Why Universities and Colleges Need to Implement IPv6

11 July 2013

Stephen Kirk

Consulting Engineer

stekirk@cisco.com

© 2008 Cisco Systems, Inc. All rights reserved. Cisco Highly Confidential—Controlled Access

Core Message of This Session

Failure [to Act] is Not an Option.

Gene Krantz, Flight Director, Apollo 13

April, 1970

The whole of IT must collectively embrace this transition, it is not just about the networks team.

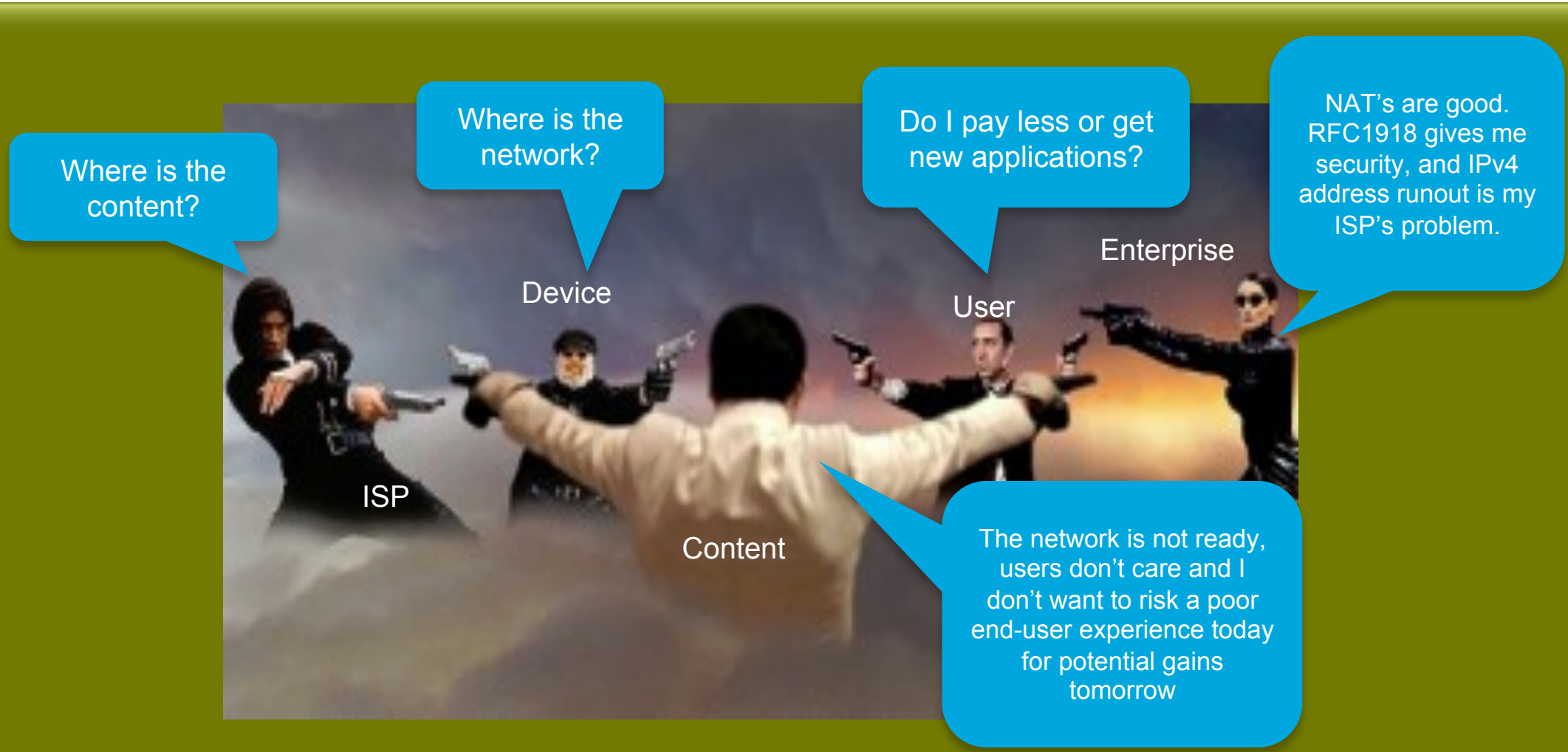
© 2013 Cisco and/or its affiliates. All rights reserved.

First Up……What is IPv6?

- It is the next generation Internet Protocol and the follow-up of the existing IPv4 technology
- IPv6 will involve the whole of ICT – EVERYTHING
- Developed in 1996 – largely by Cisco - and in IOS since 2000 (12.0S code). Cisco chair over half the dev committees.
- IPv6 provides auto-configuration, increased address space, improved mobility and enhanced operation as key benefits
- IPv6 is “NOT COMPATIBLE” with IPv4
- IPv6 address space has 79,228,162,514,264,337,593,543,950,336 times the address space of IPv4!
- IPv6 deployment has historically been suffering a Mexican stand-off…

© 2013 Cisco and/or its affiliates. All rights reserved.

IPv6 migration: A Mexican Standoff



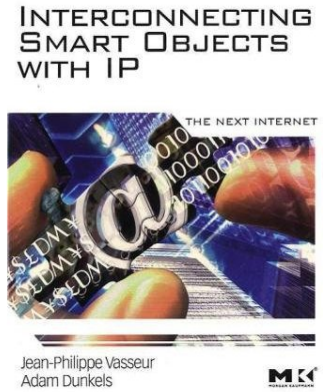
"A deadlock, stalemate, impasse; a roughly equal (and frequently unsatisfactory) outcome to a conflict in which there is no clear winner or loser,"

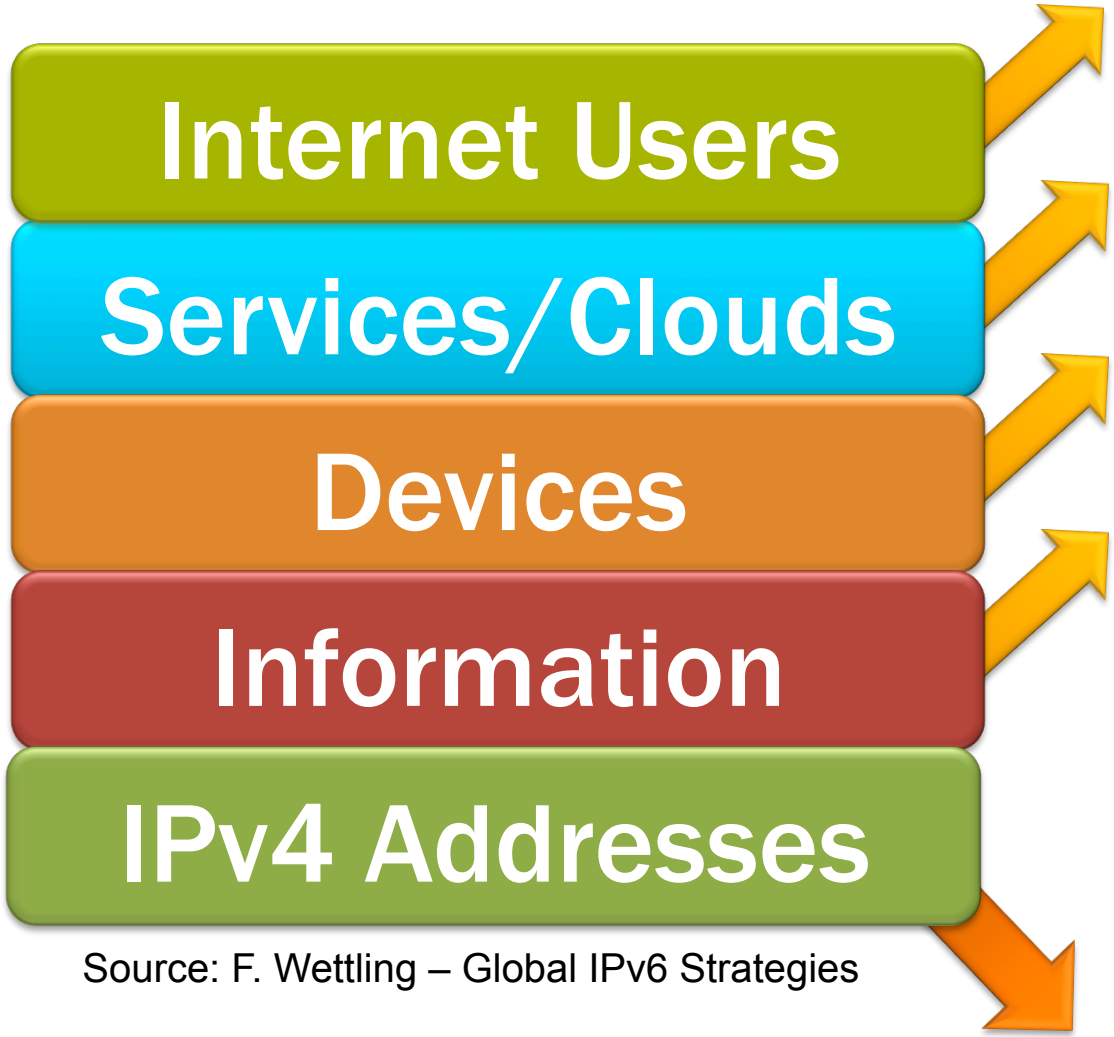
IPv4
IPv6

© 2013 Cisco and/or its affiliates. All rights reserved.

Why should I care? IPv6 Drivers

- Global connectivity
- IP convergence
- Ubiquitous Information
- Internet of Everything



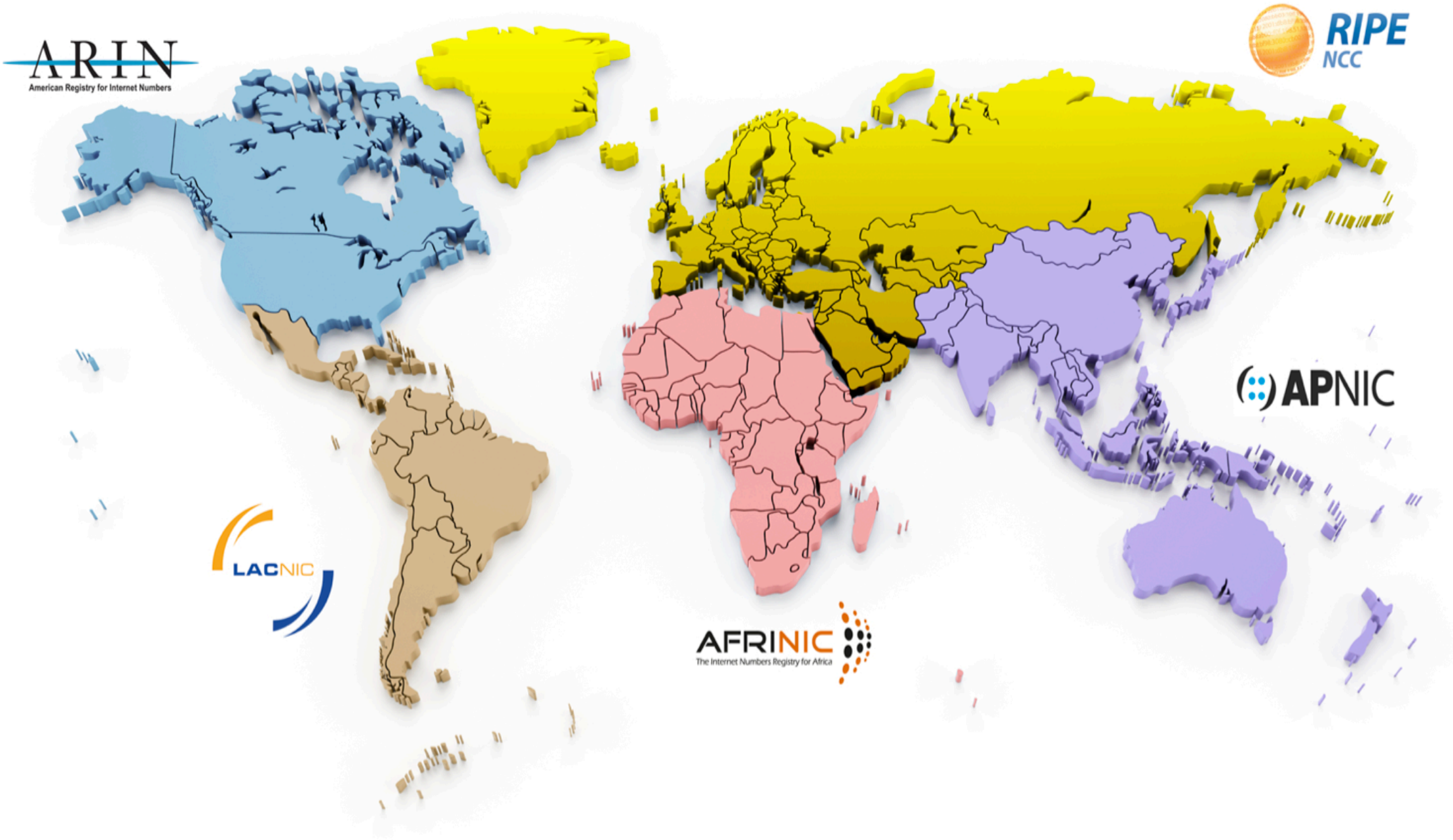


Source: F. Wettling – Global IPv6 Strategies

© 2013 Cisco and/or its affiliates. All rights reserved.

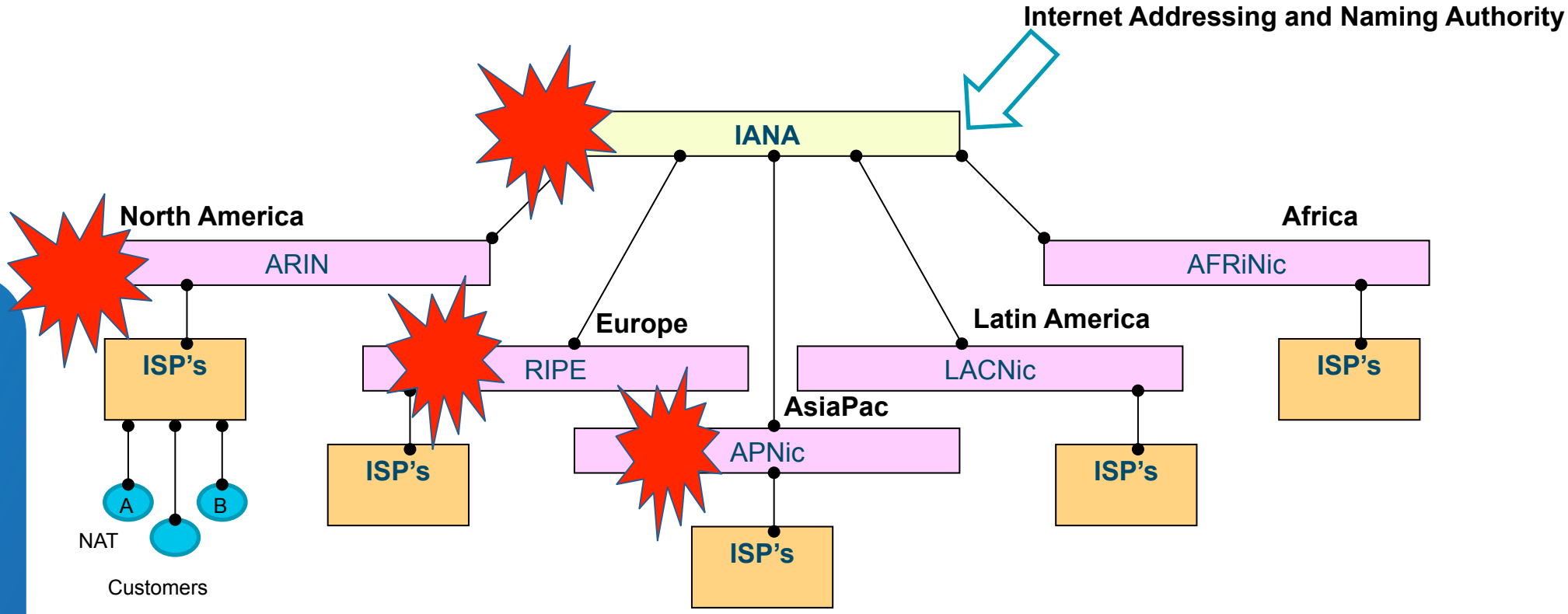
The IANA Pool Finally Ran Out for IPv4

© 2013 Cisco and/or its affiliates. All rights reserved.



© 2013 Cisco and/or its affiliates. All rights reserved.

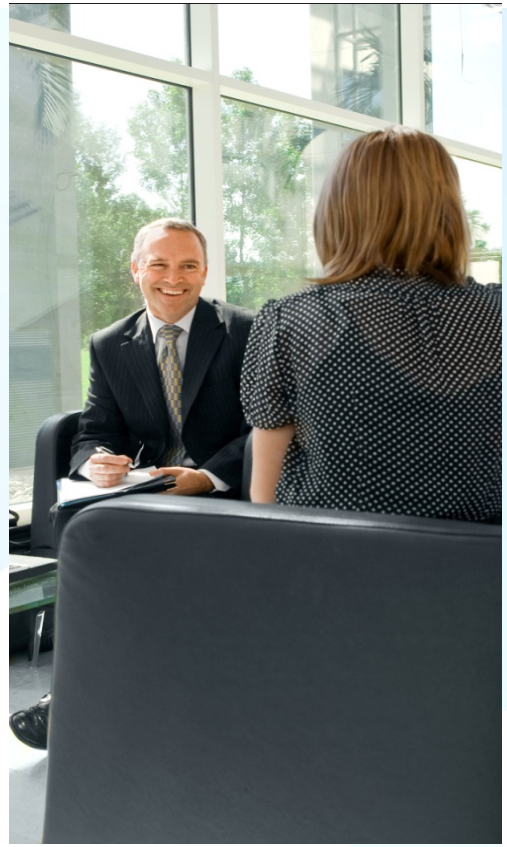
So What Happened to the IPv4 Pool ?



© 2013 Cisco and/or its affiliates. All rights reserved.

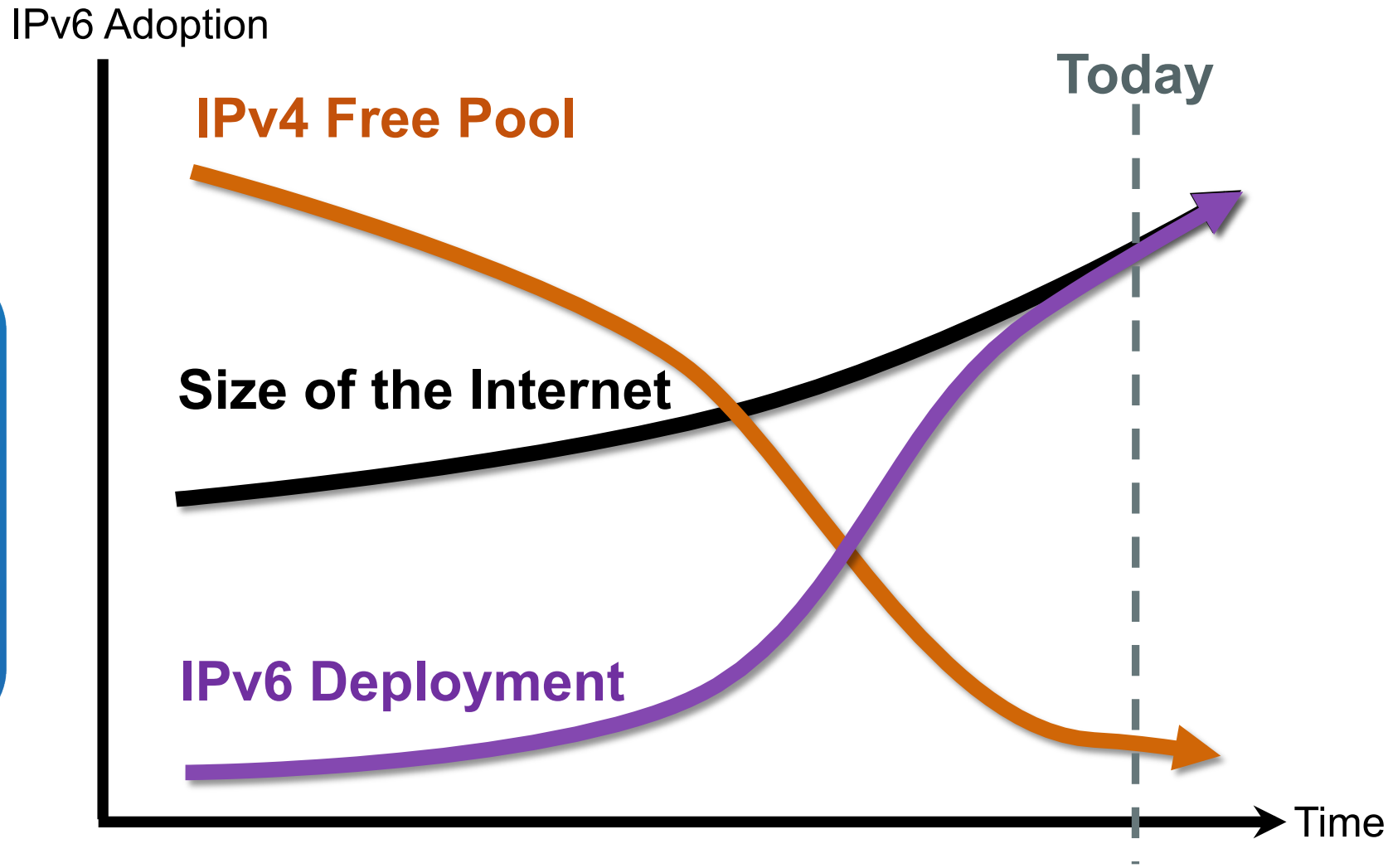
You need to develop an IPv6 Strategy to run your organisation if.....

- You serve content to the students and the internet
- You use cloud based services
- You take orders and reservations from internet customers/students
- Your customers pay their bills on line
- VPN access for my home working/green initiatives for my employees
- Your backup strategy uses the internet
- You want to open an office where there are limited IPv4 addresses – AsiaPac etc



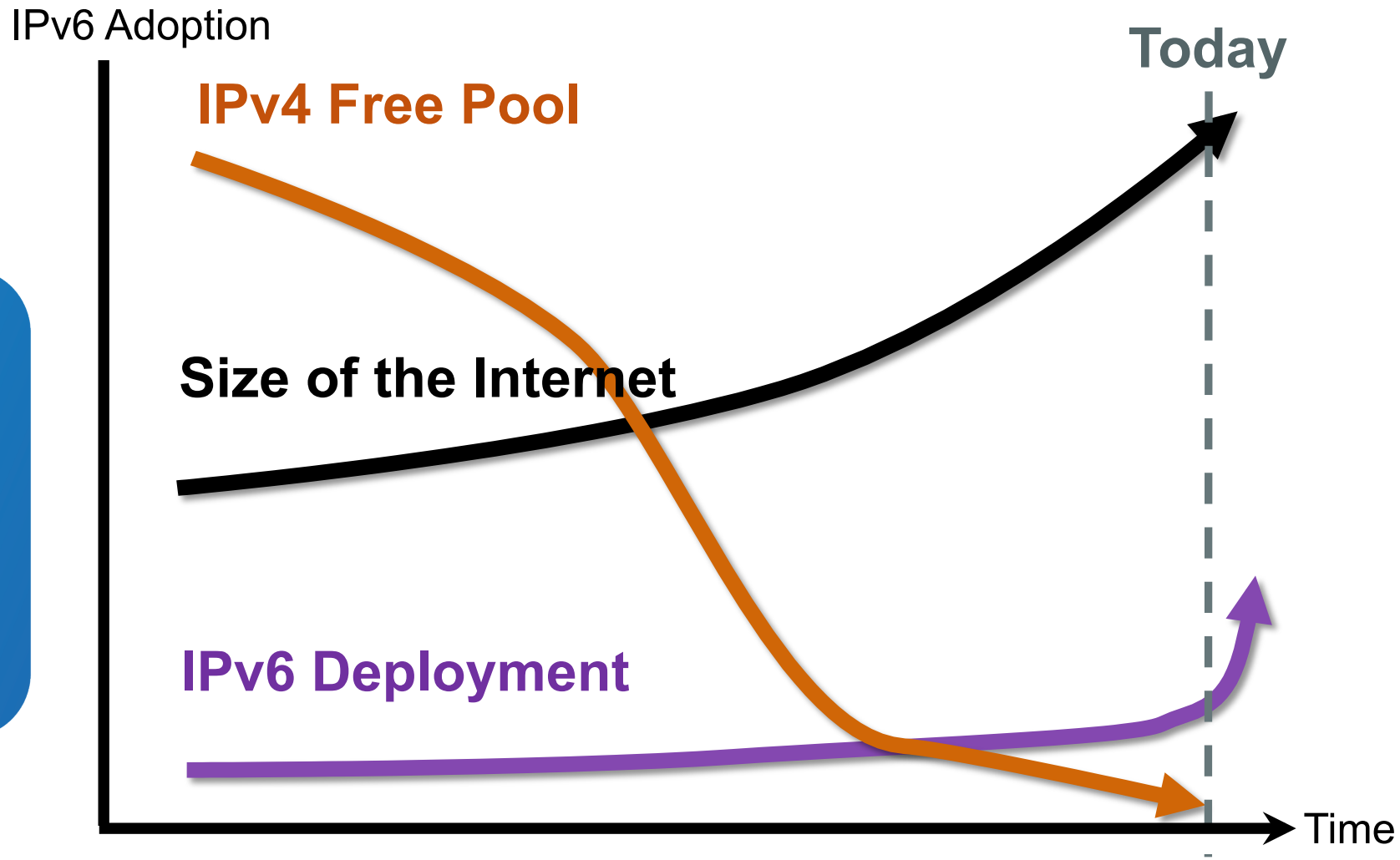
© 2013 Cisco and/or its affiliates. All rights reserved.

The Plan – What we hoped would happen with IPv6



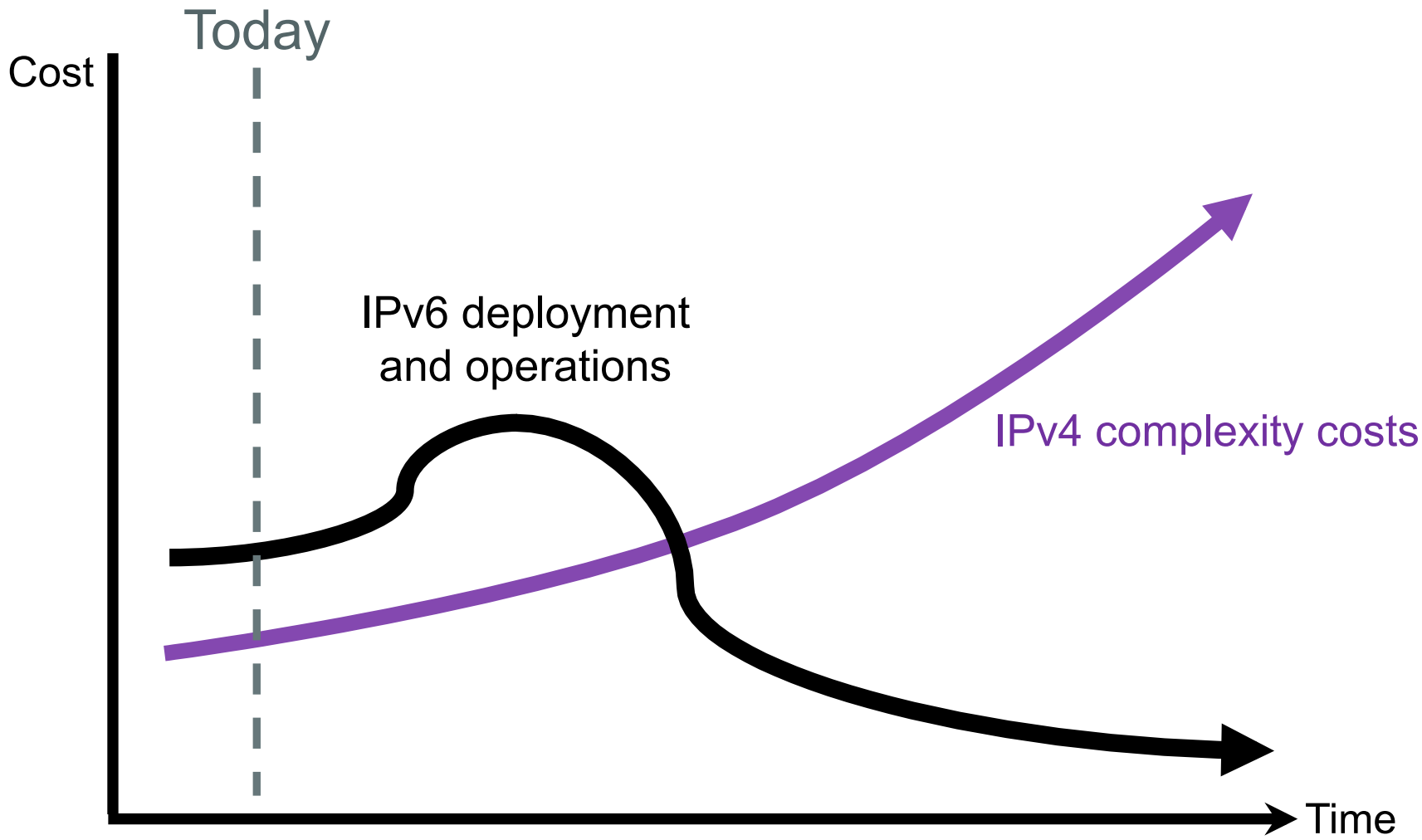
© 2013 Cisco and/or its affiliates. All rights reserved.

The Reality – What Actually Has Happened



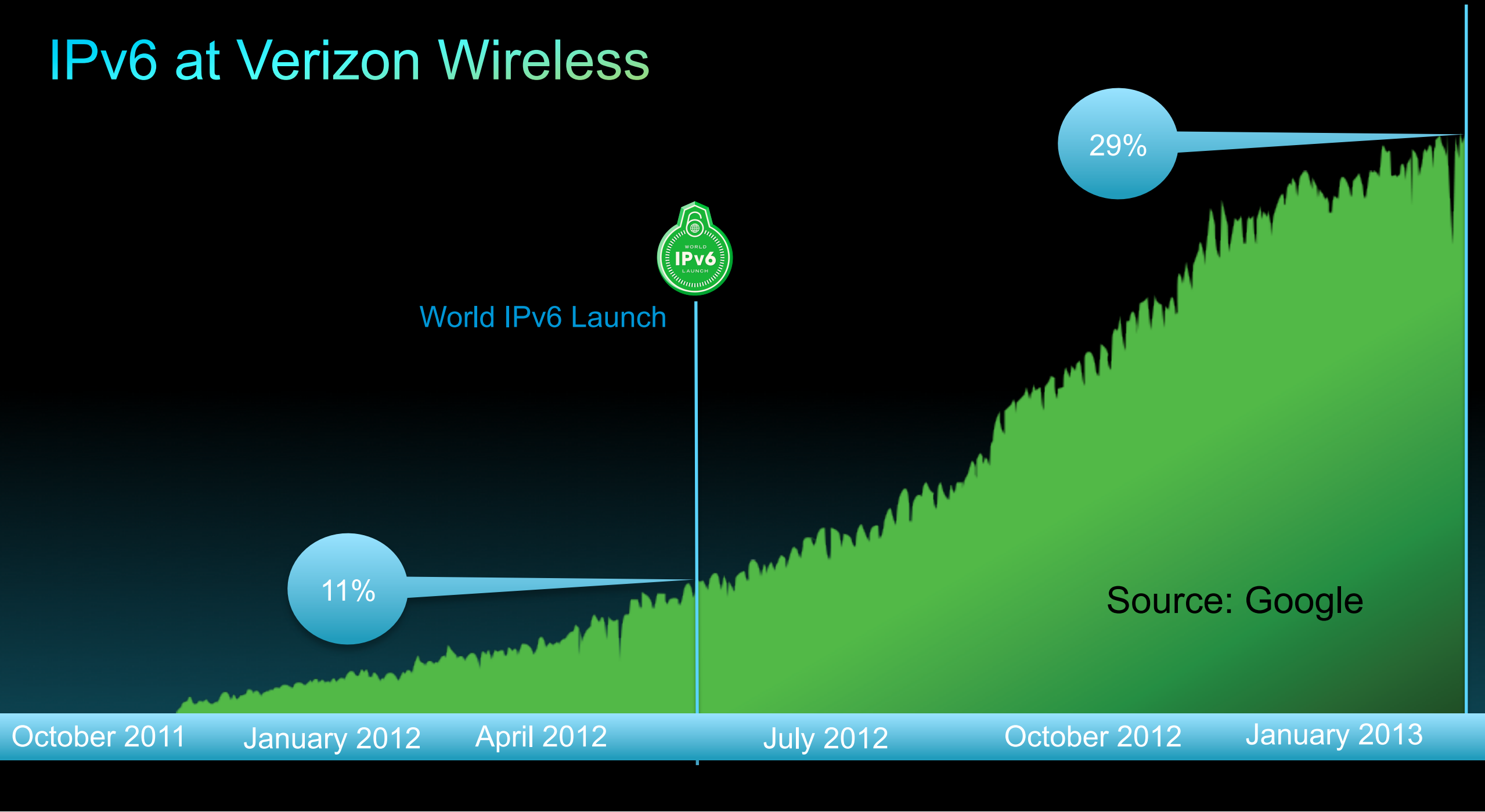
© 2013 Cisco and/or its affiliates. All rights reserved.

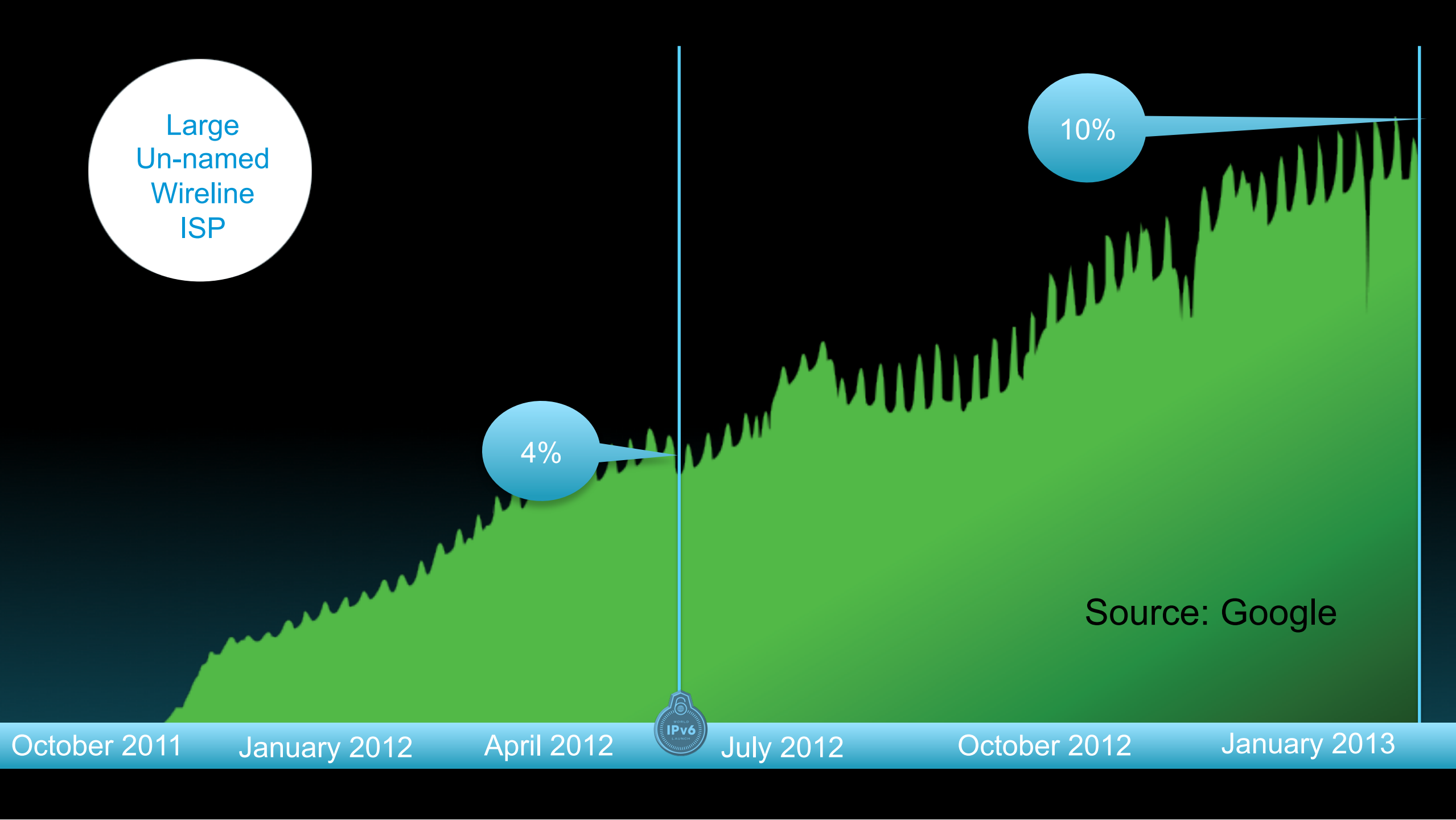
IPv6 vs. IPv4 costs over time ----- The reason for the delay? A lot to Plan!



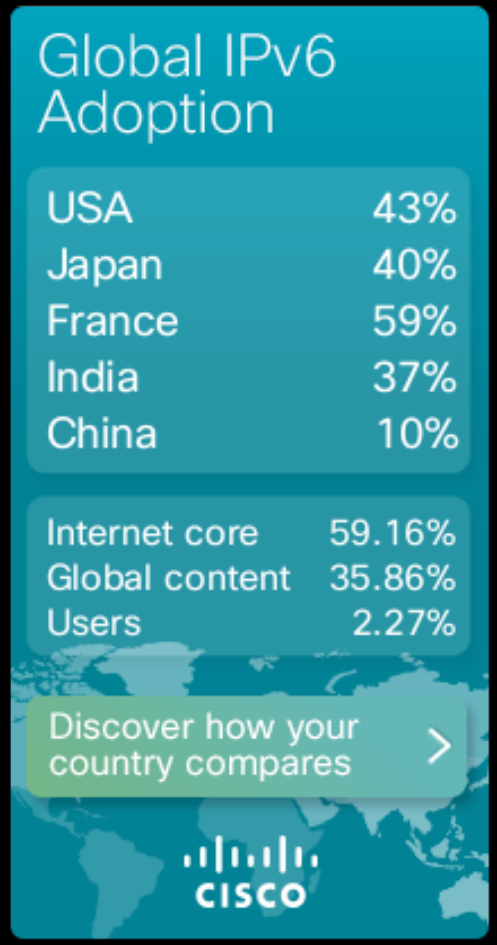
© 2013 Cisco and/or its affiliates. All rights reserved.

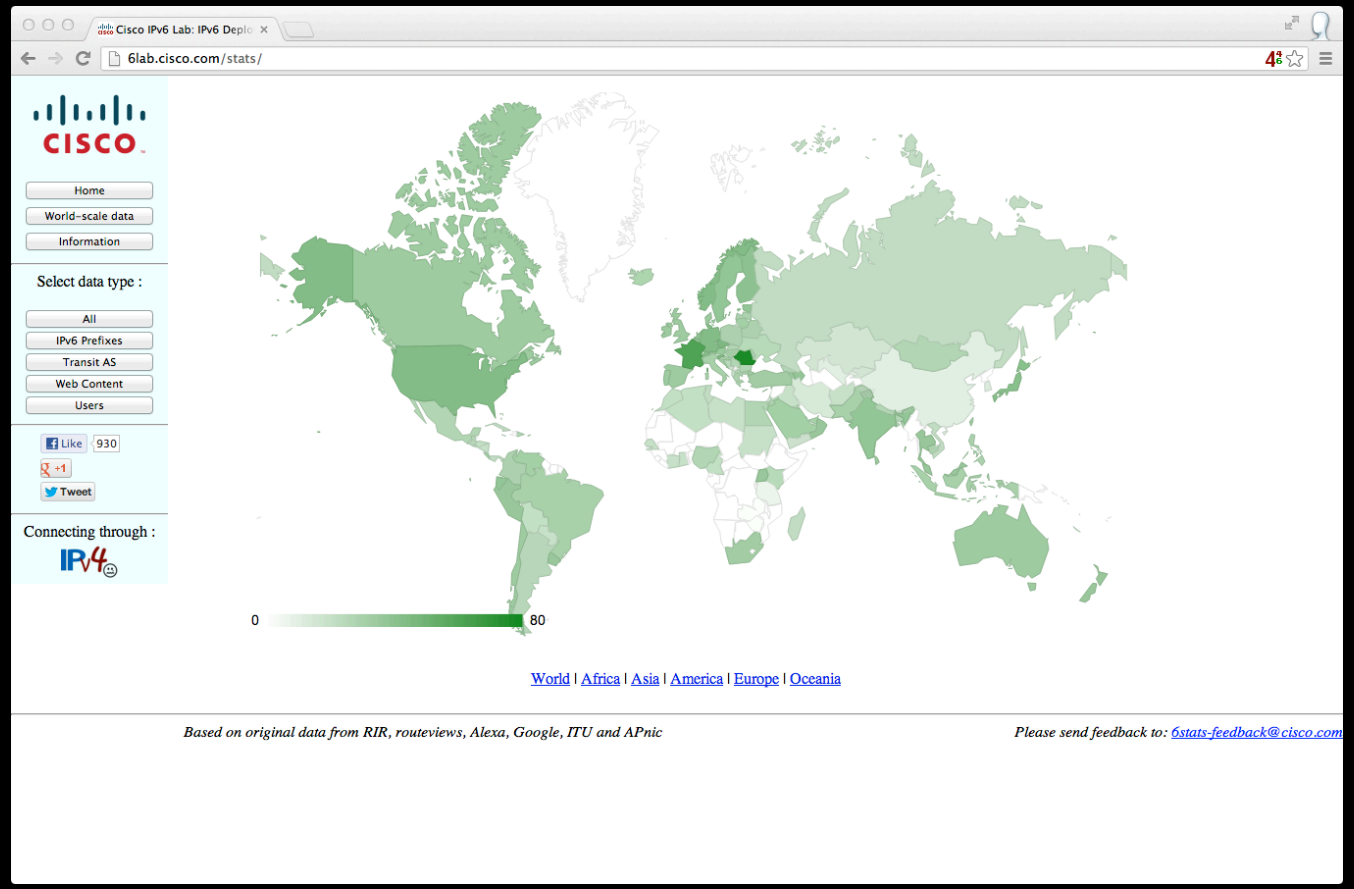
IPv6 at Verizon Wireless




Large
Un-named
Wireline
ISP
4%
10%
Source: Google
October 2011
January 2012
April 2012
July 2012
October 2012
January 2013

6lab.cisco.com





Common Objections – The Elephant in the Room

Reasons often cited for not planning for IPv6

- We have lots of IPv4 space. We're fine.
- What's wrong with NAT?
- We can buy more IPv4 from the open market
- We could use some of that multicast address space
- We could reengineer our IP addressing schema and reclaim some of the waste
- We've been talking about this for years. It'll blow over….

Wish I had a pound every time I heard these two!

© 2013 Cisco and/or its affiliates. All rights reserved.

Some Address Exhaustion Solutions

NAT

- Degrade user experience, on-line services and commerce.
- Inhibits innovation.
- Operational expense – getting worse

Trade

£

- This has started
- Doesn't help high-growth / high-population regions

Evolve

IPv6

- Only long-term solution
- Unlimited growth for people, services & devices
- Will empower the "Internet of Everything"

Doing nothing is exposing your organization to risk

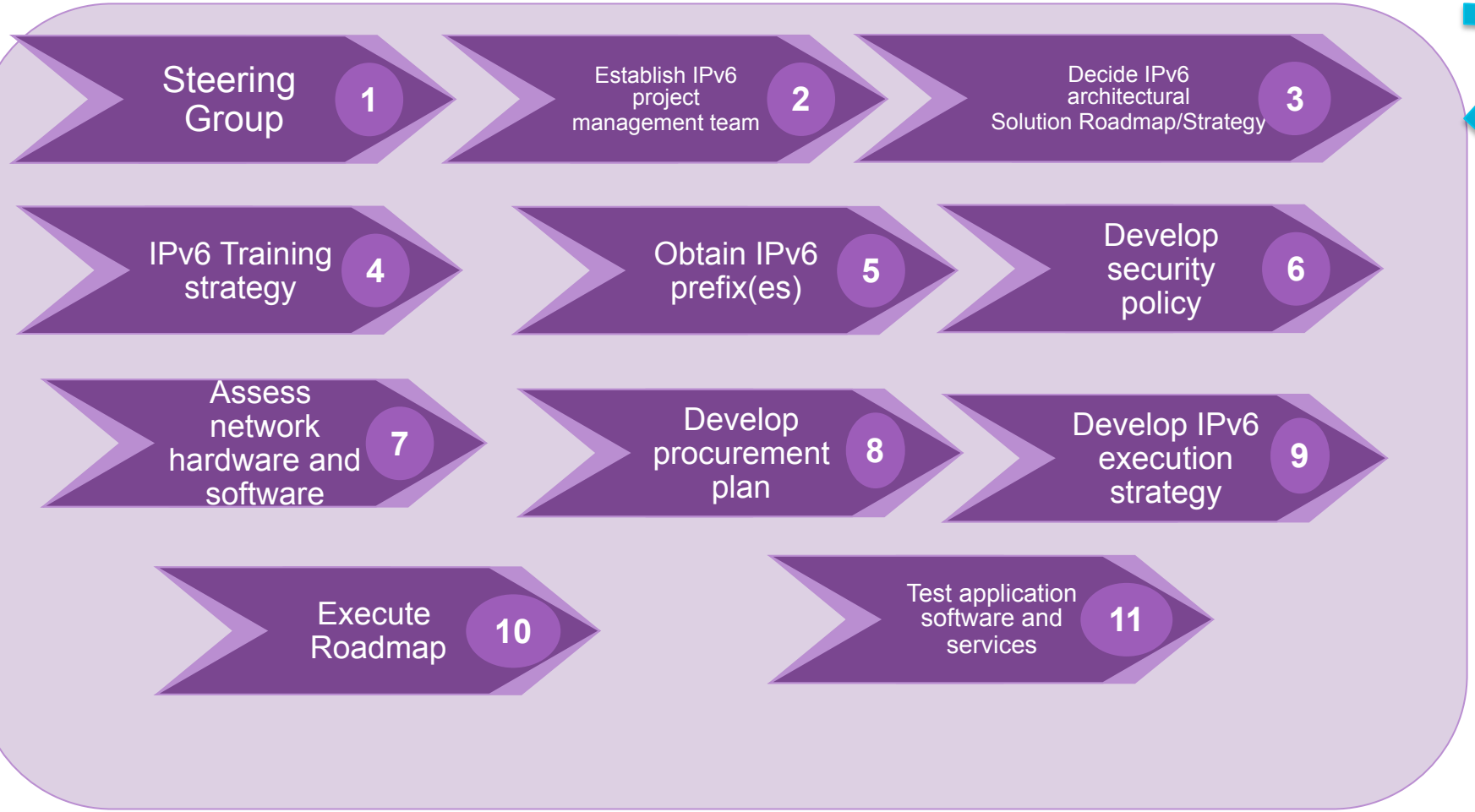
© 2013 Cisco and/or its affiliates. All rights reserved.

Where Do I Start? PLAN, PLAN, PLAN !!!!!

BUILD A LAB!

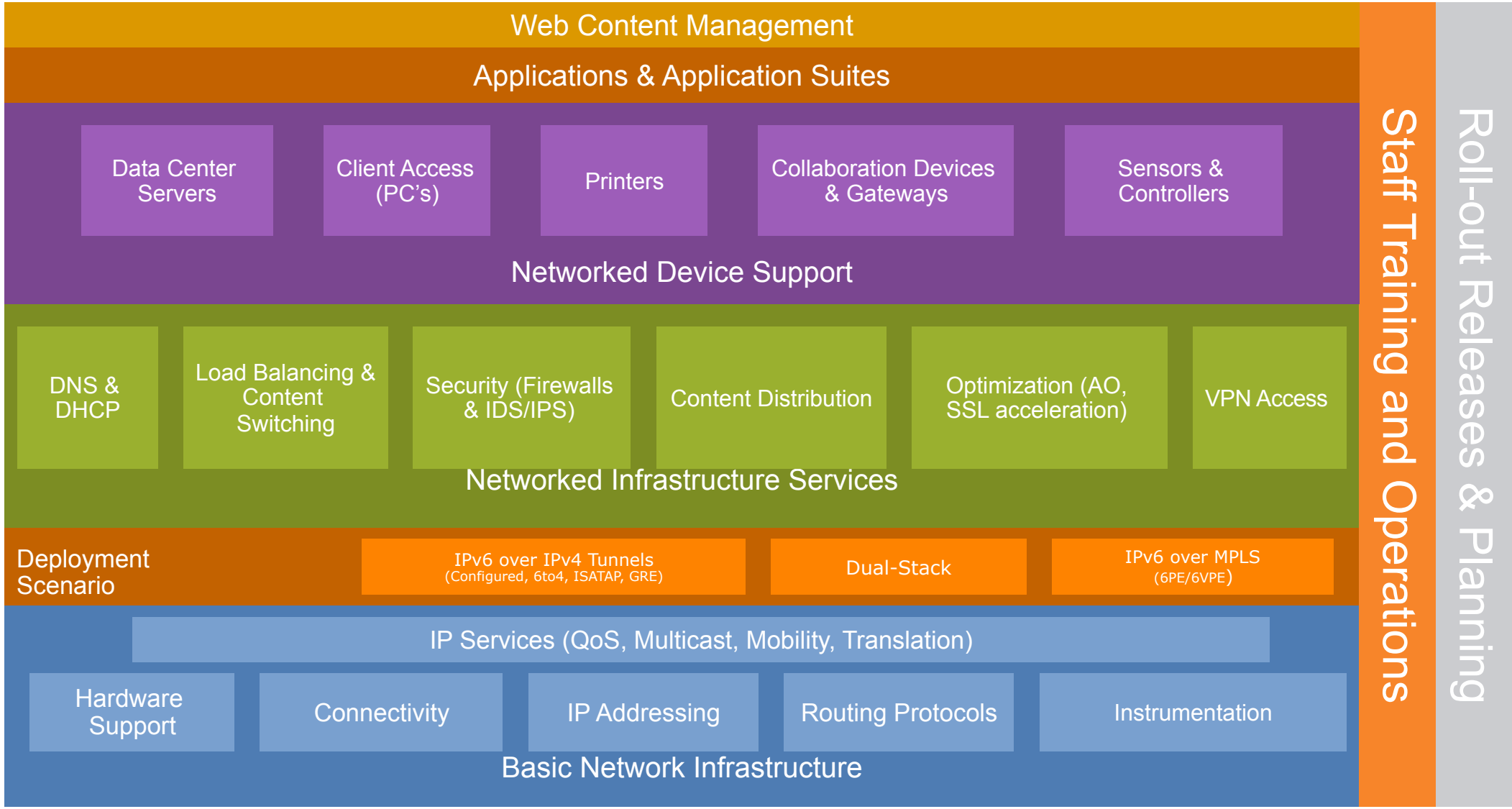
Business Case Identified/Justified

Build Cross Functional Team



© 2013 Cisco and/or its affiliates. All rights reserved.

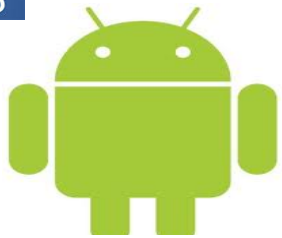
The Scope of IPv6 Deployment



© 2013 Cisco and/or its affiliates. All rights reserved.

Modern Operating Systems Support IPv6

- Prefer IPv6 connectivity (RFC 5221)
- Use SLAAC/DHCPv6 and have Link Local Addresses (RFC 4862)
- Can run IPv6 over an IPv4 network under certain circumstances
  - Tunneled over an IPv4 core
  - And/or on L2 segment
- Will try to use IPv6 if they receive a AAAA record from DNS
- Don't always display IPv6 information (mobile devices)
- Can use privacy addresses (RFC 4961)
- Modern browsers implement RFC 6555 (Happy Eyeballs)
- Use IPv6 link-local capabilities for plug and play protocols



© 2013 Cisco and/or its affiliates. All rights reserved.

Commonly Deployed IPv6-enabled OS/Apps

Operating Systems

- Windows 7 /8/ Vista
- Windows Server
- SUSE
- Red Hat
- Ubuntu

Virtualization & Applications

- VMware vSphere
- Microsoft Hyper-V
- Microsoft Exchange 2007 SP1/2010
- Apache/IIS Web Services
- Windows Media Services
- Multiple Line of Business apps - Oracle/SAP etc

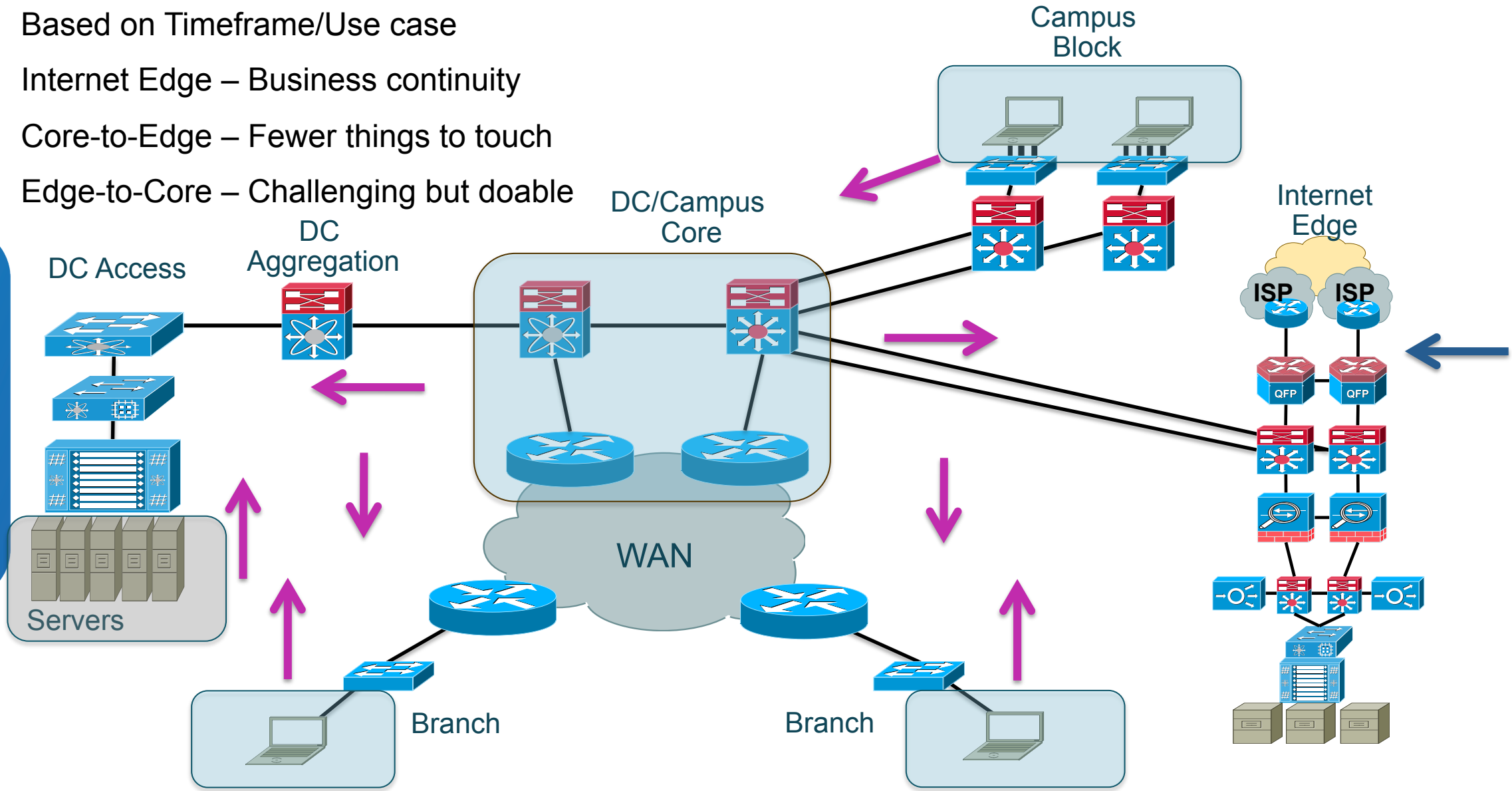
IPv6 Team Must check

Most COTS - applications won't be your problem – it will be the custom/home-grown apps

© 2013 Cisco and/or its affiliates. All rights reserved.

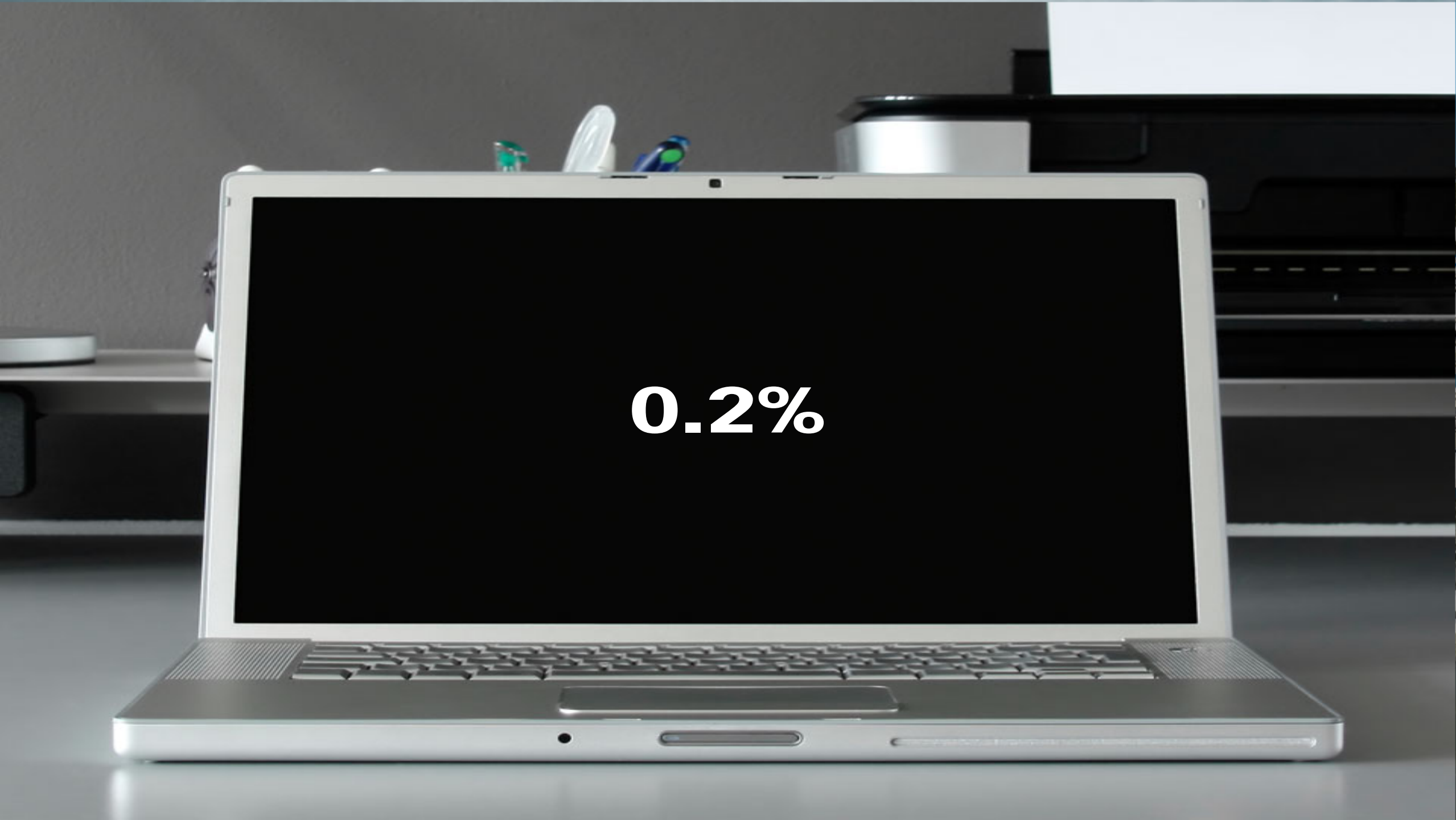
Where do I start?

- Based on Timeframe/Use case
- Internet Edge – Business continuity
- Core-to-Edge – Fewer things to touch
- Edge-to-Core – Challenging but doable



© 2013 Cisco and/or its affiliates. All rights reserved.

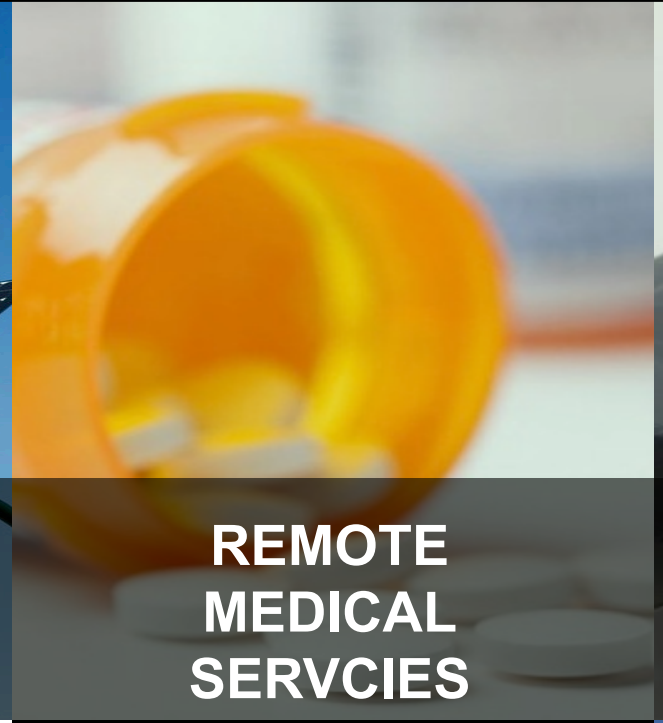
Definition: The Internet of Everything (IoE) is the connection of all machines, devices, sensors, automobiles, cameras and “things” to help customers improve operations and save valuable time, money and even lives.


0.2%


99.8%


ADDRESS
CLIMATE
CHANGE

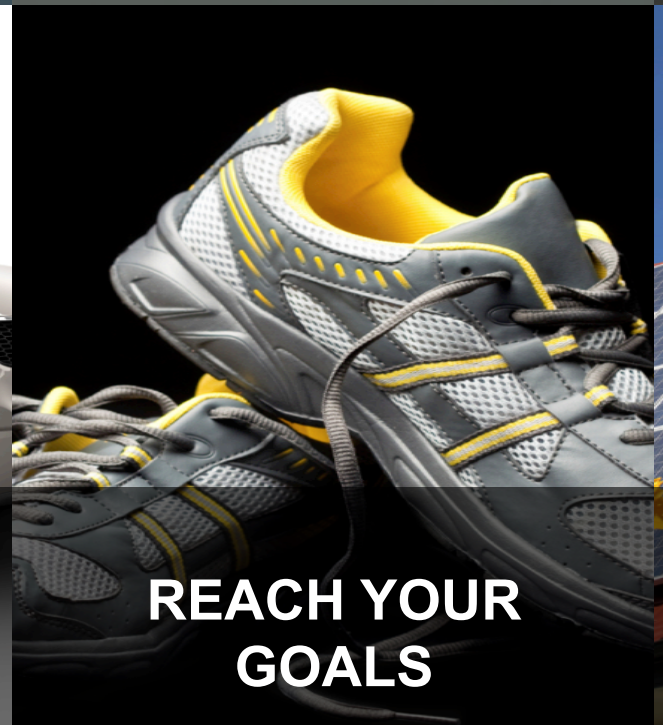

SMARTER
INTERCONNECTED
SYSTEMS


REMOTE
MEDICAL
SERVCIES


LIVE
HEALTHIER
LIVES


LESS WASTE, SAVE
MONEY


IMPROVE
SAFETY


REACH YOUR
GOALS


ENERGY
EFFICIENCY

The Internet of Everything

People

Connecting people in more relevant and valuable ways.

Process

Delivering the right information to the right person (or machine) at the right time.

Data

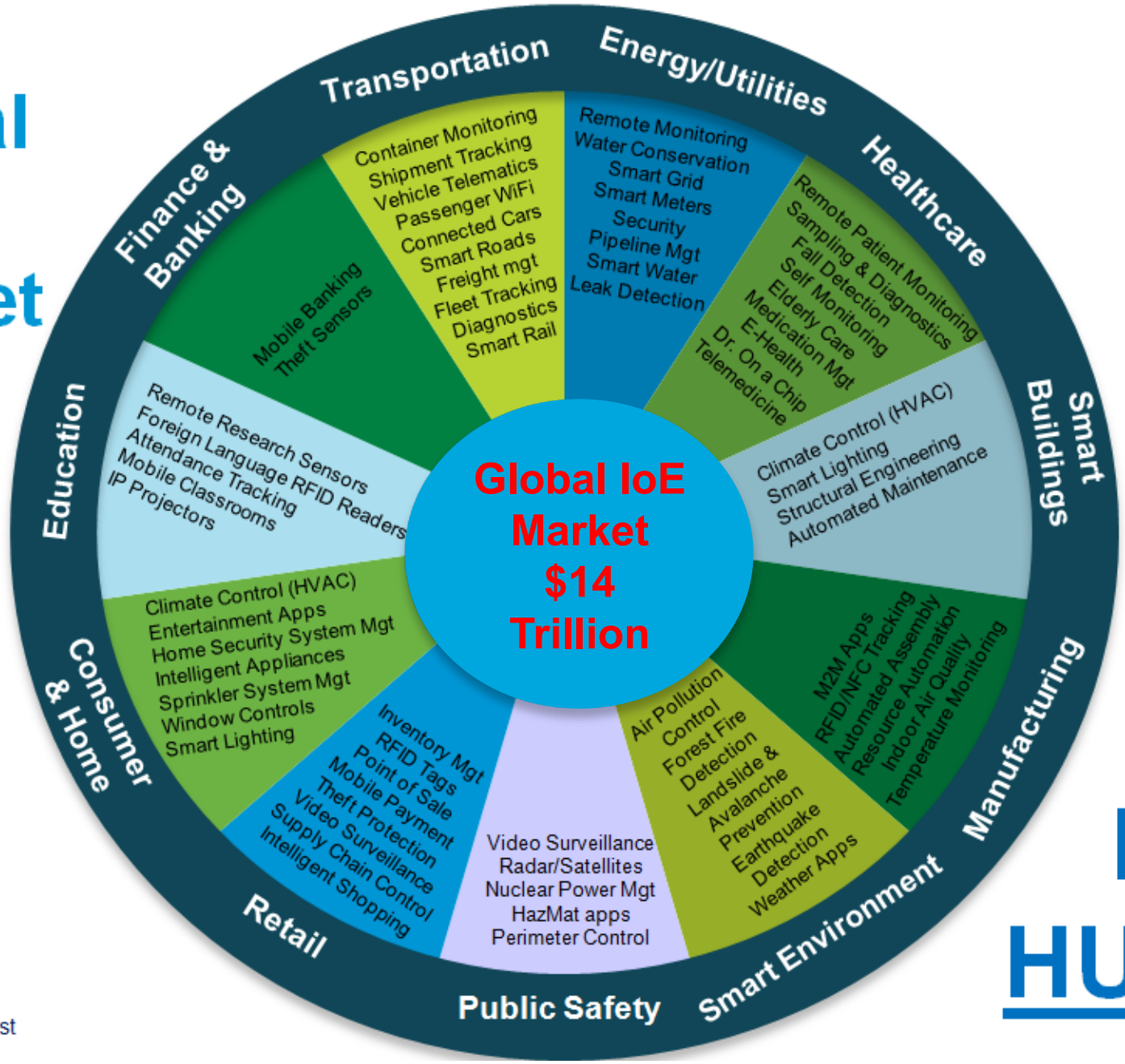
Leveraging data into more useful information for decision making.

Things

Physical devices and objects connected to the Internet and each other for intelligent decision making.

Source: Cisco Internet Business Solutions Group, 2012

The Global IoT Market

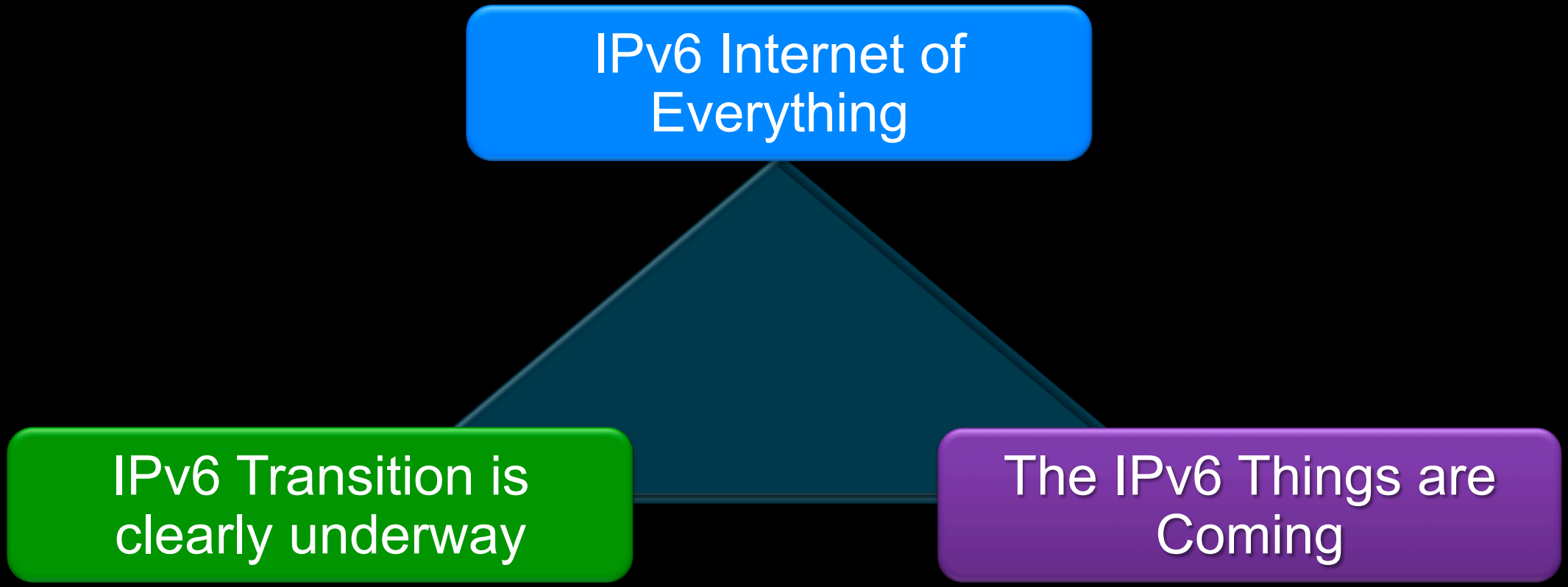


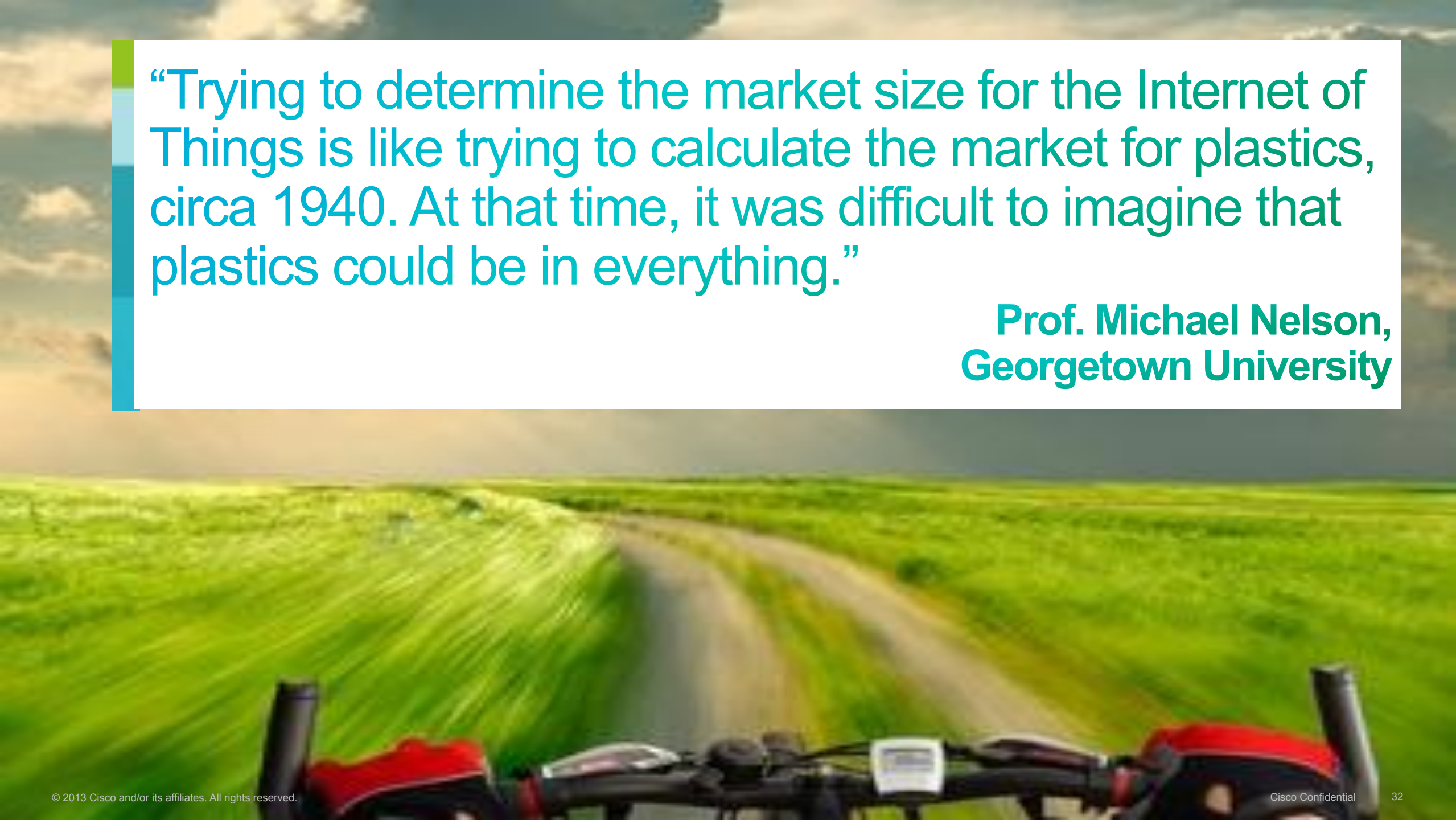
Is **HUGE!**

*2014 forecast

© 2011 Cisco and/or its affiliates. All rights reserved.

IPv6 is Setting the Stage for the Internet of Everything



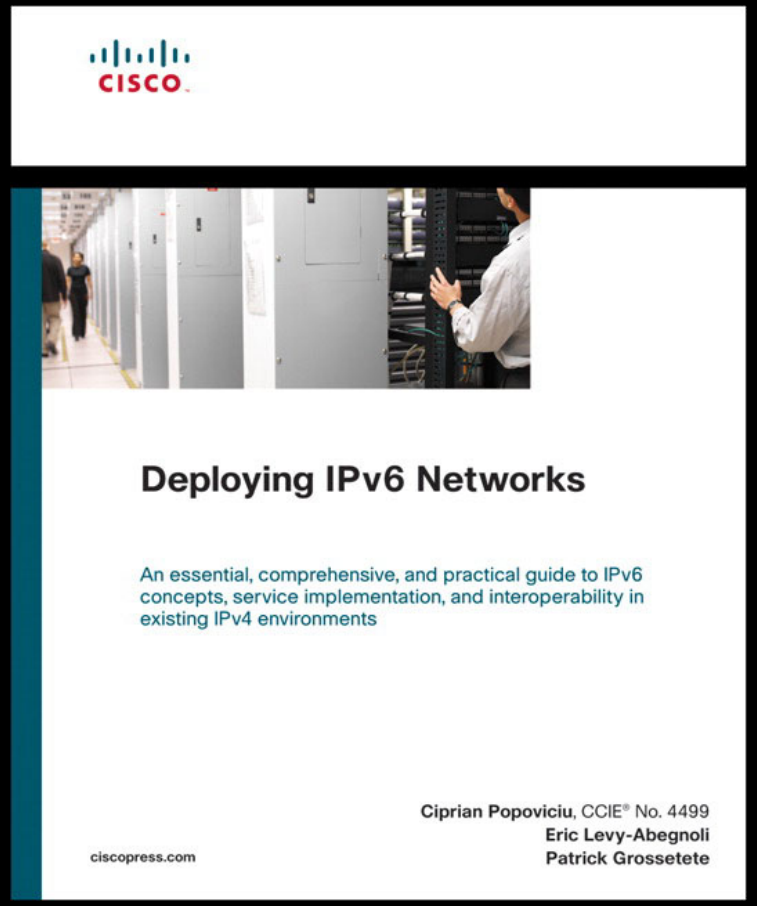


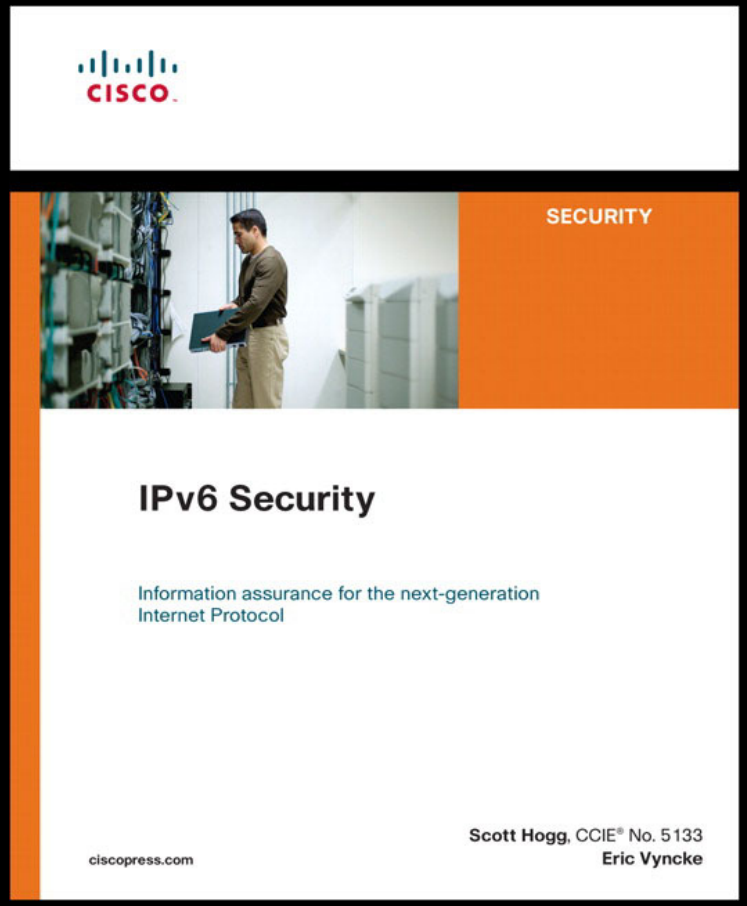
"Trying to determine the market size for the Internet of Things is like trying to calculate the market for plastics, circa 1940. At that time, it was difficult to imagine that plastics could be in everything."

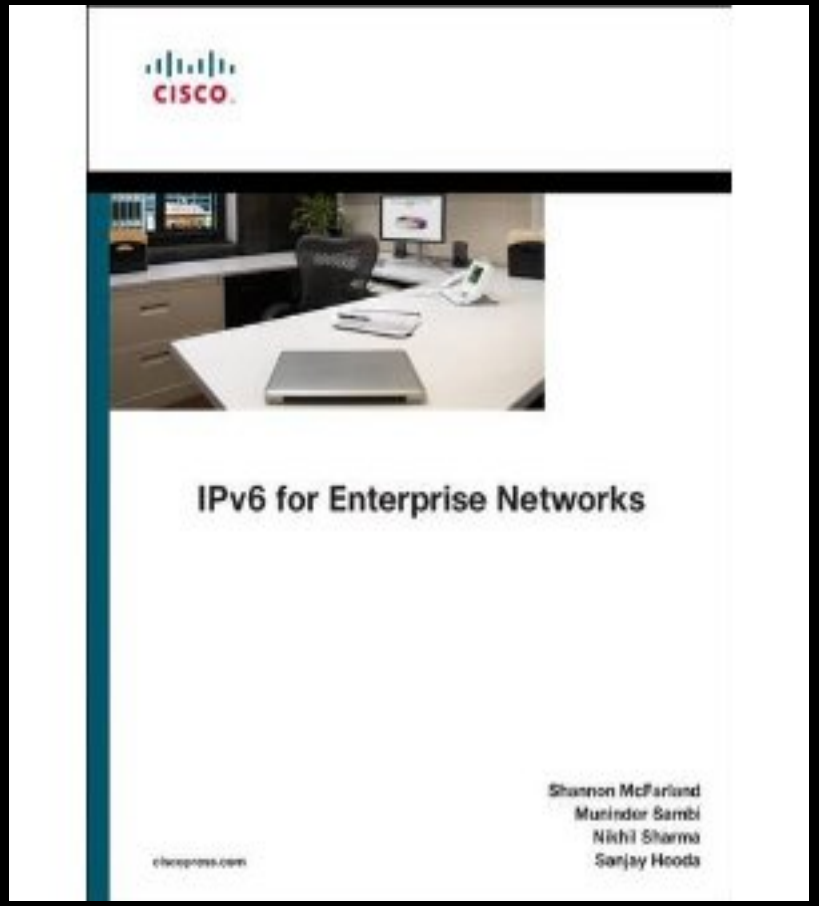
Prof. Michael Nelson, Georgetown University

© 2013 Cisco and/or its affiliates. All rights reserved.

Good technical books







© 2013 Cisco and/or its affiliates. All rights reserved.

Core Message of This Session

Failure [to Act] is Not an Option.

Gene Krantz, Flight Director, Apollo 13

April, 1970

The whole of IT must collectively embrace this transition, it is not just about the networks team

© 2013 Cisco and/or its affiliates. All rights reserved.


Thank You