Enterprise IPv6 Deployment

Experiences from the field

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What motivated us to deploy IPv6?

Google

Google Culture == Innovation

"IPv6 will enable innovation and allow the Internet's continued growth"

Early adopters of technology

Eat your own “Dogfood”

Google

Launch early, Iterate often

Think Big, Start Small

Google

About the Enterprise Network

Google

Corporate Information

Google Offices

Interested in working in one of these locations? We're always looking for great people.

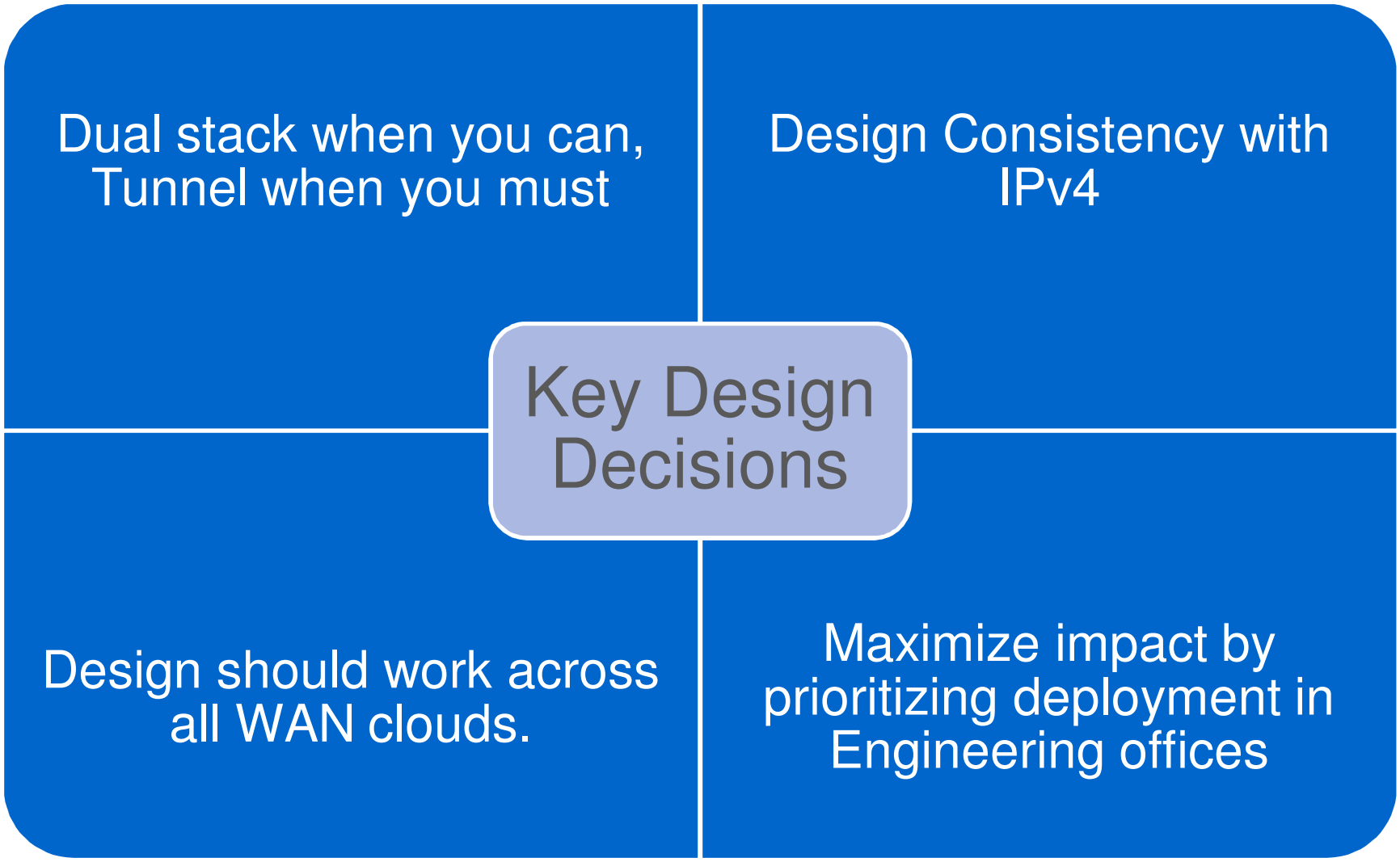
Distributed Enterprise Network

26000+ Employees

69 Offices in 36 Countries

Multi-vendor network

Design Fundamentals



“Rome wasn’t built in a day”

Google

Key Building Blocks

Addressing Plan

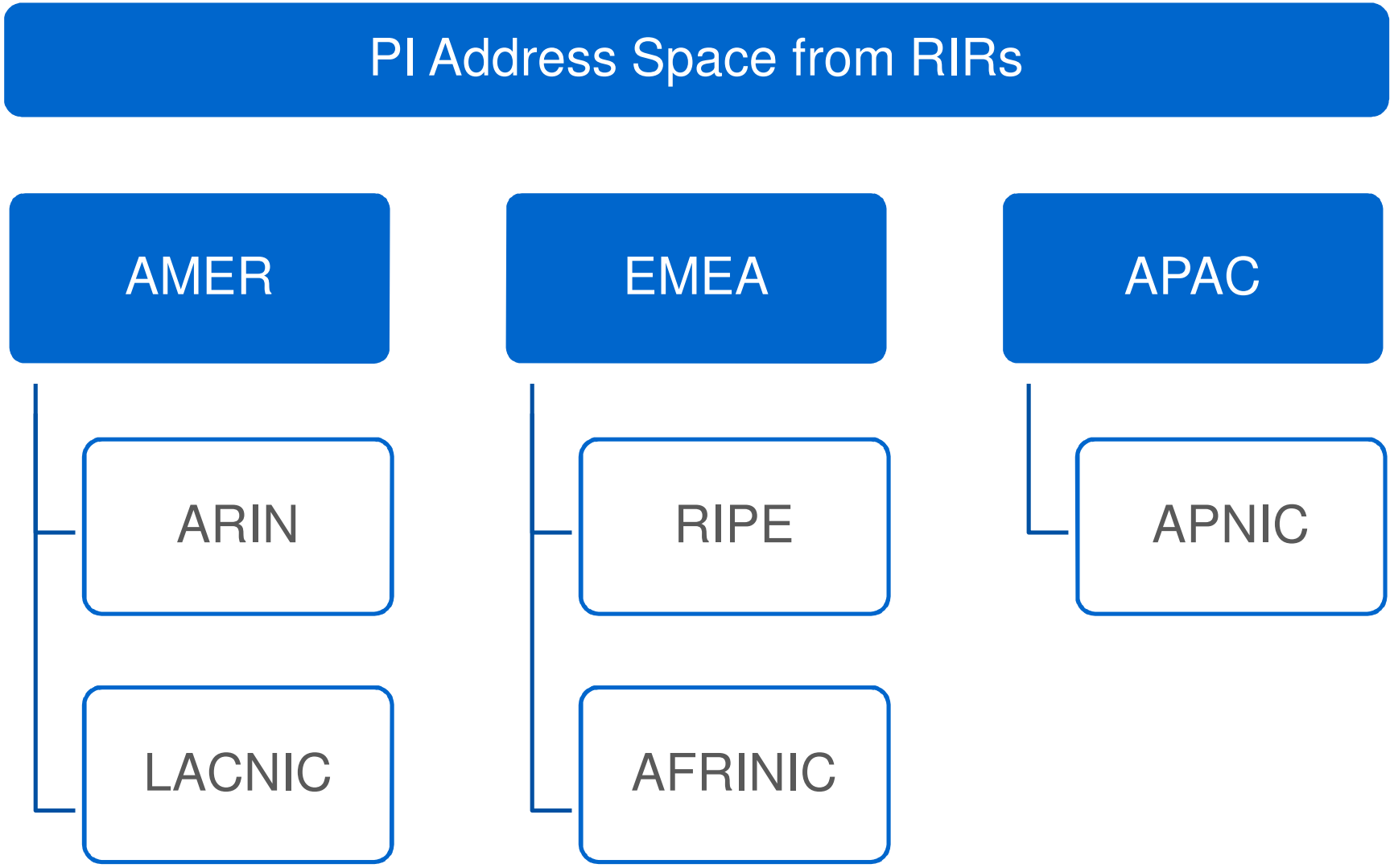
Routing

Transit

Hardware/Software

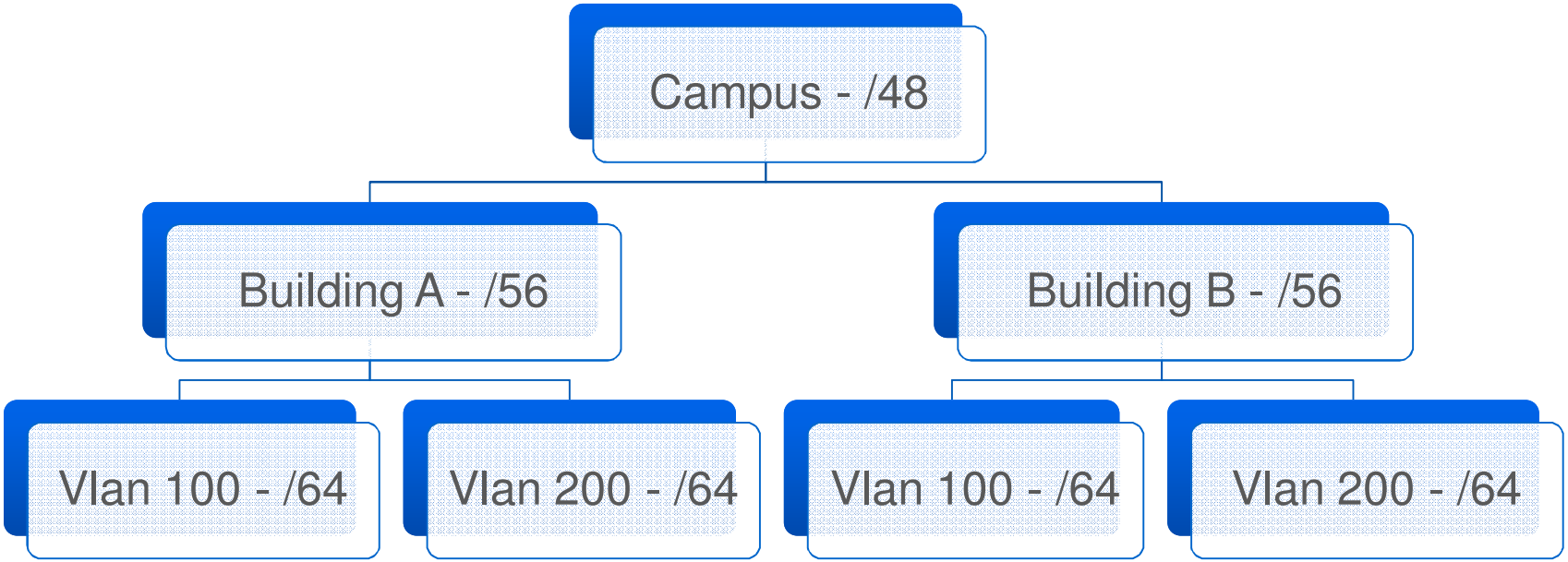
SLAAC/DHCPv6

Addressing Plan (1 of 2)



Addressing Plan (2 of 2)

Google



Routing Policy

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Protocols

- HSRPv2
- OSPFv3
- BGP

Policy

- Longest prefix length accepted/announced is /48
- Import/Export policies for v6 peers consistent with v4

Transit

Google

New Providers

- IPv6 is Mandatory
- Oh, and NO tunnels please!
- IPv6 in Hardware

Existing Providers

- When can you support IPv6?
- How good is your peering?
- Perhaps we need to go get a new provider…

Hardware/Software

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Hardware

- Does your existing Routing and Switching hardware support IPv6?
- Is the existing gear interoperable with other vendor equipment
- Does your Wifi gear support IPv6?
- Does your WAN Accelerator or other Overlay networks support IPv6

Software

- Test, Test, Test
- Test your design
- Test performance

SLAAC vs. DHCPv6

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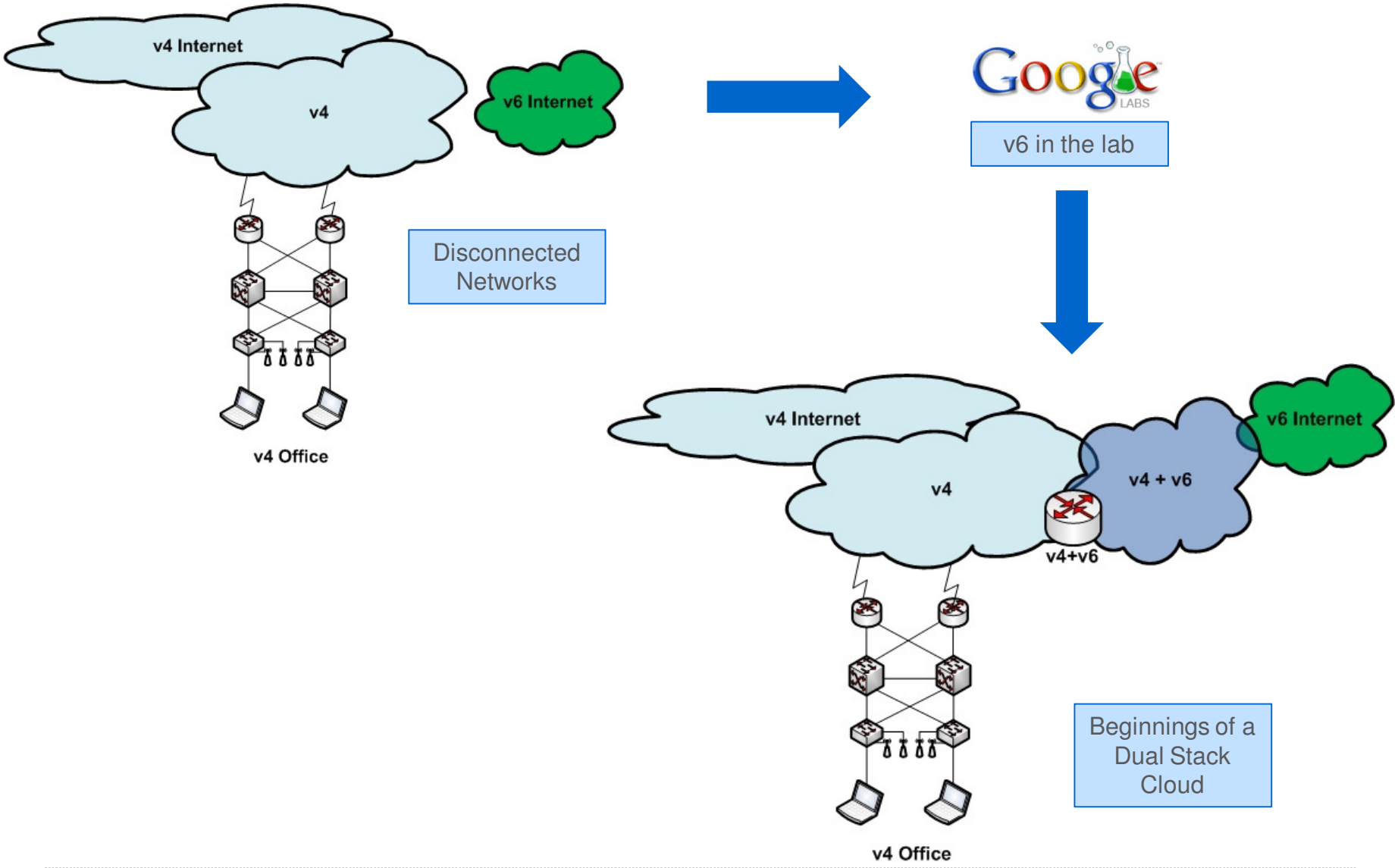
SLAAC

- Ease of deployment
- Time to delivery is faster
- Readdressing made simple
- Widely implemented

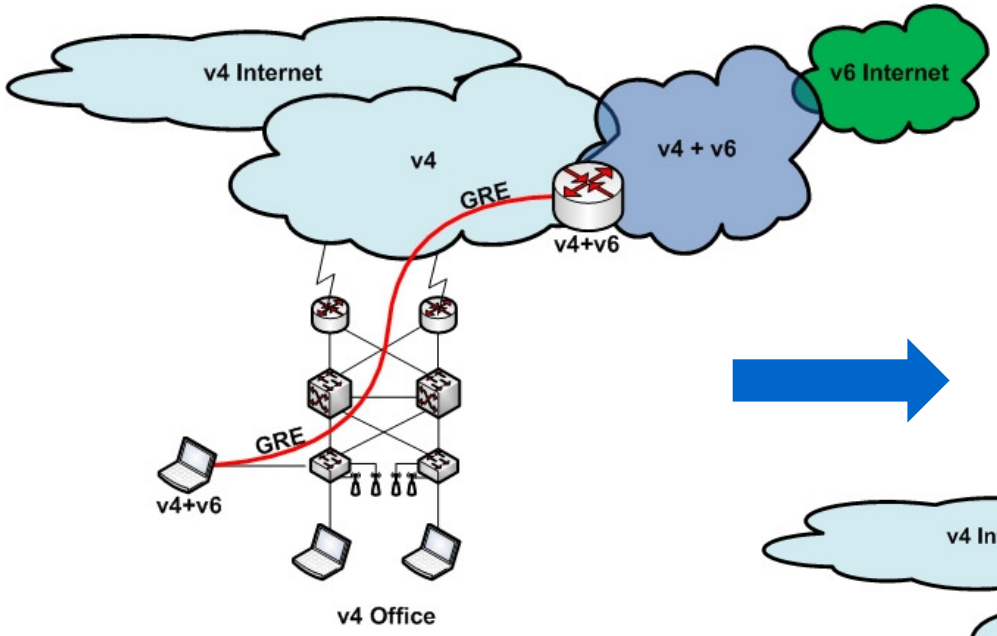
DHCPv6

- Allows granular control of IPv6 address allocation
- Poor client support

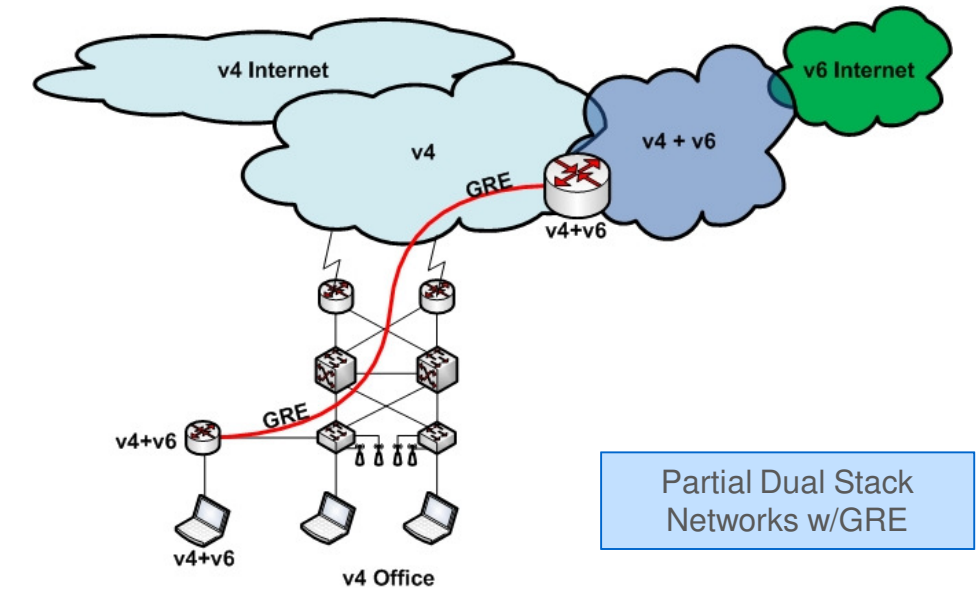
Deployment Phases (1 of 3)



Deployment Phases (2 of 3)

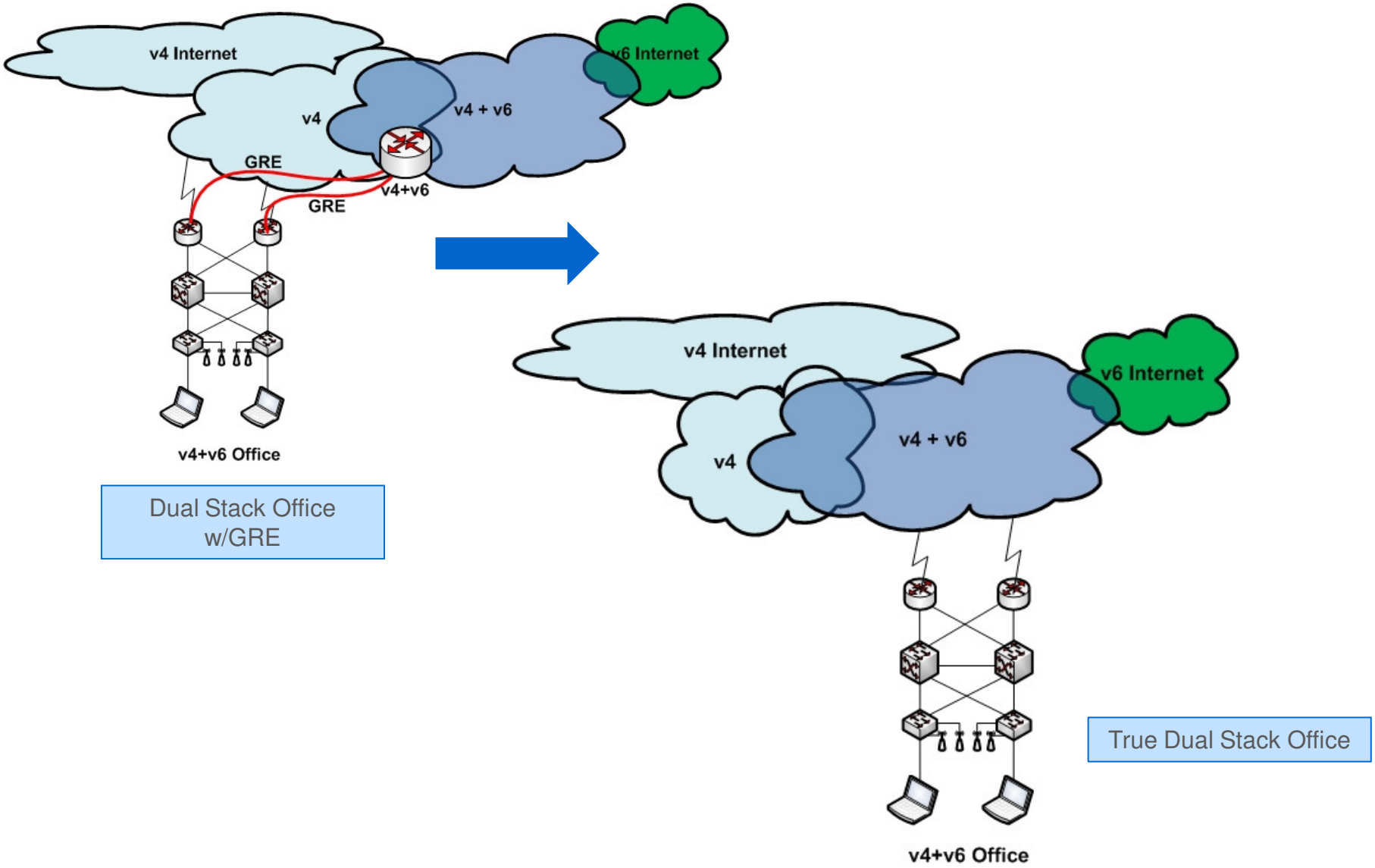


Dual Stack Hosts w/GRE



Partial Dual Stack Networks w/GRE

Deployment Phases (3 of 3)



Challenges

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Network Equipment

- Vendors don't run IPv6 on their corporate networks
- IPv6 still processed in software on many platforms
- Not all vendors support IPv6 yet

ISP Support

- General lack of ISPs that provide IPv6 on a typical enterprise connection
- Those who do, have very spotty peering
- Many ISPs still rely on Tunnels

Challenges

Google

Client Support

- No out-of-the-box DHCPv6 support on Macs

Organizational

- Personnel training is becoming increasingly important
- Resource allocation is IPv4 centric

The Bottom Line

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It's not Rocket Science

- IPv6 is easy and simple to deploy
- It just takes some time

Don't forget to 'Think Big, Start Small'

- All you need is a vision and a few enthusiastic people

Remember – 'Rome wasn't built in a day'

- Take small steps – Start with a lab and build the rest in stages
- Design to the same quality standards as IPv4

Build a "Production" IPv6 Network

- Monitored
- Supported

Launch Early, Iterate Often

- The earlier you deploy, the faster we as an internet community can iterate to make IPv6 a widespread reality

Thank You!

Q&A