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# Networks and EMS (NES) Roadmap Navy EW and Cyber Convergence

**2011 DoD Spectrum Workshop**



16 DEC 11



# Call to Action



"In the next two decades, the [electromagnetic] environment may become our most critical warfighting arena. Control of information -- much of it through the EM spectrum -- is already growing more important than control of territory in modern warfare."

- ADM Jonathan Greenert, CNO, 10 October 2011

"The future Fleet will maintain our current advantages in the electromagnetic spectrum and cyberspace, but will fully operationalize them as warfighting domains."

- CNO, Navy 2025: Forward Warfighters, Proceeding Magazine, Dec 2011



"Cyberspace will be operationalized with capabilities that span the electromagnetic spectrum – providing superior awareness and control when and where we need it."

- CNO's Sailing Directions, SEP 2011

Senior leaders understand the risks and challenges

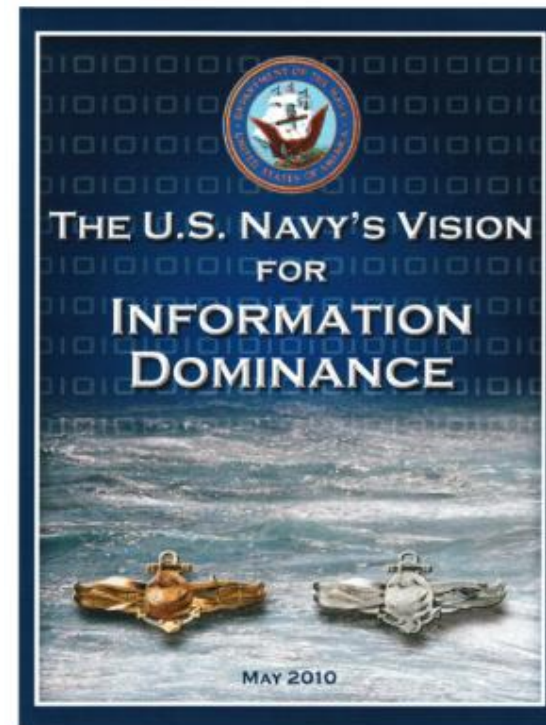


# Enabling the Information Dominance Vision

*Support the Information Dominance Vision with a single unified information environment across tactical, operational and strategic-level spectrum management and networks to assure the commander and warfighter get the right information at the right time*

Key features of NES approach:

- ❑ Assured C2 of existing networks and communication infrastructure
- ❑ Phased approach to automated, real-time spectrum operations
- ❑ Network architecture and data strategy that establishes the grid
- ❑ Enterprise services that facilitate information discovery and sharing
- ❑ Authorities, oversight, standards and training that instill unity of command

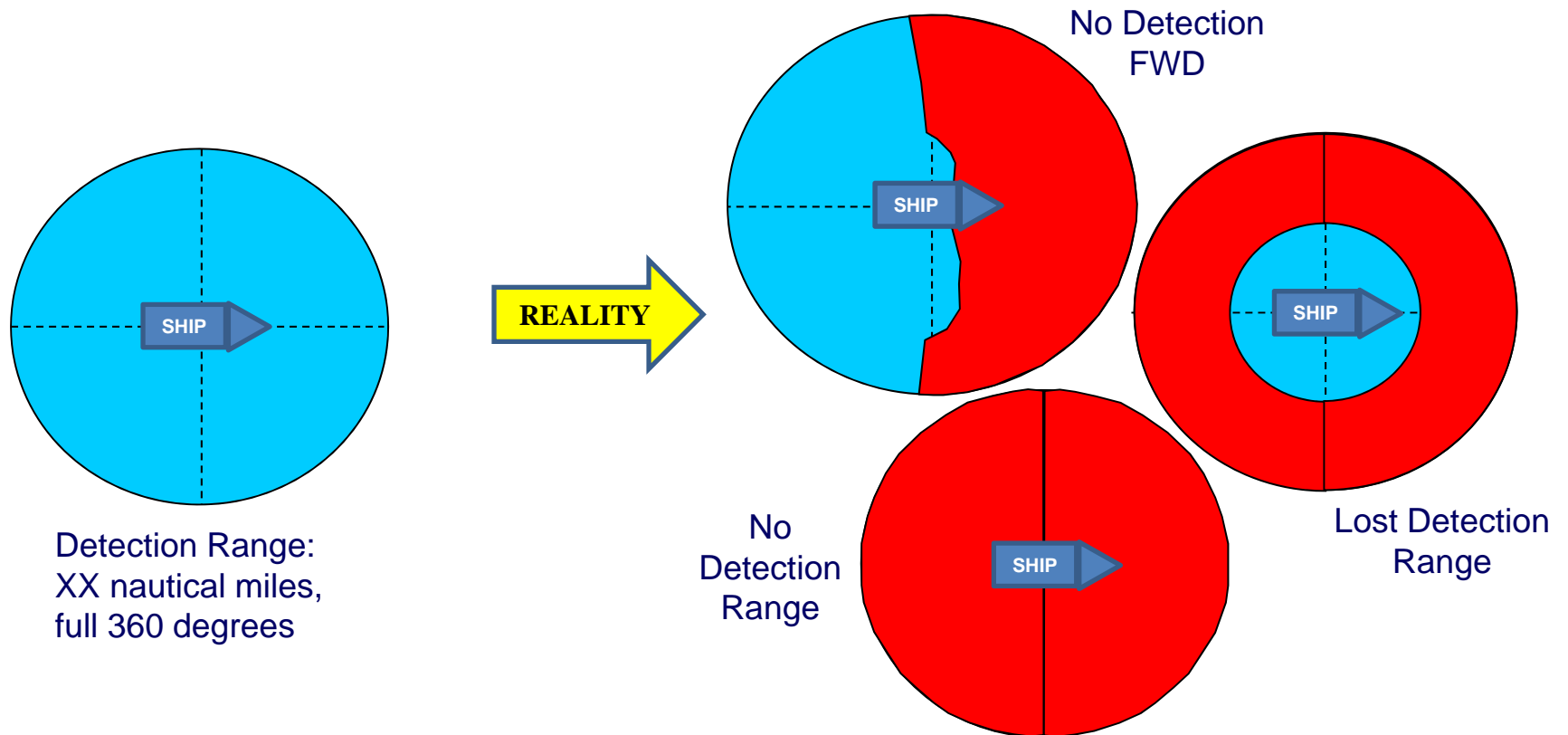




# The Hidden Problem Obscured EMI Impacts

- ❑ Ship operator assumes system 100% capable

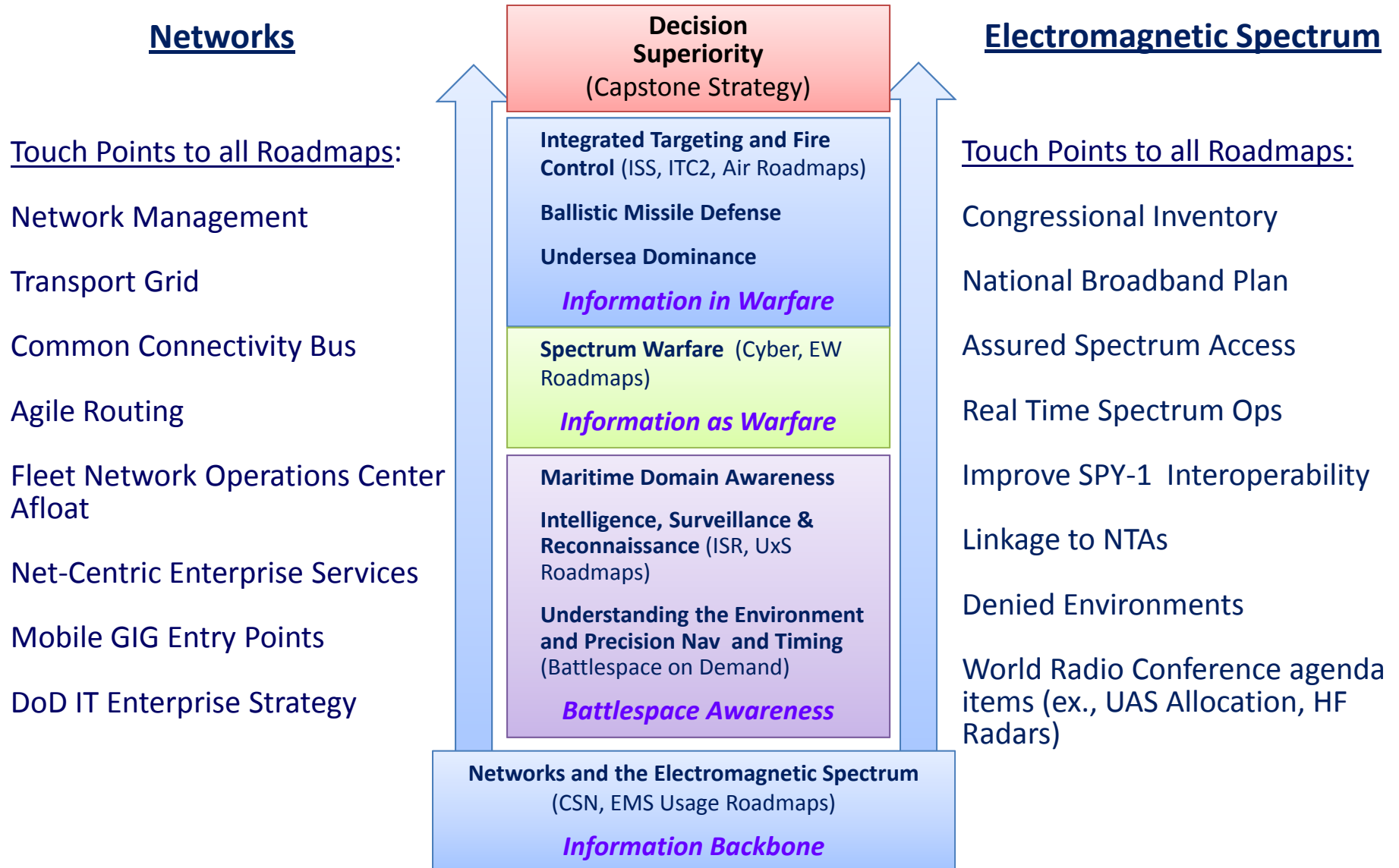
- Actual System Operational Capability



Goal: Make the Assumption the Reality



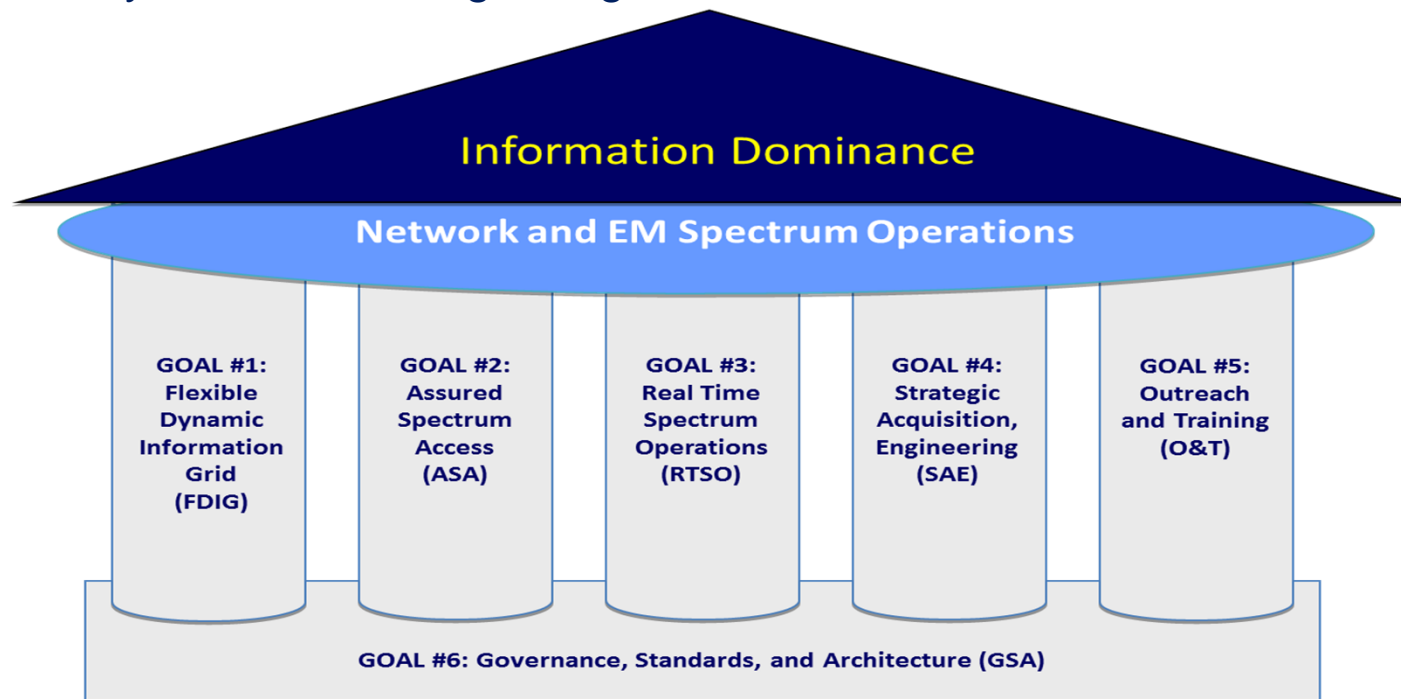
# NES Wholeness / Integration





# NES Vision and Goals

- ❑ Develop and establish a complete portfolio of reliable, highly-interoperable network and electromagnetic spectrum capabilities
- ❑ Manage through a flexible, dynamic information grid that maximizes the ability of the warfighter to access, maneuver, and achieve decision superiority in, A2AD, benign, degraded and denied environments



## [Links to NES and Spectrum Maps](#)

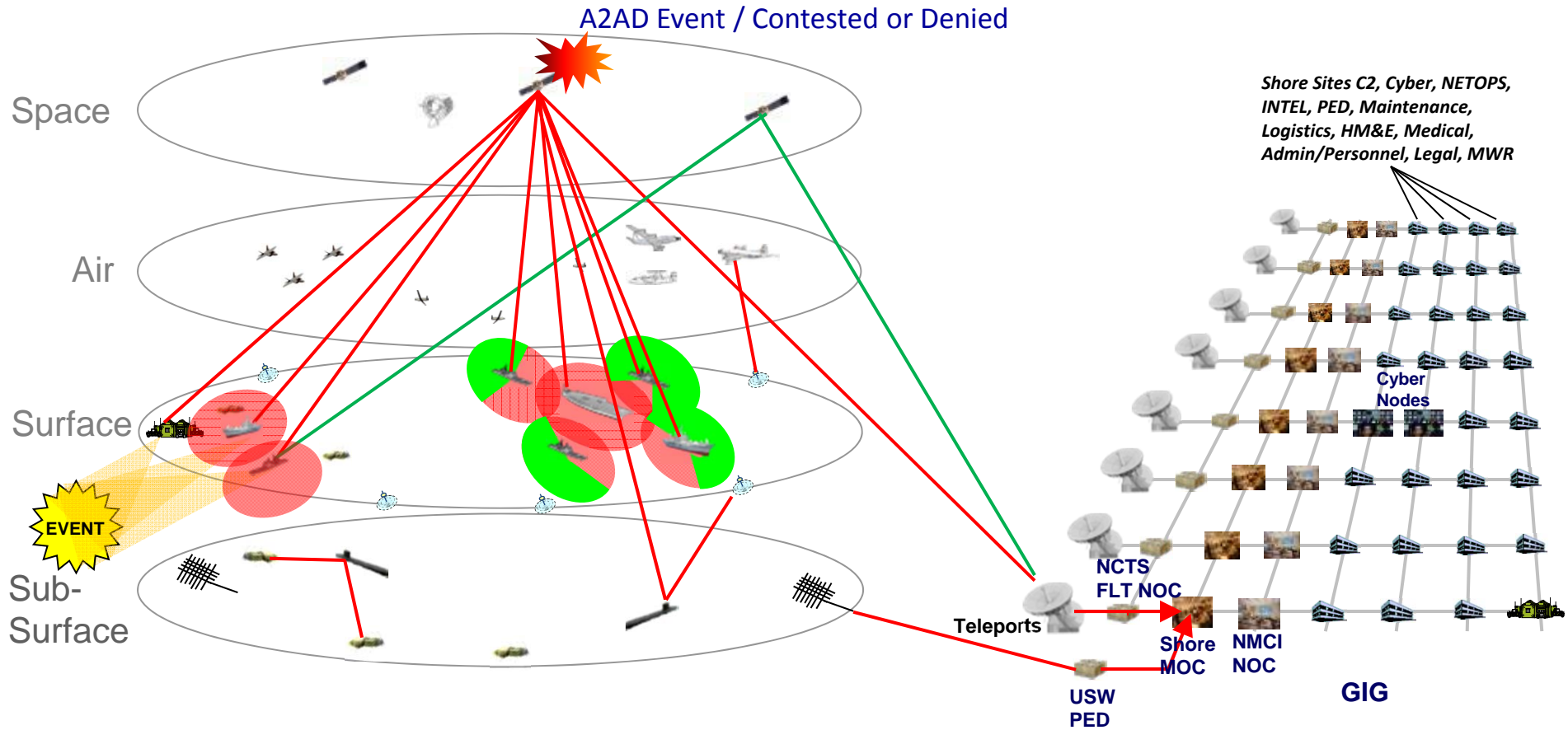
[https://www.intelink.gov/wiki/Networks and Electromagnetic Spectrum \(NES\) Roadmap](https://www.intelink.gov/wiki/Networks_and_Electromagnetic_Spectrum_(NES)_Roadmap)

[https://www.intelink.gov/wiki/EM Spectrum Usage Roadmap](https://www.intelink.gov/wiki/EM_Spectrum_Usage_Roadmap)



# NES Overarching View

As-Is 2011

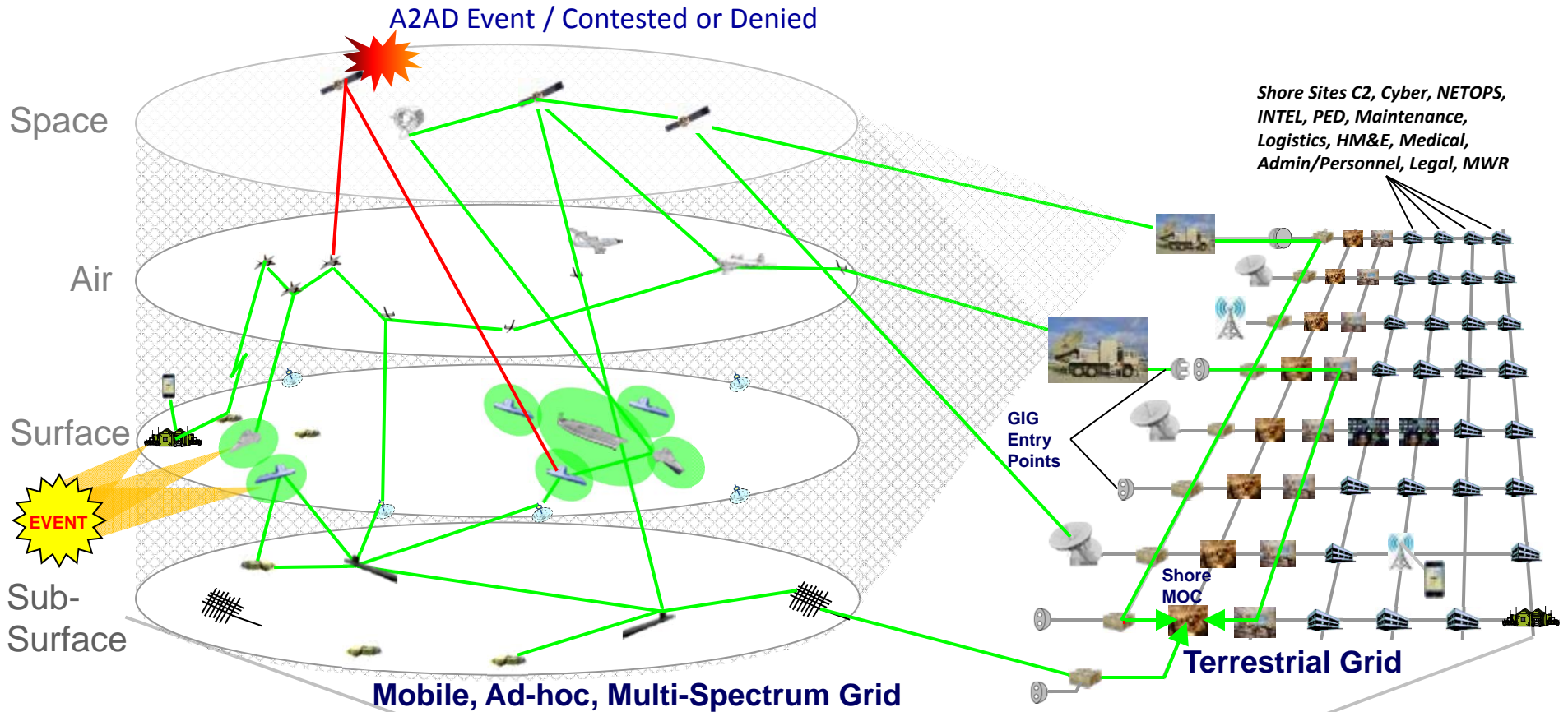


**Point-to-point comms, specialized comms relays,  
reliance on Space Layer for connection to GIG,  
platforms are degraded**



# NES Overarching View

To-be Vision 2025



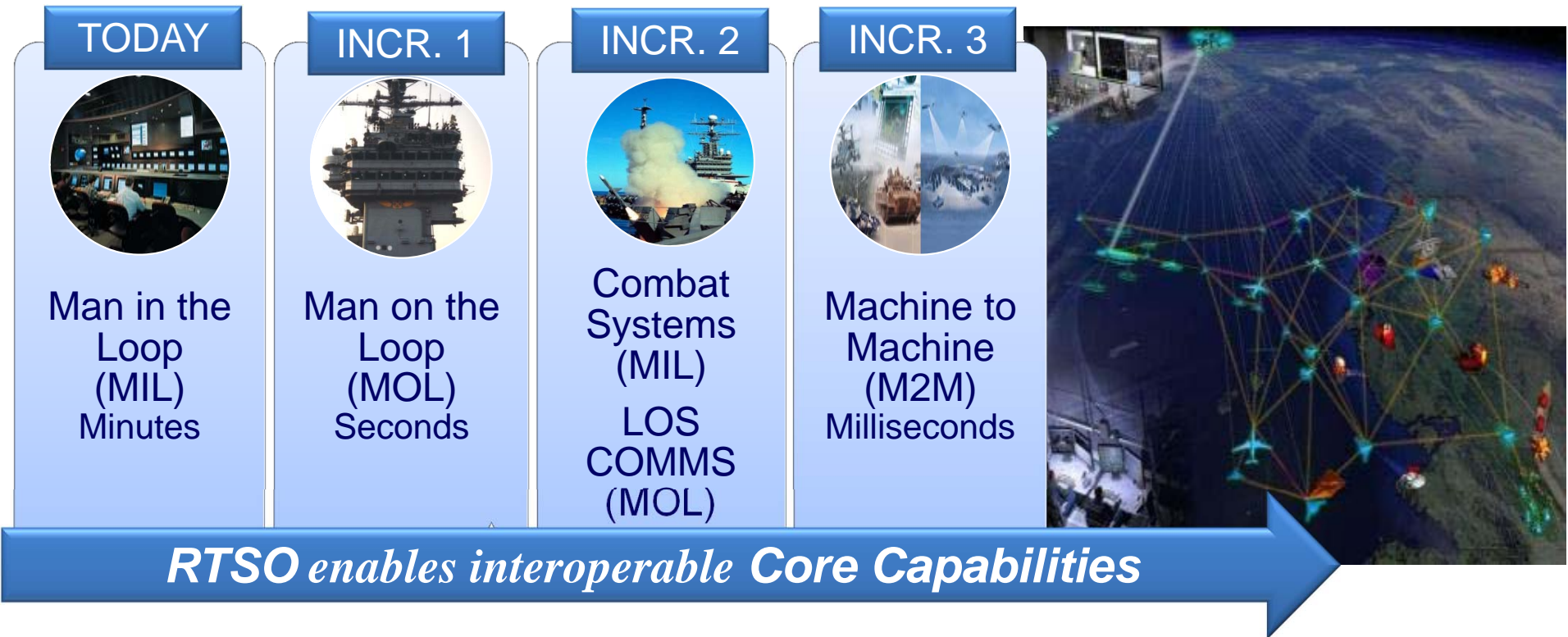
## Global Information Grid

*Every node connects to the Grid, every node supports the Grid, Platforms have full combat capability*





# Real-Time Spectrum Operations (RTSO)



**COMUSFLTFORCOM – 2011 Fleet EW Integrated Prioritized Capabilities List (IPCL)  
Specifically highlights Spectrum Management and Real-Time Spectrum Operations (RTSO)  
concept development as a priority.**



# National Broadband Plan (NBP)

## Spectrum Bands Being Considered (Goal #2: ASA)

#	Band MHz	Reallocation Impacts	Key Navy and DOD Systems	Other Federal Users
Band Study Prioritizations	406.1 – 420	3	Non-Tactical Land Mobile Radio Systems	DOC, DHS, GSA, DOJ
L Low - Reallocation Impacts minimal	1300 - 1390 (1370 – 1390)	4	Long Range Search Radars, Range Data Links, Cobra Dane, Tactical Comms (SRC-57 / MRC-142) Lightweight Counter Mortar Radar (Army), GPS	FAA, DHS, NSF, TVA, NASA
	1675 – 1695 (Fast Track 1695 – 1710)	2	Meteorological Satellite (GOES) downlinks and Radiosondes	DOC, NOAA, NASA
	1755 - 1780	1	Space Ground Link Subsystem (SGLS uplink); UAVs – Pointer, Raven, others; Tactical Comms (HCLOS, DWTS, SRC-57); Air Combat Training Systems; Precision Guided Munitions (PGMs); Sustaining Base Operations	DOJ, DOA, DOC, DHS, DOE, FAA, DOI, NASA, TVA, NSF, VA, HUD
1780 - 1850	DOJ, DOA, AID, DOC, DHS, DOE, EPA, FAA, HHS, HUD, DOI, OPM			
M Medium - Reallocation Impacts significant	2200 – 2290		Missile telemetry, Airborne telemetry, Space Ground Link Subsystem (SGLS downlink)	DOA, DOC, DHS, GSA, DOI, DOT, DOJ
	2700 – 2900		Ground and Maritime Air surveillance radars, future Navy radars	FAA, NOAA, DOE
	2900 - 3100		Ground penetrating and weather radars, Maritime Navigational radars, future Navy radars (BMD)	NOAA, DOE
H High - Reallocation Impacts Critical, band should not be pursued	3100 - 3500		DDG/CG Aegis SPY-1 Weapon System (Radar and Missile guidance); Army Fire Finder counter battery radar; Airborne radar; future Navy radars (BMD)	DOE
	3500 – 3650 MHz (Fast Track 3550 – 3650)		Airborne Station Keeping Equipment, Shipboard Air Traffic Control radar, future Navy radars (BMD)	DOE
	4200 - 4400		Radar altimeters on all DOD aircraft , PGMs, and large UAVs	FAA, DOI, DHS

NTIA Top Priority Bands

Reallocation impacts determined by OPNAV, Fleet, and PEO leads



# Lexicon Challenges



## Conventional Wisdom



- Cyber is IP based communications
- EW is radars and missile seekers
- SIGINT is communications signals
- Electromagnetic spectrum = RF only
- Cyberspace is a domain

Hard to define new things with old language



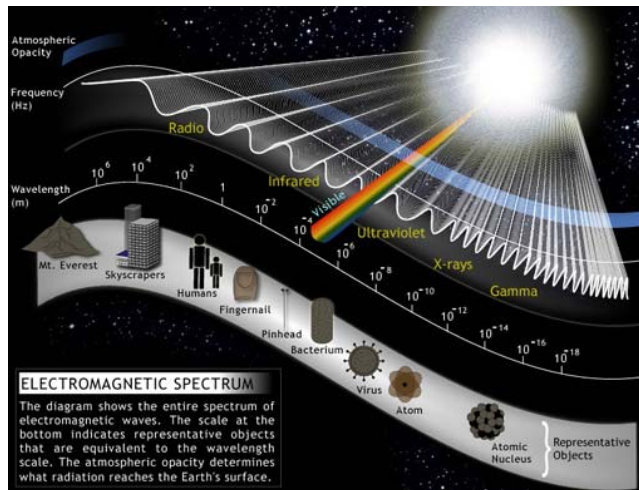
# The Lexicon Matters...



- Cyber is the language of the 21<sup>st</sup> Century, but have we got the terminology correct?

-- What is “cyber”? Where does it begin and end? Is it really the domain, or is the EMS the “domain”?

-- The EMS is more than just RF, and underpins cyberspace. It’s the physical environment in which cyberspace exists.



- When we talk convergence, convergence of what?

-- Technological convergence between wired, wireless and optical?

-- Operational employment of EW and cyber capabilities?  
EA and CNA -- OCO and ES -- SIGINT and CNE

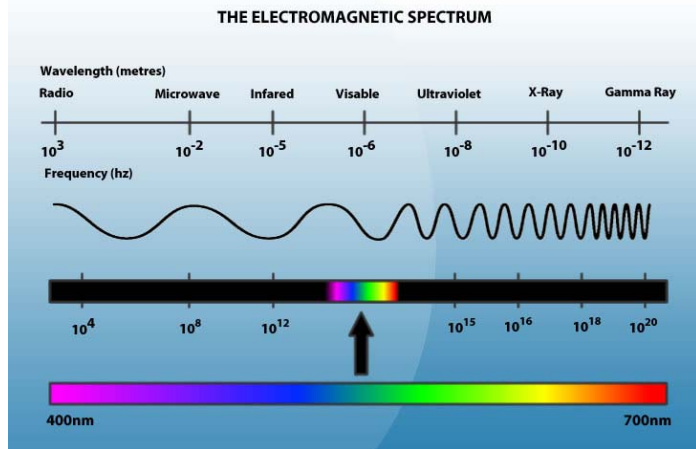
Common understanding and application of terminology



Operational Fires in the Electromagnetic Spectrum



# Operational Fires in the EMS



- Targeting/Counter Targeting
- C2/Counter C2
- Delivery/Counter delivery
- Real Time Spectrum Ops
- EW Battle Management



**Ships**



**Aircraft**



**SpecWar**



**Submarines**

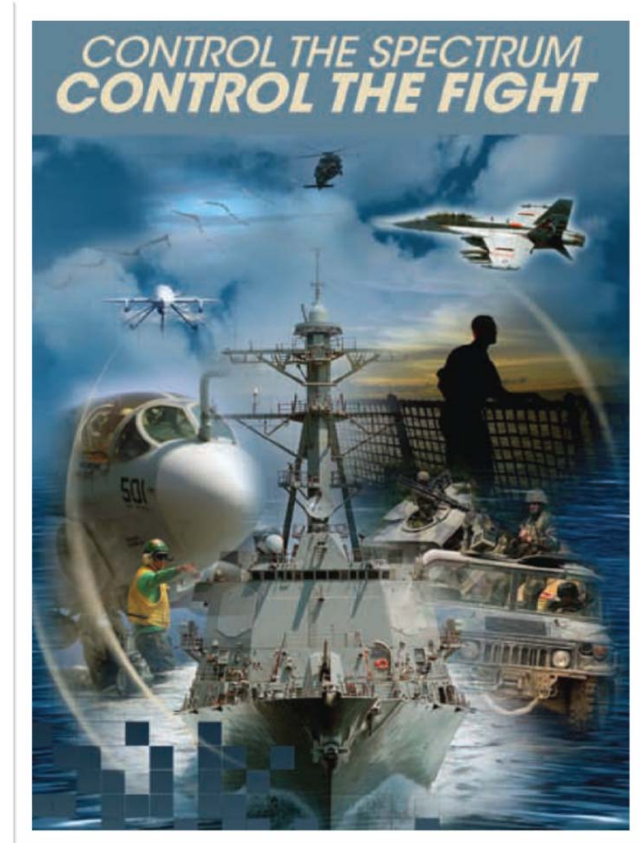
Navy provides tactical entry points to the EMS for a variety of missions



# Electronic & Cyber Warfare Plan

Modernize and converge Electronic & Cyber Warfare (E/CW) to influence, control, and when needed, fight and win in the EMS

- Investing for near-term E/CW capability & long term capacity
- Fielding capabilities for “fires” through the EMS
- Providing E/CW readiness



Building the ECW future for operating in the information environment



# Achieving Convergence



- Workforce adjustments required:
  - Historically, EW and CNO were separate and distinct skill sets.
  - What's the future? EW and cyberspace operations still separate, but less distinct?
- TTP development needed
- EW systems used for cyber mission
  - Surface EW systems such as SSEE-F are “cyber” ready
- Changes to roles and missions
  - Move beyond current focus on NETOPS/CND
- Authorities and governance need revision
  - EW can enable unique cyber “non-kinetic fires”
- Implications for Navy's Title 10 Man, Train and Equip responsibility

EW-Cyber convergence for all phases of warfighting and mission areas