Defense Information Systems Agency
Department of Defense

Overview of DoD IPv6 Transition

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3/31/08

Outline

- IPv6 Technology Introduction
- DoD Policies
- DoD IPv6 Governance
- Joint Staff Criteria
- DoD IPv6 Transition Methodology
- IPv6 “Enable the Network” Continuum
- IPv6 Implementation
- Conclusion

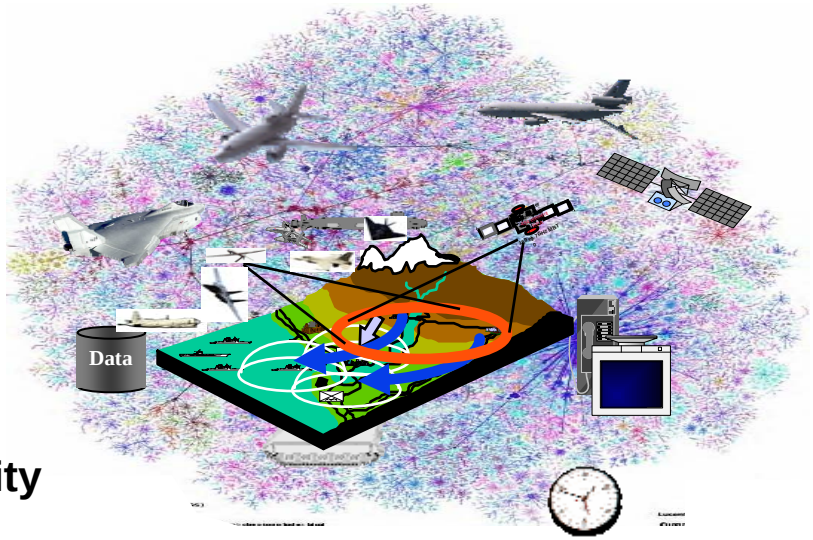
IPv6 Capabilities/Features

- Expanded Address Space
  - 340,282,366,920,938,463,463,374,607,431,768,211,456 Addresses
    - .34 Duodecilion (.34 X 10 exp39)
  - Multiple IPv6 Addresses Per Interface
- Simplified Header (40 bytes)
- Extension Headers and Options
- Authentication and Privacy
  - Mandatory IPSec
- Auto-configuration
  - Provides Address Mobility
- Source Routing (No Fragmentation)
- Flow Labels
- Quality of Service

Why IPv6 In The DoD?

Future DoD combat capabilities demand:

- **Ubiquity/Net-Centricity**
  - Allows all sensors and devices to be directly connected to the network
- **End-to-end Traceability**
- **Global Standard**
  - Eliminate stovepipe systems, gateways
- **Auto-discovery** and **auto-configuration**
- Enables **P2P** model with **end-to-end security**
  - **IPSec built-in**
- **Neighbor discovery** and **self-forming networks**
  - **Ad-hoc networking**
- **Mobile** devices connected reliably to the network
- **Multi-casting** allows for efficient way to disseminate data to secure groups
- **Readiness for advanced IPv6 features**
  - Designed to grow with "**extension headers**"

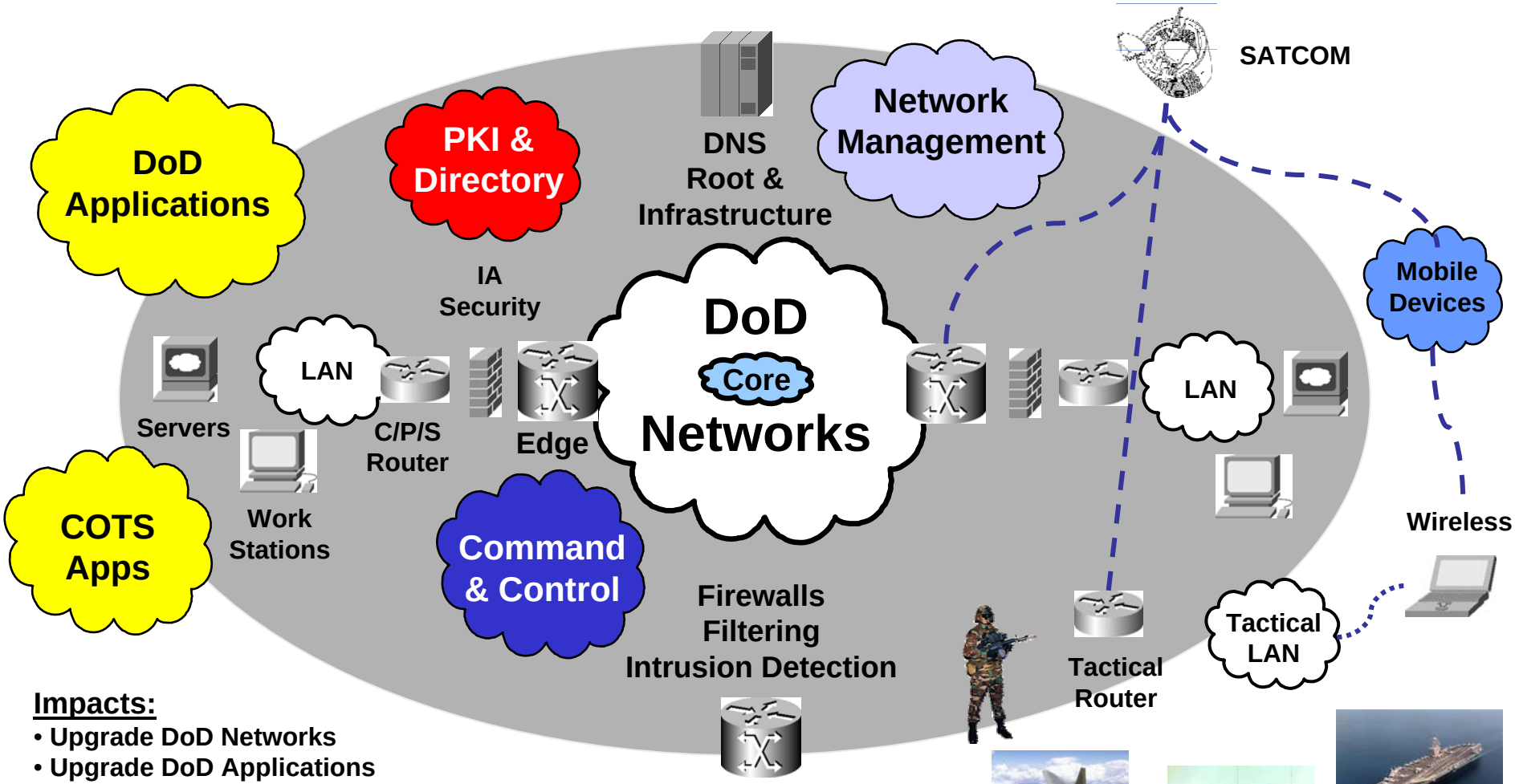


21st Century Net-Centricity

IPv4 Cannot Support Future Required Capabilities

Transition Implications

IPv6 Will Touch EVERYTHING



Impacts:

- Upgrade DoD Networks
- Upgrade DoD Applications
- End-to-End Engineering
- Integrate DoD/Partner Solutions
- Develop Mobile/Ad Hoc Capability

IPv6 Policies

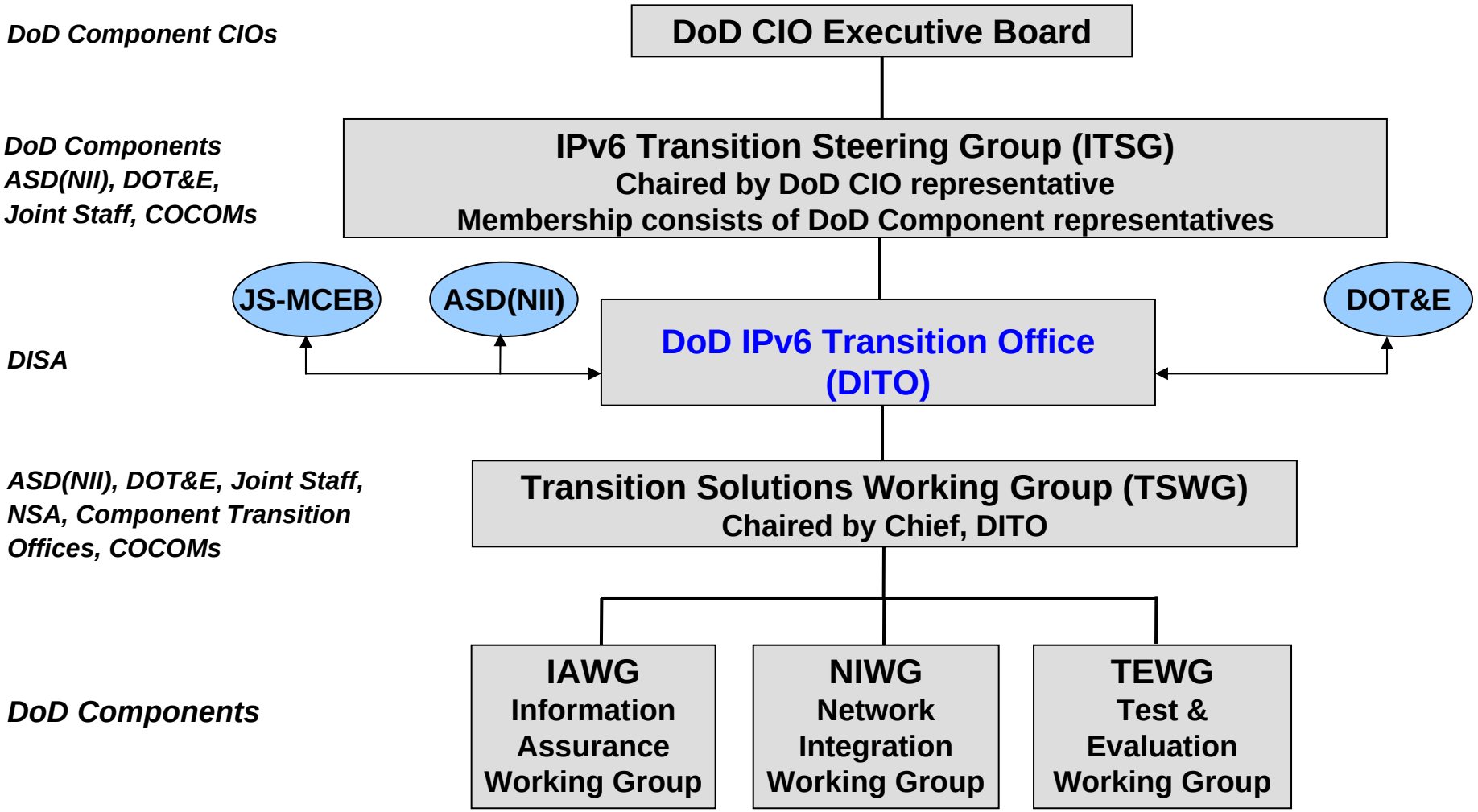
- DoD CIO Memo, Internet Protocol Version 6 (IPv6), June 9, 2003
  - Defines IPv6 Capable, Establishes goal of transitioning DoD networks to IPv6 by FY 2008
- DoD CIO Memo, Establishment of a DoD IPv6 Transition Office, February 6, 2004
  - Gives DISA the mission to establish a DoD-level Transition Office
  - DISA Director acknowledged this tasking in memo dated March 22, 2004
- NSA Memo, NSA support for the IA portion of the IPv6 Transition Plan, March 1, 2004
  - Acknowledges NSA's role to provide IA assessments and recommendations on IPv6 configurations, assets, and transition mechanisms
  - NSA to develop IPv6 capable HAIPE devices
- DoD CIO Memos, DoD IPv6 Test and Evaluation Results, July 6, 2005 & April 26, 2006
  - Requires Components report on T&E activities related to IPv6 in reference to the Congressionally Directed Action (CDA)
- OMB Memo, M-05-22, Transition Planning for IPv6, August 2, 2005
  - Requires Federal agency core networks to be IPv6 capable by June 2008
- DoD CIO memo, DoD IPv6 Policy Update, August 16, 2005
  - Establishes and defines Milestone Objectives
- DoD CIO memo, DoD IPv6 Implementation, February 6, 2008
  - Established tasker for updating IPv6 Capable definition
  - Tasks DoD Components to reprioritize funds in FY08, FY09, and POM 2010 and beyond to support IPv6 implementation and T&E

DITO Mission

- **Purpose**
  - To provide planning, integration, technical guidance, and coordination of DoD Component efforts in support of the DoD IPv6 transition
- **Products**
  - DoD IPv6 Address Plan
  - Integrated Implementation Schedule
  - Milestone Objective Information Assurance Guidance (MO)
  - Congressional Test and Evaluation Report (thru FY08)
  - Joint Staff Operational Criteria
- **Major Services**
  - Chairing DoD IPv6 WGs
  - Answering DoD level questions/issues on IPv6
  - Identifying and tracking DoD program dependencies for IPv6
  - Identifying and helping resolve technical IPv6 issues
  - IPv6 information sharing and dissemination (e.g. Portal)
- **Customers:** ASD/NII, Joint Staff, DoD Components, Intelligence Community, and DISA

*** DITO: DoD IPv6 Transition Office**

DoD IPv6 Governance



IPv6 Joint Staff Criteria

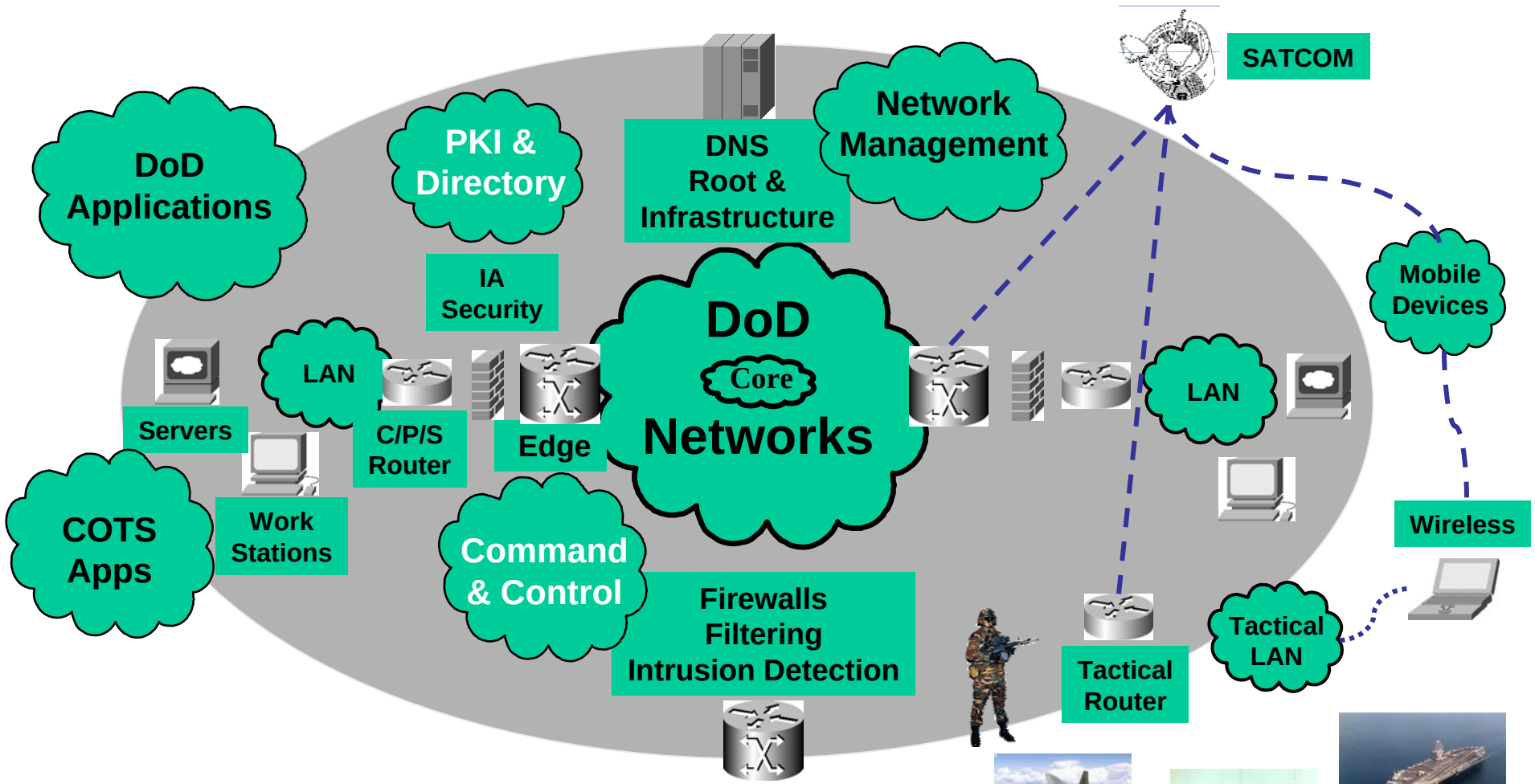
- **Criterion 1: (OPR: NSA)**
  - Demonstrate security of unclassified network operations, classified network operations, black backbone operations, integration of HAIPE, integration of IP security (IPSec), and integration with firewalls and intrusion detection systems.
- **Criterion 2: (OPR: DISA/JITC)**
  - Demonstrate end-to-end interoperability in a mixed IPv4 and IPv6 environment.
- **Criterion 3: (OPR: DISA/JITC)**
  - Demonstrate equivalent to, or better performance than, IPv4 based networks.
- **Criterion 4: (OPR: NAVY)**
  - Demonstrate voice, data, and video integration.
- **Criterion 5: (OPR: ARMY)**
  - Demonstrate effective operation in low-bandwidth environment.
- **Criterion 6: (OPR: DISA)**
  - Demonstrate scalability of IPv6 networks.
- **Criterion 7: (OPR: ARMY)**
  - Demonstrate support for mobile terminals (voice, data, and video).
- **Criterion 8: (OPR: AIR FORCE)**
  - Demonstrate transition techniques.
- **Criterion 9: (OPR: AIR FORCE)**
  - Demonstrate ability to provide network management of networks.
- **Criterion 10: (OPR: NAVY)**
  - Demonstrate tactical deployability and ad hoc networking.

JSC Status

- Criteria 6 has been demonstrated and reported green (2007 T&E Report)
- Demonstration of Criteria 1 is dependent on availability of HAIPEv3 products to meet 2QFY09
- Expected completion date for all criteria is 4QFY10 (chart to the right presents the level 1 decomposition dates)

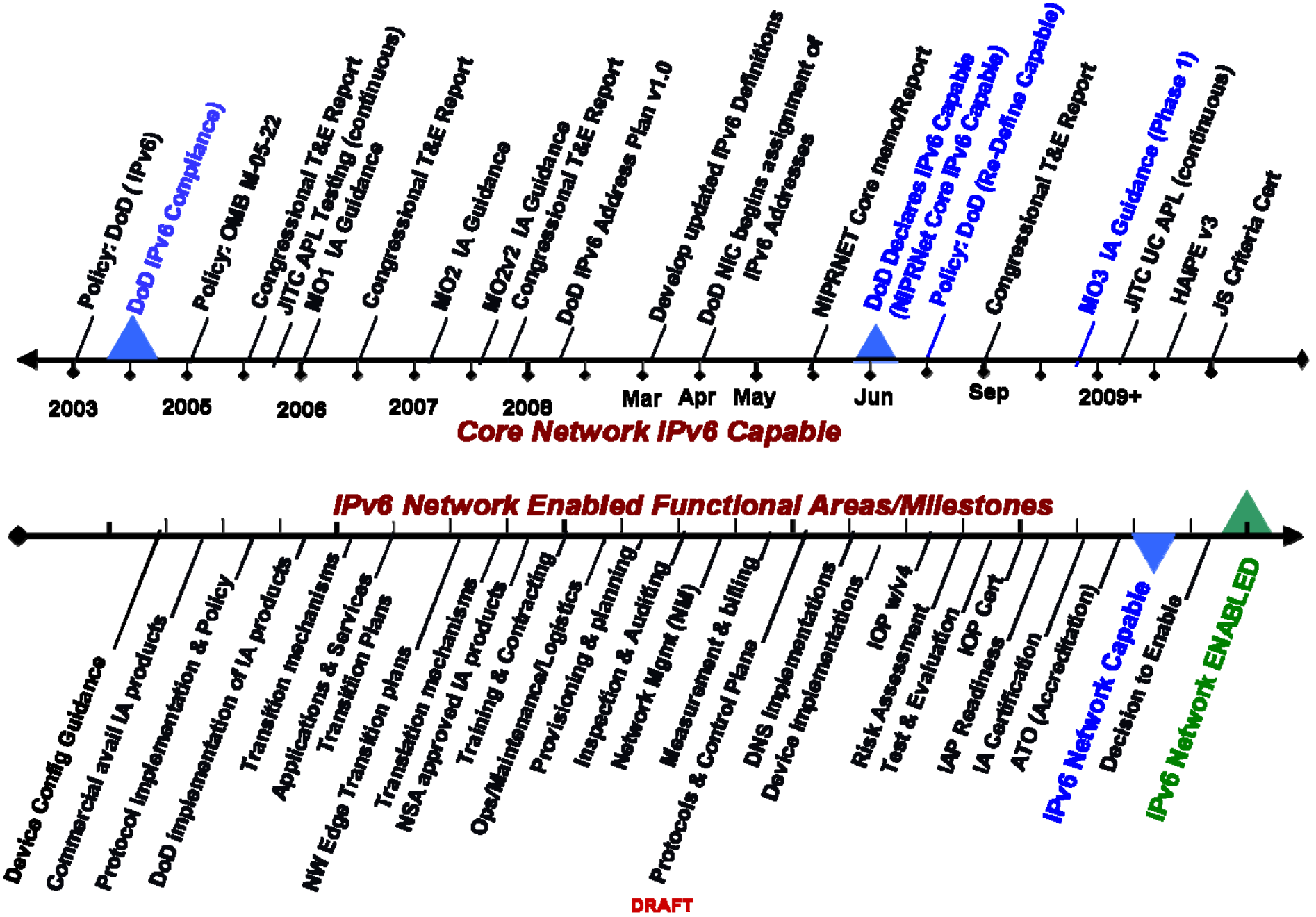
MTP ver 2, dated Sept 2006	2007 T&E Report
Completion Dates	Current Status
1.1 – 4QFY08	Yellow
1.2 – 4QFY08	Yellow
1.3 – 4QFY08	Red
1.4 – 4QFY08	Yellow
1.5 – 1QFY08	Yellow
1.6 – 2QFY09	Red
2.1 – 2QFY08	Green
2.2 – 2QFY08	Yellow
2.3 – 2QFY08	Green
3.1 – 1QFY08	Yellow
3.2 – 1QFY08	Yellow
3.3 – 1QFY08	Yellow
3.4 – 1QFY08	Yellow
4.1 – 4QFY08	Yellow
5.1 – 2QFY09	Red
6.1 – 1QFY08	Green
7.1 – 2QFY09	Red
8.1 – 1QFY08	Yellow
8.2 – 4QFY08	Red
9.1 – 4QFY08	Red
10.1 – 2QFY10	Red
10.2 – 2QFY10	Red

Transition Methodology



IPv6-Enabled

DoD IPv6 "Enable the Network" Continuum



IPv6 Implementation*

- NIPRNet Core IPv6 Capable (OMB Demo): Jun08
- Teleport - Unclass IPv6 Capable: FY05 – FY09
- MO3 IA Guidance (Phase 1): 2QFY09
- IA products (Firewalls, IDS/IPS, etc): FY09 – FY10
- NIPRNet IPv6 Capable: FY04 – FY10
- MO3 IA Guidance (Phase 2): FY10
- Services/Agencies Unclassified Networks IPv6 Capable: FY09 – FY11
- Systems/Applications IPv6 Compliant: FY09 – FY10
- HAIPE v.3 IPv6 Capable: FY10 – FY11
- MO3 IA Guidance (Phase 3): FY11
- SIPRNet Core IPv6 Capable: FY11
- SIPRNet IPv6 Capable: FY11 – FY12

* Notional schedule based on readiness, dependencies, and availability of IA Products

Future: IPv6-Enabled Battlefield

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

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

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

IPv6 Enabled Battlefield of the Future

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

Dynamic formation of COIs supported by improved multicasting.

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.

Conclusion

- **IPv6 is critical to achieving DoD's Net-Centric Vision and allowing next generation of advanced applications to be developed**
  - **IPv4 cannot support future required capabilities**

- **Challenges/Dependencies in executing DoD IPv6 transition:**
  - **Availability of commercial IPv6 products including IA products**
  - **Availability of approved NSA IA products**
  - **Managing/resourcing the transition within existing budgets**
  - **Maintaining interoperability and security during the transition (and after)**
  - **Evolving IPv6 standards/products**
  - **Accommodating residual legacy**

- **Significant progress being made in DoD IPv6 transition:**
  - **Requirements for IPv6 capability have been integrated into acquisitions/technology refreshment**
  - **Transition implementation is well underway**
    - **NIPRNet to demonstrate IPv6 Capable to OMB**
    - **Strategy: networks then sytems/applications**
  - **Transition solutions and technical guidance continue to be developed**
  - **Ongoing test and evaluation activities**
  - **Re-defined IPv6-Capable and IPv6-Enabled**
  - **WGs continue to address technical/programmatic IPv6 issues**

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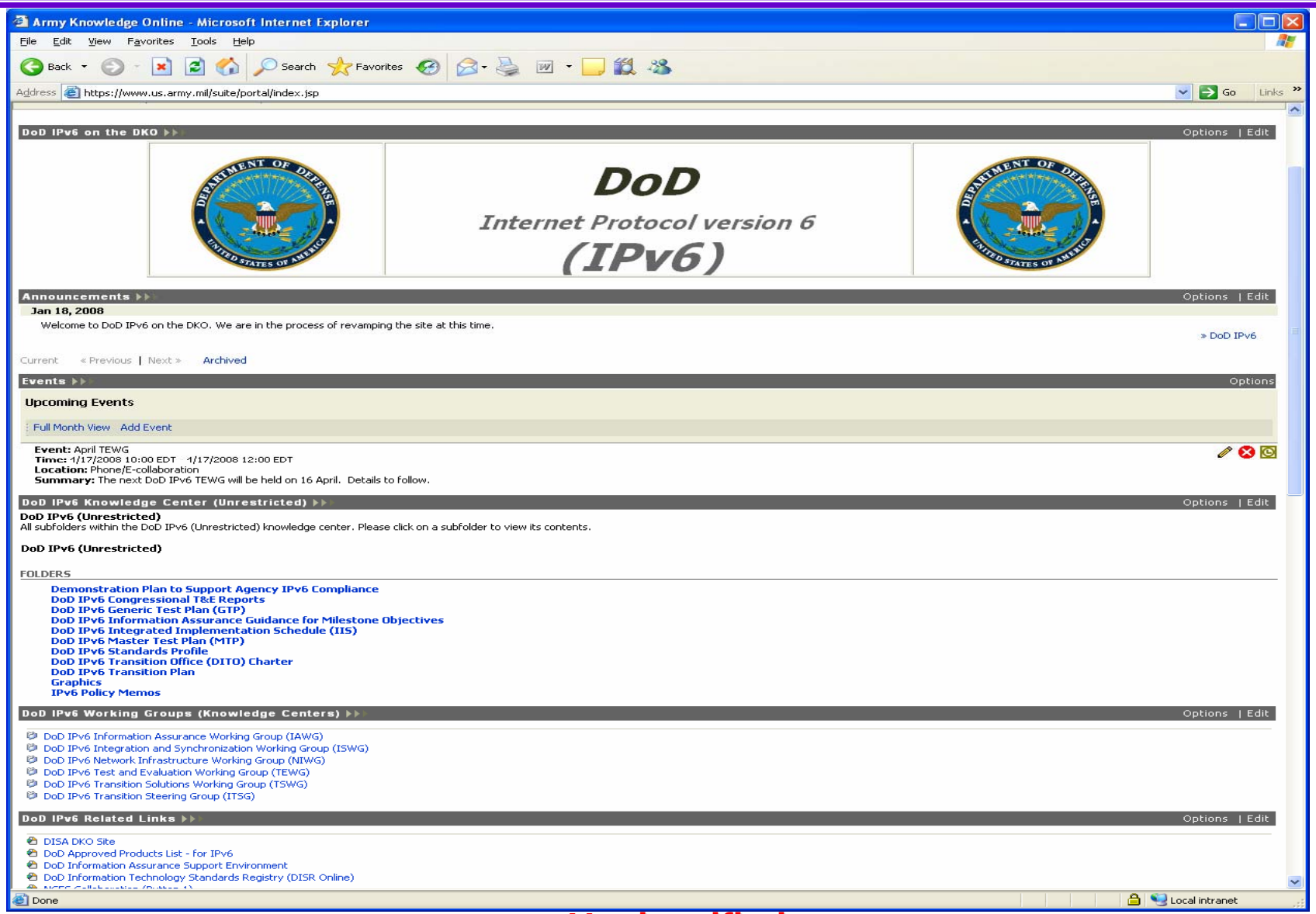

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