Been There – Done That:
The IPv6 Reality Show

Gsfe X furiph !ß C fdiufmGfmpx

Snapshot of Bechtel

A vibrant company working worldwide

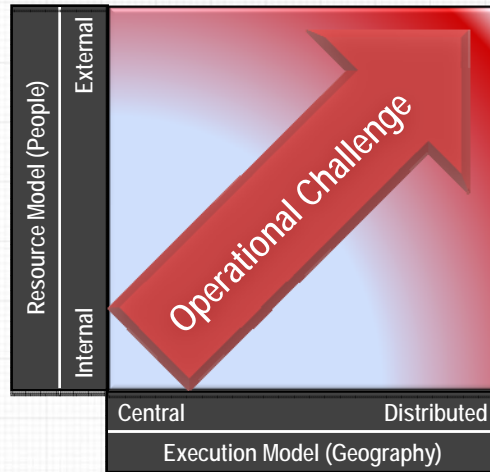•Ongoing projects in nearly 50 nations

•2007 revenue: U.S. $27 billion

•2007 new work booked: U.S. $34.1 billion

•42,500 employees worldwide (manual and non-manual)

•40 offices globally, with corporate headquarters in San Francisco
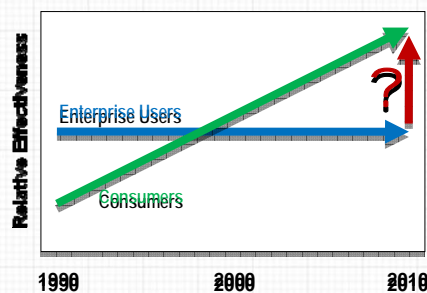
Business Changes & Challenges

Reality

Businesses are evolving to be more complex and distributed

Resource Model (People)
External
Internal

Operational Challenge

Central   Distributed
Execution Model (Geography)

Enterprise Users vs. Consumers

Reality

Productivity and Service Offerings

Relative Effectiveness

Enterprise Users

Consumers

?

1990   2000   2010

"With a browser and Internet connection the world is open..."
and by the way...
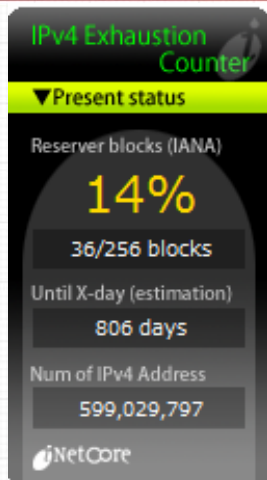*"Nobody goes to school to learn how to buy books from Amazon..."*

- There is a growing gap between consumer and enterprise adoption of emerging technologies and their relative effectiveness
- We have opportunities to capitalize on emerging technologies and paradigms that deliver new meaningful services to our business
- The challenge is how to learn from the consumer-developed services and technologies and incorporate those to our enterprise environments

Everything over IP(v6)

Information is today's currency

Reality

IP convergence enables information exchange

Data

M2M

Industrial Controls

Social Networks

IP

Video

P2P

Voice

Mobility

IPv4: Resource Scarcity

IPv4 Exhaustion Counter

▼Present status

Reserver blocks (IANA)

14%

36/256 blocks

Until X-day (estimation)

806 days

Num of IPv4 Address

599,029,797

*i*NetCore

Gadget developed by Takashi Arano's Intec NetCore.
Details at: http://entne.jp/tool/toollist/000101.php

Are you be ready for this
Reality?

Projected IANA Unallocated Address Pool Exhaustion: 06-Feb-2011

Projected RIR Unallocated Address Pool Exhaustion: 08-Mar-2012

17-Nov-08 source: Geoff Huston – http://www.potaroo.net/tools/ipv4/

IPv6 & Major Operating System Milestones

### Running IPv6 today?

Reality

IPv6 Capable

[2002] Apple: Macintosh OS/X 10.2
[2001] Cisco: IOS (12.x and Later)
[1997] IBM: AIX 4.2
[2000] Microsoft: Windows 2000
[2002] Microsoft: Windows XP
[1996] Various: Linux 2.1.6 Kernel
[2001] Various: Linux 2.4 Kernel

IPv6 ON by default

[2007] Apple: Airport Extreme
[2003] Apple: Macintosh OS/X 10.3
[2007] Apple: Macintosh OS/X 10.5
[1996] BSD: OpenBSD / NetBSD / FreeBSD
[2000] HP: HP-UX 11i
[2007] HP: HP-UX 11i v2
[2007] HP: Open VMS
[2006] IBM: AIX 6
[2002] IBM: AS/400
[2002] IBM: z/OS 1.4
[2002] Juniper: JUNOS (5.1 and Later)
[2003] Microsoft: Windows CE 4.2
[2003] Microsoft: Windows Mobile 2003
[2008] Microsoft: Windows Server 2008
[2007] Microsoft: Windows Vista
[2000] Sun: Solaris 2.8
[2005] Sun: Solaris 2.10
[2003] Various: Linux 2.6 Kernel

The Context for IPv6

The Connected Model

Services

People

Network

Information

Devices
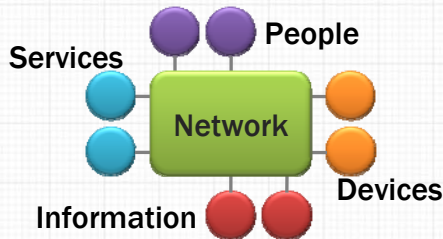
End-to-end communication is essential in the connected world of today & the future

Global Internet Trends

Internet Users

Services

Devices

Information

IPv4 Addresses

Quick Profile: Sprint – Nextel

Why IPv6?

- Address space scalability
- Improved Security
- Mobility
- Packet Processing Optimizations

IPv6 Implementation Approach

- Be prepared for customers
- Determine and improve behavior at scale
- Prepare for innovation

Source: *Global IPv6 Strategies*, Cisco Press, 2008

Quick Profile: Comcast

Why IPv6?

- IPv4 Address space constraints
- Device Management
- New Services

IPv6 Implementation Approach

- IPv6 must be part of the roadmap
- Incremental deployment (core → edge)
- Minimal disruption
- Maintain / improve security

Source: *Global IPv6 Strategies*, Cisco Press, 2008

Quick Profile: Greek Schools Network

Why IPv6?

- ▸ Enhance / facilitate the transfer of information
- ▸ Enable new ways of collaboration
- ▸ Support education beyond school hours
- ▸ Stimulate cross boundaries social interaction

IPv6 Implementation Approach

- ▸ Remove addressing constraints (NAT/PAT)
- ▸ Enable peer-to-peer applications
- ▸ Mitigate management and security issues
- ▸ Stimulate innovation

Source: *Global IPv6 Strategies*, Cisco Press, 2008

Quick Profile: Bechtel Corporation

Why IPv6?

- ▸ Industry leadership positioning
- ▸ Business and project execution models
- ▸ Foundation for innovation
- ▸ Industrial systems to IP

IPv6 Implementation Approach

- ▸ Move networks, applications, support in parallel
- ▸ Broad deployment of expected successes
- ▸ Maintain / improve security & stability
- ▸ Use established change processes

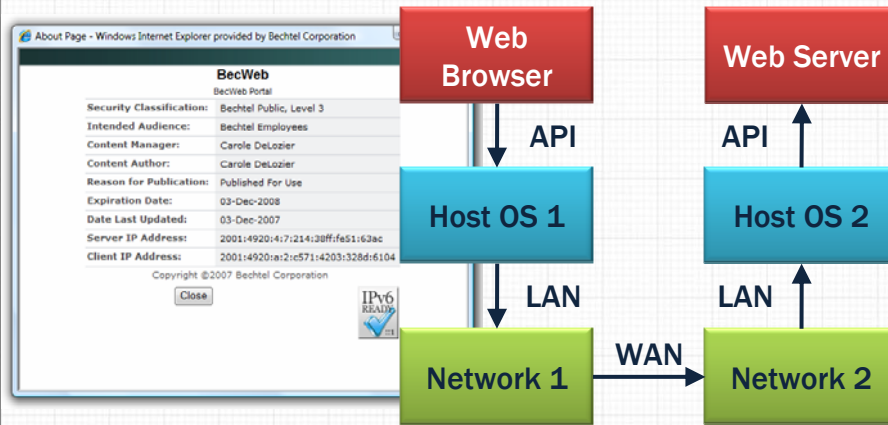Source: *Global IPv6 Strategies*, Cisco Press, 2008

Six Connection Paradigms

People
Services
Network
Devices
Information

1. Internal to Internal
2. Internal to Internet
3. Internal to DMZ
4. Internet to DMZ
5. Internet to Internal
6. Internet to External

Internet
Firewall
DMZ
Internal
Network
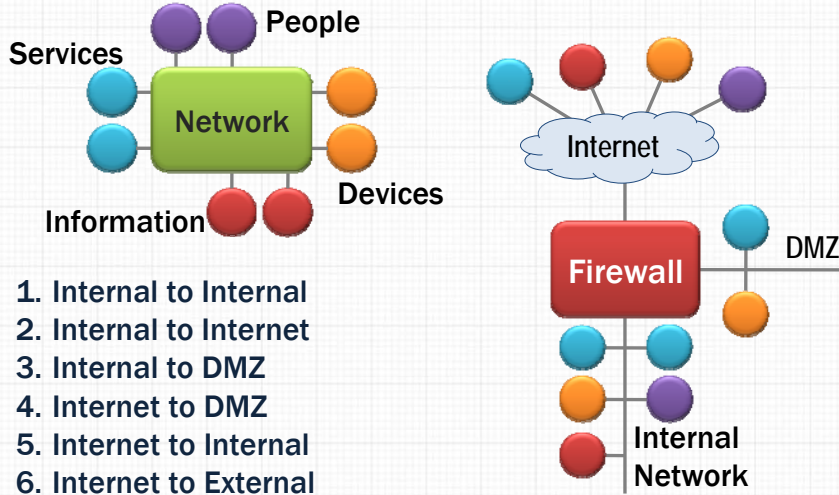
Bechtel – Running IPv6 TODAY

Layers of the End-to-end Model

Web Browser → API → **Host OS 1** → LAN → **Network 1** — WAN → **Network 2** ← LAN ← **Host OS 2** ← API ← **Web Server**

Mind the Apps

Guidelines for IPv6 Enabled Applications

- Operating System Configuration
- Development Environment
- Windows Sockets
- Checkv4.exe Utility

IPv6 Application Checklist and Certification Steps

- Storage and manipulations of IP addresses
- Technology (NO VB 6.0)
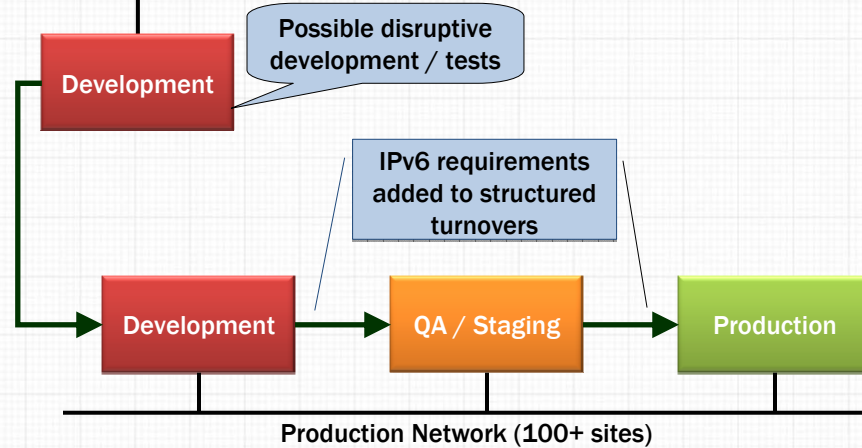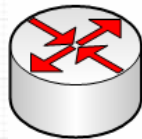- Use of hardcoded addresses
- User interface with addresses
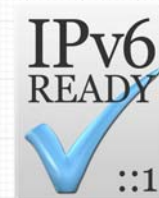
Transition Success: Know & Use Gatekeepers

Isolated Network (4 sites)

Development

Possible disruptive development / tests

IPv6 requirements added to structured turnovers

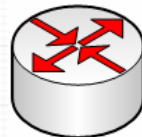Development → QA / Staging → Production
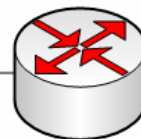
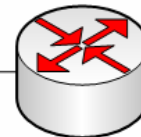Production Network (100+ sites)

Things Will Change

IPv4 Internet VPN or IPv4 Private Line

Protocol 41 Tunnel

Metro Ethernet or Dual Stack Private Line

Native Dual Stack

Outside Influences

- IPv4 Address Depletion
- Standards maturity
- Product maturity
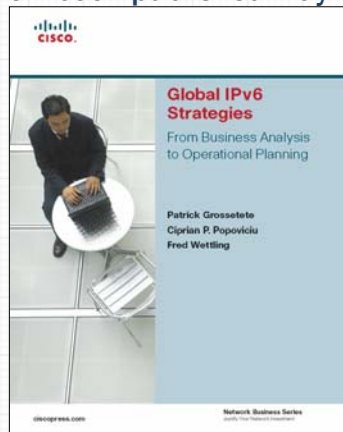- Service availability
- Global adoption
- Innovation

You are NOT in total control.

Contact Information

New book published May-2008

CISCO.

Global IPv6 Strategies

From Business Analysis to Operational Planning

Patrick Grossetete
Ciprian P. Popoviciu
Fred Wettling

Network Business Series

ciscopress.com

Don't miss it!

Global IPv6 Strategies

- The Business and Economic Importance of IP Communications
- IPv4 or IPv6 – Myths and Realities
- The Economy of an IP Evolution
- IPv6 Adoption Strategies
- Analysis of Business Cases for IPv6
- Planning Your IPv6 Migration

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