

IPV6 IN CRNOGORSKI TELEKOM

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LIFE IS FOR SHARING.





```
inet6num.....: 2a00:fe80::/29
netname.....: ME-CRNA-20110603
country.....: ME
org.....: ORG-ICGd1-RIPE
admin-c.....: TMa29-RIPE
tech-c.....: VR3145-RIPE
status.....: ALLOCATED-BY-RIR
notify.....: ripeadmin@telekom.me
mnt-by.....: RIPE-NCC-HM-MNT
mnt-by.....: AS8585-MNT
mnt-lower....: AS8585-MNT
mnt-routes...: AS8585-MNT
created.....: 2016-01-29T08:17:38Z
last-modified: 2016-08-15T10:43:35Z
source.....: RIPE
```

CRNOGORSKI TELEKOM IPV6 ON RIPE NCC

Origin	Prefix
AS 8585	2a00:fe80::/32

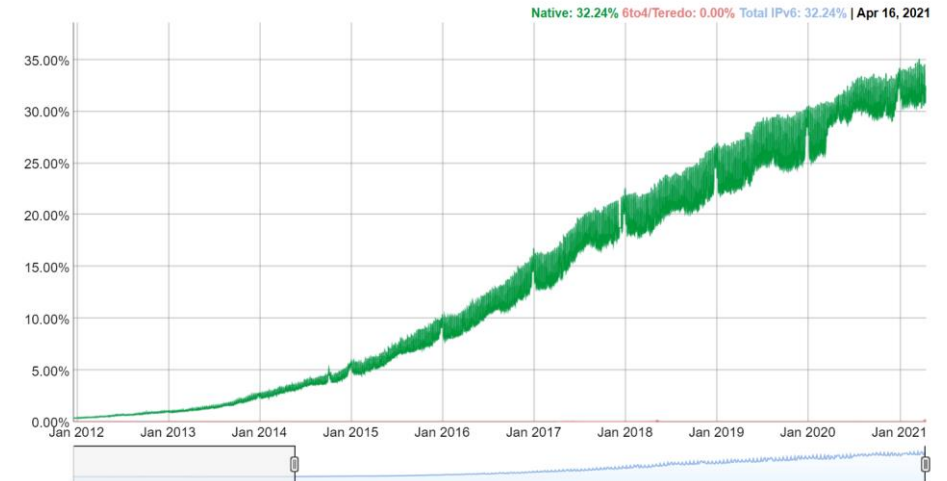


HIGH LEVEL MOTIVATION FOR IPV6 DEPLOYMENT

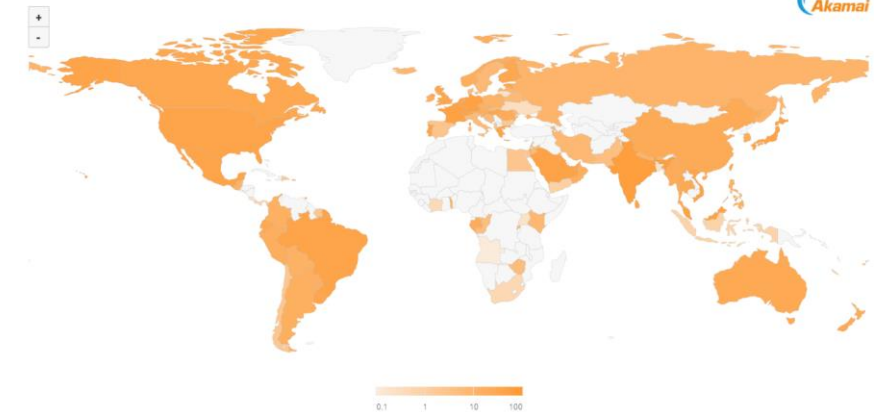
- 01** Public IPv4 addresses are already allocated
No new IPv4 ranges available from RIPE NCC
- 02** Number of TelCos have already exhausted IPv4
confirming the inevitability of the process
- 03** CGNAT in use to mitigate IPv4 exhaustion
with a number of disadvantages
- 04** New services are taking off (SmartX, m2m/IoT)
New IP addresses demand is growing
- 05** Simplified future-proof approach is IPv6-only
Complexity in IPv4-in-IPv6 enc/de-capsulation

IPv6 Adoption

We are continuously measuring the availability of IPv6 connectivity among Google users. The graph shows the percentage of users that access Google over IPv6.



IPv6 Adoption By Country



IPV6 STATUS IN CRNOGORSKI TELEKOM

Internet Core and Gateway

IPv6 dual-stack active in ICG Core and GW
Active IPv6 peering with Gia and sub-providers
ISIS configured as internal IPv6 protocol between IGW
Range 2a00:fe80::/32 range visible from our IGW

MPLS layer

IPv6 support configured on RR and PE machines
Infrastructure ready for IPv6 services in B2B and WS

IPv4
PAST

IPv6
FUTURE



Mobile Packet Core

Wide IPv6 support in **SGSN-MME** and **GGSN-SGW-PGW**
IPv6 fast convergence
IPv6 routing
IPv6 security
IPv6 management

FixBB Core

Wide range of IPv6 functions in **BRAS** segment
IPv6 routing
BRAS (PPPoE sessions)
SP WiFi termination (IP sessions)
Dual stack support for PPPoE and IP sessions



CT IPV6 DUAL STACK PILOT IN MBB

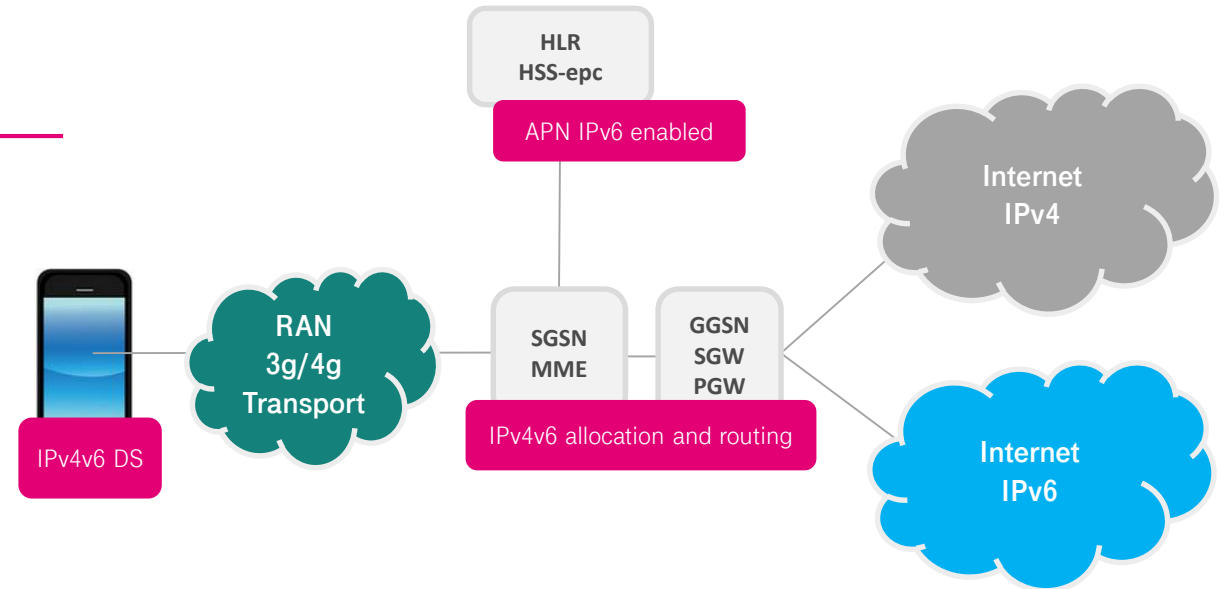
MBB e2e segment IPv6 ready

Core Network features made IPv4v6-DS possible

HLR/HSS
SGSN-MME
GGSN-SWG-PGW

IP routers affected

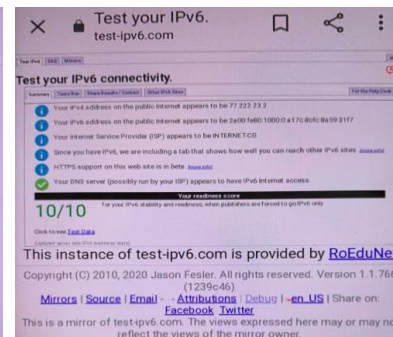
Back-Bone
IC
IGW



IPv6 CT range advertisement sessions

2-way test scenarios of e2e service and Internet visibility

test-ipv6.com
ipv6-test.com
ipv6test.google.com
<https://lg.he.net/>



Looking Glass

Welcome to Hurricane Electric's Network Looking Glass. The information provided by and the support of this service are on a best effort basis. These are some of our routers at core locations within our network. We also operate a public route server accessible via telnet at route-server.he.net.

Show options

core3.fmt1.he.net> traceroute ipv6 2a00:fe80:1000:0:22d6:8a0:8b05:23d5 source 2001:470:0:427::1 numeric												
Target		2a00:fe80:1000:0:22d6:8a0:8b05:23d5										
Hop Start		1										
Hop End		30										
Hop#	Packet 1#	Packet 2#	Packet 3#	Hostname								
1	16 ms	2 ms	<1 ms	100ge6-1.core1.sjc2.he.net (2001:470:0:1a7::2)								
2	63 ms	63 ms	69 ms	100ge10-2.core1.nyc4.he.net (2001:470:0:296::1)								
3	152 ms	146 ms	155 ms	100ge4-1.core1.par2.he.net (2001:470:0:338::2)								
4	149 ms	159 ms	149 ms	100ge5-2.core1.vie1.he.net (2001:470:0:394::2)								
5	198 ms	155 ms	155 ms	100geB-1.core1.zag1.he.net (2001:470:0:448::2)								
6	176 ms	157 ms	155 ms	hrvatski-telekom-d-d.100gigabitethernet8-2.core1.zag1.he.net (2001:470:1:855::2)								
7	*	*	*	?								
8	198 ms	181 ms	159 ms	2a00:c30:b000::113								
9	178 ms	166 ms	183 ms	2a00:c30:b000:10::61								
10	166 ms	181 ms	167 ms	2a00:fe80:0:1:4								
11	166 ms	167 ms	166 ms	2a00:fe80:0:1:25								
12	*	*	*	?								
13	190 ms	190 ms	200 ms	2a00:fe80:1000:0:22d6:8a0:8b05:23d5								

HOW TO MOVE ON

Challenges

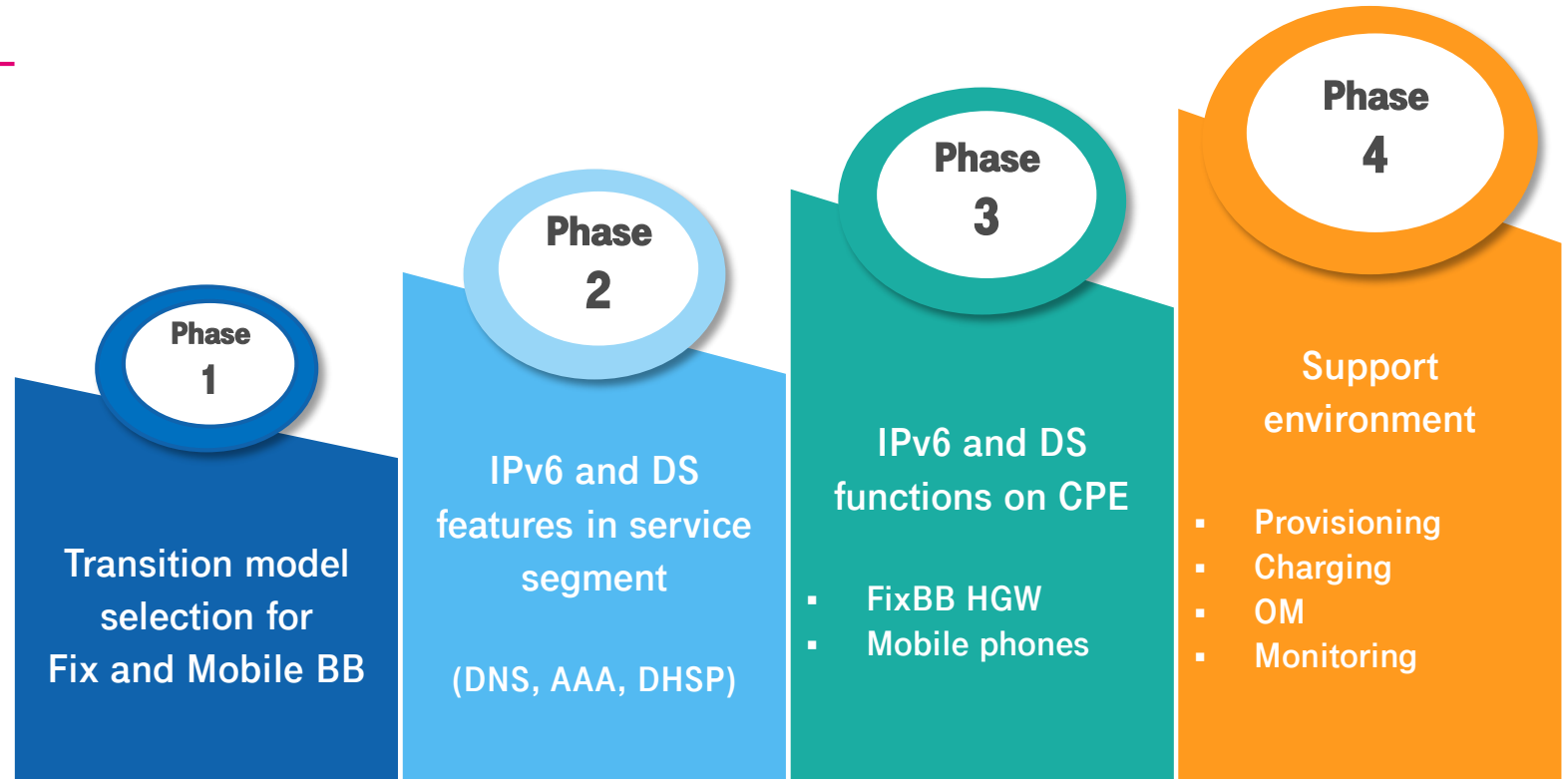
Large existing network

Variety of vendors and NEs

Different IPv6 plans and RMs

Difference in operational tools

IPv4 world still dominant





THANK YOU