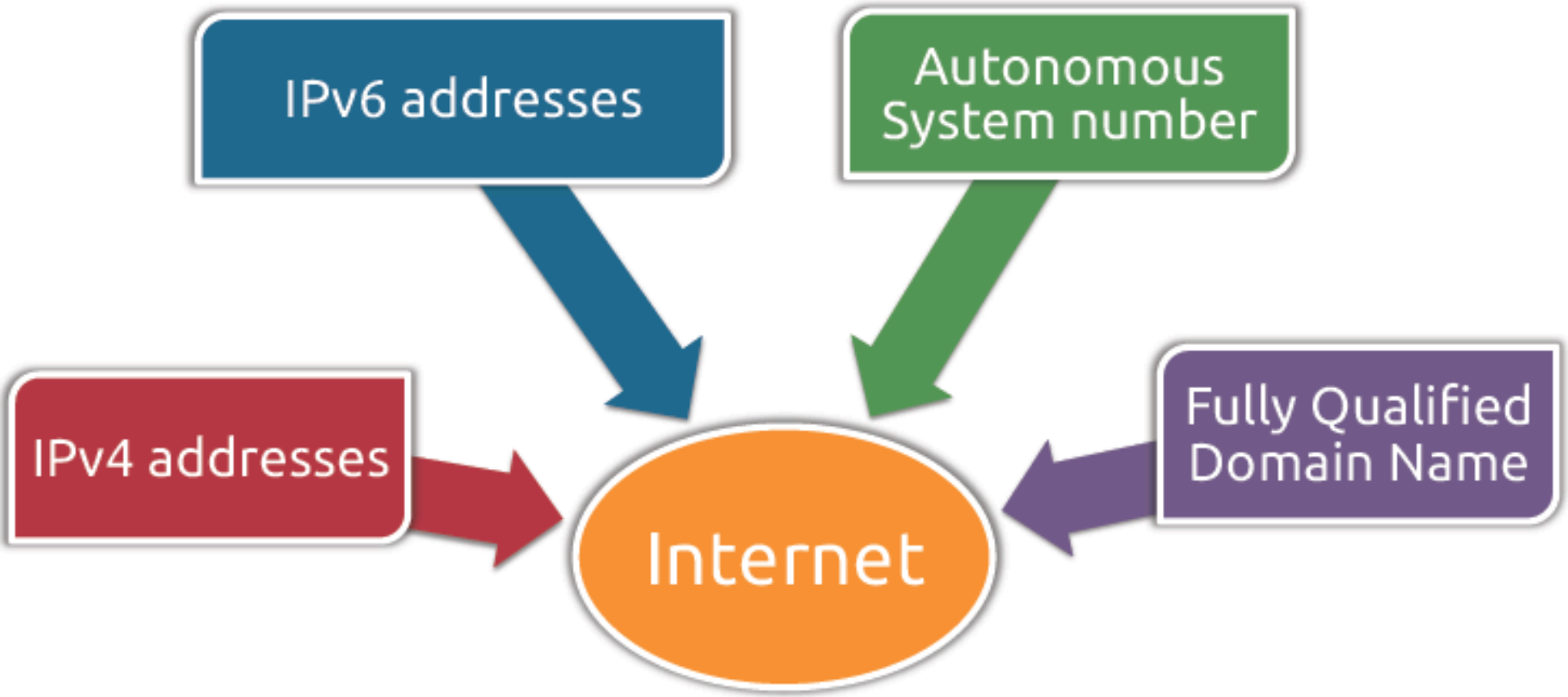
- The "*RIR*" Serving Africa
  - (4 others for other regions)
- Location:
  - Mauritius (Administrative)
  - South Africa (Core Network Infrastructure for public services: whois, rDNS, etc)
  - Egypt (Disaster Recovery Centre).

About AFRINIC

Core Function:

Manage the distribution of Internet Number Resources for operators of *IP networks* in the region (Africa):

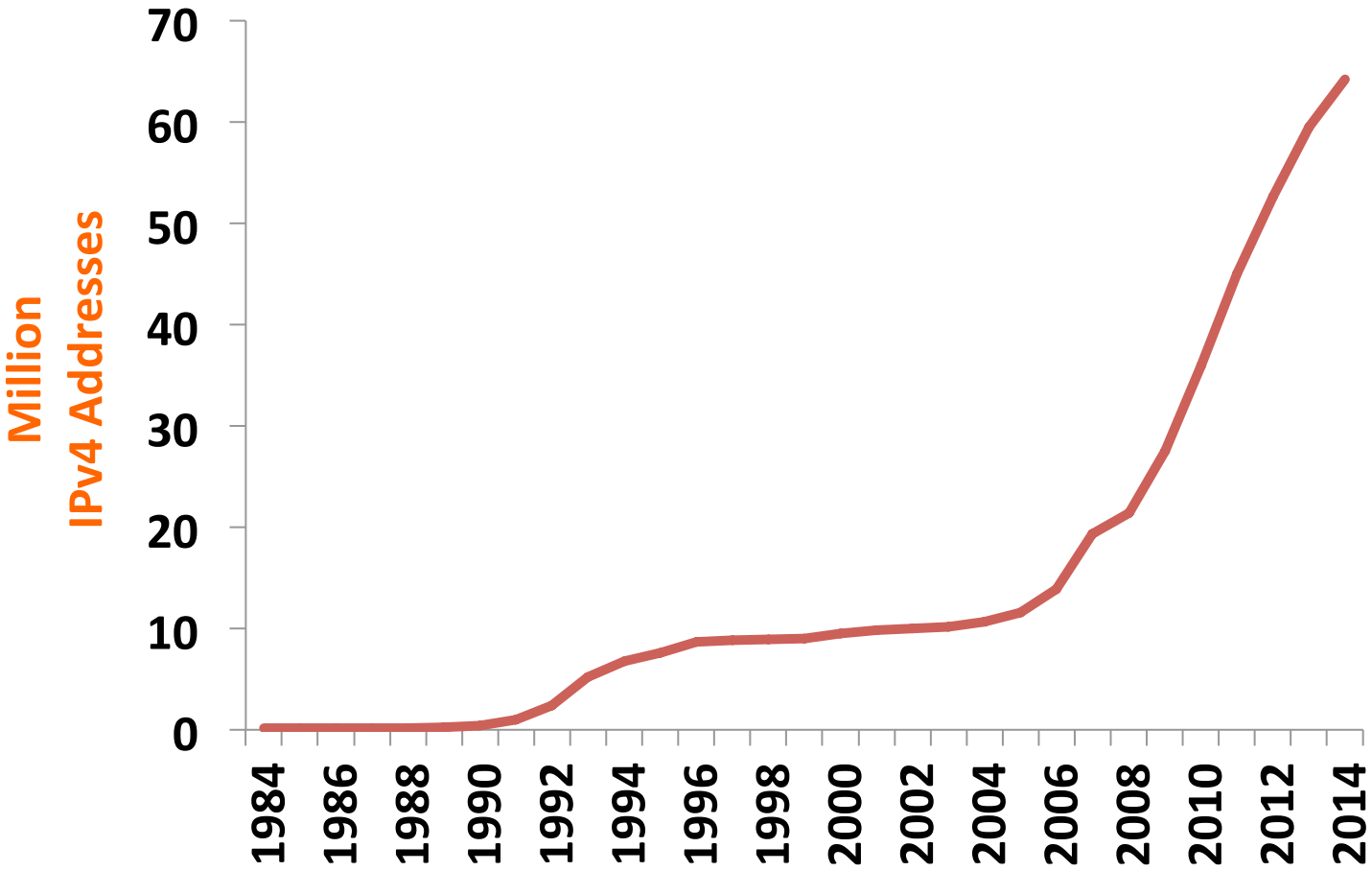
Key Internet Resources



The IPv4 Problem

- IPv4 was designed, in 1981, to provide a theoretical maximum of 4.3 billion IP addresses.
- The actual usable IP addresses are much less, probably close to half.
- Scale of internet growth had not been envisioned at that time.

IPv4 address Consumption (Africa)



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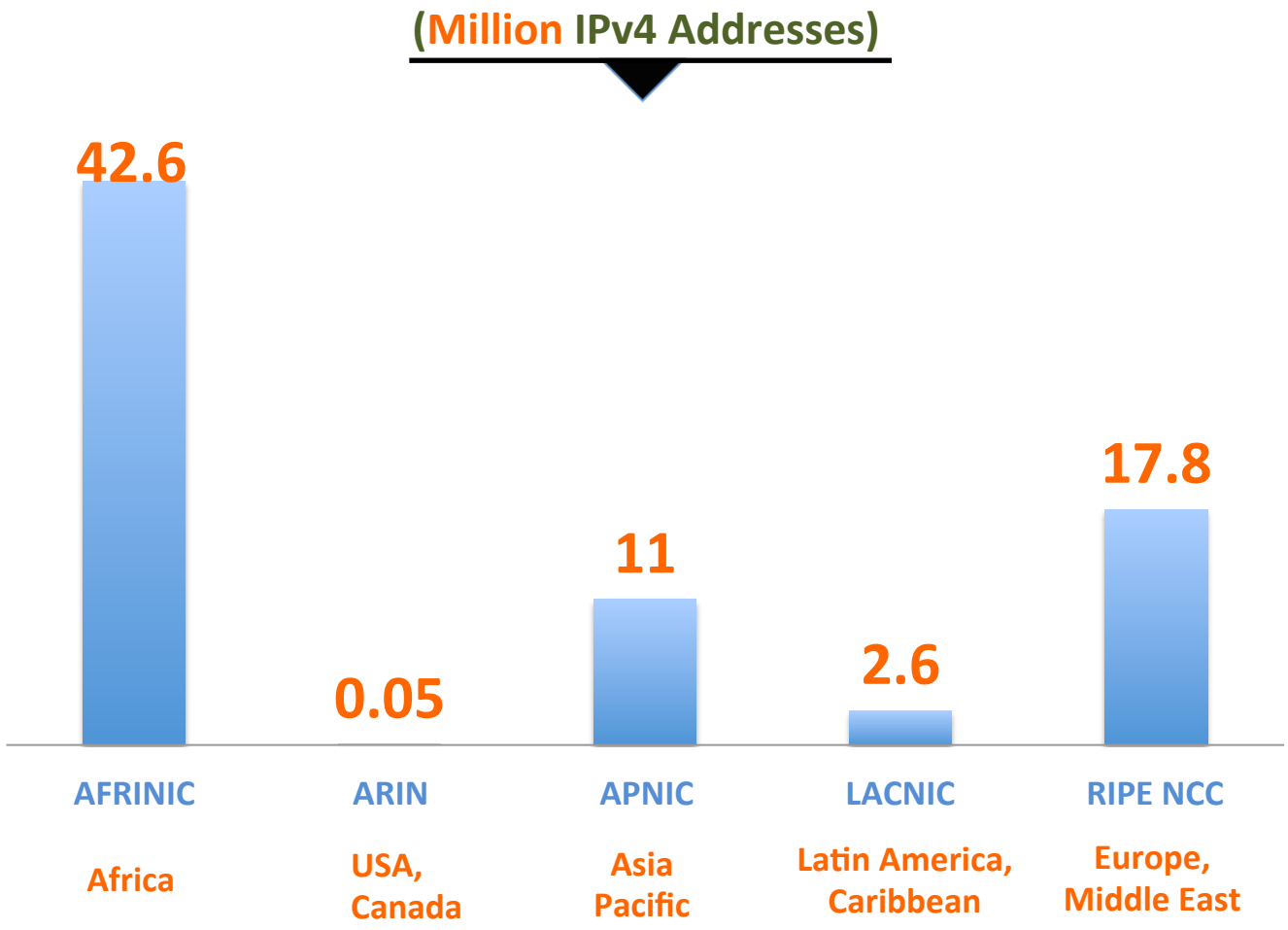
IPv4 Addresses remaining



Total Available : 74.05m

(vs 210m at the same point in 2012)

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IPv4

Africa Status:

- Available: 42.6 million IPv4 addresses (~ half of total global pool)
- Consumption: Approx. 10m per year.
- Depletion in: 4 years (most likely much less)

IPv4

- The (central) IPv4 address pool is exhausted (Since Feb 2012). RIRs cannot get more from anywhere.*

- All Regional Registry pools fast nearing depletion.
  - APNIC (Asia Pacific), RIPE NCC (Europe), ARIN and LACNIC issuing from their last “blocks”. *

IPv4

Implications of Africa's pool running out last:

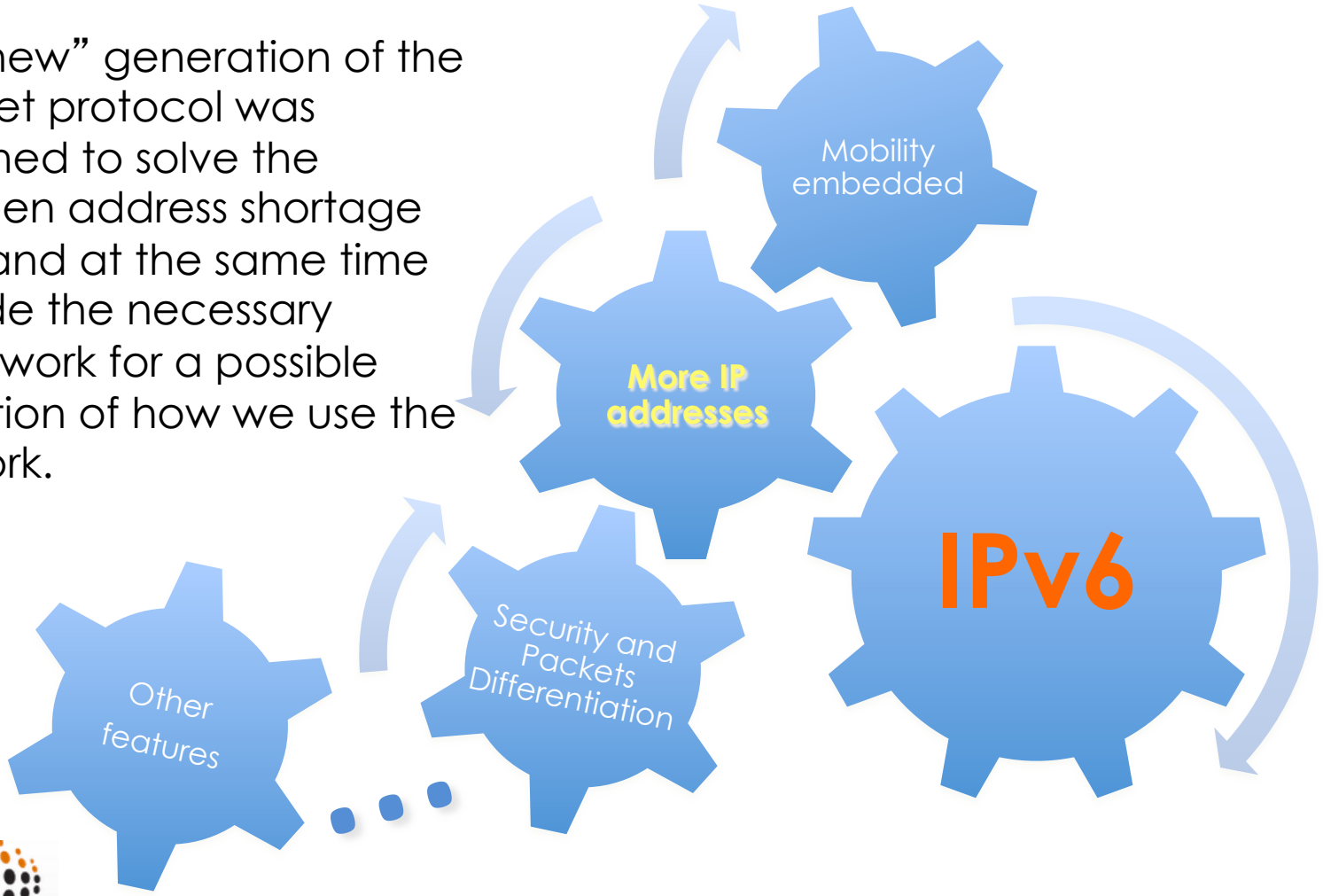
- Rest of the world moves to IPv6 before us.
- Cost of connecting to them increases.
- A rush of our "IPv4" pool from other regions.
  - IPv4 needed during transition to IPv6.

IPv4

IPv4 can no longer sustain the rapid growth of the internet.

IPv6 is the SOLUTION

The “new” generation of the Internet protocol was designed to solve the foreseen address shortage issue and at the same time provide the necessary framework for a possible evolution of how we use the network.



IPv6

- Successor to IPv4.
- Designed to provide 2^{128} IP addresses.
  - "An IP address for each grain of sand" ☺
- It is not directly and backwards compatible with IPv4.
- Runs on the same physical infrastructure.
- The same applications.
- The ONLY sustainable answer to IPv4 address exhaustion

Why is IPv6 important?

- Continue to grow your network business
  - Business case for IPv6 deployment?
    - **Stay in business!**
- Restoring the end-to-end paradigm for Internet communication
  - P2P technology is well-established as an efficient and popular solution for many applications (e.g. VoIP, file sharing, IPTV).

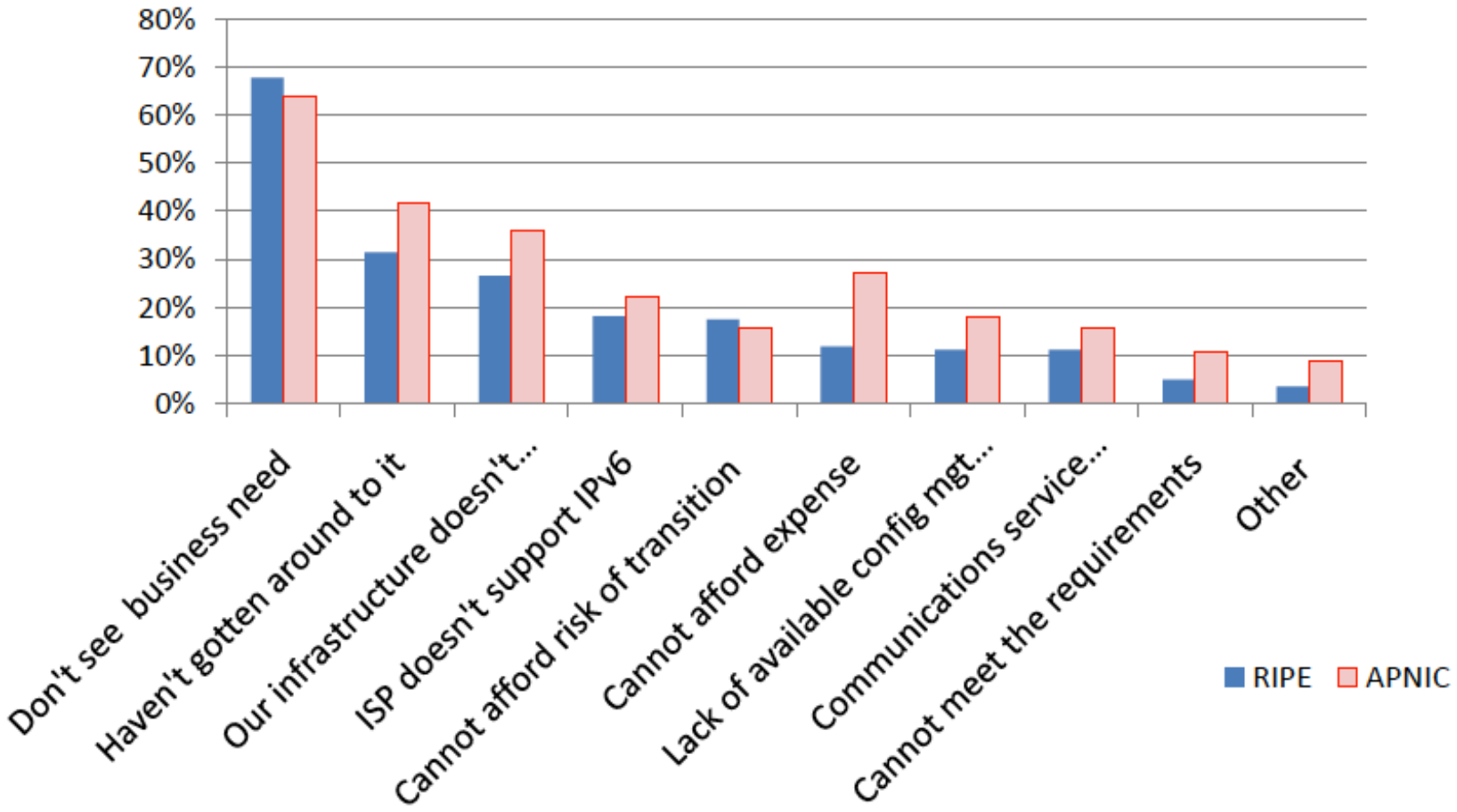
Why is IPv6 important for us in Africa?

- Why should you care about IPv6 when there's still 53m IPv4 addresses un-deployed?
  - It is important to bear in mind that the Internet works on a point to point peering agreement basis:

  * You have to announce your prefixes to run a network! And at some point in the future, the default will be IPv6 for the major players …

  * If you are not testing IPv6 already, you may find yourself in a situation where you would not be able to announce IPv4 (at a reasonable cost) as service levels for v4 will gradually erode over time!

Why not considering IPv6?



AFRINIC/Africa and IPv6

Since 2004, we have been engaged in a wide-scale programme to raise awareness and build capacity in IPv6.

- We have invested more than 1M USD in these activities over the past 5 years).
- In 2005 there were only 4 networks in Africa that had IPv6 prefixes and most of them were not visible to the Internet.
- Today we have more than 200 networks with IPv6 prefixes!
- IPv6 footprint of 50 out of 55 African economies.
- **15.0 %** of publicly visible networks in Africa are IPv6 ready, compared to the global average of 1**7%** (That's positive reinforcement that African networks are growing and ready for new challenges!)

What do we have to do to improve the situation?

We globally need to:

- Push for more action from Operators (Train, Plan and implement, allow user to access v6 networks)
- Be innovative and explore the opportunity of developing applications that can directly benefit from IPv6 and its “features”.
- Involve the Research and Education community into the game.

What do we have to do to improve the situation?

- Governments/Regulators need to lead by making sure:
    - their own internet-based services are IPv6-ready (early adopters.
    - The public is aware and educated on the transition.
    - Appropriate policies are developed to foster national transition to IPv6

…. Education is a critical aspect of this long journey ahead of us

What do we have to do to improve the situation?

- In 2008, AFRINIC partnered with the 6Deploy consortium (in the EU) for:
  - Collaboration on training activities
  - Hosting of a Virtual IPv6 Lab available to the African (and general Internet) community @Large at no cost!
  - Collaboration in “use case” collection on IPv6 deployment experience.

IPv6

Support towards IPv6 deployment and transition:

- IPv6 workshops for engineers: Hands-on drills for 4 days.
- IPv6 workshops for Managers.
  - Engineers don't make the decisions.. Managers need to buy into it.

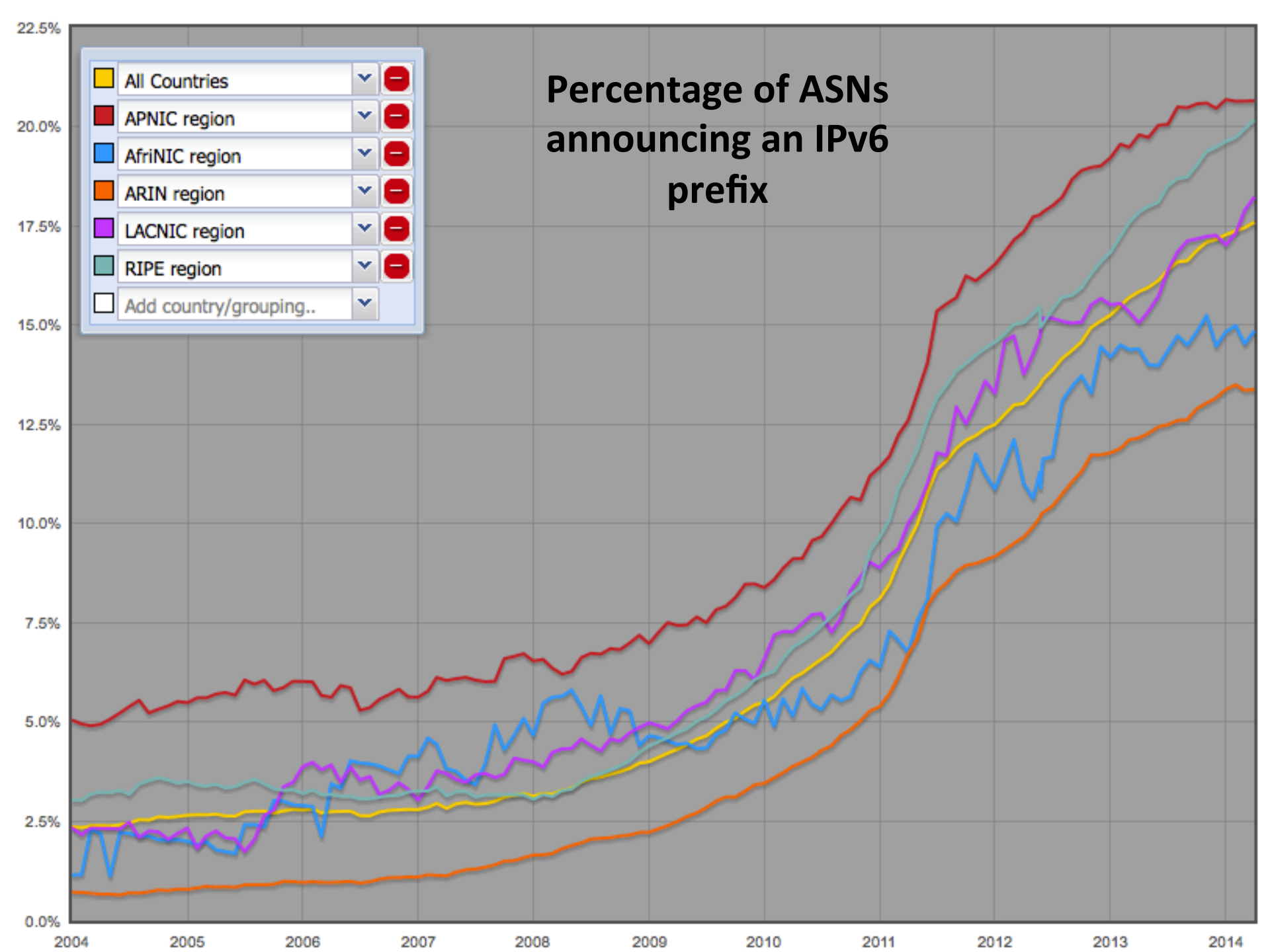
The way forward

While thinking about the future of networks:

There will be no future Internet without an Internet protocol that will be able to support it.

IPv6 has been designed for that,

It has to become a key element of any future plans.

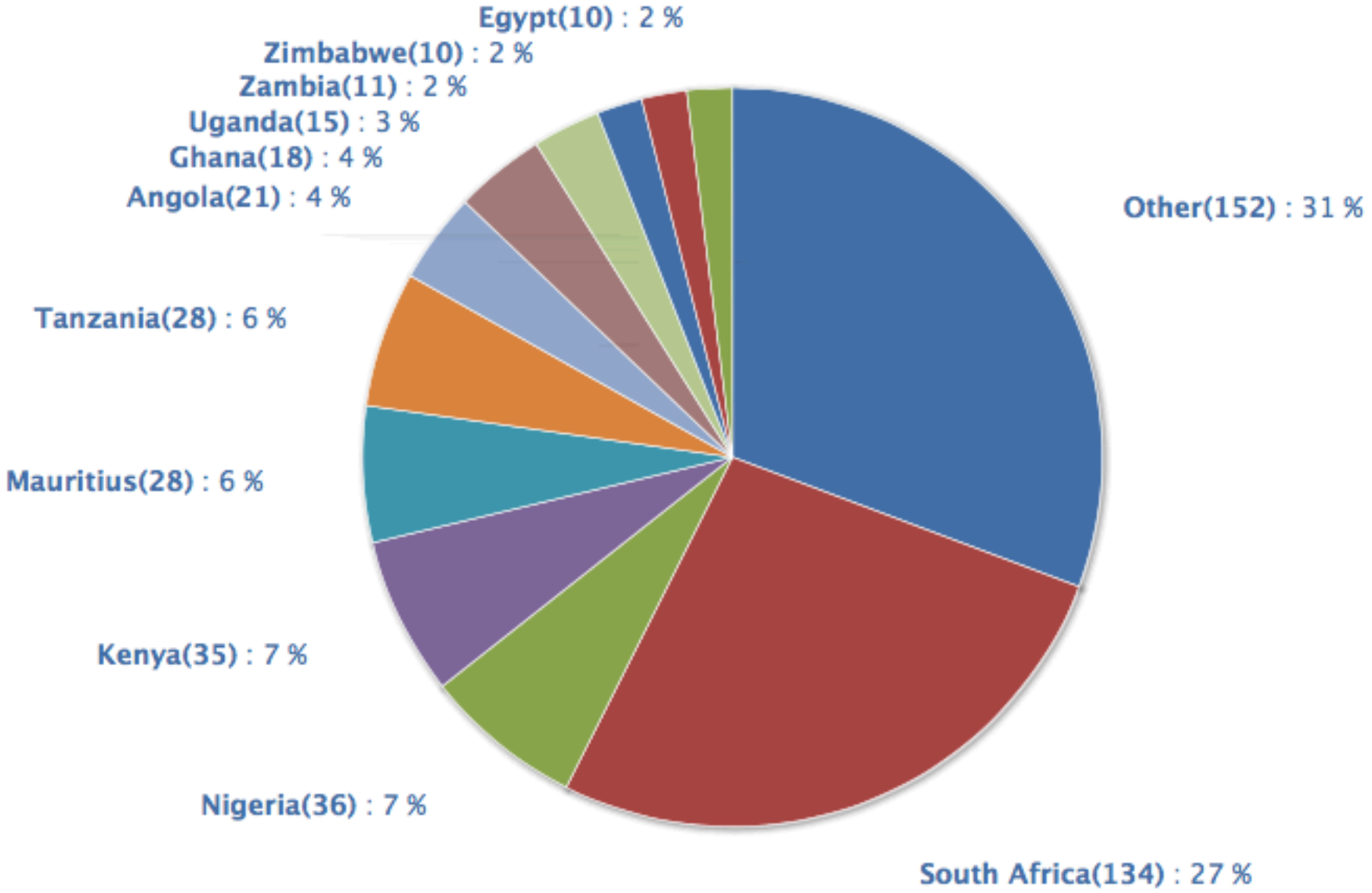

Percentage of ASNs announcing an IPv6 prefix
All Countries
APNIC region
AfriNIC region
ARIN region
LACNIC region
RIPE region
Add country/grouping..
22.5%
20.0%
17.5%
15.0%
12.5%
10.0%
7.5%
5.0%
2.5%
0.0%
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014

Percentage of users accessing Google over IPv6

Source:

http://www.google.com/intl/en/ipv6/statistics.html

IPv6 Prefixes Per economy



IPv6 Prefixes: Uganda

Prefix	Len	Type	▲ Reg Date	Org
2c0f:fe10:: UG-MTN-V6-1	/32	PA	2010-04-07	MTN Uganda
2001:43f8:130:: UIXP-v6	/48	PI	2010-04-13	Uganda Internet eXchange Point
2c0f:fe70:: TMP-UGANDA-v6	/32	PA	2010-07-09	Broadband Company Limited
2c0f:fec0:: ORANGE-UG	/32	PA	2010-10-21	Orange Uganda Limited
2c0f:ff98:: TANGERINE-UG-v6	/32	PA	2011-01-12	Tangerine Limited
2c0f:ffa0:: BCS-IPV6	/32	PA	2011-01-13	Bandwidth and Cloud Services Group Ltd
2c0f:fd60:: Roke-Telkom	/32	PA	2011-06-14	Roke Investments International Ltd
2c0f:fdb8:: Smile-Telecoms	/32	PA	2011-07-13	Smile Communications Ltd
2c0f:fb00:: UGANDA-TEL-v6	/32	PA	2011-12-22	Uganda Telecom Ltd
2c0f:f8a0:: OneSolutions	/32	PA	2012-11-07	OneSolutions
2c0f:f658:: SNU-NET-AS	/32	PA	2013-11-27	SIMBANET (U) LIMITED
2c0f:fbc8:: AIRTEL-UG	/32	PA	2014-02-13	Airtel Uganda Limited
2c0f:f6d0:: RENU-v6	/32	PA	2014-03-20	Research and Education Network of Uganda
2c0f:f750:: NITA	/32	PA	2014-09-02	National Information Technology Authority Uganda
2001:43f8:a30:: UCC	/48	PI	2015-02-27	Uganda Communications Commission

Uganda – IPv6 Prefix Visibility*

Owner	AS	S	Allocated	First seen
Infocom Ltd		A	2009-05-12	2014-04-22 13:23:28
Uganda Internet Exchange ...		A	2010-04-13	2014-03-29 09:08:13
SIMBANET (U) LIMITED		A	2013-11-27	
Research and Education Ne...	327687	A	2014-03-20	2014-04-24 12:28:06
OneSolutions		A	2012-11-07	
Uganda Telecom Ltd		A	2011-12-22	
Airtel Uganda		A	2014-02-13	
Roke Investments Internat...		A	2011-06-14	
Augere Uganda Ltd	37227	R	2011-06-21	
Smile Communications Ugan...		A	2011-07-13	
MTN Uganda		A	2010-04-07	
TMP Uganda Ltd aka The Br...		A	2010-07-09	
Orange Uganda Ltd		A	2010-10-21	2014-03-29 09:20:17
Tangerine Limited	37113	A	2011-01-12	
Bandwidth and Cloud Servi...	37273	A	2011-01-13	2014-03-29 09:20:18

Conclusion

We, in Africa, should be prepared, so as not to miss the boat this time !

You are all invited to:

AFRINIC-23
Congo Brazzaville
~ 25 – 30 November 2015

- IPv6 Workshops
- Internet Number Resource Policy discussions
- AFRINIC, AFNOG, AFGWG, other AF* entities
- Many more activities.

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THANK YOU