IPv6:

Moving Beyond June 30 and into Phase II

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A brief history and chronology…

- The Internet is a worldwide network of networks comprised of servers, routers, and backbone networks
- The basic function of the Internet is to transmit packets of information across interconnected networks via:
  - Addressing
  - Fragmentation of data
- The two primary protocols enable these packets to traverse the Internet: TCP and IP
- In February 2003, the President's *National Strategy to Secure Cyberspace* commenced the government wide effort to address IPv6
- In May 2005, the GAO-05-471 informed Congress on the state of the federal IPv6 landscape and recommended that OMB begin addressing key planning considerations for an IPv6 transition
- In August 2005, OMB released M-05-22 requiring to begin the transition to IPv6 on core network backbones

Exponentially More Addresses...

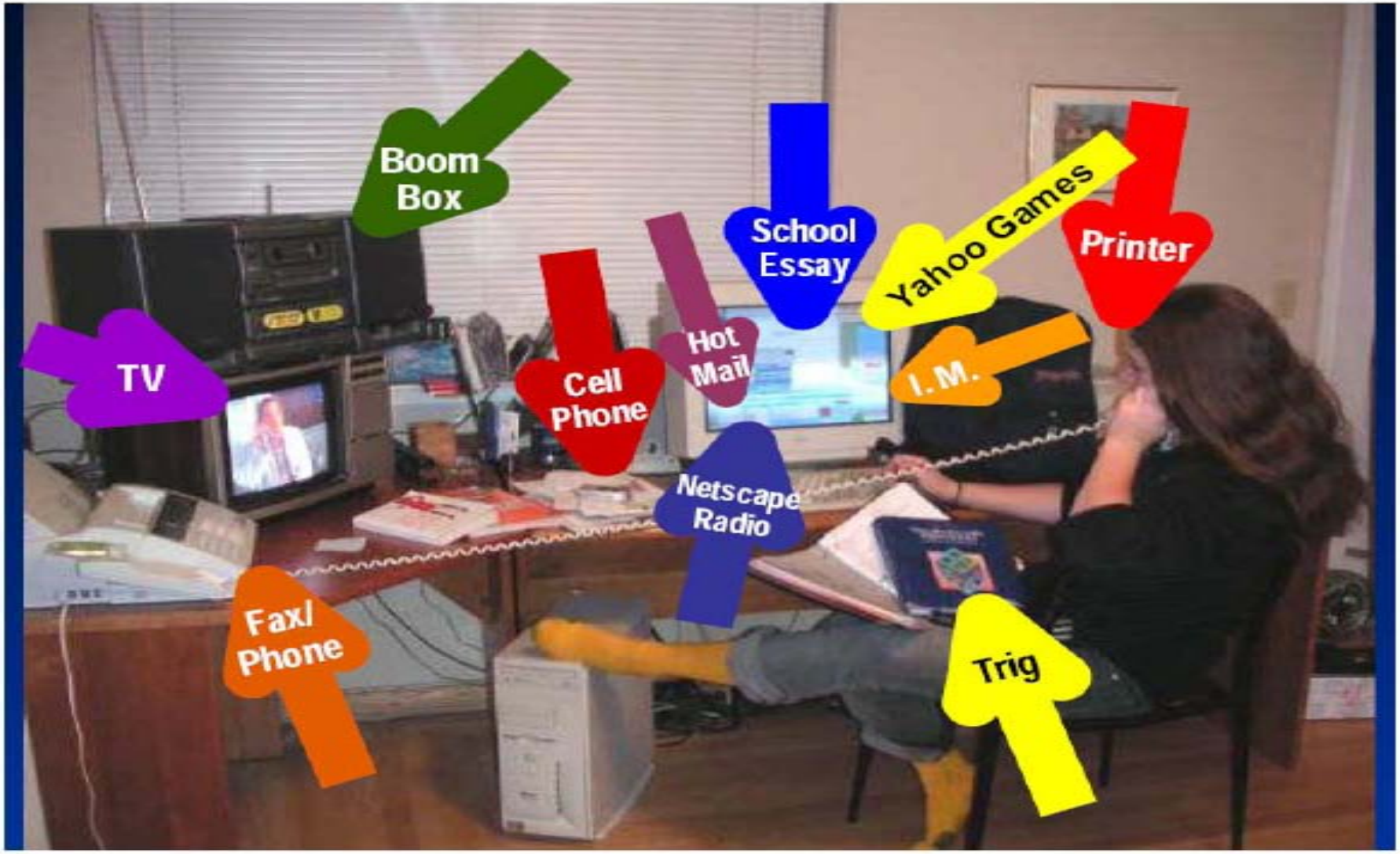
IPv4:

4,294,967,296

IPv6:

340,282,366,920,938,463,374,607,432,768,211,456

A Picture Is Worth a Thousand Words...



Implications of not using IPv6…

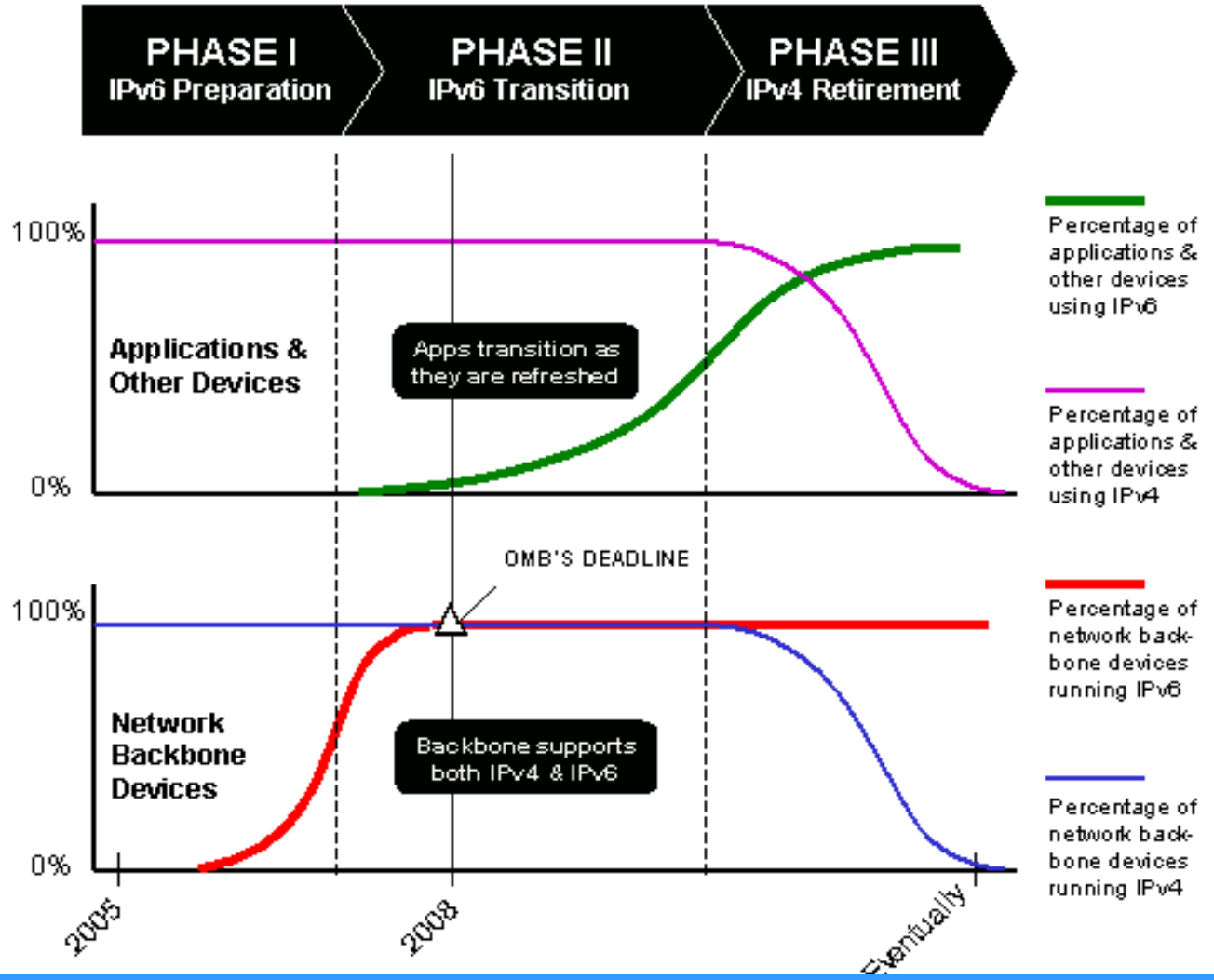
- Despite the wide-scale deployment of Network Address Translation (NAT) at Federal agencies and within the United States, the worldwide consumption of the IPv4 address pool continues at an accelerating rate
- IPv4 address space is projected to run out in or before 2011
- Moreover, the current community (IPv4) may not be able to talk to the future Internet community (IPv6) effectively, which could splinter the Internet
- Agencies may not be prepared for dramatic changes brought about by IPv6 in commercial and international markets

High Level IPv6 Transition Strategy...

A. Transition will happen in 3 phases

B. Most Application software and non-backbone devices will automatically switch to IPv6 when they are upgraded / refreshed

C. Network backbone devices will support both IPv4 & IPv6 network communications while applications & other devices transition



Transition Roles and Responsibilities…

	Ensure future acquisitions are IPv6-capable	Inventory all IT network backbone devices	Develop an IPv6 Transition Plan	Inventory all other (non-backbone) IT equipment	Analyze Operational and Fiscal Impacts and Risks	Ensure all network backbone equipment is IPv6-enabled	Develop migration plans for all other IT equipment
Transition Manager	R,A,C	R,A,C	A,C	R,A,C	R,A,C	R,A,C	A,C
Enterprise Architecture	R,C	C	R	R,C	C	C	C
Information Assurance	R,C	C	C	R	C	C	C
Capital Planning and Investment Control	R,C	C	C	R	C	C	C
Contracts	R,C	I	C	I	I	I	C
IT Operations	R,C	R	C	R	C	R	R
Engineering Services	R,C	R	C	R	C	R	R
Exhibit 53 Investment Owners	R	R	C	R	C	R	R

Phase I was about...

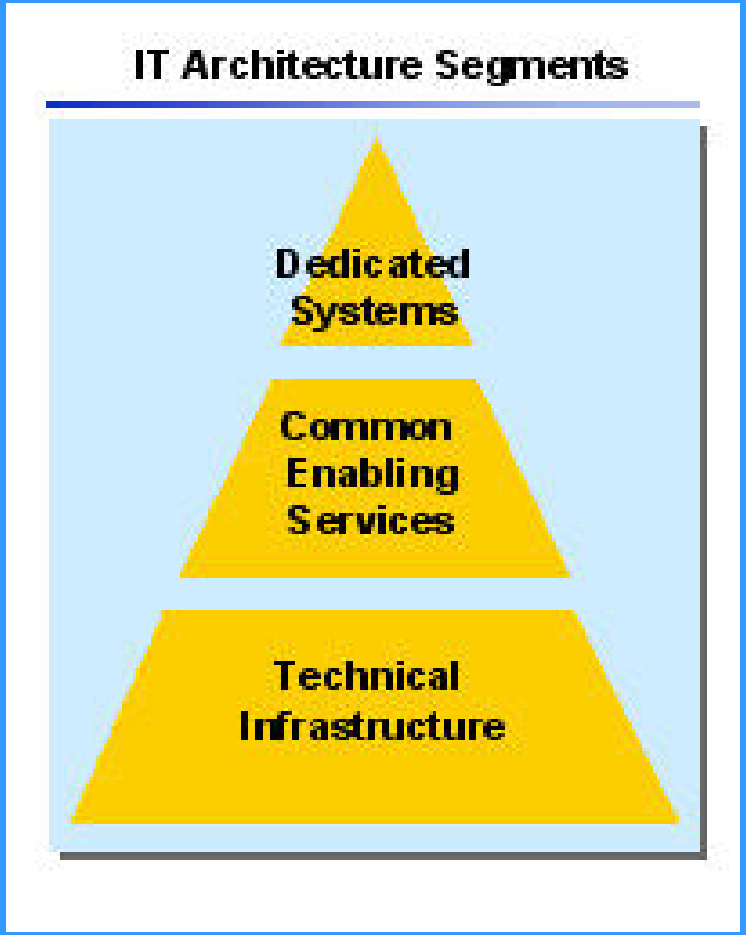
- Culminating a 35-month initiative to begin migrating the federal government to the next generation Internet
- Integrating the next generation Internet protocol into core backbone network infrastructure
- Substantiating an enterprise architecture framework for IPv6 adoption
- Building momentum for Phase II

Phase II is about…

- **Implementation of the USG standards profile (SP 500-267)**
  - Recommending a technology acquisition profile for common IPv6 devices to be procured and deployed in operational USG IT systems
  - Defining a simple taxonomy of common network devices
  - Defining minimal mandatory IPv6 capabilities and identifying significant configuration options
  - Providing the basis to further define the technical meaning of specific USG policies
- **Development of an open, public formal testing program for IPv6 technologies**
- **Development of operational guidance for the secure deployment of IPv6**
- **Establishment of a common interoperability strategy (v4-v6 co-existence)**

Segmenting IT Architecture…

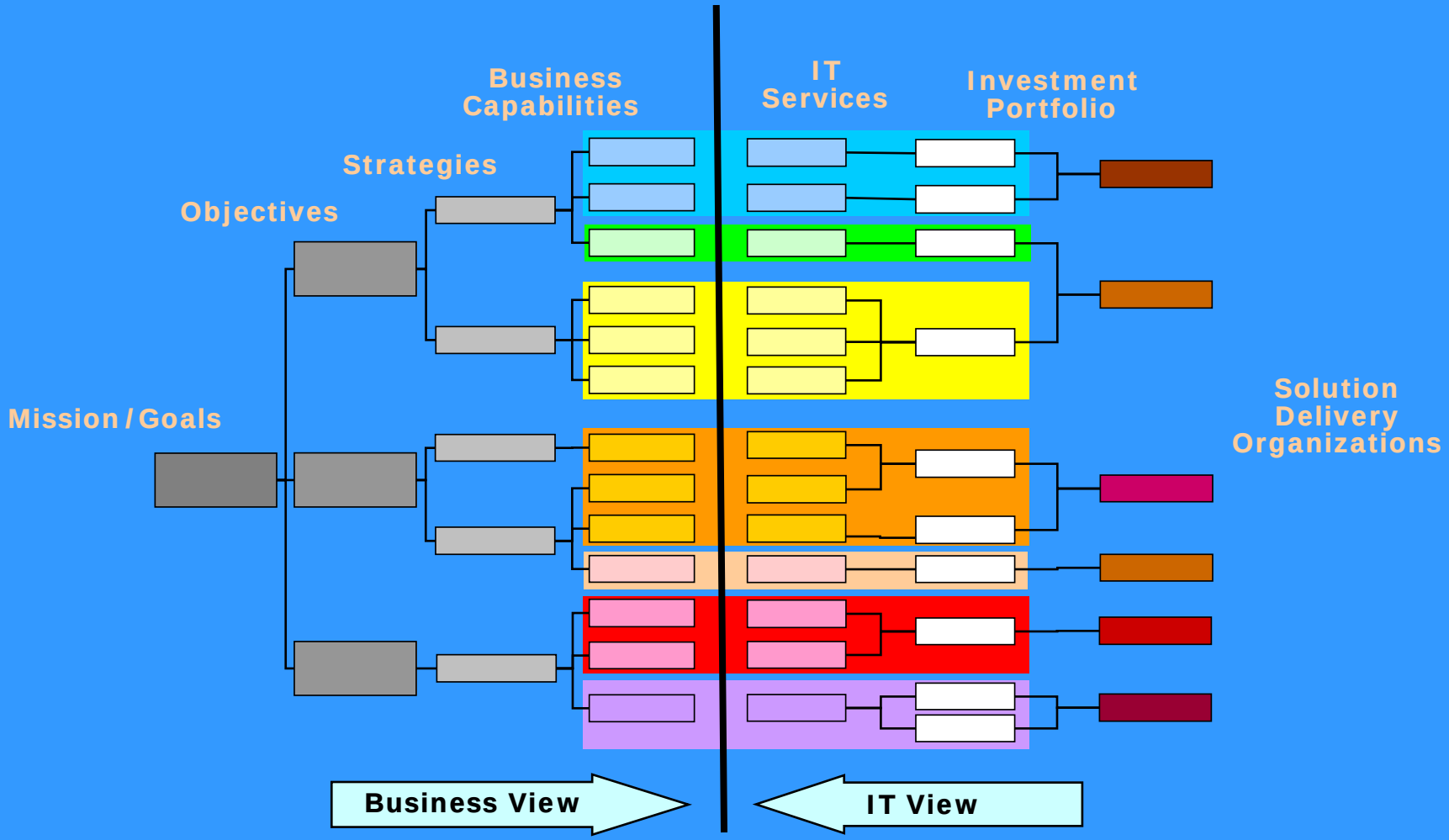
- Focus on delivering specific capabilities to support the business process
- Focus on delivering common capabilities that can be leveraged across multiple business units
- Required to support enterprise wide IT operations



Linking IPv6 to FEA Principles…

- **Business-led versus Technology- or Budget-driven**
- **3 levels of architecture:**
  - Enterprise — common/shared assets; aligning resources; all stakeholders
  - Segment — core mission areas; structure, reuse, and alignment; business owners
  - Solution — applications/components; users and developers
- **Performance Improvement Lifecycle**
  - Top-down strategic goals and bottom-up system needs
  - Architect…Invest…Implement
- **Segment Architecture Process**
  - Describing baseline architecture, target architecture, and a transition strategy for a defined segment of the enterprise
  - Analyze…Define…Operate

IT Portfolio Alignment: Line-of-Sight



Communities of Interest *	Objectives and Requirements	IPv6 Features and Capabilities
Land Use, Mapping, and Agriculture	• Resource tracking and allocation via sensor networks • Land boundary and border marking via tags with IP addresses	• Ad-hoc routing via neighbor discovery • Address tagging with low-order 64-bit identifiers • Extension headers (location-based services)
Science, Green Science, and Weather	• Improved utilization of existing infrastructure • Sensor networking	• Satellite communications • Ad-hoc routing via neighbor discovery • Extension headers (location-based services)
Commerce, Banking, and Finance	• End-to-end network security authentication and encryption	• IPSec authentication and encryption • Extension headers (financial attributes)
Information Science and IT Optimization	• Streamlined data flows and reduced networking complexity • Improved end-to-end multimedia and converged communications • Virtual services and tele-presence	• Flow labels for priority data flows • Optimized hierarchical addressing and routing • Extension headers (variable)
Justice and Law Enforcement	• Asset deployment identification and tracking • Real-time, ad-hoc, interoperable communications	• Address tagging with low-order 64-bit identifiers • Mobile, ad-hoc routing via neighbor discovery
Privacy, Protection, and Security	• Mandatory, end-to-end authentication and encryption • Non-attributable addresses	• IPSec authentication an encryption • Extensive address pool
Homeland Protection and First Response	• Secure communications • Mobile, ad-hoc communications for first responders • Total force and asset integration	• IPSec authentication and encryption • Mobile, ad-hoc routing via neighbor discovery • Address tagging with low-order 64-bit identifiers
Defense, Intelligence, and Military Operations	• Secure, mobile communications • Mobile, ad-hoc communications for war fighters • Asset integration and insightful logistics	• IPSec authentication and encryption • Mobile, ad-hoc routing via neighbor discovery • Address tagging with low-order 64-bit identifiers • Extension headers (specialize, private use)
Education, Learning, Knowledge Management, and Library Science	• Improved end-to-end multimedia and converged communications • Virtual services and tele-presence	• Flow labels for priority data flows • Source routing for more efficient transport
Transportation Optimization, Shipping, and Tracking	• Transport and container tracking via sensor networks • Live traffic reporting and communications	• Ad-hoc routing via neighbor discovery • Address tagging with low-order 64-bit identifiers
Health and Biomedical Science	• Tele-presence • Tele-science (real-time) • Records management and security	• Flow labels for priority data flows • Extension headers (attribution characteristics) • IPSec authentication and encryption
Constituent Services (Delivery and Tracking)	• Tracking via sensor networks • Package locations services	• Ad-hoc routing via neighbor discovery • Address tagging with low-order 64-bit identifiers • Extension headers 9Location-bases services)

** Prepared in collaboration with ACT/IAC ET SIG*

Takeaways…

- June 30, 2008 marks the end of Phase I
- Utilize the USG profile to develop specific acquisition and deployment plans
- Leverage Federal Enterprise Architecture and Capital Planning activities to deliver IPv6-enabled mission results
- Design a hierarchical routing and addressing strategy based on your current and future IP-based service portfolio
- Use network modeling and simulation tools to develop routing architectures
- Craft an enterprise security plan to support an end-to-end, “holistic” service model versus an enclave approach
- Securing IPv6 not only depends on the protocol but also on integration planning and implementation
- Increase agency awareness, train staff, and recruit talent
- The USG is a key catalyst in the globalization of IPv6

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FOR MORE INFO:
Go To www.EGOV.gov > Information Policy > IPv6