



Prepare Your Enterprise for the Future: Embrace IPv6 Now

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Chief Technologist,
Technology Services Networking**

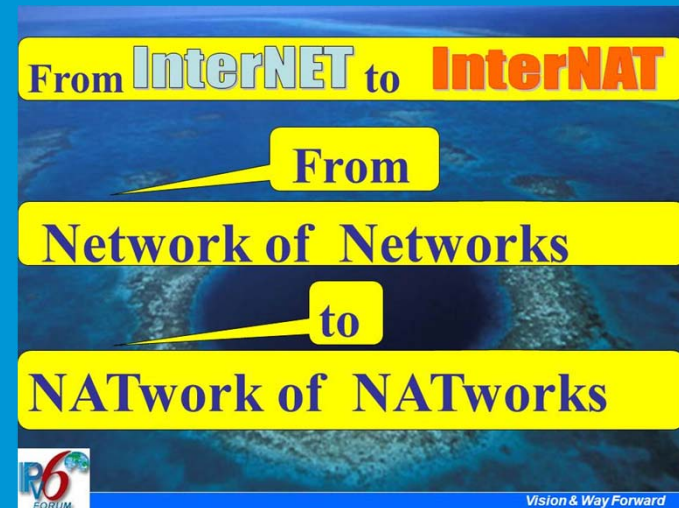
Oct 16, 2012

Agenda

1. Today's Realities. Drivers and Operational Advantages
2. IPv6 Advantages and Transition Strategies
3. HP & IPv6
4. Time to Act NOW



Market Trends Today's Realities and Challenges



Why IPv6? Why now?

The new Internet

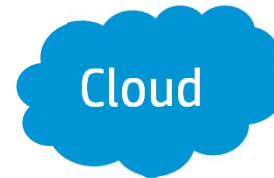
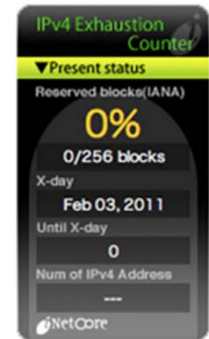
The Internet has become mission critical yet it is running on empty.

- Explosion of users, devices, connected appliances and applications
- Virtualization and cloud computing

“Killer App” Arguments for IPv6

- Pervasive connectivity & Business Continuity
 - Reactive - How do I avoid isolation?
- Business enabler/opportunity
 - Proactive - How can I leverage IPv6 to grow my business?

IPv6 is already on a network close to you



Mobility



Business realities demand IPv6

Connecting Everything

Demand for Agility is driving a Technology Evolution

- Enterprise shifts to “just in time IT” are changing the technology
- Prosumer demands are changing the technology

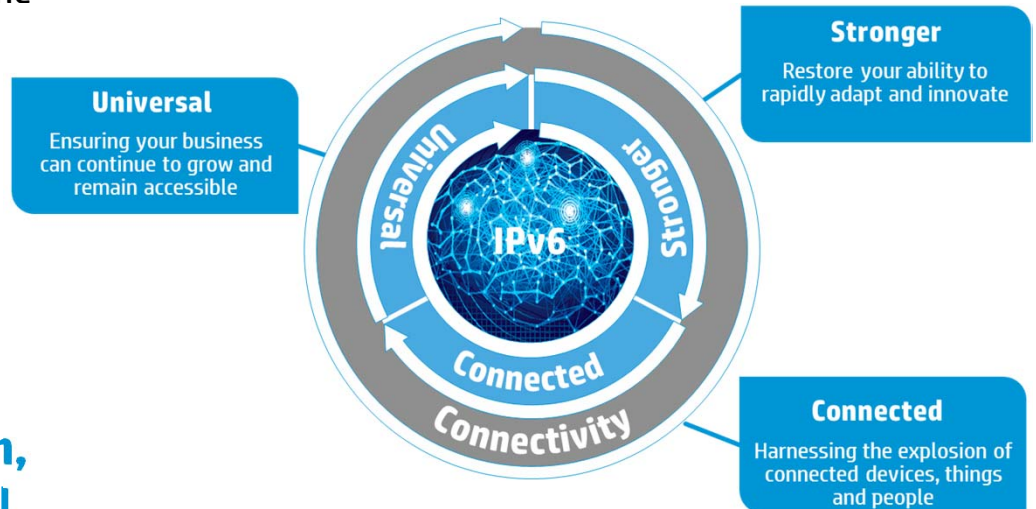
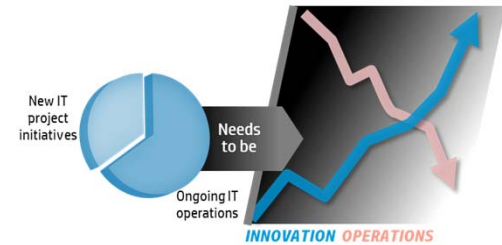
Demand for Innovation

All Technology Mega Trends rely on a healthy fully interconnected Internet

- Convergence, Cloud, Big Data, Rich Media, Mobility all adding pressures

Peer-to-peer, always-on (immediate-on, quality of experience, security), a social market, changing norms

Flip the ratio from operations to innovation



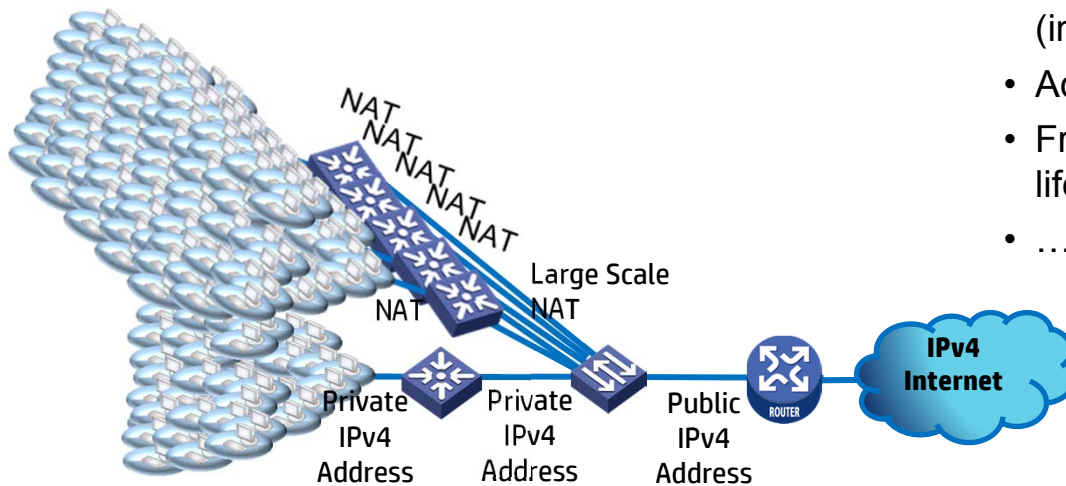
Today's Reality and Challenges

Quality of Experience is evermore critical

Mitigation techniques (like NAT) to handle the address pool depletion are now inherent as a dominant business model

Address sharing issues

- Traceability of network usage and abuse
- Geo-location and Geo-proximity services
- Multiple levels of NAT may make impossible to establish secure connections (in addition to break end-to-end security)
- Address sharing application impacts
- Frequent NAT Keepalives reduce battery life
-



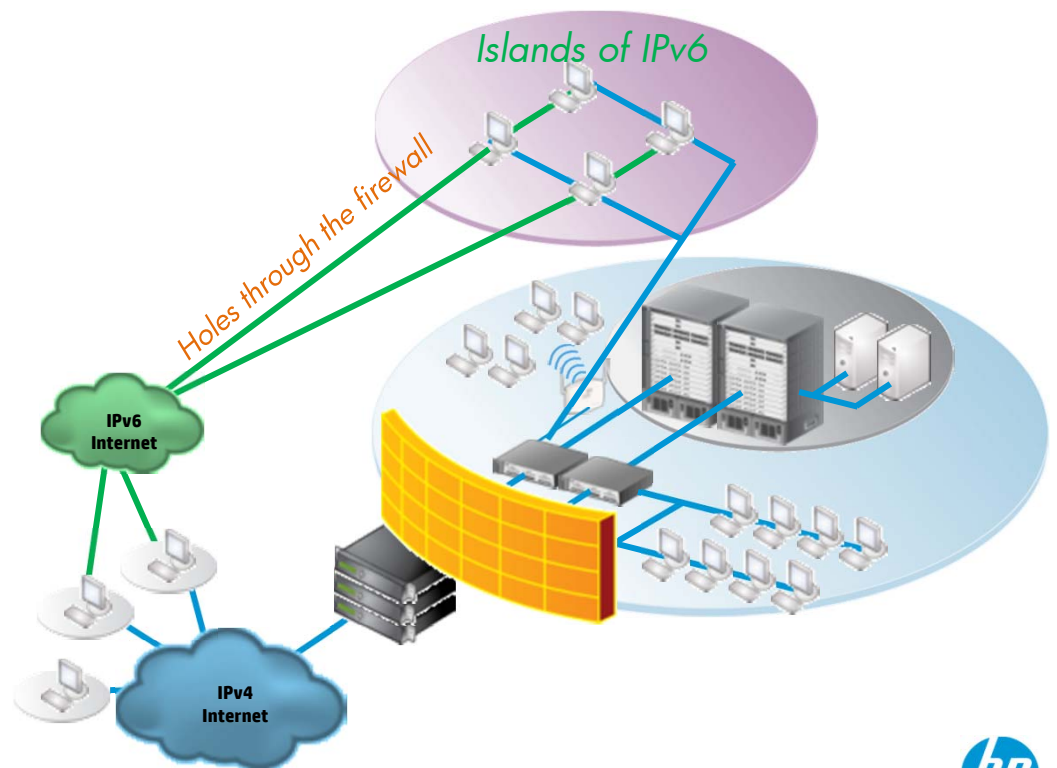
Today's Reality

IPv6 is already on a network close to you

IPv6 is very often unmonitored

Security Operational Challenges

- Complexity due deployment of IPv4 transition techniques
- IPv6 deployed along IPv4 increases the size of the attack vector

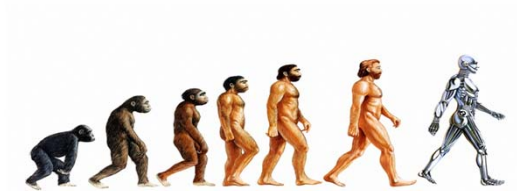


IPv6 Advantages



IPv6 Advantages Overview

Building on IPv4, IPv6 addresses contemporary networking needs



Features	IPv4	IPv6
Address length	32 bits $2^{32} = \sim 4,000,000,000$	128 bits $2^{128} = \sim 340,000,000,000,000,000,000,000,000,000,000,000,000,000$
NAT	Often necessary	Not necessary
Header size	Variable length, 20 bytes + many options	Fixed-length, 40 bytes + extension headers
Configuration	Manual, DHCPv4	Manual, stateless automatic, stateful automatic (DHCPv6)
Types of addresses	Broadcast, multicast, unicast	Multicast, unicast, anycast
Addresses per-interface	Single	Multiple
Neighbor discovery, router discovery, Address resolution, NUD, redirects, etc.	A variety of separate protocols	Neighbor Discovery Protocol (built in)
Security, autoconfig, QoS, mobility	Optional	Integrated, enhanced
	Address pool depleted	Projected lifetime - Indefinite



IPv6 Operational Advantages

Much more than just a larger addressing space

- Robust, Effective, Efficient. Unlimited Address space.
- Extensibility. Enhanced Mobility.
- End to End Services and applications.
- Enable Service Automation.
- Better Support for QoS.
- Policy driven operations.
- Rapid deployment.
- Free manpower from ordinary tasks

Unlock the potential of IPv6

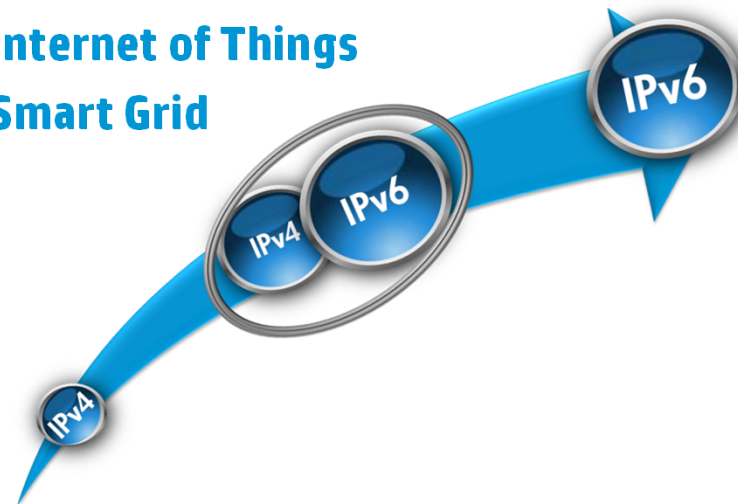
BYOD & Mobile Enterprise

Cloud Computing

4G/LTE mobile networks

Internet of Things

Smart Grid



IPv6 Network Architecture Options

Address Allocation

- Provider Independent versus Provider Aggregatable address allocation scheme

Addressing Mechanisms

- Manual, Stateless autoconfiguration and/or Stateful autoconfiguration

Transition Mechanisms

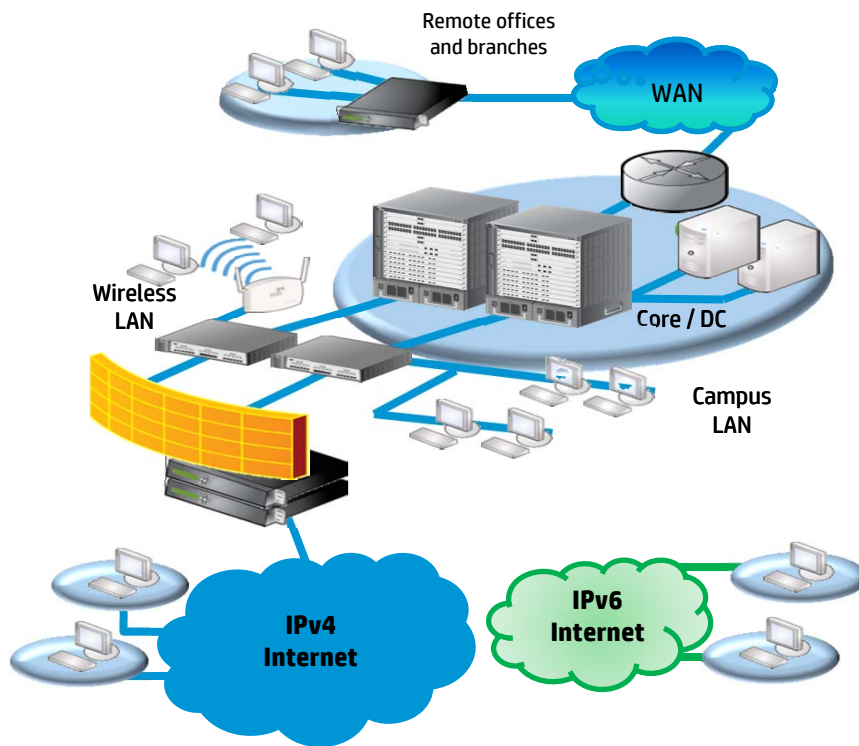
- Dual Stack to allow coexistence of both IPv6 and IPv4 on the same infrastructure
And/or Tunneling and/or Translation
- IPv6 Internet presence only
 - BUT having a longer term plan for full end-to-end IPv6 enablement is the recommended approach

Security

- Similar to IPv4 + new IPv6 specific security concerns and need to include access media security
Remember IPv6 is almost certainly already in your internal network, just unmonitored!



Transition Strategies



Example Today State Disconnected from IPv6 Internet

Three main methods

Dual Stack

- Provides complete support for IPv4 and IPv6 protocols

Tunneling

- Encapsulates IPv6 packets in IPv4 headers (and in later IPv4 packets in IPv6 headers)
- Requires dual-stack devices at either end of the connection

Translation

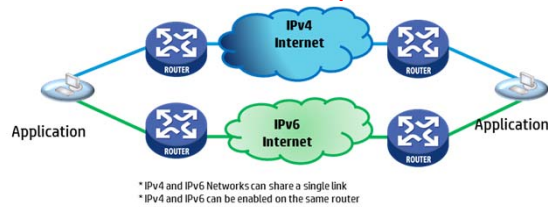
- Translates IPv6 addresses and into IPv4 addresses

Transition Strategies Explained

Dual Stack

Use IPv4 or IPv6

- IPv4 and IPv6 protocol stacks implemented on the same device
- + Most simple. Network is the same
+ Applications can select which network protocol to be used
- - IPv4-only cannot communicate with IPv6-only
 - Need to maintain 2 routing tables, 2 firewall rule sets, 2 network management configurations etc..
 - Network applications must distinguish between IPv6 and IPv4 peers



Simple and widely used.
Recommended Strategy

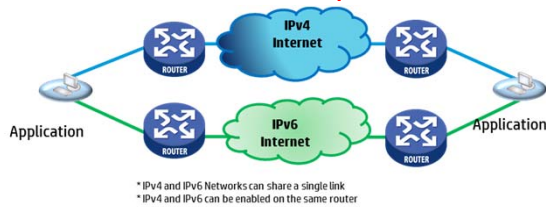


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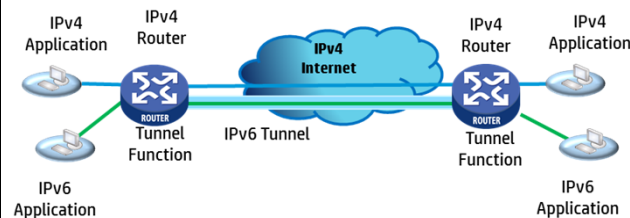


Simple and widely used.
Recommended Strategy

Tunneling

6-in-4 or 4-in-6

- One transport protocol is encapsulated as the payload of the other (and vice versa).
- + Connect Islands of IPv6 or IPv4
+ Compatible across incompatible networks
+ Recommended for site-to-site
- - Security issues with tunneled protocols
- Reduced performance
- Complicated network management and troubleshooting



Simple and widely used

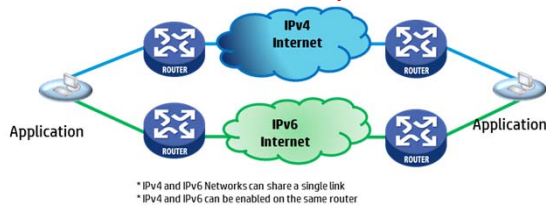


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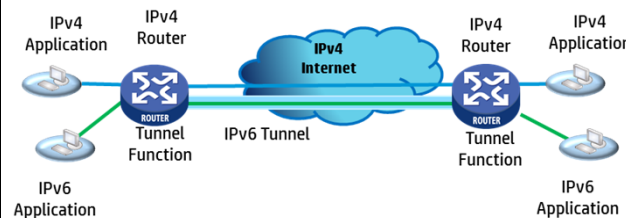


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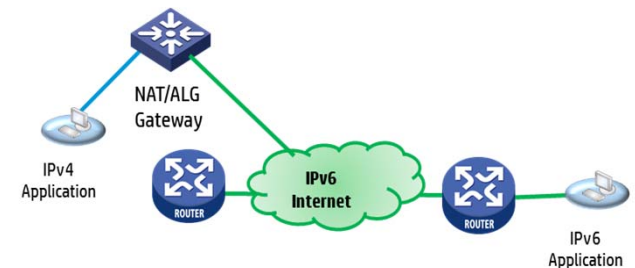


Simple and widely used

Translation

Between IPv4 and IPv6 (NAT64/DNS64)

- Translates IPv6 names & addresses into IPv4 names & addresses (and vice versa).
- + Enables IPv6-only host to communicate with IPv4-only hosts (and vice versa),
+ No modification to IPv4 or IPv6 end nodes, only at boundary routers
- - Application incompatibilities (e.g. VoIP), need for ALG, and has all NAT drawbacks
- Increased complexity in network topology
- Reduced Performance (dep. on HW)
- Complicated troubleshooting



If you must!



IPv6 Transformation

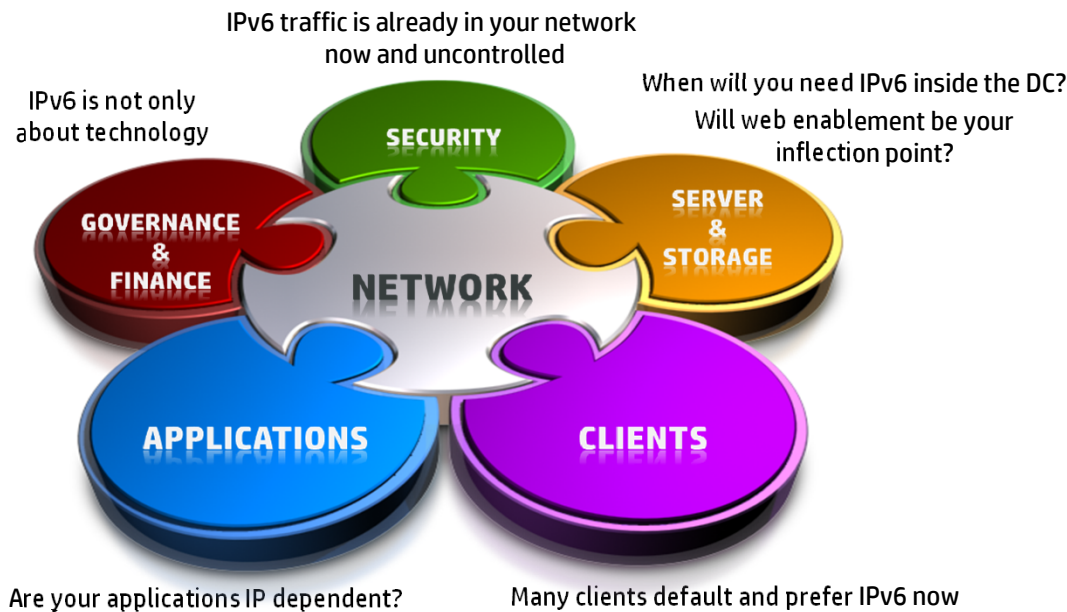
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IPv6 Transformation - Not just about the Network

IPv6 has implications across the entire IT environment

Establish a Task Force



Strategy to achieve Transformational Benefits

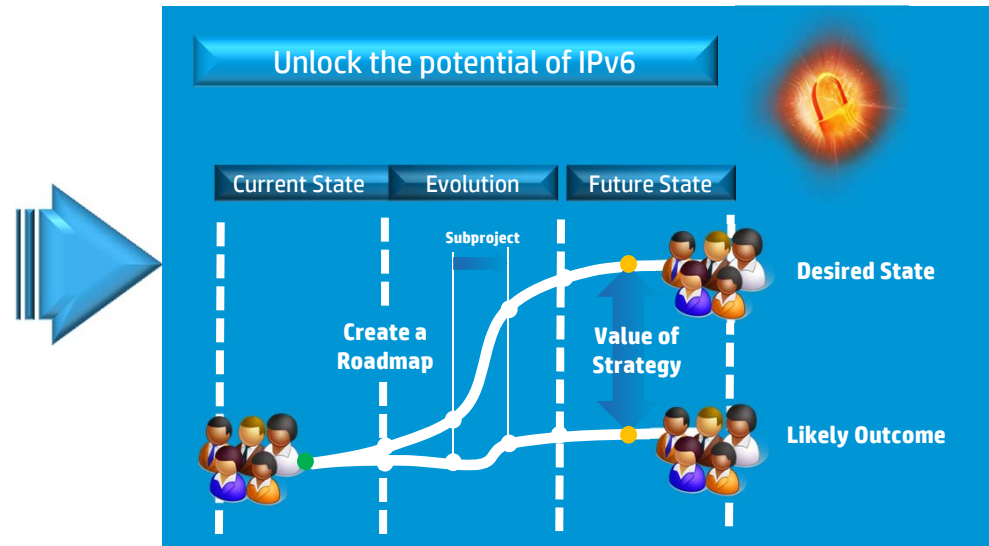
How will you get there?

Facts

- IPv6 is inevitable, what is your inflection point?
- You control how and what role you want to play
- If your business is reliant on the internet, IPv6 is a necessity.
- Late start rapid deployments of IPv6 increases risk and cost
- Ignoring IPv6 introduces security risks

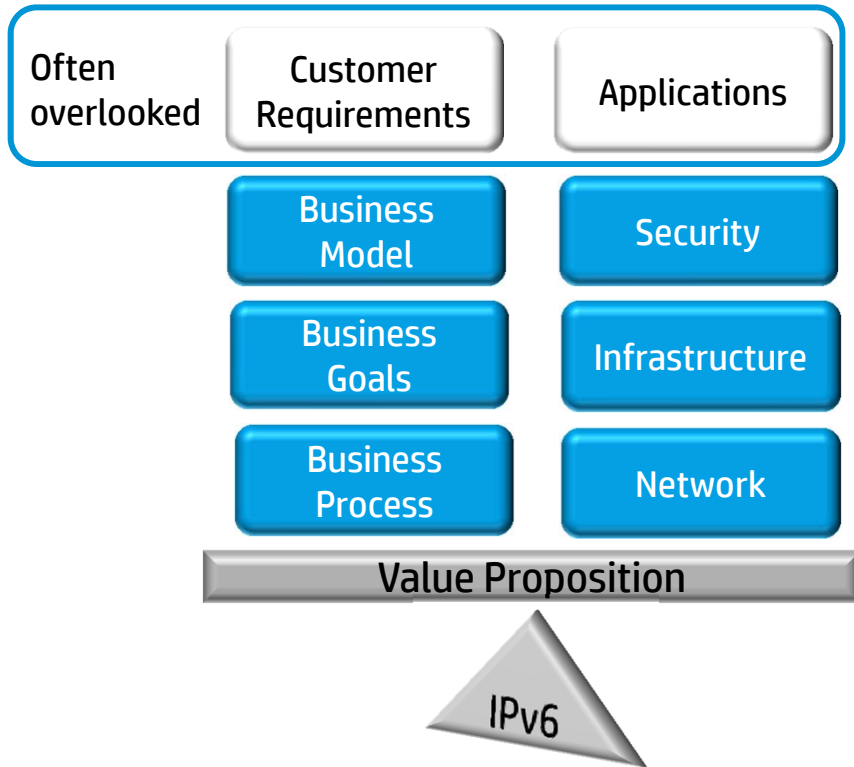
Pain Points

- Content consumption is breaking down on IPv4
- Instant Connectedness is not possible with IPv4



IPv6 transformation journey

Joint Business & IT Task Force ensures a smooth path toward IPv6



Yesterday's thinking won't solve today's opportunities

- Determine how IPv6 affects all business units
- Find ways IPv6 can help achieve your business and IT goals
- Analyze risks

- Remember Transforming IP dependent applications is time consuming task



HP and IPv6

HP has already delivered IPv6
HP IT IPv6

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HP has already delivered IPv6



Entire HP Integrity and HP ProLiant product line

- Through use of IPv6 compliant operating systems

HP Storage

- Broad portfolio

Entire Business-critical server operating systems

- HP-UX , OpenVMS, HP NonStop Server
- Debian GNU/Linux with HP Telco Extensions
- HP Serviceguard Solutions

Entire HP PC product lines

- Through use of IPv6 compliant operating system

HP Enterprise, Consumer printers and Print Servers

- JetDirect, Designjet, LaserJet and Color LaserJet printers

HP Networking and HP TippingPoint IPS

- Broad portfolio. Core-to-edge, switch, high-end to low-end router and security

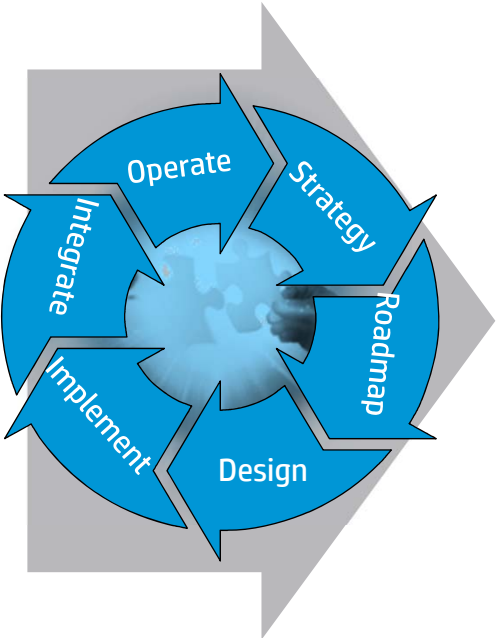
HP Software

- Broad support.
- HP Network Node Manager. HP Network Automation. HP Server Automation. HP SiteScope (SiS). HP Intelligent Management Center (IMC).



HP IPv6 Consulting Portfolio

- IPv6 Transformation Experience Workshop
- IPv6 Readiness Assessments
- IPv6 Architecture and Design
 - IPv6 Web Start Service*
- IPv6 Transition Consulting
- IPv6 Roadmap Service
- IPv6 Integration & Deployment



- ✓ Aligned Business and IT strategy plan for IPv6
- ✓ Understand current state
- ✓ IPv6 transition roadmap

* for those customers with urgent IPv6 web presence enablement needs



Example - IPv6 in the HP Enterprise

Business Drivers

- Inevitability of IPv6
- Business Continuity issue
- External
 - hp.com e-commerce reachability via IPv6
- Internal
 - Unified communication

Architectural Principle

- Stepwise deployment
- Ensure application and network services support IPv6
- Allow no IPv4 disruption
- Standardize on Dual-stack
- Managed environment
 - Use DHCPv6 where you can
 - Run IPv6 on HP products

Status

- Started deployment in 2001
- Today (Mar 2012)
 - 300+ IPv6 subnets available
 - 120 IPv6 R&D labs deployed
 - Labs interconnected with Tunnels
 - Core Dual-stack
 - Each existing subnet are being migrated to native IPv6 WAN



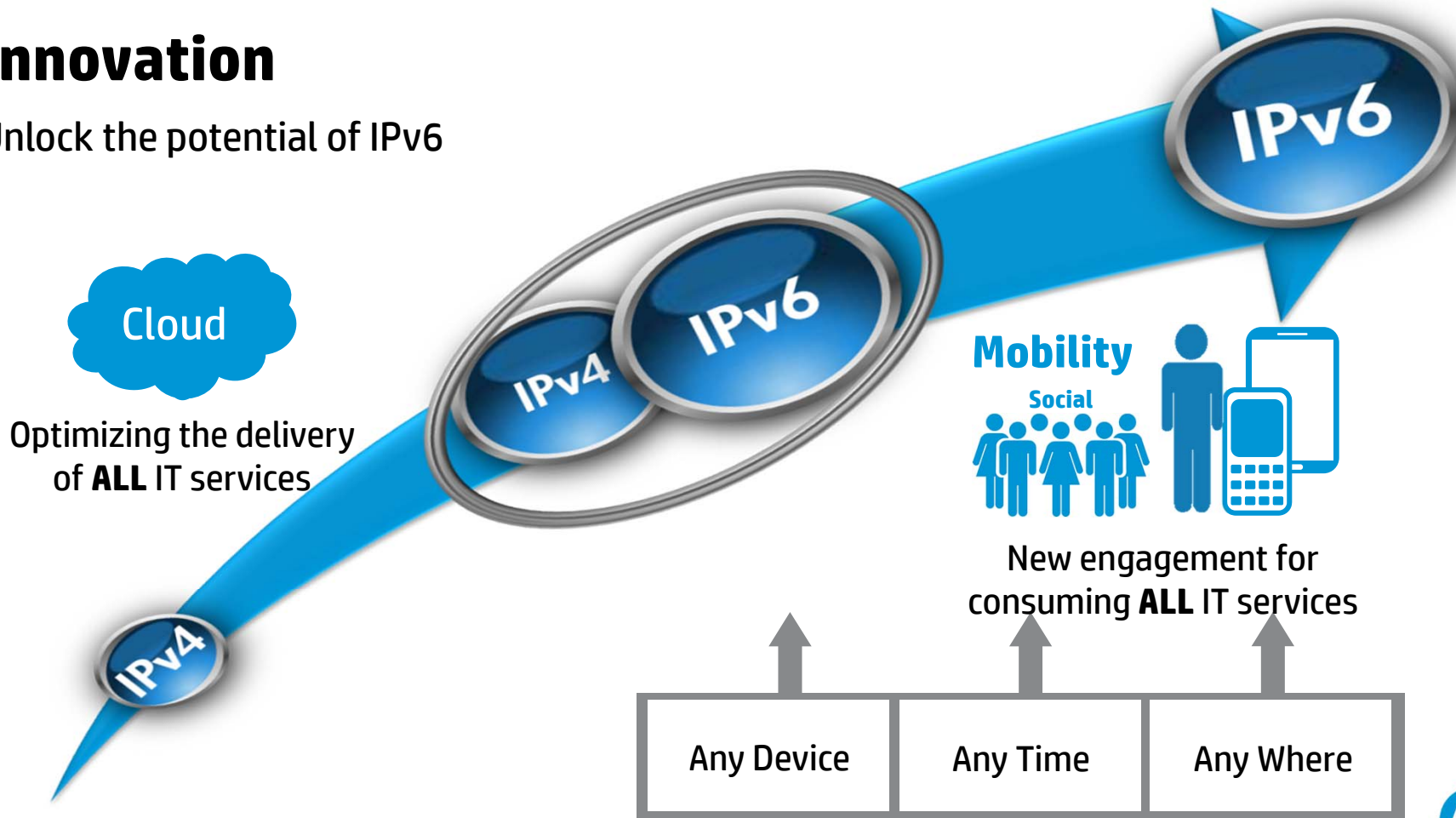
IPv6 Time to Act

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Innovation

Unlock the potential of IPv6



IPv6 Time to Act NOW

IPv6 transition is inevitable

Many countries, have mandated IPv6

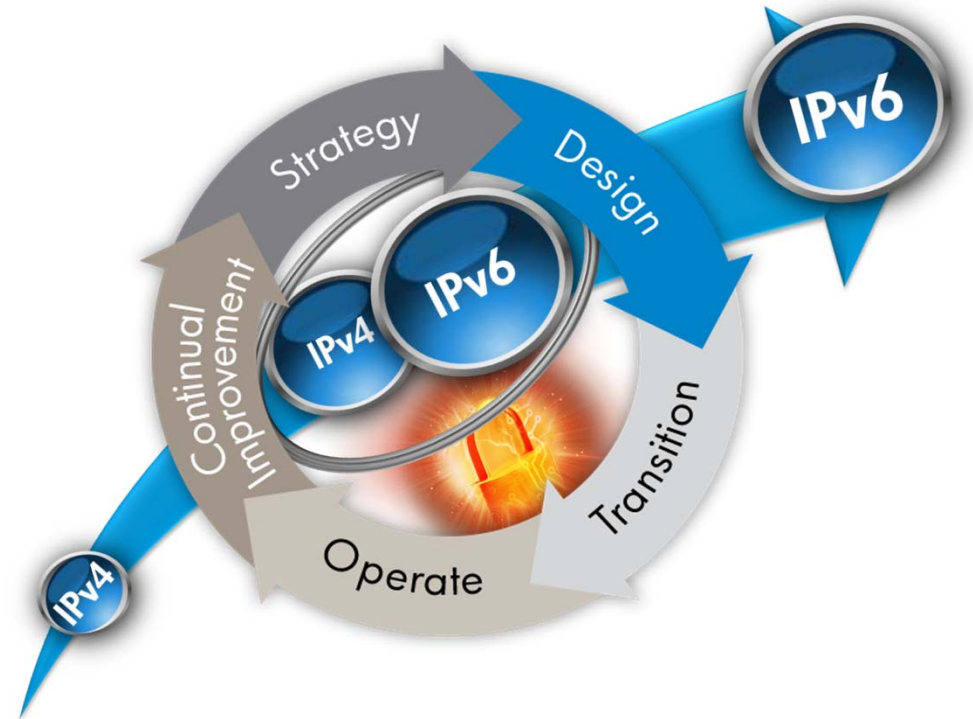
IPv6 is a compliance requirement

IPv6 is one of the most significant technology changes in the history of the Internet

www.hp.com/go/networks

www.hp.com/network/ipv6

www.hp.com/services/ipv6



Thank you

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