Putting
IPv6
to work

North American IPv6 Summit

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Rocky Mountain IPv6 Task Force
RMv6TF

Wells Fargo's IPv6 Journey

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Agenda

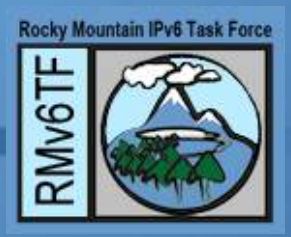
- About Wells Fargo
- A chronological walk through our IPv6 journey:

2010-11 Tracking

2012 Assessing

2013 Planning

2014 Executing



Wells Fargo at a Glance

We are a diversified financial services company providing banking, insurance, investments, mortgage, and consumer and commercial finance across North America and internationally.

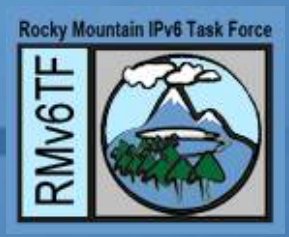
One in three households in America does business with Wells Fargo.

Wells Fargo at a Glance

Category	Measure as of 1/1/14
Assets	$5 trillion
Employees	More than 265,000
Customers	70 million
Locations	More than 9,000
ATMs	More than 12,500

Our Vision
We want to satisfy all our customers' financial needs and help them succeed financially.

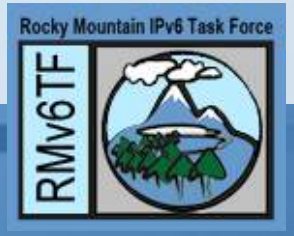
- Wells Fargo is America's fourth-largest bank when ranked by assets, and first by market capitalization.
- Team members are located in 36 countries.



IPv6 Awareness

2010/11

- Some of us remember IPv6 training circa 1999
- The merger of Wachovia and Wells Fargo in 2009 started to put pressure on our IPv4 registered and RFC1918 address space
- IPv6 seemed an obvious long-term candidate, but not sure it was ready for primetime at Wells Fargo
- Formed a technical working group in 2010, meeting monthly
  - Mainly network SMEs, but some security, compute, app, etc.
  - Have members present on IPv6 topics
  - Invite vendors to share their thoughts
  - Review industry milestones and commentary
- IANA IPv4 exhaustion in February 2011 was a call to action – industry was getting serious
- Began promoting awareness among architect and technical community



Motivation for WF to adopt IPv6

2012

Potential IPv6 Impact	Business Impact	Timeline
Customers experience inconsistent or degraded performance	Low switching costs may lead to **loss of customers**	Mid-term
Challenges identifying the user and location with original IP Address	Increased **fraud risk** and **marketing limitations**	Mid-term
Exhaustion of current internal IPv4 addressing resources	Significant **constraint on organic & inorganic growth**	Business Driven
Client requirements and regulatory mandates to support IPv6	**Opportunity loss** or **financial penalties**	Long-term
Remote employee/partner challenges in accessing WFC via VPN	Workforce and client **mobility challenges**	Mid-term

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IPv6 Assessment Project: Objective and Approach

2012

Objective

An IPv6 Readiness Assessment was conducted to deliver the following:

- Analysis of market drivers and leading indicators of IPv6
- Assessment of current application and infrastructure capabilities to support IPv6
- Evaluation of IPv6 overall impact to technology, business, and organization
- IPv6 enablement recommendations
- High level IPv6 enablement roadmap and associated cost estimate

Approach

- Developed separate work streams for applications and network infrastructure

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Assessment-- Technology Exposure Areas

2012

- Primary IPv6 exposure in next 3-5 years can be **mitigated through IPv6 → IPv4 translation in the DMZ.** Strategically, IPv6 compliance should be considered during the normal **technology refresh**.
- Initial remediation efforts should focus on **technology in the DMZ** that is not IPv6 compliant.
- Evaluate the likelihood of exposure to IPv6 traffic in the next **3-5 years.**
- Determine the percentage of the environment that is IPv6 capable without requiring major upgrades.
- Identify the **risk of execution** by considering the strength of effort required to prepare for IPv6:
  - Is a plan in place? If so, how detailed is it?
  - Has funding been secured?

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Sample Assessment Chart -- Technology Exposure Areas

Category		Likelihood	Capability	Execution Risk	Comments
Infra.	Data Network	L	M	M	Upgrades are required in DMZs.
	Network Security	M	M	L	Part of this environment has limited or no IPv6 support and will need a comprehensive approach to upgrade.
	Servers	M	H	M	Large server environment supports IPv6 at the OS level and testing is needed to identify and remediate DMZ Web Servers.
Software Platforms	Systems Monitoring and Management	M	M	M	Moderate IPv6 exposure as these tools will need to manage IPv6 traffic and devices supporting it.
	Application Platforms	H	H	L	DMZ components have higher capability and lower risk of enablement.
	(Web and App Servers)				

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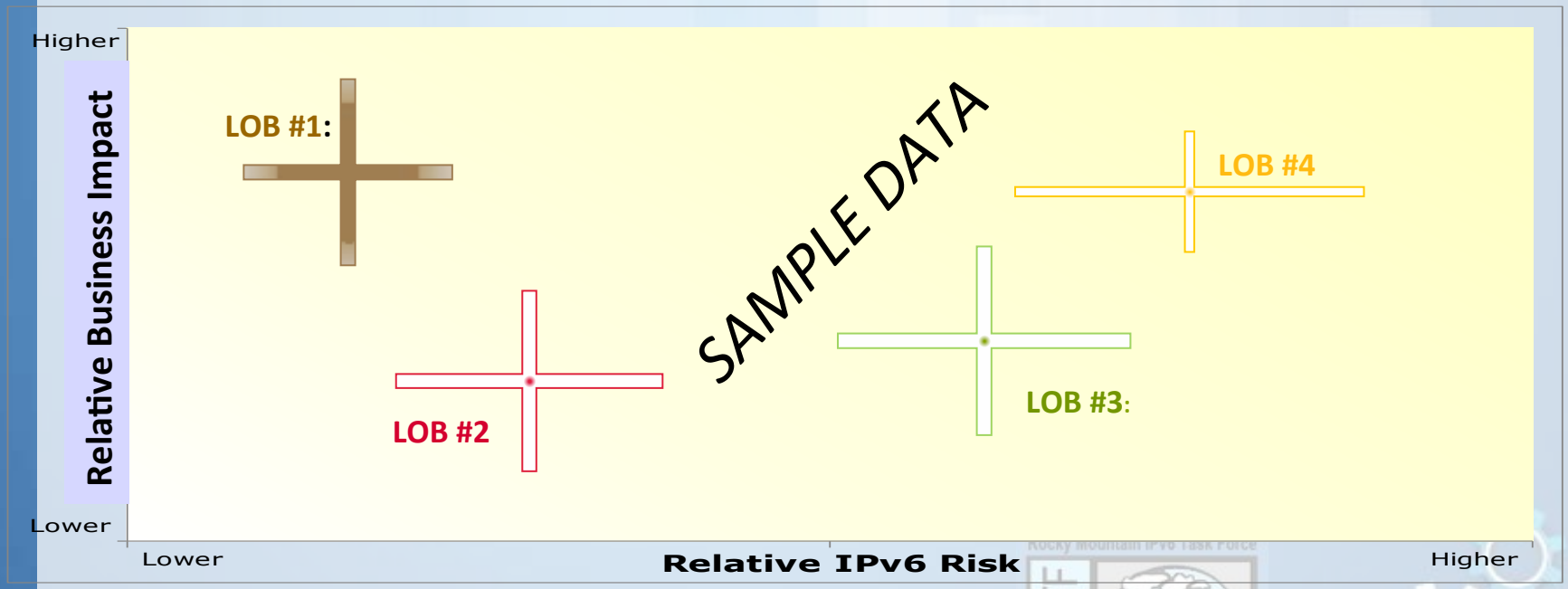
Assessment – LOB / Application Exposure Areas

- LOB's were rated relative to each other for Business Impact and IPv6 Risk
- The cross midpoint represents the average for the LOB
- Wider horizontal lines represent a wider range of technology used
- Taller vertical lines represent more varied business impact range per Enterprise BCP



Program Governance Structure

2013

IPv6 Operating Committee

Senior Leaders - monitor & guide

- Key stakeholders in technology, procurement, and operational risk management organizations plus subject matter experts; coordination with LOB executive stakeholders
- Meets monthly

IPv6 Executive Steering Committee

Executive Leaders – oversee, direct & provide resources

- Executive leaders in the technology organization
- Meets bi-annually

Enterprise Production & Technology Services

Program Sponsor

Program Manager

Working Group

- Daily management and tactical oversight of efforts
- Meets weekly

Infrastructure Enablement

- Defines scope, plans and executes deployment of IPv6 across infrastructure domains:
  - DMZ, DC, Backbone, Access, End User Devices, Storage, International, Mainframe, Distributed Servers

Line of Business Enablement

- LOB coordination, consultation, and support to facilitate transition strategy development, planning and execution
- Works closely with Infrastructure Enablement PMs to align priorities and roadmaps

Program Support

- Analytics
- Communications
- Training
- Integration/coordination
- Financial management

Drivers and responses on "Buy" and "Sell" sides

2013

The IPv6 program is at the core of external adoption factors, from increasing regulatory and business requirements to suppliers' support and product roadmaps.

External Drivers ("BUY")

Vendor IPv6 Support/ Adoption

- *Vendor Product Roadmap*
- *Vendor Services*
- *Industry Certifications*

Response

- Develop WFC IPv6 Profile technical requirements
- Institute capability and instantiation tracking
- Update RFx and contract language to specify IPv6 compliance

Wells Fargo IPv6 Program

External Drivers ("SELL")

Business/Regulatory Requirements

- *Business Partner Requests*
- *Customer IPv6 adoption*
- *Competitive landscape*
- *Regulatory Requirements*

Response

- Begin monitoring peer adoption
- Track national and international mandates
- Educate LOB on potential impacts

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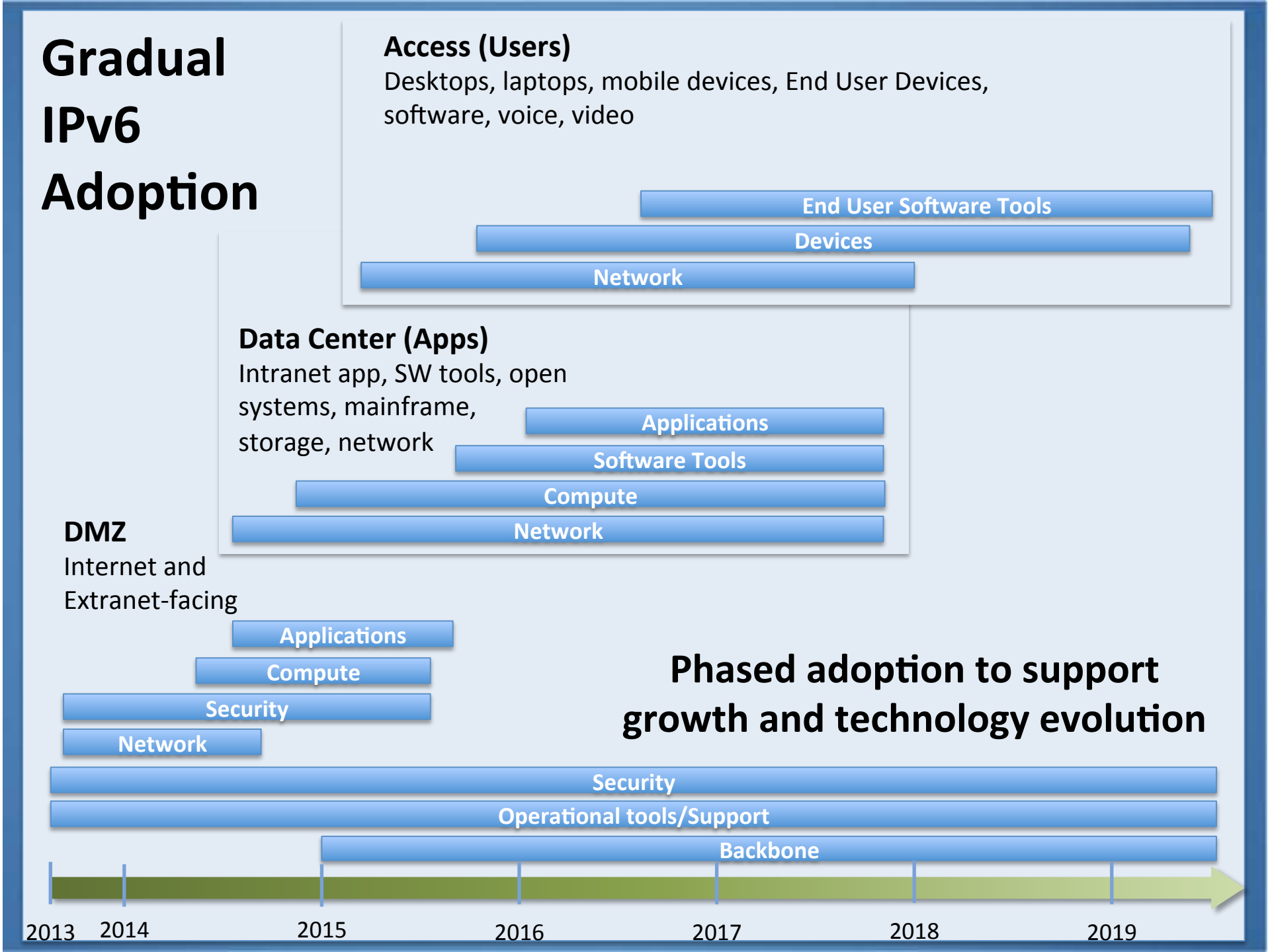
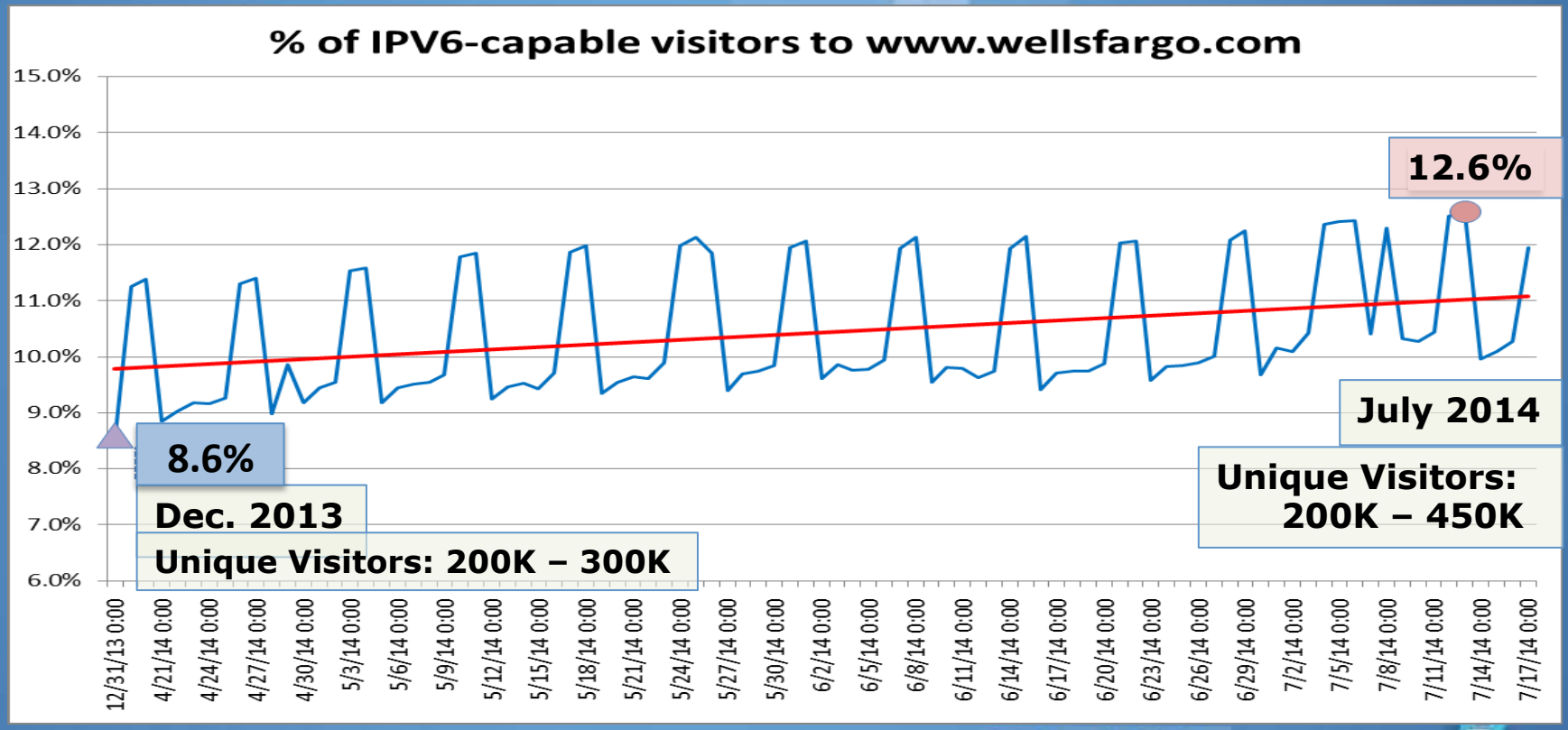
Gradual IPv6 Adoption



IPv6 Adoption by Wells Fargo Customers

2014



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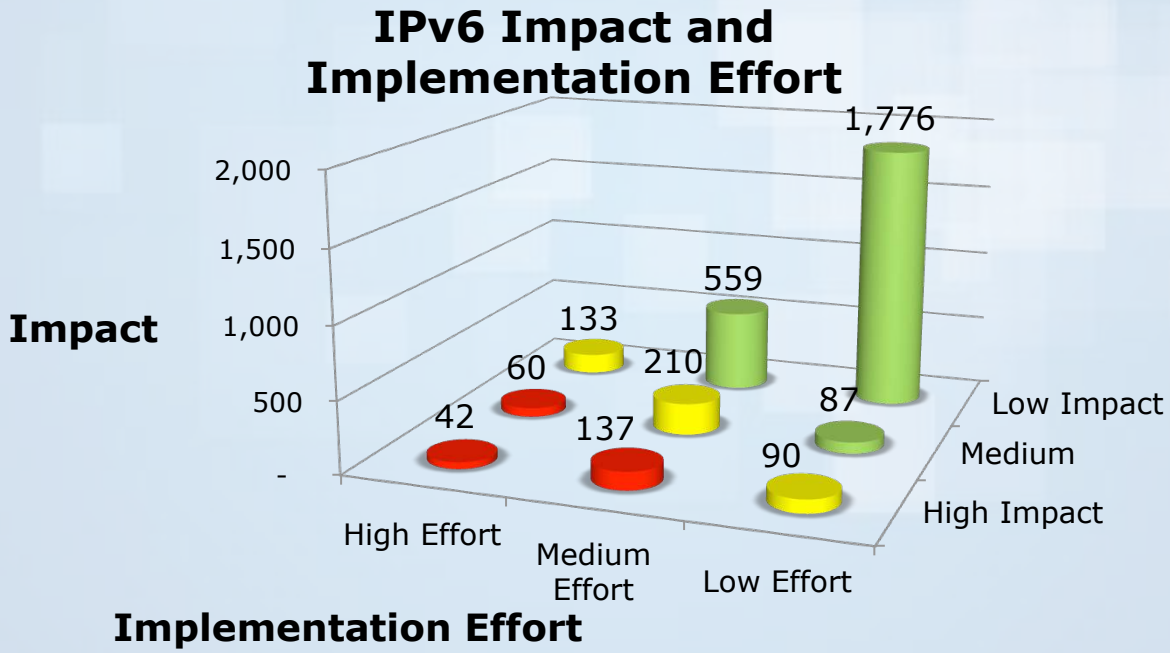
CIO communications

2014

Provide leadership with assessment results for their team -- number of applications rated high, medium, and low on two scales.



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Observations

- US Government has paved the way in a number of key areas
- Natural approach is to try to treat IPv6 as "IPv4 with bigger addresses" – need to continually challenge that thinking
- Have to relearn many IPv4 lessons over again with IPv6 (but usually with a twist)
- To succeed in a large enterprise, it is critical to continually build awareness, education and organizational support
- Tension exists between business drivers and infrastructure enablement – each "waiting" for the other to be ready
- Lots of helpful information and tools available from the "coalition of the willing"
- Need to allow extra time for almost every aspect
- The IPv6 journey is full of surprises (good and bad)

Thank you

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