IPv6 @ LinkedIn

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The world is going to run out of IPv4 addresses in 3-5 years time.

Data flows between LI and its members has been IPv6-enabled since 2014. Apache Traffic Server listens on IPv6 and sends the internal request over IPv4, with the IPv6 address in a special field.

Email: 2013 Web: 2014
To allow testing, in 2014, we enabled IPv6 in our offices.

Geoff Huston IPv4 exhaustion by RIR

IPv6 to LinkedIn website (worldwide)

IPv6 is faster than IPv4*. Most mobile providers in the USA are at more than 75% deployment.

*Mileage may vary and devil is in the details.
LinkedIn is going to run out of RFC1918 (Internal) IPv4 addresses in 3-5 years time.

Let's build Oregon DC dual stack with no AAAA
Let's build next data center after it IPv6-only

IPv6 in the Data Center: Oregon Dual Stack

- Scale – From dense (x10) to virtual compute (x100)
- Opportunities – New technical solutions not constrained by addressing space
- End to End connectivity – No NAT44 between DCs or offices.
For traffic to go on IPv6
Client: IPv6 global address → Server: IPv6 global address + DNS AAAA

3 Pillars

Network
- Static vs Dynamic
- ACLs and security rules
- VIPs, Anycasts
- Edge Networks
- No more deep NATs

Hardware
- UEFI Network boot over IPv6
- BMC/IPMI over IPv6
- Server Build Automation

Software
- Listening over IPv6
- Discovering Services
- Connect strategy (fail, fallback, HE)
- Upgrade, Upgrade, Upgrade
- Support legacy IPv4 software

Network
- Static – IPv6 address decided at build time
- Gateway – FE80::1
- Tools – Convert IPv4 configuration to IPv6 automatically
- Mapping – IPv6 can be deduced from IPv4 for dual stack machines but without technical debt – Each IPv4 network has a paired IPv6 network

Hardware
- UEFI – Supports IPv6 boot (SLAAC vs DHCPv6, TFTP vs HTTP)
- Grub – IPv6 support is weak
- BMC/IPMI – Redfish standard but IPMI tools are lagging
- Firmware – Always dangerous to flash at scale

Software
- Listener – Listens on IPv4 and IPv6 – every language is special
- Connect strategy – hardfail, fallback, Happy Eyeballs
- Java – control in java settings
- Deploy – and redeploy till right
- IPv6 ready – “should work” or limited support – Test, don’t believe.

Key Takeaways
Where are we?

- Staging environment entirely dual stack with A and AAAA
- Retrofitting production environment
- Working on building IPv6 only servers

We don’t want to deploy IPv6, we want to remove IPv4!

IPv6 Takeaways

- Know all the unknowns very early
- Engage vendors straight away (takes one year to deliver)
- Don’t relax or forget you have IPv6
- Engage Top Level Management
- Need Software Engineers more than Network Engineers