



CIO/MII
Enabling Net-Centric Operations



Internet Protocol Version 6 (IPv6)

A Key to Net-Centric Operations

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DoD Net-Centric Vision

- A robustly networked force leads to information sharing:

- Enhancing shared situational awareness in support of commander's intent
- Improved **self-synchronization** and,
- Much more effective mission accomplishment

- Goal is to deliver “Power to the Edge”- to enable and empower people at the edge of the network

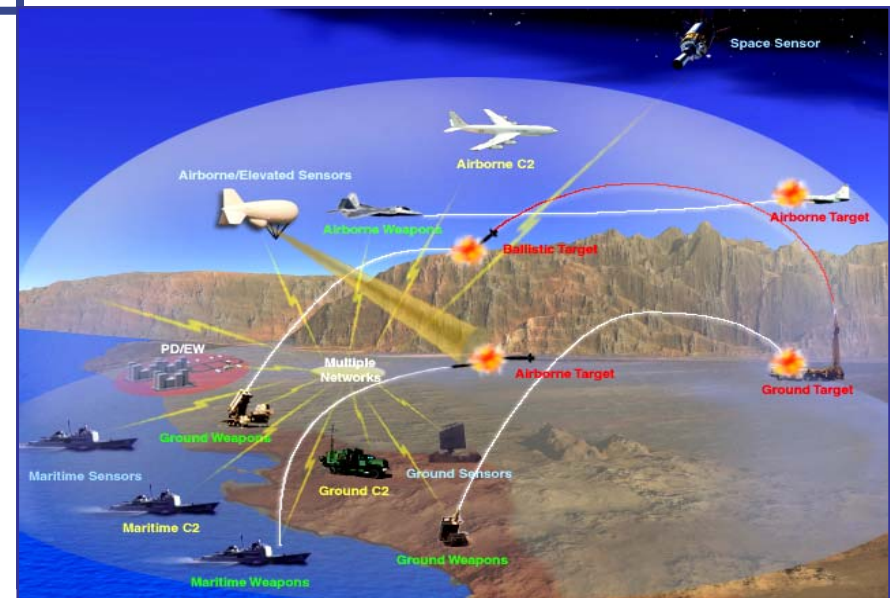
- Must move from smart information push to **smart information pull**
- Seek to build an **agile, robust, interoperable and collaborative DoD**, where warfighters, business and Intelligence users all share knowledge on a secure, dependable and global network

- DoD is leveraging the information revolution:

- Real transformation is more than just technology

Need to co-evolve: doctrine, organization, training, materiel, leadership, personnel and facilities

- These changes are showing results and increasing capabilities daily





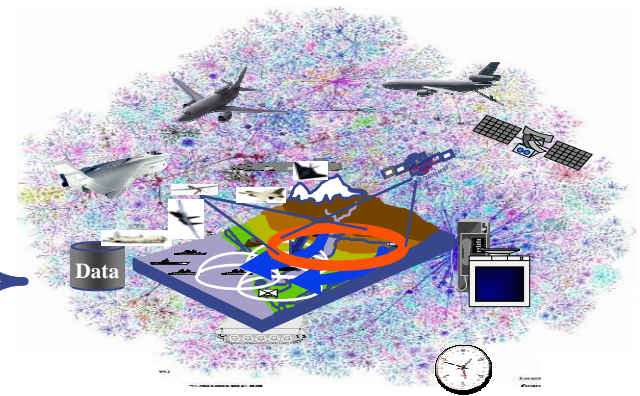
Why IPv6 In The DoD?

- Future Combat Systems Demand:

Ubiquity (IP Foundation)

Mobility (+ Ad-Hoc)

Operability (Security, QOS, NetOps)



**21st Century
Net-Centricity**

IPv4 Cannot Support Future Required Capabilities





IPv6 is a Critical Enabler of DoD's Net-Centric Vision



Drivers:

- Proliferation of IP-addressed applications/devices
- **Robust networking**
- **Agility to form dynamic Communities of Interest**
- **Increasing requirements for wireless /communications on the move**
- **Collaboration with joint, allied, coalition, federal, non-governmental organizations**
- **Mission assurance**
- Everything over IP

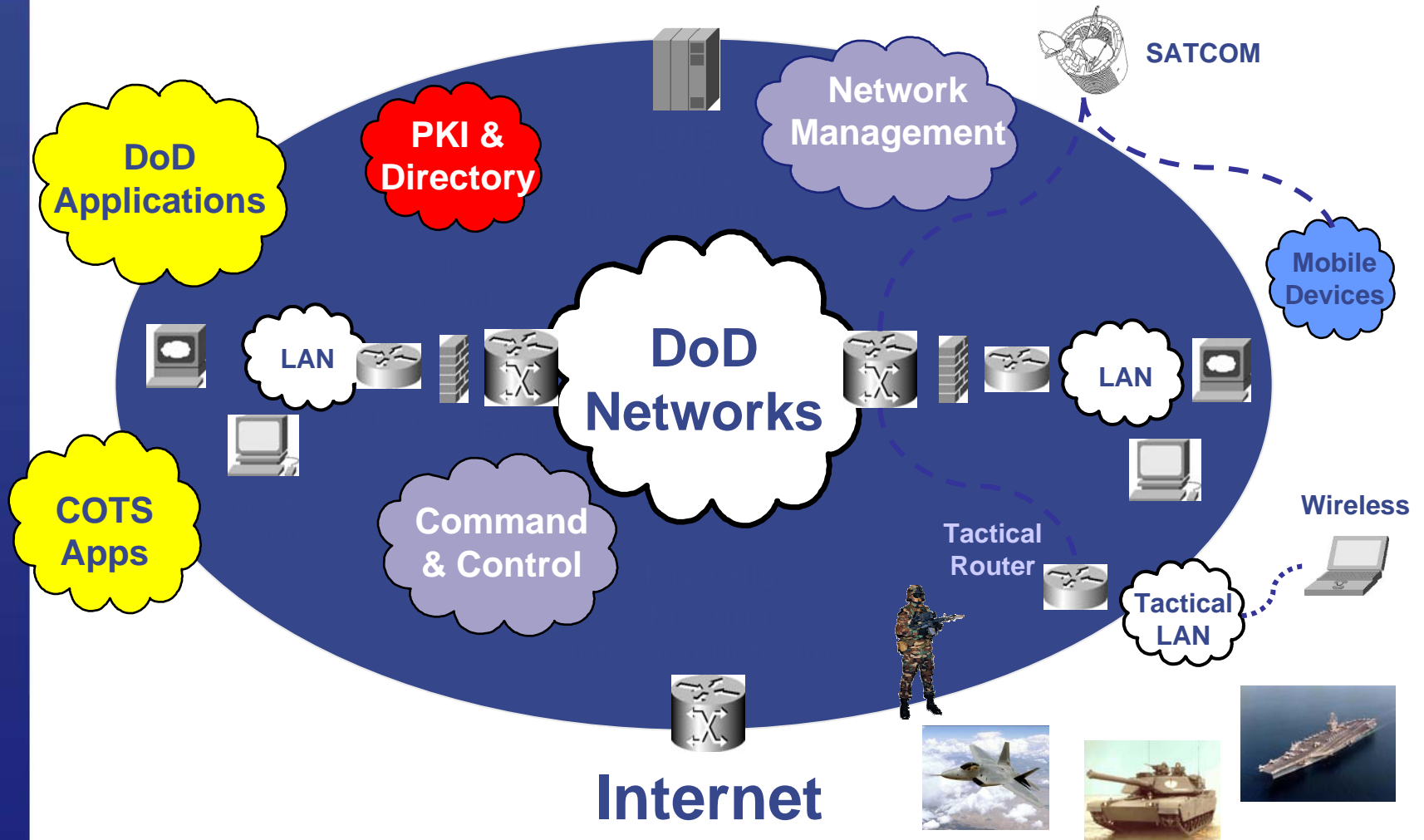


IPv6 Enables:

- Network ubiquity\scalability
- **“Unlimited” address space**
- Globally routable addresses
- **Quality of Service**
- **Enhanced plug-n-play/mobility**
- **Auto-configuration**
- Improved multicast
- **Mandatory end-to-end security**
- Improved header
- **Network maintainability**

Transition Implications

IPv6 Will Touch EVERYTHING



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IPv6 Policy Mandates

- **DoD CIO Memorandum -- 9 June 2003**
 - Established goal of FY 2008 to complete the transition to IPv6
 - Prohibited use of IPv6 on operational networks until IA risk assessment was complete

- **DoD CIO Memorandum -- 29 September 2003**
 - Established policy that products and systems procured or acquired after October 1, 2003 must be IPv6 capable

- **Office of Management and Budget Memorandum -- 2 August 2005**
 - Established June 2008 by which all federal agencies' infrastructure (network backbones) must be using IPv6

- **ASD(NII) Memorandum -- 16 August 2005**
 - Updated DoD transition policy contained in June 2003 and September 2003 memos
 - Amended waiver policy for programs not transitioning to IPv6 by FY 2008
 - Defined Milestone Objectives for enterprise-wide deployment of IPv6





Key Elements of DoD IPv6 Transition Strategy

- **Requiring IPv6 capability** (in addition to IPv4) for acquisitions, procurements and technology refreshments since October 2003
 - DoD will control transition costs by relying primarily on already scheduled/planned technology acquisitions and refreshments
 - Avoiding Y2K-like situation
- Actually **“turn on” IPv6 capability in carefully controlled manner** through set of pilot implementations, test and evaluation activities
 - Managing transition interoperability, security and performance risks
- **Careful and coordinated transition** and implementation planning across DoD
 - Managing transition interoperability, security and performance risks
- **Demonstrate operational criteria** established by the Joint Staff before enterprise-wide IPv6 transition
 - Managing transition interoperability, security and performance risks
- **Leverage commercial/industry standards/products**
 - Affordability

**DoD IPv6 Transition Plan Version 2 submitted to
U.S. Congress in June 2006**



DoD IPv6 Milestone Objectives

MO₁ - Authority to operate using IPv6 within an **isolated network domain (Enclave)**

- Systems **opting** to enable IPv6 at MO1 must meet the MO1 requirements
- Fundamental functional capabilities established for initial limited operation
- MO1 date is **1 October 2005**

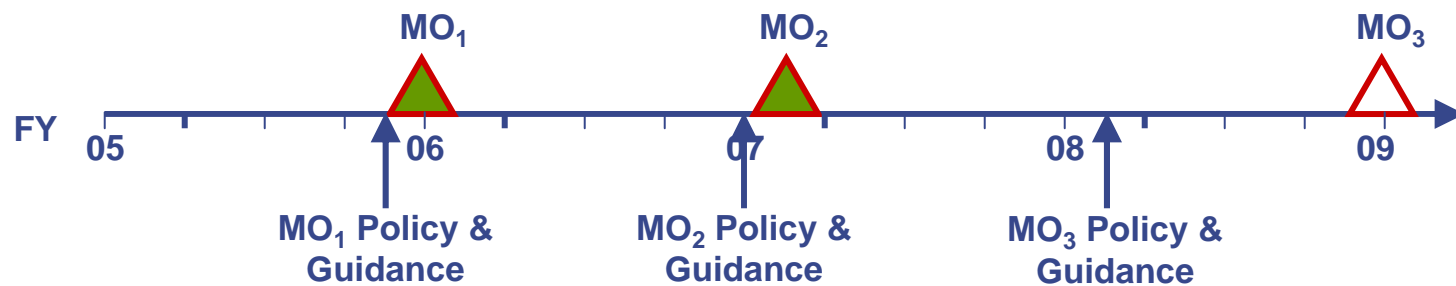
MO₂ - Authority to operate using IPv6 **across cooperative multi-domain environments (Transport)**

- Systems **opting** to enable IPv6 at MO2 must meet the MO2 requirements
- Individual programs will generally have additional specific operational and functional requirements
- MO2 date is **1 October 2006**

MO₃ - DISN and DoD Components' core **IP infrastructures capable of accepting, routing, and processing IPv6 protocol traffic** while providing parity to IPv4 (**e.g. Security**)

- Policy, planning, specifications, testing and transition guidance complete to allow for transition
- **Target date for MO3 is FY 2008**. The exact date for MO3 will be determined after IPv6 implementation schedules are established for the DISN and DoD Components' core IP infrastructures

Future MOs - Shall be defined, as required, to represent MOs for specific IPv6 advanced features. Dates will be event and technology driven as IPv6 capabilities mature



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DoD IPv6 Transition Challenges

- **Synchronizing IPv6 transition:**
 - Planning must coincide with technology refresh cycles
 - Benefits are long-term, so no immediate business case, competes with immediate funding needs
- **Managing a difficult IPv6 transition in the complex DoD environment:**
 - Numerous large scale networks, based throughout the world
 - Coordinating DoD Components efforts, with diverse missions
 - Technology in weapon systems -- longer development cycles
- **Maintaining interoperability and security during and after the transition:**
 - Need for maintaining IPv4 interoperability -- allies, combined and coalition forces
 - Understanding and mitigating IPv6 security threats and vulnerabilities
- **Identifying IPv6 limitations in the low-bandwidth/mobile environment:**
 - Mobile networks -- bandwidth constrained environment
 - IPv6 will provide significant advantages for mobility -- significant technical work yet to be done
- **Evolving IPv6 standards/products:**
 - Not all needed standards/products are available
 - Need to develop products to meet DoD's needs
- **Accommodating residual legacy IPv4 (beyond 2008):**
 - Legacy systems will still exist -- new coalition partners, etc.
 - How to interoperate over time with IPv4



Rapid and agile IT infrastructures with the capability to “discover” adjacent network systems and plug-n-play enable quicker, more dynamic responses..



Real time collaboration using integrated voice, video and data capabilities enabled by performance and QoS improvements.



Dynamic formation of COIs supported by improved multicasting.



IPv6 Enabled Battlefield of the Future



Ubiquitous, robust and scalable end-to-end networks enable integrated operations.



Proliferation of IP-addressed sensors, munitions, logistics tracking, applications, ... will enhance situational assessments and information availability.



End-to-end security, authentication and non-repudiation will enable new IA strategies that support mission assurance.

Increased OPTEMPO supported by **rapid reorganizational capabilities, shared situational awareness and improved wireless and mobility support.** Support for communications on the move.

Summary

- **IPv6 is critical to achieving DoD's Net-Centric Vision**
 - IPv4 cannot support future required capabilities
- **There are challenges in executing an aggressive IPv6 transition:**
 - Managing/resourcing the transition
 - Maintaining interoperability and security during the transition (and after)
 - IPv6 in the low bandwidth/mobile ad hoc network environment
 - Evolving IPv6 standards/products
 - Accommodating residual legacy
- **Significant progress being made in DoD IPv6 transition:**
 - Requirements for IPv6 capability being integrated into acquisitions/technology refreshment
 - Transition planning is well underway
 - Transition solutions and technical guidance are being developed
 - Ongoing test and evaluation, and demonstrations

