

Embracing IPv6: From nice to necessary

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InternetNZ

Embracing IPv6 - from nice to necessary

- *IPv6 is real and here!*
- *IPv6 is essential for reaching the entire Internet!*
- *IPv6 will soon be the default training protocol!*
- *If you do IPv6 right you can minimise your investment!*

IPv6 is real and here!

The amount of IPv6 traffic traversing the global Internet is growing day-by-day. The wave of IPv6 is well and truly upon us and it's imperative that New Zealand enterprises act now to deploy.

IPv6 - We've heard it all before

"We know about IPv6, it's just that no one is using it."

"It's not ready"

"There's no support"

"There are no clients"

"There is no content"

IPv6 Works Today

- IPv6 is ready and deployed on large mobile networks and content providers
 - *Google*
 - *Facebook*
 - *Yahoo*
 - *Wikipedia*
 - *Akamai*
 - *Verizon Wireless has IPv6 on by default for nearly all LTE devices*
 - *T-Mobile USA has IPv6 on GSM/UMTS/LTE optionally, and will have IPv6 by default soon*

Massive Growth in IPv6 Traffic

- When IPv6 is turned on, a large percentage of content is delivered over IPv6
- Many IPv6 enabled edge networks reporting over 50% of traffic is IPv6 when the network is IPv6 and IPv4
 - *Google and Akamai both reporting exponential growth in IPv6 use*

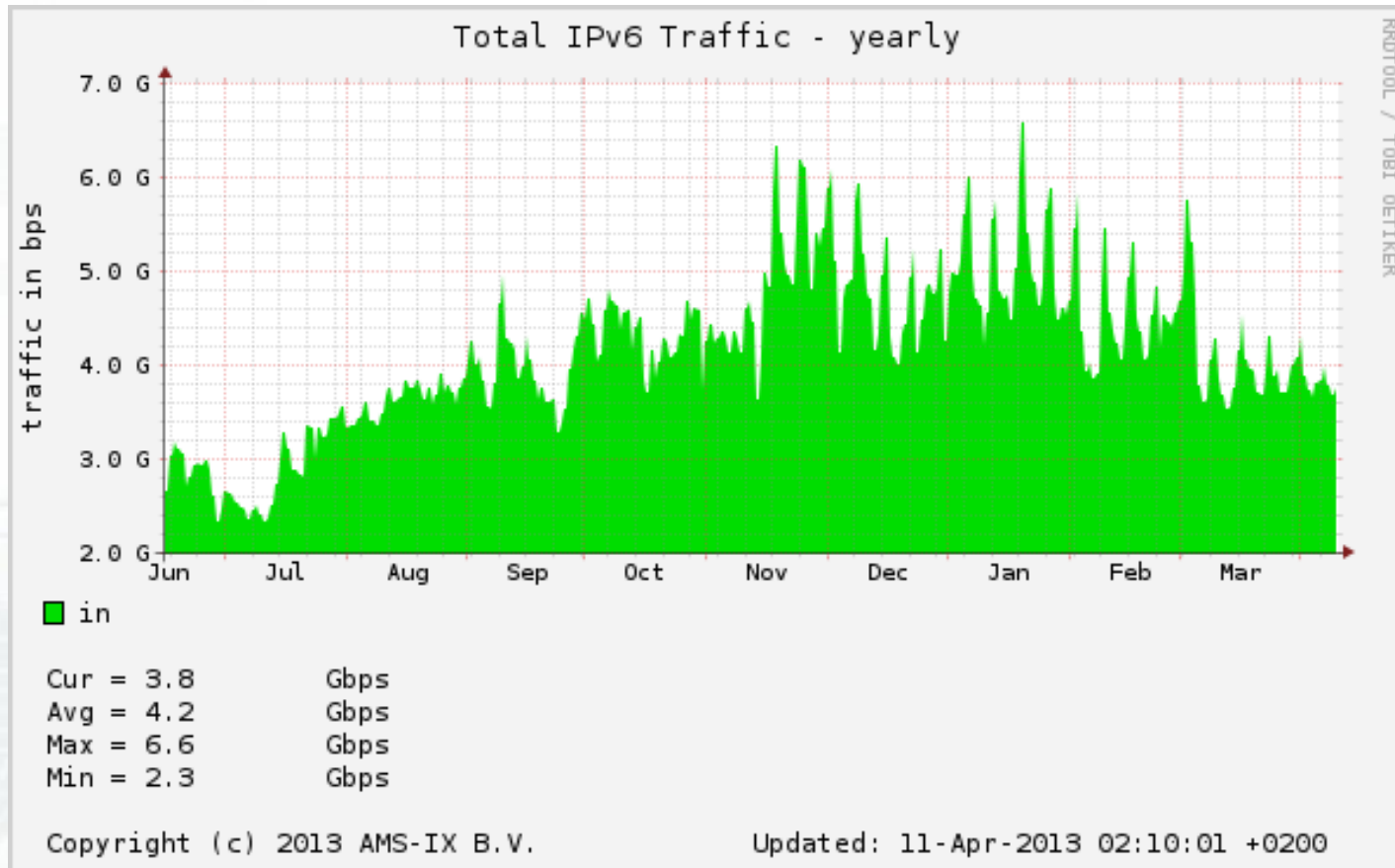
Google

IPv6 Adoption

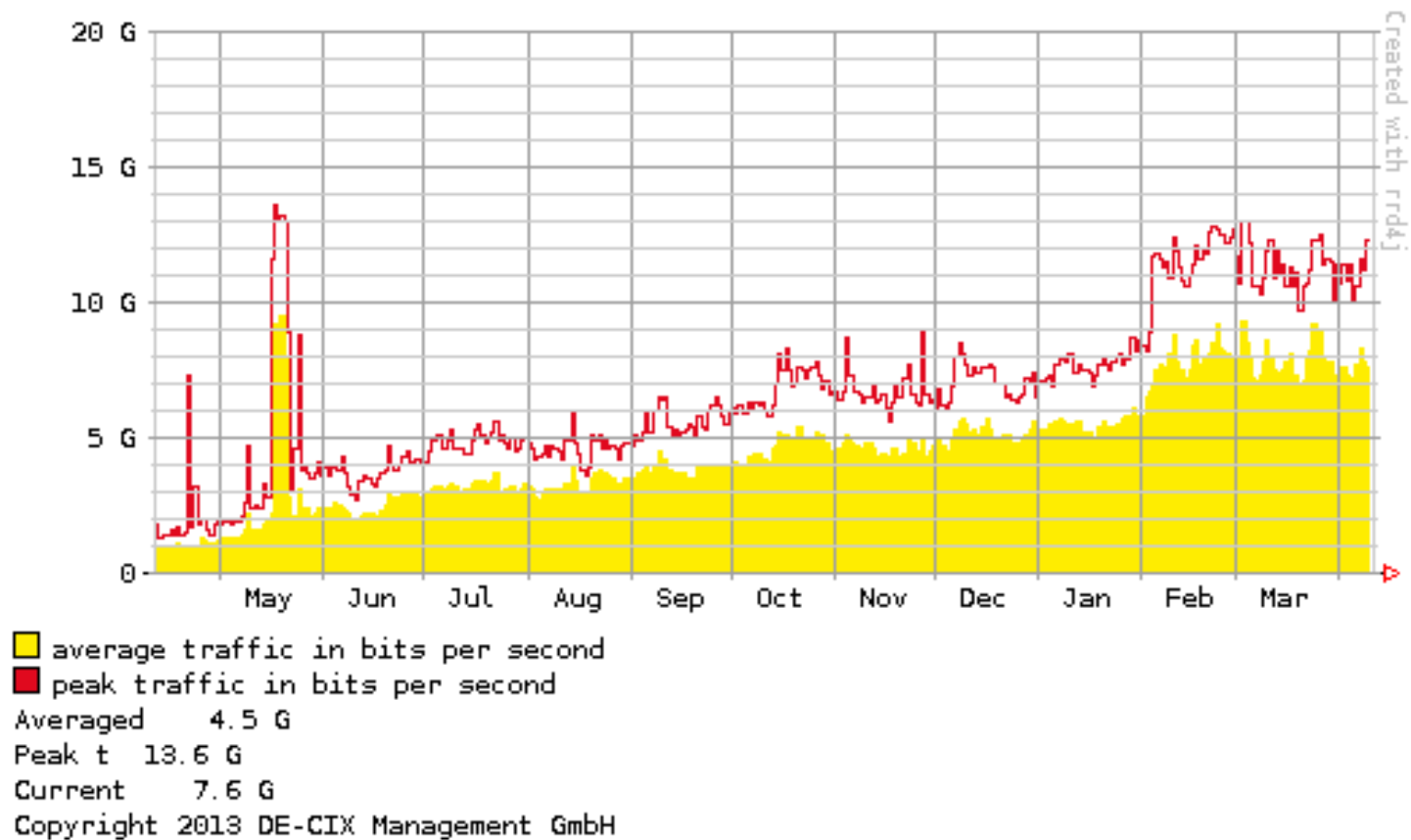
We are continuously measuring the availability of IPv6 connectivity among Google users. The graph shows the percentage of users that access Google over IPv6.



AMS-IX Internet Exchange



DE-CIX Internet Exchange



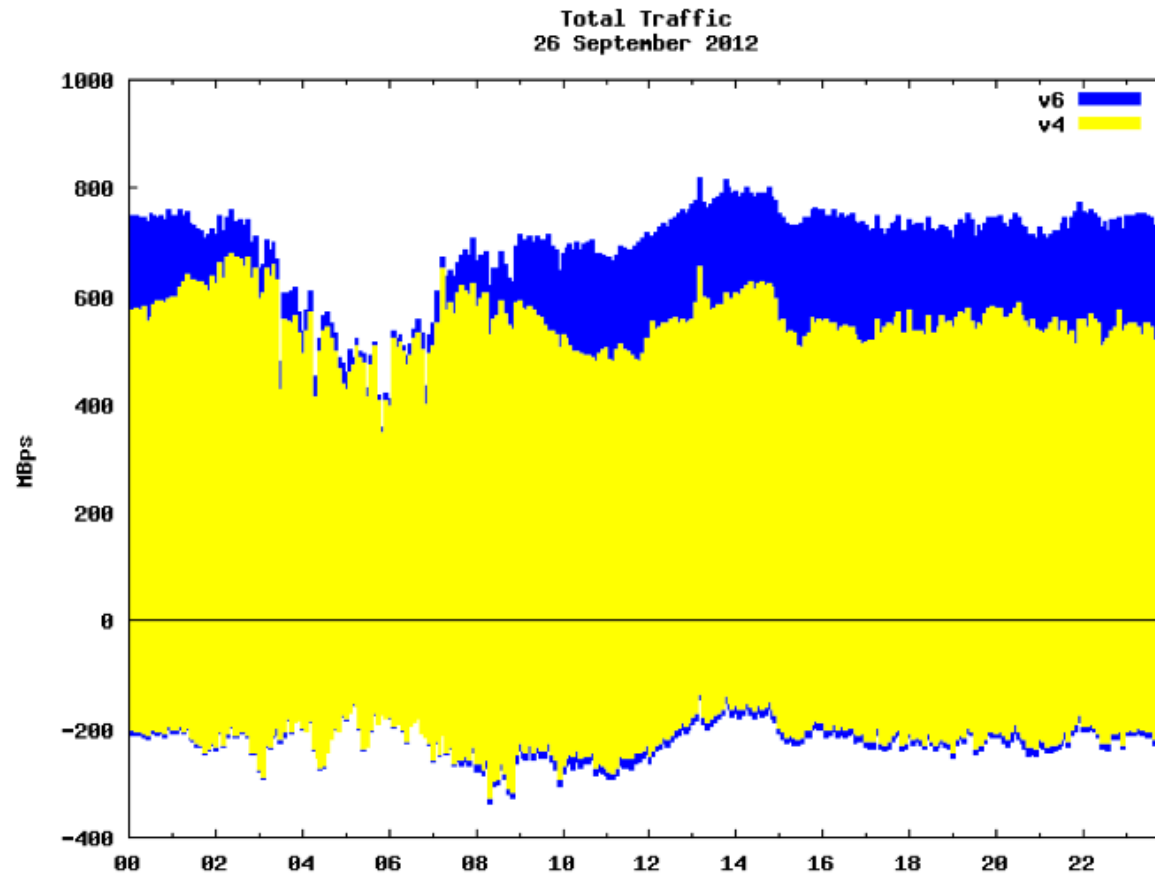
High percentage of native IPv6 traffic

Participating website measurements are available [here](#).

Network operator measurements, 16th November 2012 ([notes](#))

Show 10 ▾ entries		Search: <input type="text"/>	
Participating Network	ASN(s)	IPv6 traffic	
Louisiana State University	2055	63.70%	
Virginia Tech	1312	61.47%	
DreamHost	26347	56.73%	
Rensselaer Polytechnic Institute	91	55.57%	
US Dept of Transportation	2576	53.85%	
Indiana University	87	42.31%	
DMZGlobal	17649	39.96%	
Gustavus Adolphus College	17234	38.19%	
DegNet GmbH	20902	27.87%	
University of Iowa	3676	23.96%	
Showing 1 to 10 of 79 entries			
First Previous 1 2 3 4 5 Next Last			

Virginia Tech – IPv4 Vs IPv6 mix



IPv6 is real and here!

Real Traffic

Real Sites

Real Deployments

The question is not 'if' or 'when' anymore it's
'how can I join them'

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IPv6 is essential for reaching the entire Internet!

The number of trading partners you may want to work with will increasingly be making more use of IPv6 than IPv4. Those in Asian countries, in particular, but also service providers and operators in the United States.

The Internet isn't just for developed countries anymore.

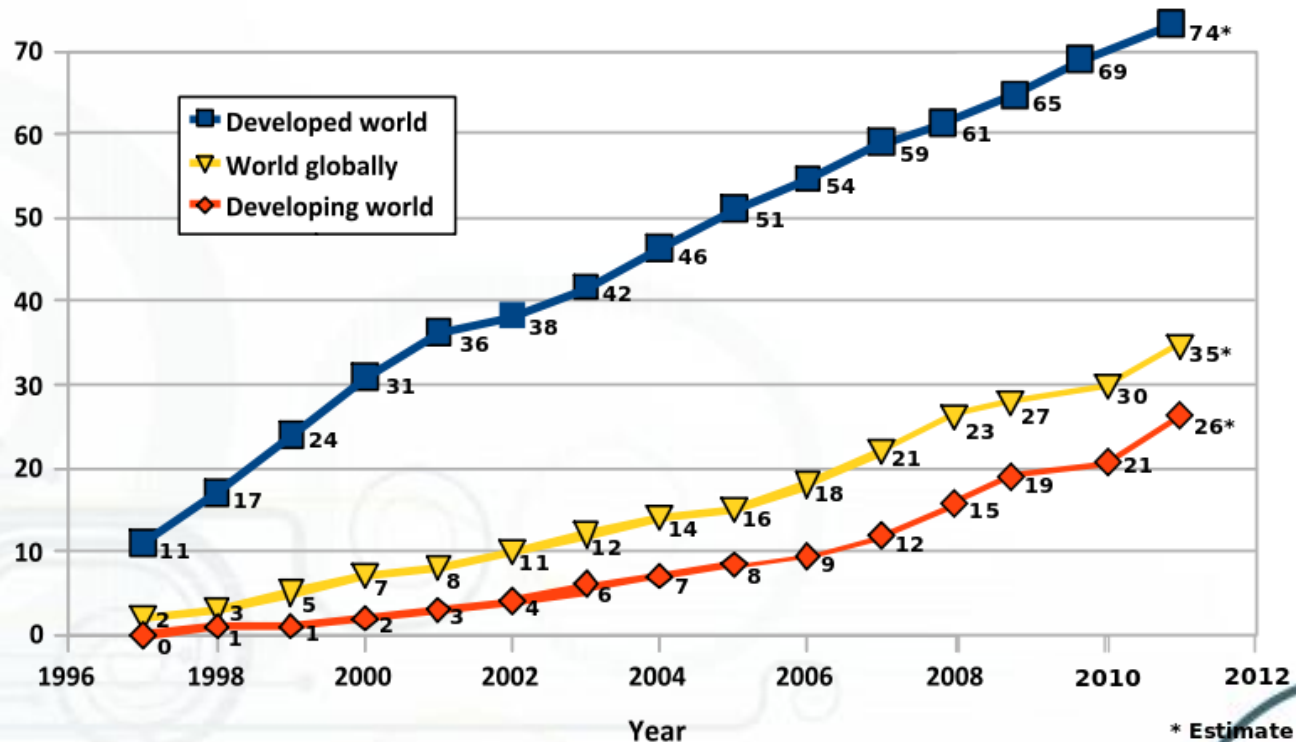
The Least Developed Countries(LDCs) have some of the largest growth in Internet deployment.

New Zealand is an export driven economy.

We need to ensure that our customers can contact us in the method they feel most comfortable with

Growth across all economies

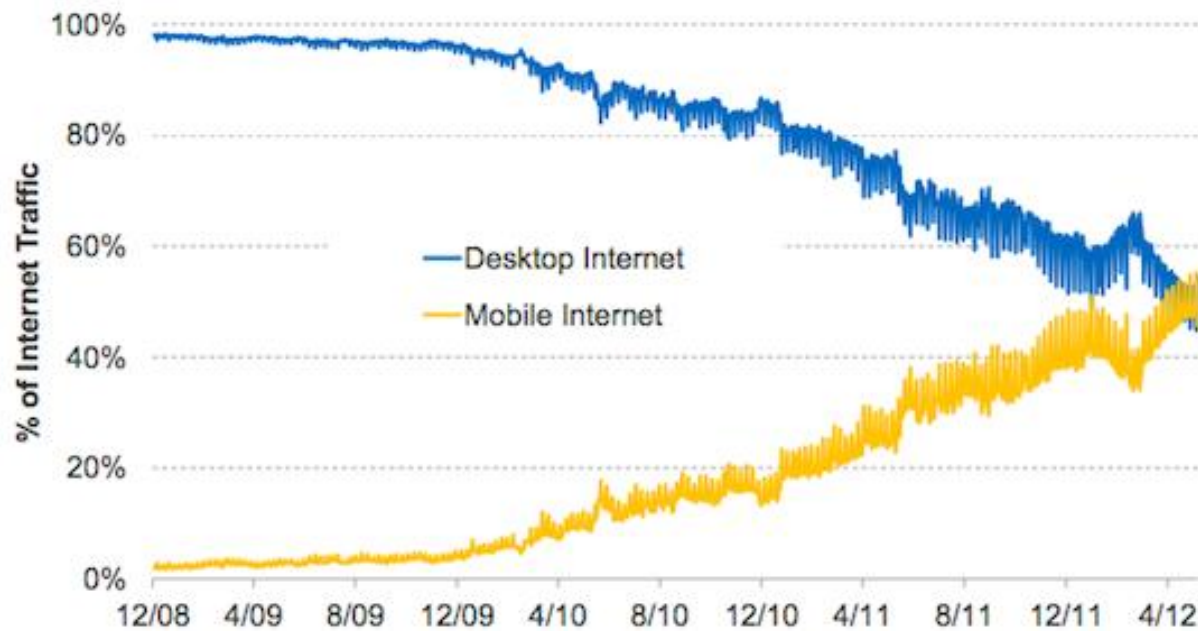
Internet users per 100 inhabitants



* Estimate

Internet Traffic Type in India

India Internet Traffic by Type, Desktop vs. Mobile, 12/08 – 5/12



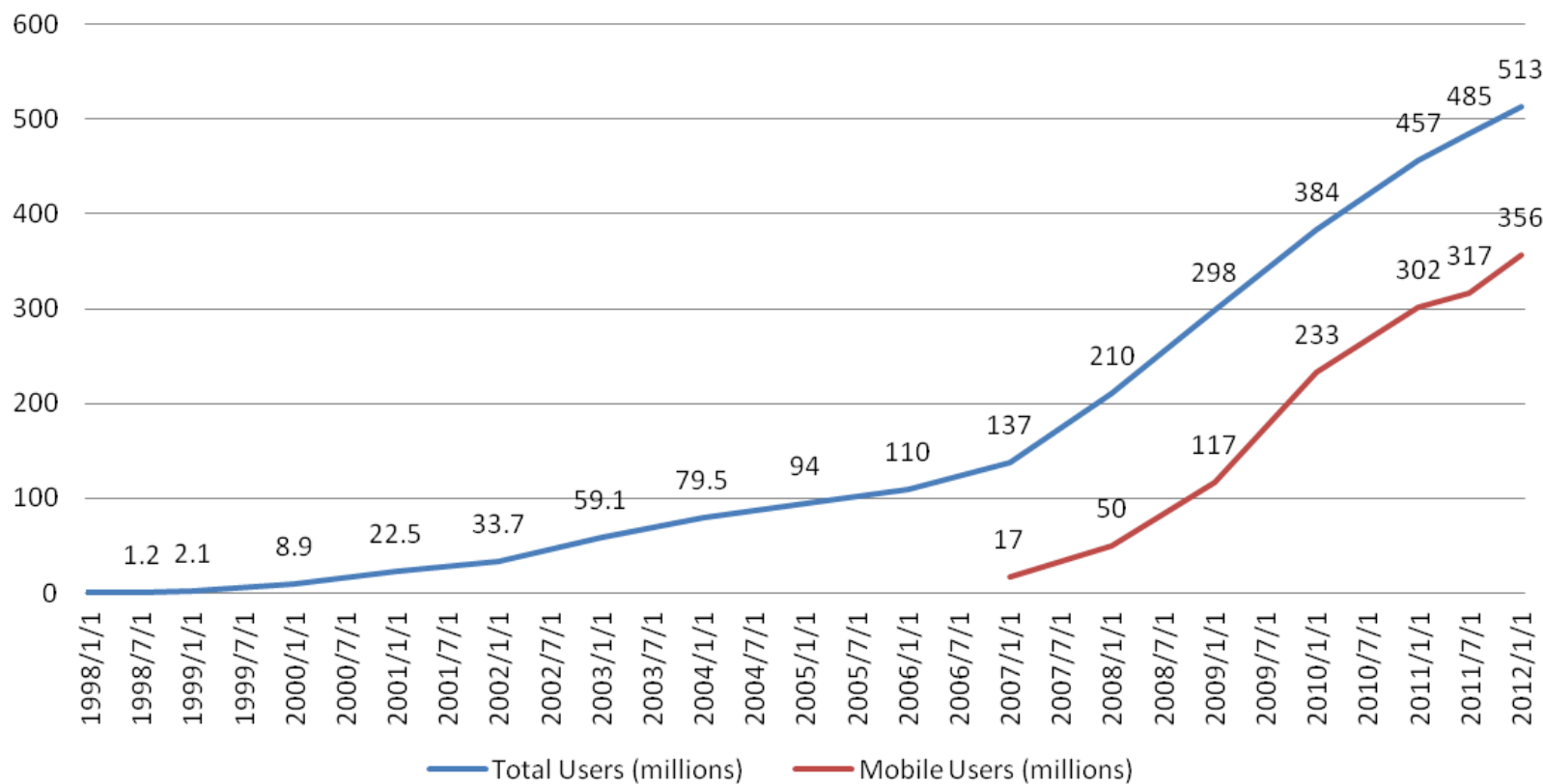
KPCB

Source: StatCounter Global Stats.

18

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Number of Chinese Internet Users



Internet of Things



When all these things are connected how will you address them?



Vehicle, asset, person & pet monitoring & controlling



Agriculture automation



Energy consumption



Security & surveillance



Building management



Embedded Mobile

Internet of things

Everyday things get connected for smarter tomorrow



M2M & wireless sensor network



Everyday things

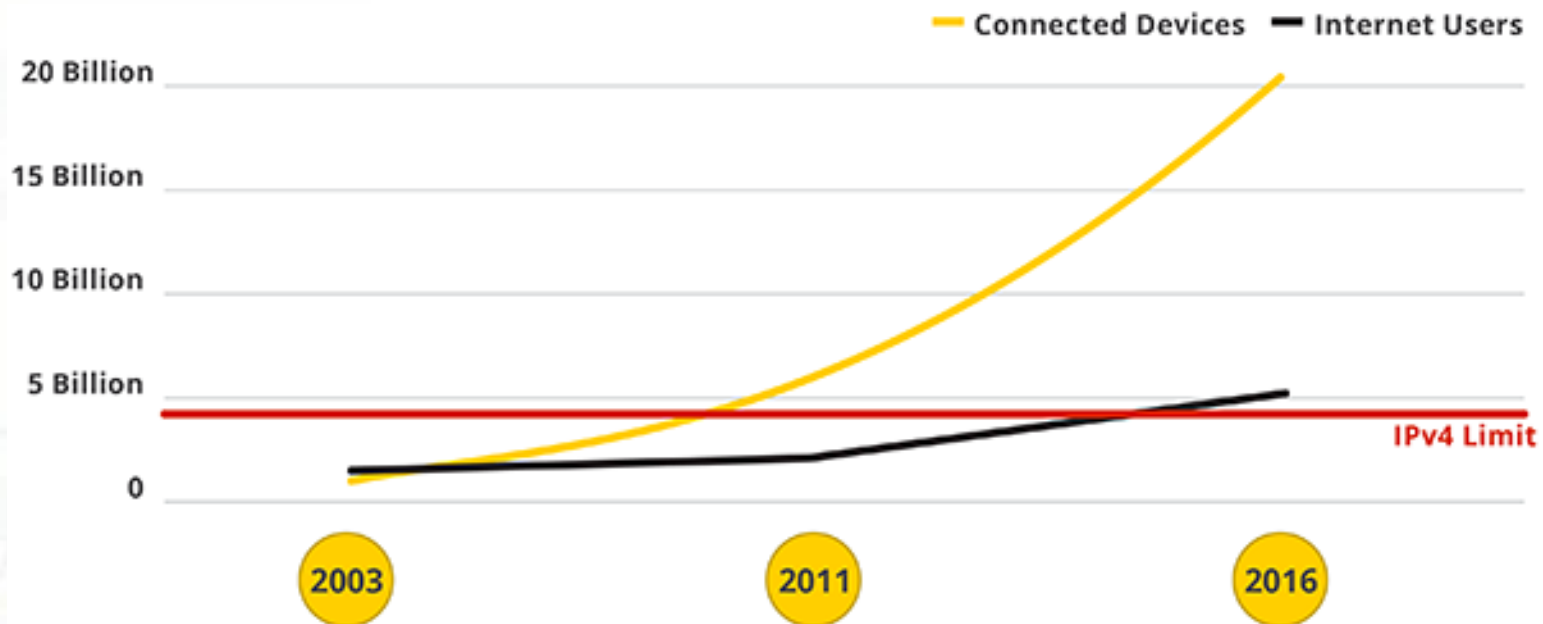


Smart homes & cities



Telemedicine & healthcare

What's the problem?



New ISP conundrum

- You're starting a new ISP in India.
- You apply for some IPv4 addresses.
 - *APNIC gives you 1024 IPv4 addresses and says "That's it, no more".*
- You apply for some IPv6 addresses.
 - *APNIC gives you 4,951,760,157,141,521,099,596,496,896 and says "Come back if you need some more".*

Lets say those out loud

four octillion,
nine hundred fifty-one septillion,
seven hundred sixty sextillion,
one hundred fifty-seven quintillion,
one hundred forty-one quadrillion,
five hundred twenty-one trillion,
ninety-nine billion,
five hundred ninety-six million,
four hundred ninety-six thousand,
eight hundred ninety-six IPv6 addresses

Lets say those out loud

one thousand and twenty four IPv4 addresses

Guess which one the ISP is going to choose.

- Especially when there is a culture of believing that you're going to be successful, i.e. have thousands upon thousands of customers
- Especially when you're going to have to invest in some pretty heavy NAT44 hardware to make 1024 IPv4 addresses scale.

These are the people that you want to do business with.

IPv6 is essential for reaching the entire Internet.

PLEASE WAIT...

YOU HAVE REACHED THE END OF THE INTERNET.
SORRY FOR THE INCONVENIENCE.

IPv6 LOADING...



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IPv6 is now the default (training) protocol!

The last few years have seen a paradigm shift in IP education. Universities and industry training organisations are now considering a switch to teach IPv6 as the default protocol, with IPv4 only mentioned when required. Your new hires will be better-versed in IPv6 than IPv4. You need to be up-to-speed too!

What ICT training used to look like



The Future of training



NSRC training in Yangon, Myanmar - March 2013

The Future of training



APNIC Training in Baguio, Philippines - 2013

APNIC Training Statistics 2012

APNIC training Statistics in 2012

- 73 training course conducted
- 33 cities
- 25 economies
- 2347 engineers have been trained

NSRC reaches out

Google grant boosts UO-based center's technical training in Africa

EUGENE, Ore. — (Feb. 25, 2013) — More than 20 years ago the non-profit [Network Startup Resource Center](#) (NSRC), based at the University of Oregon, helped build some of the initial Internet infrastructure — providing hardware, networking support and technical training — on campuses in South Africa, Botswana, Namibia, Zimbabwe and, later, many others in Africa.

The NSRC's outreach in Africa is now expanding under a new three-year, \$3.2 million grant from Google.org, a team at Google focused on social impact. Under [the grant](#), the NSRC will help to connect additional universities and research institutes while training more locally based operators so that they can link into the regional and international research-and-education network fabric, often in cooperation with governmental networks and industry.

<http://uonews.uoregon.edu/archive/news-release/2013/2/google-grant-boosts-uo-based-centers-technical-training-africa>



Why am I telling you this?

Organisations like APNIC and NSRC are how the developing world is getting their ICT training

Both APNIC and NSRC are looking for ways to make IPv6 the default protocol taught in their workshops.

- Making use of IPv6 in examples of how routing works, how to configure protocols, interfaces, etc.
- Rather than defaulting to IPv4 all the time.
- Falling back to IPv4 only when IPv6 is not supported (yet)

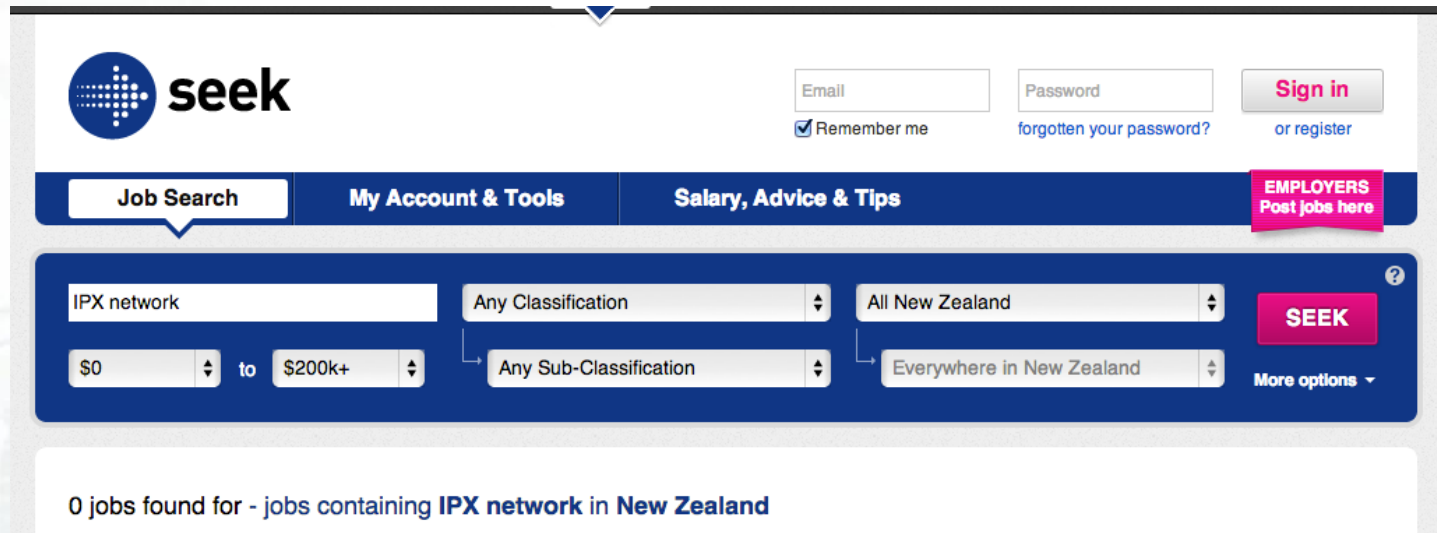
An example closer to home

At least one Network Engineering course at a New Zealand University looking to do the same.

What impact will it have on your ability to secure new staff if they have more experience in IPv6 than IPv4?

Jobs and people filling them

How hard is it to find people with IPX/SPX skills now days?



The screenshot shows the Seek website's job search interface. At the top left is the Seek logo. To the right are input fields for 'Email' and 'Password', with a 'Remember me' checkbox and a 'Sign in' button. Below these are links for 'forgotten your password?' and 'or register'. A navigation bar contains 'Job Search' (highlighted), 'My Account & Tools', and 'Salary, Advice & Tips'. On the right of the navigation bar is a pink button for 'EMPLOYERS Post jobs here'. The search area has several filters: a text input for 'IPX network', a dropdown for 'Any Classification', a dropdown for 'All New Zealand', a salary range from '\$0' to '\$200k+', a dropdown for 'Any Sub-Classification', and a dropdown for 'Everywhere in New Zealand'. A pink 'SEEK' button is next to the filters, with a 'More options' link below it. At the bottom, it states '0 jobs found for - jobs containing IPX network in New Zealand'.

seek

Email Password Sign in
☒ Remember me forgotten your password? or register

Job Search My Account & Tools Salary, Advice & Tips EMPLOYERS Post jobs here

IPX network Any Classification All New Zealand
\$0 to \$200k+ Any Sub-Classification Everywhere in New Zealand SEEK
More options

0 jobs found for - jobs containing IPX network in New Zealand

Much easier to find IP Skills/Jobs



seek

Email

☒ Remember me

Password

[forgotten your password?](#)

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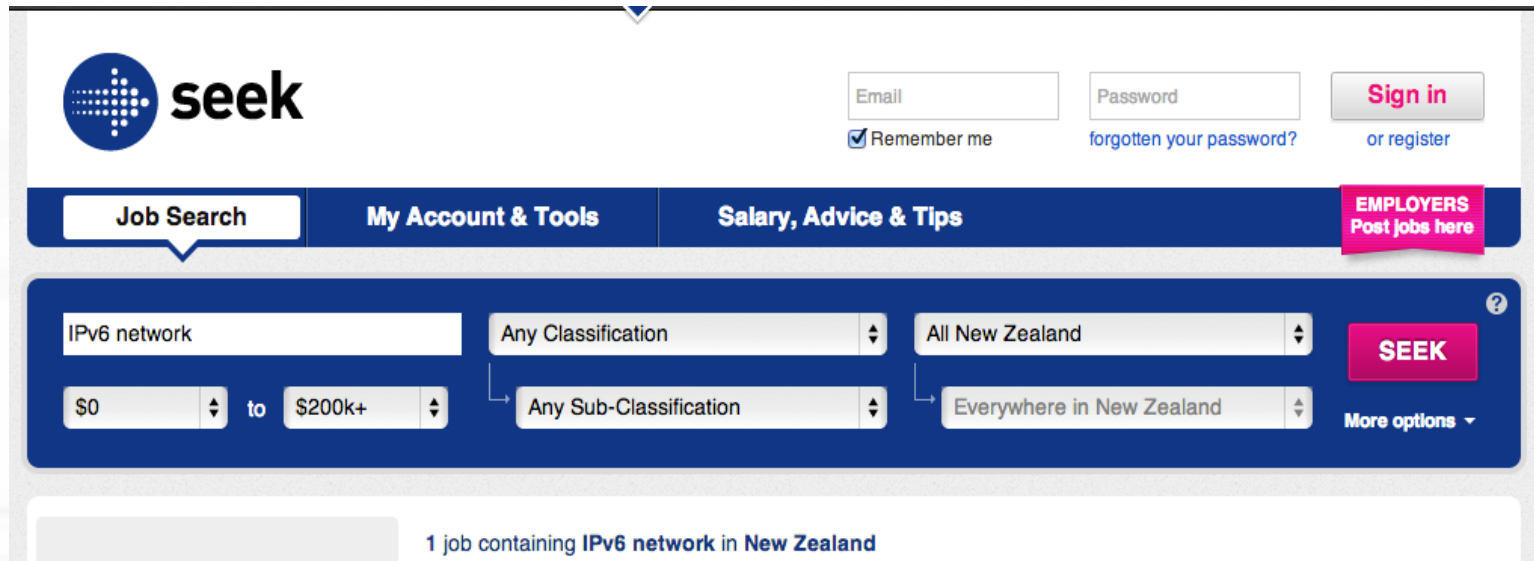
Everywhere in New Zealand

[More options](#)

125 jobs containing **IP network** in **New Zealand**

InternetNZ

And yes, there was a job looking for IPv6!



The screenshot shows the SEEK website's job search interface. At the top, there's a navigation bar with the SEEK logo, login fields (Email, Password, Remember me, forgotten your password?, Sign in, or register), and a menu with 'Job Search', 'My Account & Tools', 'Salary, Advice & Tips', and 'EMPLOYERS Post jobs here'. Below the navigation bar is a search bar with the following filters: 'IPv6 network' (text input), 'Any Classification' (dropdown), 'All New Zealand' (dropdown), '\$0' to '\$200k+' (range), 'Any Sub-Classification' (dropdown), and 'Everywhere in New Zealand' (dropdown). A pink 'SEEK' button is on the right, along with a 'More options' link. Below the search bar, a grey box displays the result: '1 job containing IPv6 network in New Zealand'.

seek

Email Password **Sign in**
☒ Remember me [forgotten your password?](#) [or register](#)

Job Search **My Account & Tools** **Salary, Advice & Tips** **EMPLOYERS Post jobs here**

IPv6 network Any Classification Any Sub-Classification All New Zealand Everywhere in New Zealand
\$0 to \$200k+ **SEEK** More options

1 job containing IPv6 network in New Zealand

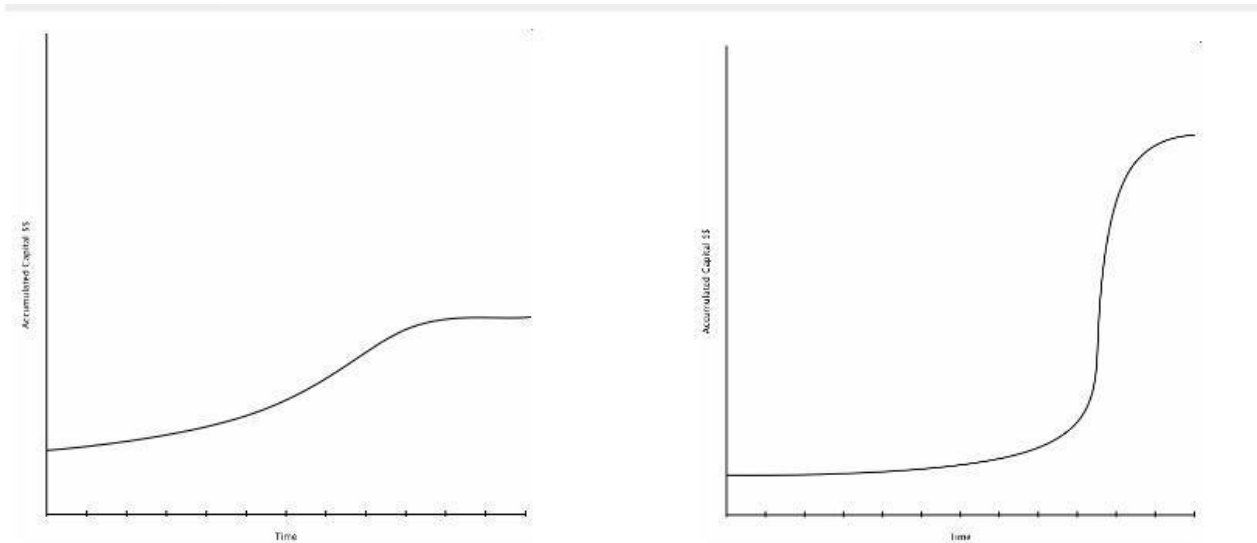
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If you do IPv6 right you can minimise your investment!

You can amble along supporting both IPv4 and IPv6, or you can take a deliberate approach to maximise IPv6 and minimise IPv4. That will be the cheapest, longest-term sustainable approach for enterprise to take. Deploy IPv6 the right way and it will cost you 'next to nothing'. Deploy it under pressure and feel the pain!

Engineering in a crisis costs money



Real world example

"T-Mobile USA did not spend any CapEx on IPv6"

Where would you like to spend your money?

- Ways to keep IPv4 working
- Ways to reduce reliance on IPv4.
- Ways to deploy IPv6.

Questions?

Thank You