

CERN IPv6 deployment status

GDB - CERN

11th December 2013

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Agenda



- IPv4 depletion status
- IPv6 deployment status
- Next steps
- Conclusion

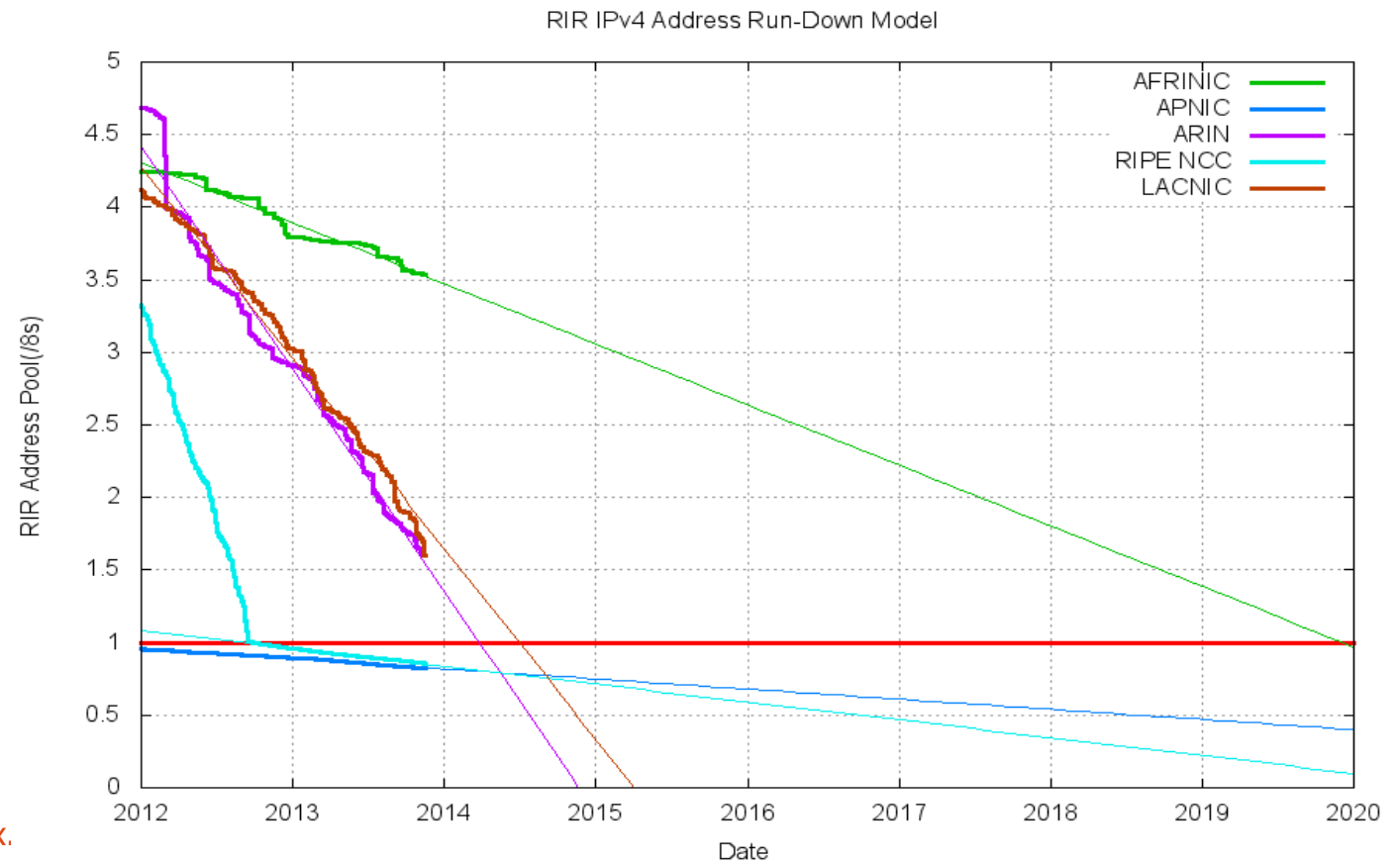
IPv4 depletion status

World IPv4 pools' status



Region	Exhaustion date	Remaining /8 (16M)
Asia-Pacific	19-Apr 2011 (last /8)	0.8225
Europe	14-Sep-2012 (last /8)	0.8554
North America	27-Jan-2015 (another /10)	1.5974
South America	13-Feb-2015 (last /11)	1.5955
Africa	24-Ago-2022	3.5374

[19th November 2013]



<http://www.potaroo.net/tools/ipv4/index>.

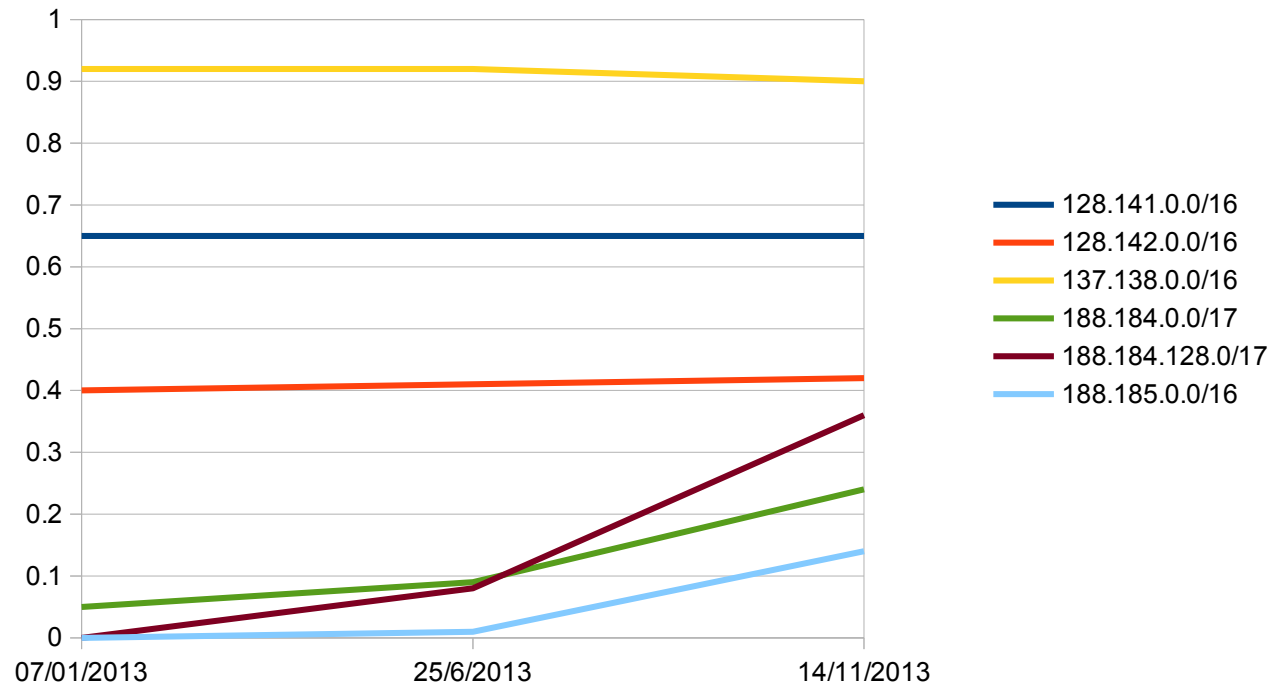
CERN IPv4 pools' status



128.141.0.0/16 (64K, GPN portables): 65% used
128.142.0.0/16 (64K, LCG): 42% used
137.138.0.0/16 (64K, GPN): 90% used
188.184.0.0/17 (32K, GPN): 24% used
188.184.128.0/17 (32K, LCG): 36% used
188.185.0.0/16 (64K, Wigner): 14% used

CERN IPv4 prefixes utilization

[14th of November 2013]



IPv6 deployment status

CERN IPv6 service description



- Dual Stack
- One IPv6 address assigned to every IPv4 one
- Identical performance as IPv4, no degradation
- Common provisioning tools for IPv4 and IPv6
- Same network services portfolio as IPv4
- Common security policies for IPv4 and IPv6

“Dual stack”



Routers: each IPv4 service is configured together with its associated IPv6 service.

Implemented in: **GPN, LCG, EXTernal, Firewall**

Can be deployed: **Experiments**

Won't be deployed: **Technical Network**

“An IPv6 address to every IPv4 ones”

- Every device with an IPv4 address has an IPv6 address assigned in CSDB

- All IPv6 assigned addresses have a name in **ipv6.cern.ch**

```
# host cfmgr.ipv6.cern.ch
cfmgr.ipv6.cern.ch has IPv6 address 2001:1458:201:1c80::100:175
```

```
# host TELEPHONE-62470.ipv6.cern.ch
TELEPHONE-62470.ipv6.cern.ch has IPv6 address fd01:1458:204:27a::100:2e
```

- Dynamic (portable) devices have a name in **dyndns6.cern.ch**

```
# host thepub.dyndns6.cern.ch
thepub.dyndns6.cern.ch has IPv6 address 2001:1458:202:180::101:8a26
(known issue: only MS Windows devices for the time being)
```

“Identical performance”



True everywhere, except in the firewall bypass
HTAR (hardware implementation of IPv6 policy base routing
not available yet).

=> The IPv6 firewall bypass is not implemented

“Common provisioning tools”



Cfmgr: HP and Brocade routers, DHCPv6, DNS, ACLs

CSDB: networks, blocks, services, devices, gates

WebReq: Device information

Device Information

- **Device Name:** **PCITCS16** [Last Operation]
- **Location:** **0513 R-0050** (Rack: 513C 40-0001)
- **Manufacturer:** VOBIS
- **Model/Type:** 2400
- **Generic Type:** COMPUTER
- **Description:** BACKBONE 513-B
- **Tag:** IT/CS
- **Serial Number:**
- **Operating System:** LINUX Version: UBUNTU
- **CERN Inventory number:**
- **Network Interface Card(s):** 00-07-E9-71-D2-D4/ETHERNET
- **Responsible for the device:** MARTELLI EDOARDO IT CS
EDOARDO.MARTELLI@CERN.CH / Tif: 72613
- **Main User of the device:** MARTELLI EDOARDO IT CS
EDOARDO.MARTELLI@CERN.CH / Tif: 72613
- **HCP Response:** This system **CAN** obtain an IP address automatically [[more info](#)]
- **Last changed:** 06-06-2013 (13:15)

Interface(s) Information

>>Network Service HELP<< >>Network Interface Card(s) HELP<<

Interface Name	IP Address	Service Name	Internet Connectivity
PCITCS16.CERN.CH	137.138.28.143 2001:1458:201:1c80::100:17e	S513-C-IP1	Y
Subnet IPv4 Mask: 255.255.255.192 Default IPv4 Gateway: 137.138.28.129		Name IPv4 Servers: 137.138.16.5, 137.138.17.5 Time IPv4 Servers: 137.138.16.69, 137.138.17.69	
Subnet IPv6 Netmask: 64 Default IPv6 Gateway: 2001:1458:201:1c80::1		Name IPv6 Servers: 2001:1458:201:1000::5, 2001:1458:201:1100::5 Time IPv6 Servers: 2001:1458:201:1040::69, 2001:1458:201:1140::69	
IP Aliases: CCNINJA			
Service belongs to set(s): IT NETWORK SERVICES Part of set(s) (set containing sets above): ATLAS BYPASS LIST,LHCB BYPASS LIST,IT CS MGMT ACCESS,CLOUD BYPASS LIST,NA62 BYPASS LIST,ALICE BYPASS LIST			

“Same network services as IPv4”



DNS:

- available over ipv6 (ip-dns-1.ipv6.cern.ch and ip-dns-2.ipv6.cern.ch)
- record AAAA for cern.ch not deployed yet (only with manual config)

NTP:

- available over IPv6 (ip-time-1.ipv6.cern.ch and ip-time-2.ipv6.cern.ch)

DHCPv6:

- Static: same servers and daemon of SHCP for IPv4
- Dynamics: beta version of the daemon

dhcpv6



Autoconfiguration (SLAAC) not available for management reason

dhcpv6 is already available for dynamic (portable) and static devices

Today, only "ipv6 enabled" devices in CSDB can get the response. Tomorrow (2014Q1), every device will get the response

Known issues with "CERN" MAC address authentication: dhcpv6 clients don't have to use the MAC address of the interface they send the request via. RFC6939 will fix this issue

Unknown portable registration based on IPv4 only. After the registration, they can use ipv6 too

Not all devices support dhcpv6 (iOS v6, Android...)

“Common security policies”



CSDB Gate

- software ready for production
- IPv4 rules translated into IPv6, except the ones that need manual care

ACL compiler

- Antispoofing deployed on Brocade and HP routers
- Central firewall gate ready for deployment

IPv6 ready



The DNS device name **.cern.ch** will be resolved only with the IPv4 address **until the user declares to LANDB (via WEBREQ) to be IPv6 ready.**

IPv6 ready will mean:

- IPv6 connectivity is OK
- all the server's applications are listening on both IPv4 and IPv6 protocols



Consequences:

- IPv6 security openings activated in the central firewall
- name.cern.ch returns IPv4 and IPv6 addresses (A and AAAA records)

Summary status



DNS: Ready, but cern.ch not enabled yet

DHCPv6 for statics: Ready

DHCPv6 for portables: Ready, but beta code

NTP: Ready

Internet: Ready

Firewall: In production in January

Summary status (continue)

Network database (LANDB): Ready

IT/CS tools (CSDBWEB, cfmgr): Ready

User web interface (WEBREQ): Ready

SOAP interface: Ready

Monitoring (Spectrum): Growing

Operations: To be addressed now

Check the current status at

<http://ipv6.web.cern.ch/content/implementation-plan-and-status>

Next steps and conclusion

Next steps



- Deploy software for main firewall: *January 2014*
- Training and procedures for support lines: *January 2014*
- Inform CERN users: *January 2014*
- Enable dhcpv6 for the IT department: *January 2014*
- Enable dhcpv6 for all static devices: *February 2014*
- Enable dhcpv6 for all dynamic devices: *~March 2014*

Testers wanted!



Anyone at CERN willing to test IPv6 is welcome!

Get in touch with ipv6@cern.ch

Conclusions



- IPv4 shortage will hit CERN in 2015
- IPv6 development is almost finished
- IPv6 deployment will be completed in 2014Q1

More information:

<http://cern.ch/ipv6>