

# Status of Swisscom's IPv6 Activities, Outlook and Opportunities

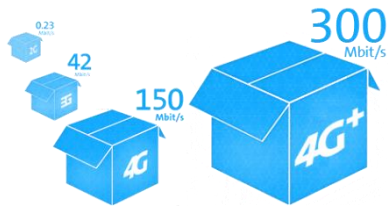
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Martin Gysi, 18.06.2015  
public

# Swisscom's mission: Create the world's best network!

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## Top Speed:

- LTE advanced with up to 300 Mb/s
- Ultra-fast fixed broadband, 1Gb/s symmetrical



## unique mobile coverage:

- 98% LTE, 99% GSM

*The 6th time in a row!*



## excellent voice quality:

- HD-Voice, VoLTE (10.06.2015)



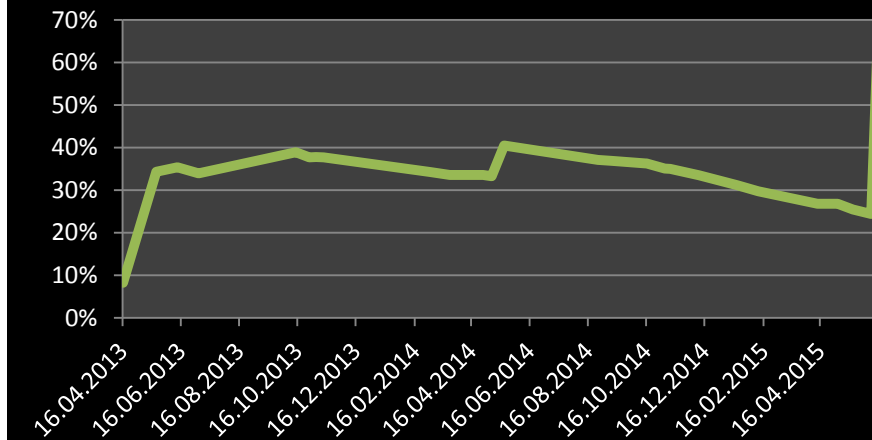
## IPv6 enabled broadband (10.06.2015):

- by default for all wireline residential customers
- rolled out to all supported home routers

# IPv6 is now a significant part of traffic volume

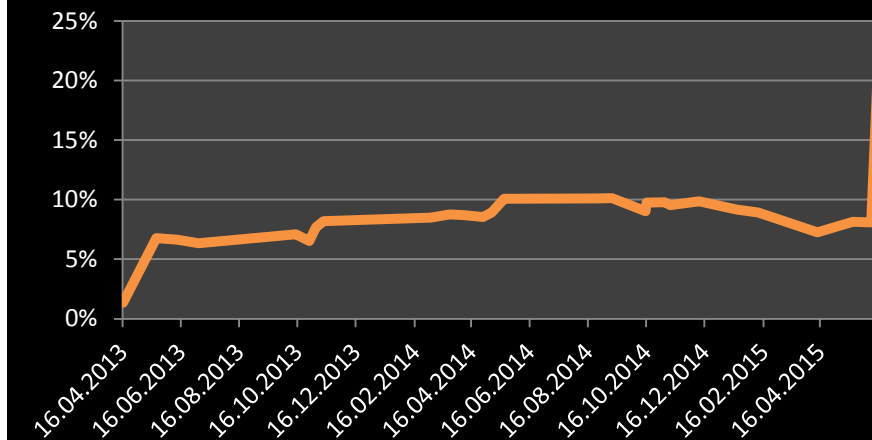
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## Dual-stacked customers



- 67 % of customers are dual-stacked (IPv4 + IPv6)

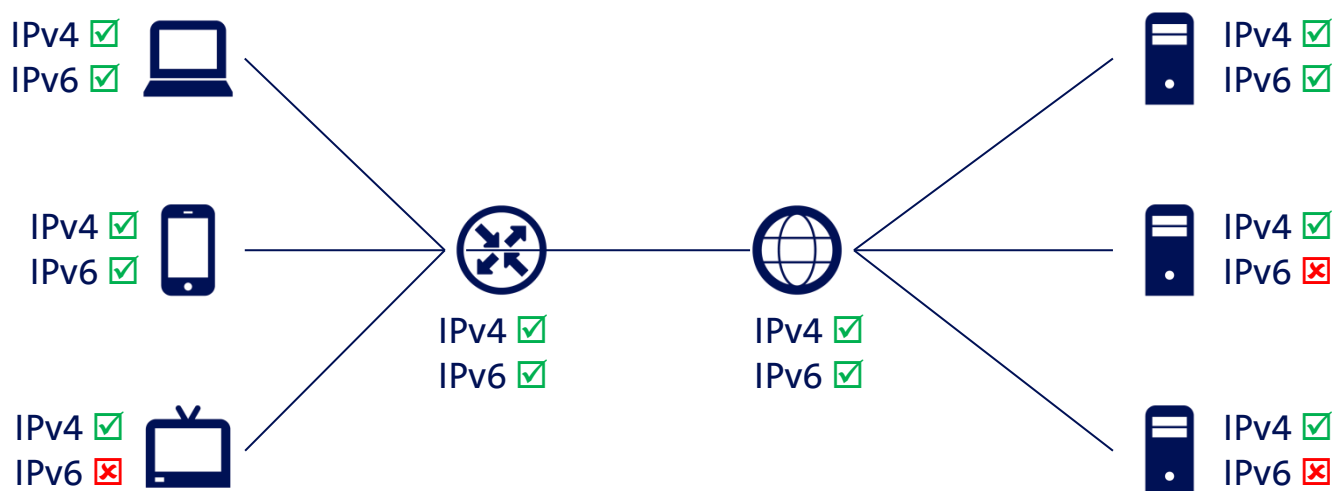
## IPv6 traffic share



- > 20 % of total traffic is on IPv6

# Dual-stacked devices can use both IPv4 and IPv6

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2/3 users

\*

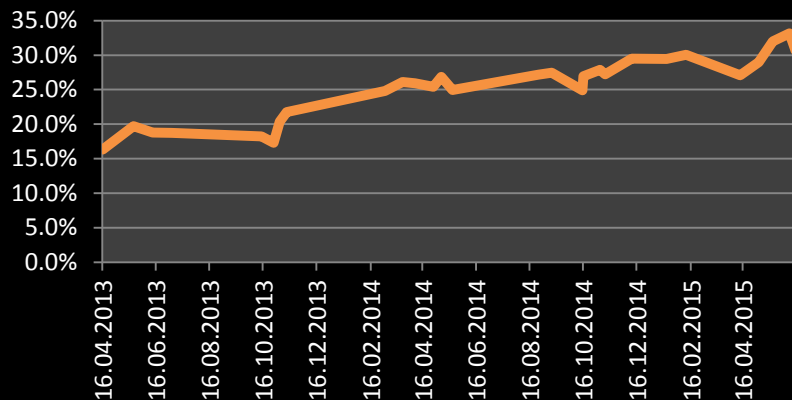
1/3 content = 22.2% IPv6

( - some unhappy «happy eyeballs»)

# The IPv6 ratio of dual-stacked users grows steadily

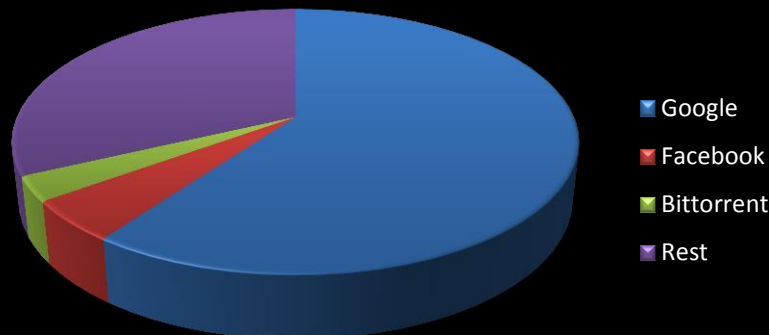
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## IPv6 ratio for dual-stacked customers



- 31 % of a dual-stacked user's traffic is IPv6

## IPv6 traffic sources



- Google sources 60 % of IPv6 traffic
- IPv6 traffic is off-loaded from CG-NAT infrastructure





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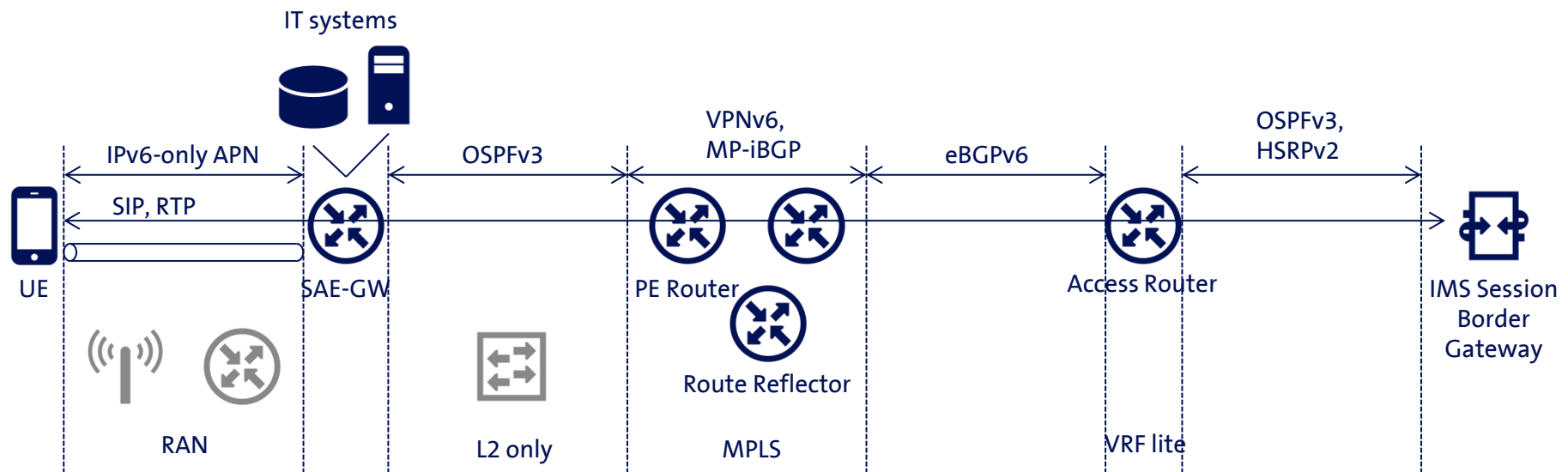
# New products and outlook

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# VoLTE: Swisscom's first IPv6-only infrastructure

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- LTE is a packet-only network. No circuit-switched voice, unlike UMTS or GSM
- Voice over IP over LTE: VoLTE
- Communication between Mobile and IMS Session Border Gateway is IPv6-only!



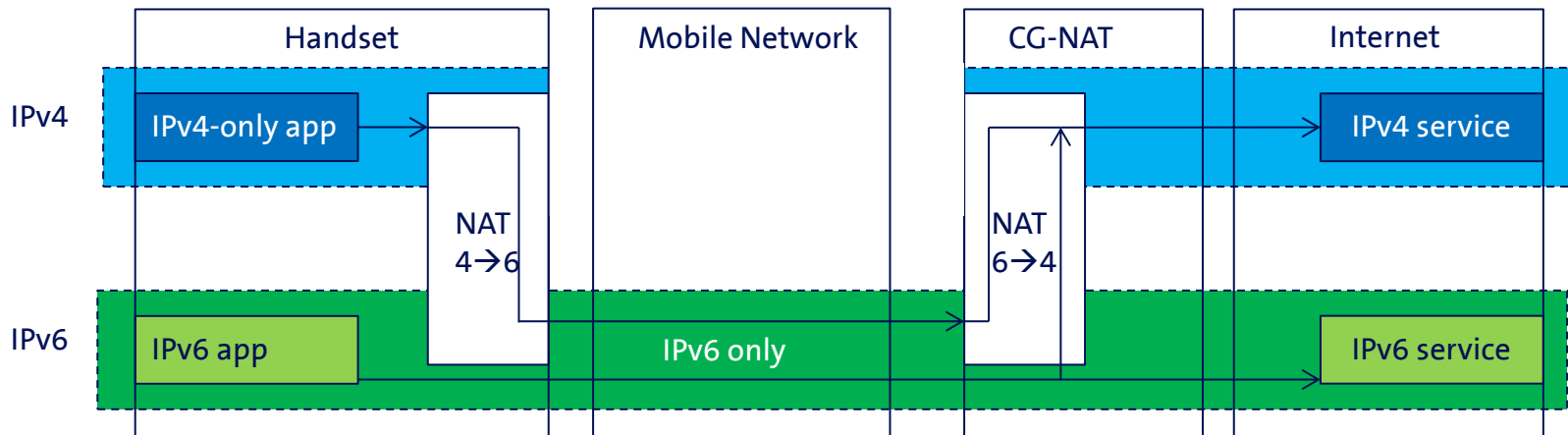
Active PDN connection	
Id	: 80600
Default Bearer Id	: 6
Type requested	: IPv4v6
Type in use	: IPv6
Address in use	
IPv4	
IPv6	: 2A02:1216:1750:4F7::1
APN requested	: Information not available
APN in use	: ims.mnc001.mcc228.gprs

Launched June 2015!

# Internet-APN on Mobile

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- Target is a single-stack, IPv6-only APN for new devices
- Android, Windows Phone: We plan on using 464XLAT (RFC 6877) to get rid of IPv4 in the mobile network, but still enable IPv4 connectivity for applications that need it.
- IOS: IPv6-only (see Apple's recent announcement):  
<https://developer.apple.com/videos/wwdc/2015/?id=719>



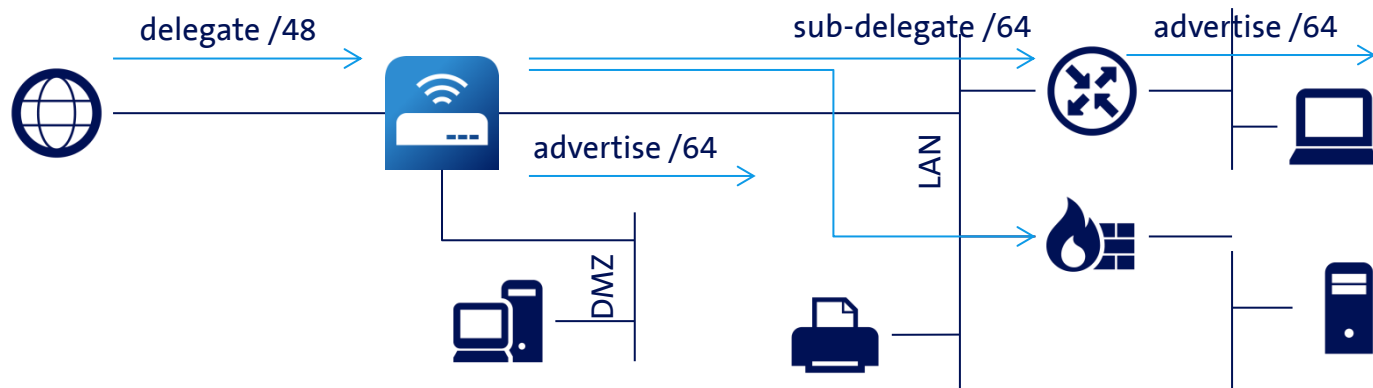


# New IPv6 offering for SME: «my KMU office»

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- IPv6 product offering

- Fixed /48 prefix per site. (65'536 /64 LAN segments).
- DMZ & LAN
- Prefix delegation to subtended routers/firewalls
- Static routing to subtended routers/firewalls



- Product to be launched in August

# Local address assignment using SLAAC, DHCPv6, or both

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	Overview	Settings	Diagnostics
<b>Network</b>			
WLAN	Basic Settings		
VoIP	Port Forwarding		
Router	Public Addresses		
Firewall	Devices		
	Services		
	DynDNS		
<b>Network Settings</b>			
Router IP address		192.168.1.1	IP address, e.g.192.168.1.1
Subnet Mask		255.255.255.0	IP address, e.g.255.255.255.0
<b>IPv4 Address Distribution</b>			
<input checked="" type="checkbox"/> Enable DHCPv4			
Range starts at IP address		192.168.1.33	IP address, e.g.192.168.1.10
Range ends at IP address		192.168.1.127	IP address, e.g.192.168.1.20
Router		192.168.1.1	IP address, e.g.192.168.1.1
<b>IPv6 Address Distribution</b>			
IPv6 Autoconfiguration Mode		DHCPv6 only	
LAN Range starts at IP address		SLAAC only	IPv6 4 words suffix, e.g.:0:0:0:1
LAN Range ends at IP address		DHCPv6 only	IPv6 4 words suffix, e.g.:0:0:0:fff
		SLAAC and DHCPv6	
		None	
DMZ Range starts at IP address		<ASSIGNED-DMZ-PREFIX>:0:0:1:1	
DMZ Range ends at IP address		<ASSIGNED-DMZ-PREFIX>:0:0:1:fff	

## Advanced DHCPv6 Settings

### Add Static Lease

MAC Address  IP Address 2001:918:ffff:1090 : 0:0:0:0

Save

Cancel

# Finely configurable firewall with distinction between DMZ and LAN

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The screenshot displays the 'Settings' tab of a network configuration interface, specifically the 'Firewall' section. It shows two rule sets for the DMZ firewall: 'WAN-LAN Rules' and 'LAN-WAN Rules'. Each rule set contains a table of rules with columns for Status, Name, Description, Policy, Log, and Actions.

**WAN-LAN Rules of DMZ firewall**

Status	#	Name	Description	Policy	Log	Actions
Disabled		Default Policy IPv4	IP version: IPv4	✗	No	Edit
Disabled		Default Policy IPv6	IP version: IPv6	✗	No	Edit

**LAN-WAN Rules of DMZ firewall**

Status	#	Name	Description	Policy	Log	Actions
Enabled	1	New Rule	IP version: IPv6 Destination Ports: TCP:2000-7000 (servrange)	✗	No	Edit Delete
Disabled		Default Policy IPv4	IP version: IPv4	✓	No	Edit
Disabled		Default Policy IPv6	IP version: IPv6	✓	No	Edit

The 'Edit Default Policy' dialog box is shown, featuring a dropdown menu for selecting a policy. The options are 'Drop', 'Accept', 'Drop', and 'Reject'. The 'Drop' option is currently selected. The dialog includes 'OK' and 'Cancel' buttons.

**Edit Default Policy**

**Edit Policy**

Policy: Drop

OK Cancel

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What lies ahead?

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# When will IPv6 exceed IPv4? When will IPv4 start to decline? When will IPv4 disappear?

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- Traffic doubles every 2 years.
- 80% of traffic is still IPv4.
- IPv6 is at 20%. Let's assume its share increases by 10 % per year
- IPv6 reaches 50% in 2018
- Percentage of CG-NAT users increases to 20% by 2025
- IPv6 off-loads traffic from CG-NAT

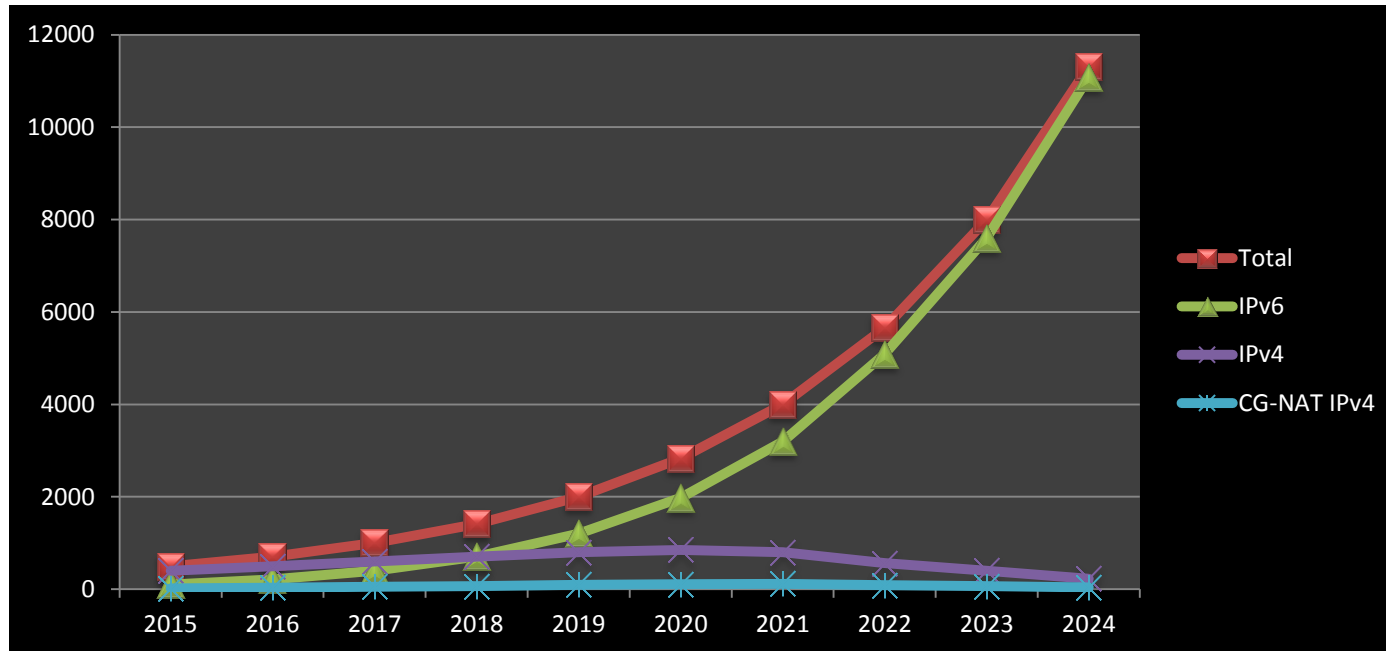
Year	IPv6	IPv4	CG-NAT users	CG-NAT IPv4 traffic
2015	20.0%	80.0%	5.5%	4.4%
2016	30.0%	70.0%	7.0%	4.9%
2017	40.0%	60.0%	8.5%	5.1%
2018	50.0%	50.0%	10.0%	5.0%
2019	60.0%	40.0%	11.5%	4.6%
2020	70.0%	30.0%	13.0%	3.9%
2021	80.0%	20.0%	14.5%	2.9%
2022	90.0%	10.0%	16.0%	1.6%
2023	95.0%	5.0%	17.5%	0.9%
2024	98.0%	2.0%	19.0%	0.4%
2025	100.0%	0.0%	20.5%	0.0%





# When will IPv6 exceed IPv4? When will IPv4 start to decline? When will IPv4 disappear?

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- IPv4 traffic will peak in 2020
- CG-NAT traffic will peak in 2021
- No more IPv4 traffic after 2024

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Getting rid of  
IPv4?

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# Can ISPs switch off IPv4 before the last web server in the Internet is available on IPv6?

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- Dual-stack is painful. It doubles resource consumption on BNGs
- Stateless
  - MAP: Mapping of address and port (draft-ietf-softwire-map-t-08, draft-ietf-softwire-map-13)
  - Similar to 6rd (IPv4 → IPv6 prefix), but the other way around
  - Algorithmic (stateless) mapping of IPv6 prefix to (IPv4 address + port range)
  - No stateful, central CG-NAT device
  - Need to manage IPv6 pools carefully
- Per client state
  - Lightweight 4 over 6 (draft-ietf-softwire-lw4over6-13)
  - Per-subscriber provisioned tunnel of IPv4 over IPv6
  - No stateful, central CG-NAT device
- Per-session state
  - DS-Lite (deployed, dual-NAT like ordinary CG-NAT)
  - NAT64 + DNS64 (won't work with literals or direct IPv4 sockets)



*That's all Folks!*