



IBM Software Group

IBM IPv6 Update

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Andras R. Szakal

IBM Distinguished Engineer

Director IBM Federal Software Architecture

aszakal@us.ibm.com



Agenda

- ❑ Business Drivers – Value of IPv6
- ❑ IPv6 Technical Overview
- ❑ IBM and IPv6
- ❑ IPv6 Transition Strategies

- ❑ Thanks!

Welcome to the smarter planet

The planet is getting more
Instrumented, Interconnected and **Intelligent**.



1 trillion

By next year, an estimated 2 billion people will be on the Web... and a trillion connected objects – cars, appliances, cameras, roadways, pipelines – comprising the "Internet of Things."



90%

Nearly 90% of innovation in automobiles is related to software and electronics systems. 30-60% of the value is in the software.



162 million

Almost 162 million smart phones were sold in 2008, surpassing laptop sales for the first time.

Approximately 70% of the digital universe is created by individuals, **but enterprises are responsible for 85% of the security, privacy, reliability, and compliance.**

As the world gets smarter, demands on IT will grow.



Smart traffic systems



Intelligent oil field technologies



Smart food systems



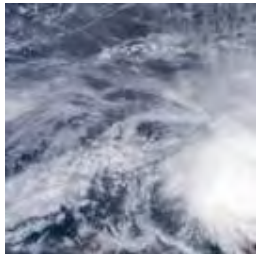
Smart healthcare



Smart energy grids



Smart retail



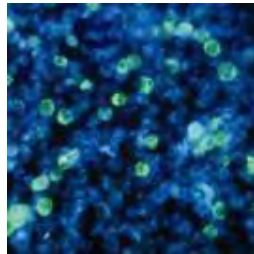
Smart water management



Smart supply chains



Smart countries



Smart weather



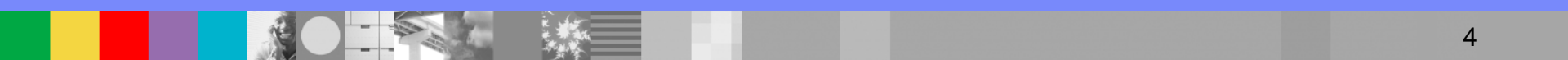
Smart regions



Smart cities

Despite the risk, the reason we will all begin to transform our systems, operations, enterprises and personal lives to take advantage of a smart planet isn't just because we can.

It's because we must.



IPv6 History

- Early 1990s, address depletion concerns first raised, CIDR deployed
- 1993: IETF solicits next-generation IP requirements
- 1995: IPv6 selected (out of multiple protocol proposals)
- 1996: Base set of IPv6 specifications first published
- Mid-to-late 1990s: Network Address Translation (NAT) deployed, easing address consumption rate
- 2000-2006: Steadily increasing product support, culminating with Microsoft Vista, which is completely IPv6-enabled
- 2006: Concern about IPv4 address depletion resurfaces; end of IPv4 free pool really in site now (2010-2012)
- 2007 – 2010: USGv6 Profile Harmonization
- 2011: IPv4 Exhaustion

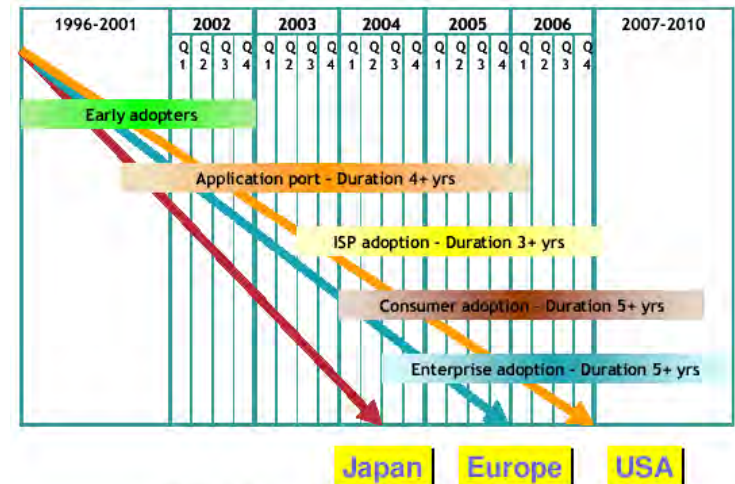


Figure 2-7: IPv6 in Japan, Europe and USA

History of IPv6 within IBM

- Leading contributor in IETF IPv6 standardization
 - ▶ Co-authoring and shaping specifications, etc.
- Leading contributor in RIR IPv6 address policy development
- Reviewed and helped shape JITC and NIST IPv6 profiles
- Broad commitment to IPv6-enable portfolio
 - ▶ Base series have world class IPv6 stacks (AIX, zSeries, i5/OS, Linux)
 - ▶ Majority of software products IPv6 dual-stack enabled – some acquisitions working remediation
- Consulting services to help customers with IPv6 transition
- Deployment of IPv6 within IBM
 - ▶ Dual-stack deployment across multiple research labs (Watson, Zurich, etc.)
 - ▶ Broader IPv6 connectivity via Internet2 (using IPsec)
 - ▶ No significant issues encountered
 - ▶ Broad internal account implementation underway

IPv4 Free Pool Exhaustion

- The IPv4 free pool expected to be exhausted TODAY!
 - ▶ Will an IPv4 free market evolve?
 - No probably not - too difficult – probably an eBay model is not realistic because of the way organizations have allocated the use of their address space.
 - ▶ To compensate - NAT usage will increase (including within organizations)
 - ▶ Even if you have plenty of IPv4 space, others will not – could cause a short term bifurcation of the internet



Hidden Cost of NAT

- IPv4 with NAT delays, but does not solve the problem
 - ▶ Works well (mostly) in simple client/server world
 - ▶ Restricts model to client browsers contacting web servers
 - ▶ Increasingly problematic when devices also act as servers
 - ▶ Compromised performance, robustness, security, and manageability of the Internet
- But, NAT is entrenched and seen as providing value
- End-to-end model at stake
 - ▶ Critical for maintaining substrate for continued innovation
 - ▶ But entrenched interests largely happy with current model
 - ▶ Entire classes of potential applications at risk of never being deployed (peer-to-peer, ...)
- General perception that NAT works “Just Fine” and there is no urgency to do anything.
 - ▶ Engineers understand problem, but rest of world does not
- Organizations will find that transition to IPv6 will be less messy in the long run.

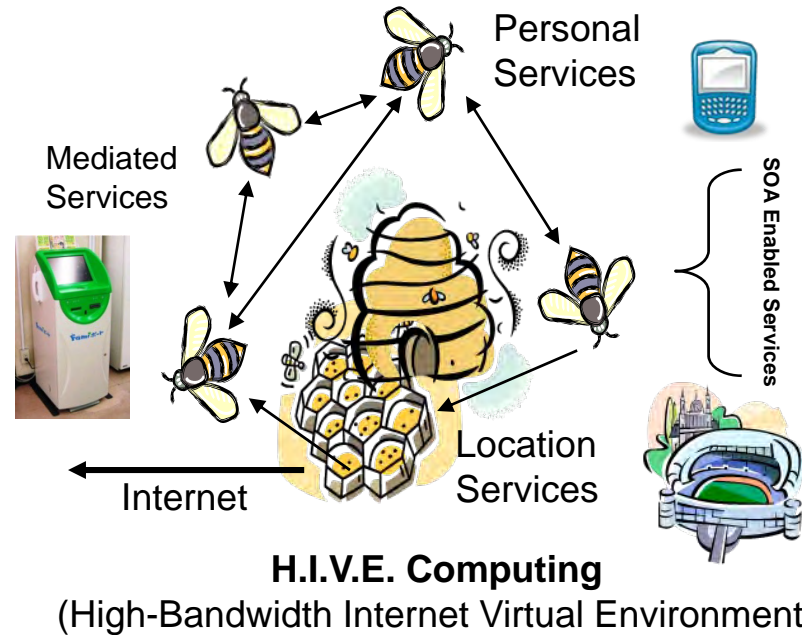


IPv6 Business Case – What is Driving IPv6 Adoption?

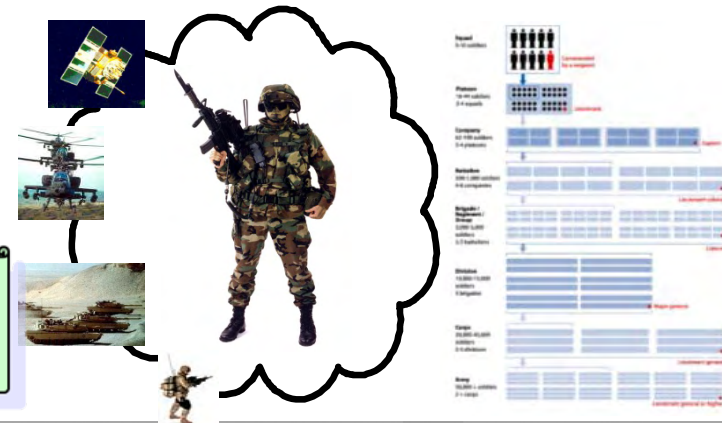
Why SOA...and other stuff...

IPv6 Business Drivers

- Reduced complexity of network topology
 - IPv6 more flexible
 - Lower TCO
 - More efficient (faster)
- Increased Quality of Services (QoS)
 - Network Management
 - Security (IPsec)
 - Ad-Hoc mobile computing
- IPv4 Obsolescence
 - IPv4 Address Exhaustion ~5 yrs
 - Investments in IP TV and VIOP
 - Requires greater human interaction
- H.I.V.E. Computing
 - SOA Enabled
 - Dynamic & Personalized
 - Location Specific



Military Applications



Japan Government Directive 2007 - The strategy proposes with regard to e-government systems:

"To make ICT devices of each government ministry or agency compatible with IPv6 by FY 2008, in principle, when they are replaced."

IPv6 creates a foundation for a Smarter Planet

Automobile Design



Facilities Management



18% Energy ↓
6.1% CO₂



>200K Sensors / Bldg



あなたと、コンビに、
FamilyMart

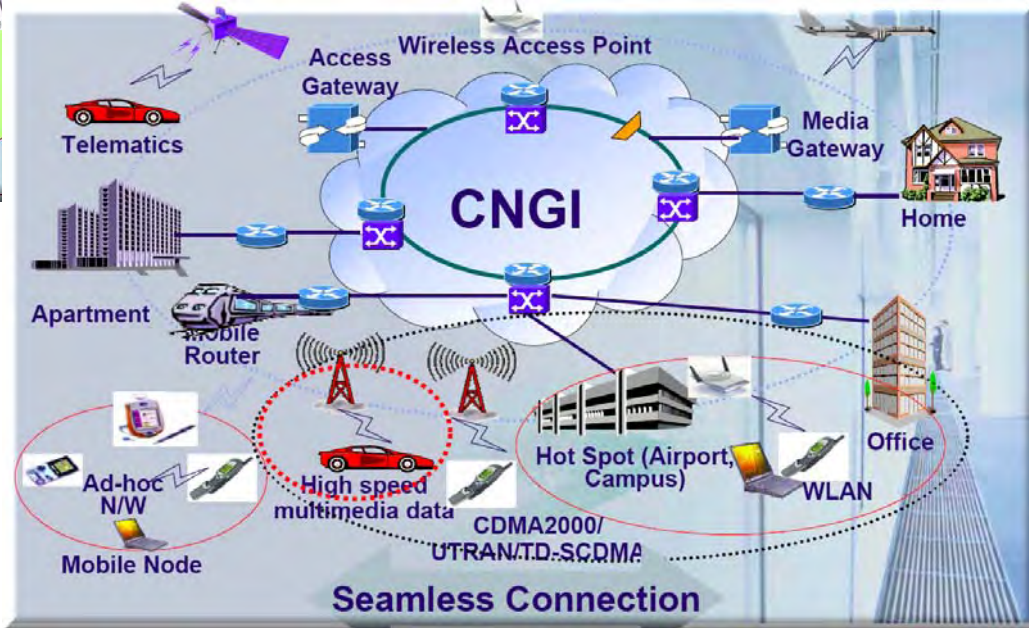
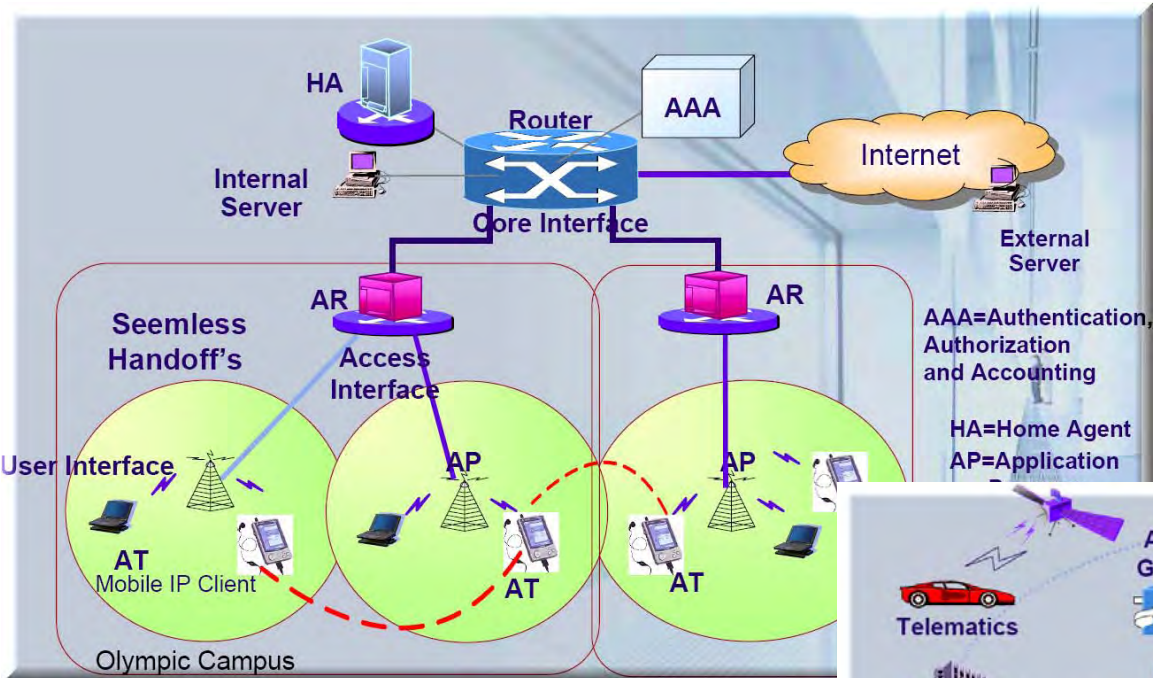


Network Kiosks



Ubiquitous Connectivity

Beijing Olympics and CNGI



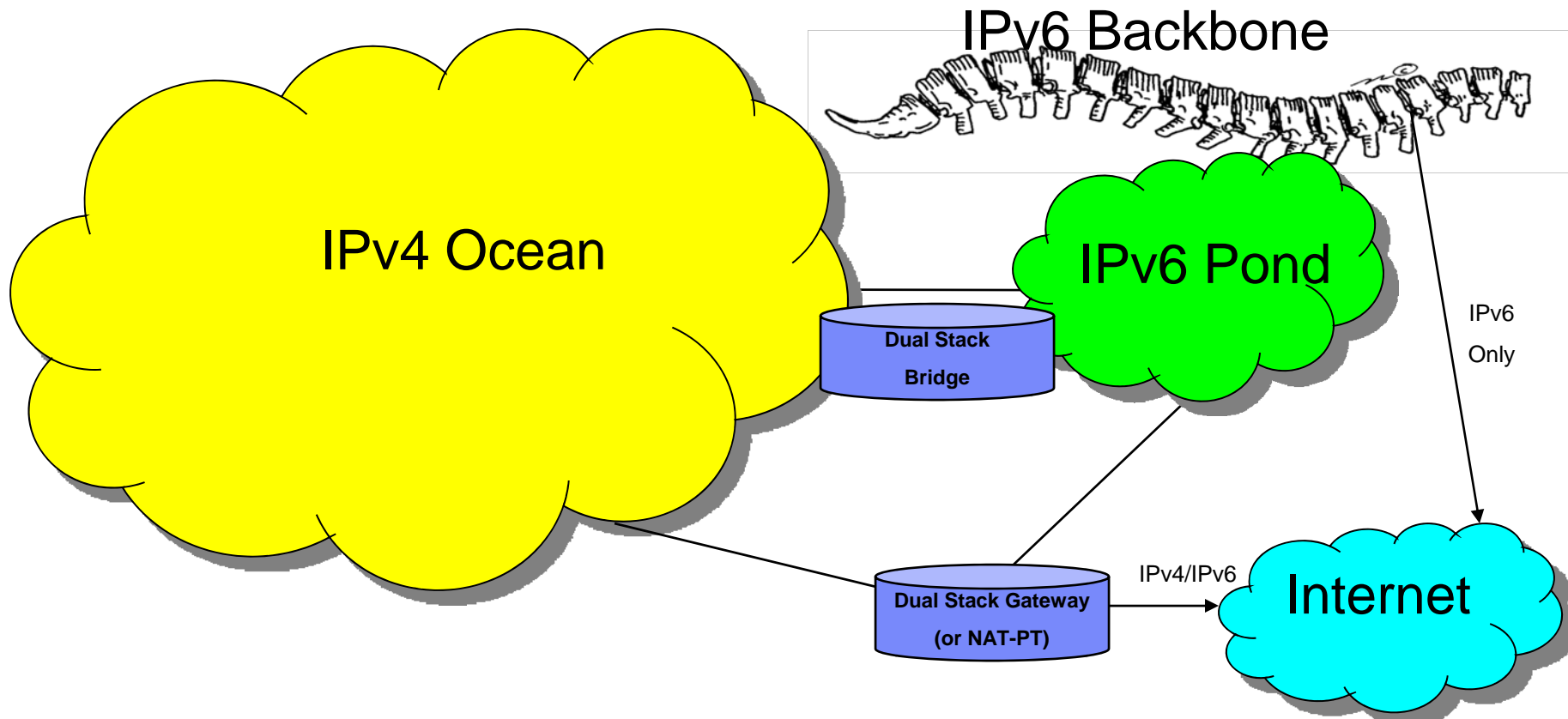
Transition/Co-Existence Approaches

- Dual stack
 - ▶ When adding IPv6, IPv4 service continues unchanged
 - ▶ Dual-stack systems continue to support IPv4 as before
 - ▶ Complete interoperability with IPv4
- Tunneling
 - ▶ Carry IPv6 packets across an IPv4 system
 - ▶ Numerous approaches to tunnel setup (configured, automatic, etc.)
- Translation service between an IPv4-only and IPv6-only system
 - ▶ NAT-PT (Protocol Translation between IPv4/IPv6)
 - ▶ Proxies/ALGs (Application Level Gateways)
- All will be used, none is perfect in every environment



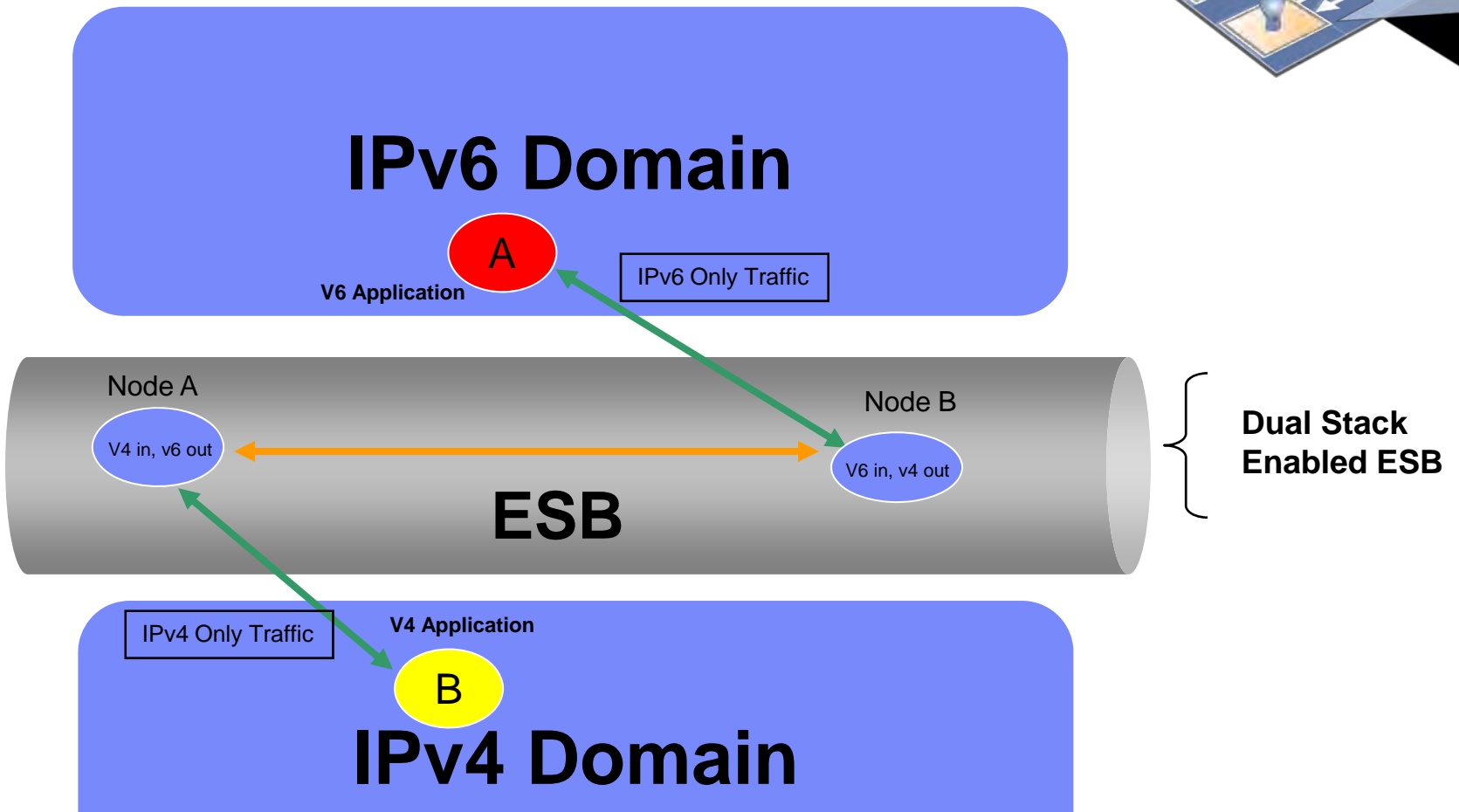
Internal Transition: Filling the pond to Create an Ocean

- Controlled transition of applications and client services managed over time
- New enterprise services implemented are born native IPv6
- Interoperability through dual stack connectivity (potentially NAT-PT)



IPv6 Transition – ESB Mediation

SOA Enabled IPv6 Transition



http://www.ibm.com/developerworks/websphere/techjournal/0810_koehl/0810_koehl.html

http://www.ibm.com/developerworks/websphere/techjournal/0903_koehl/0903_koehl.html



Thank you!

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