



**Program Executive Office  
Command, Control, Communications,  
Computers and Intelligence (PEO C4I)**

# **Afloat Networks ASNE Combat Systems Symposium**

**March 2012  
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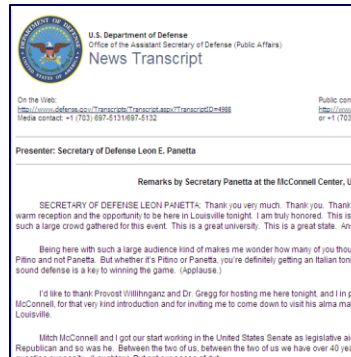
***Information Dominance  
Anytime, Anywhere...***



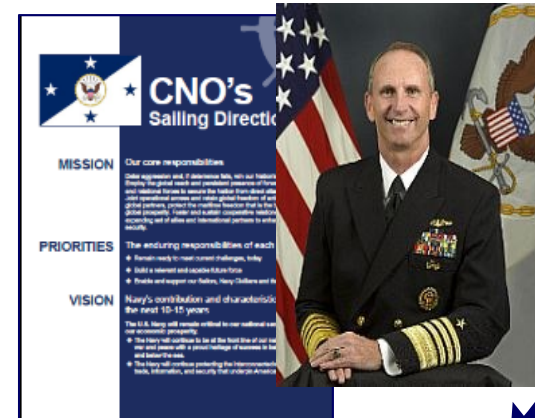
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# Bandwidth = Time = Battlespace



Proceedings Magazine, "Lead or Get Out of the Way: Winning the Millennium War," VADM Mark Edwards, US Navy, April 2008,



- We must continue to invest in new capabilities like cyber and unmanned systems and space...
- I have to tell you that I do worry, however, about this new area I talked about of cyber-war.
- I think the capabilities are available in cyber to virtually cripple this nation, to bring down our power grid system, to impact on our governmental system, to impact on our -- on Wall Street, on our financial systems, and to literally bring -- paralyze this country.
- So the one thing that I worry about the most right now is knowing that this is possible and feeling that we have not taken all the necessary steps to protect this country from that possibility.

- Over the next 10-15 years, the Navy will evolve and remain the preeminent maritime force.
  - The reach and effectiveness of ships and aircraft will be greatly expanded through new and updated weapons, unmanned systems, sensors, and increased power.
  - Unmanned systems in the air and water will employ greater autonomy and be fully integrated with their manned counterparts.
  - Cyberspace will be operationalized with capabilities that span the electromagnetic spectrum -- providing superior awareness and control when and where we need it.



# PEO C4I End to End Capability Early – Mid 90's



## RF Bandwidth

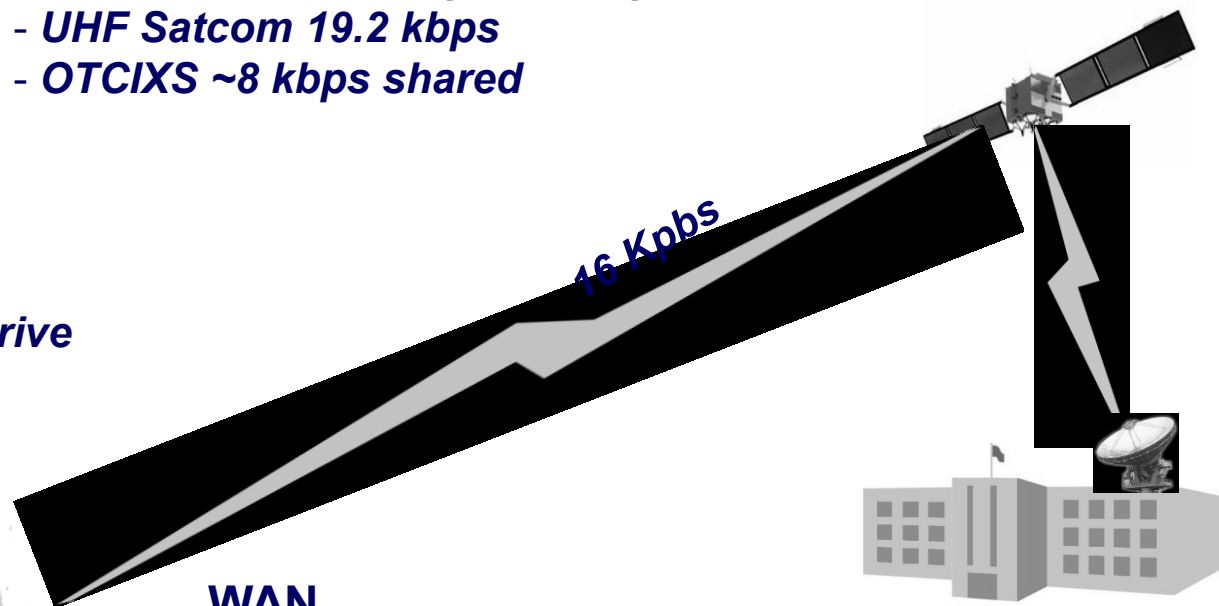
- *Inmarsat 16kbps*
- *SHF voice (CMD Ships) 16 kbps*
- *UHF Satcom 19.2 kbps*
- *OTCIXS ~8 kbps shared*

## Network Storage

- *JOTS/JMCIS: 20 MB Hard drive*

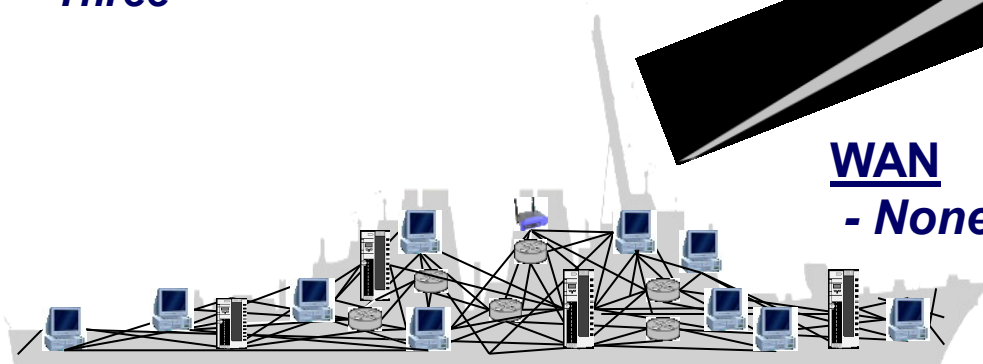
## Applications

- *Three*



## WAN

- *None*



SHF – Super High Frequency  
EHF – Extremely High Frequency  
OTCIXS - Officer in Tactical Command Information Exchange Subsystem  
JOTS – Joint Operational Tactical System  
JMCIS – Joint Maritime Command Information System

***Required Bandwidth achieved via helicopter – Navy disadvantaged and nearly kept out of the game....***



# PEO C4I End to End Capability 2010's



## RF Bandwidth (up from 16 Kbps)

- Inmarsat 16kbps
- SHF up to 7 mbps
- EHF 1.5 mbps
- UHF Satcom 48 kbps
- GBS (rcv only) 45 mbps
- CWSP/CBSP up to 21 mbps

## Network Storage

**Common Computing Environment (ISNS):**

**20 TB storage per enclave (up from 20 MB Hardrive)**

**CANES: 9.5 TB for apps alone**

## Applications

**- Over 800 Connected or hosted (up from 3)**

## WAN (ADNS)

**- 25 / 50 mbps**

CANES – Consolidated Afloat Networks and Enterprise Services  
ISNS – Integrated Shipboard Network System  
ADNS – Automated Digital Network System  
SHF – Super High Frequency  
EHF – Extremely High Frequency  
GBS – Global Broadcast System  
CWSP/CBSP – Commercial Wideband Satellite Program/Broadband

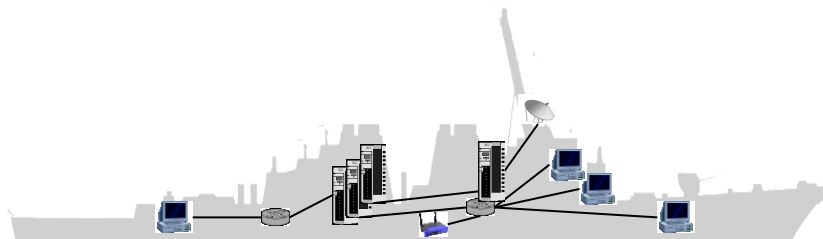
**...now Supports Full Motion Video, persistent COP, ISR Data Management and full array of Warfare**



# PEO C4I End to End Capability



| Capability         | Current Systems                                                                                                                                                                                                                                                                                                                                  | Future Technology                                                                                                                             |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Local Area Network | <ul style="list-style-type: none"> <li>- Integrated Shipboard Network Systems (ISNS)</li> <li>- Submarine LAN (SubLAN)</li> <li>- Combined Enterprise Regional Information Exchange System – Maritime (CENTRIXS-M)</li> <li>- Sensitive Compartmented Information Networks (SCI Net)</li> </ul>                                                  | <ul style="list-style-type: none"> <li>- Consolidated Afloat Networks and Enterprise Services (CANES)</li> </ul>                              |
| C2 Application     | <ul style="list-style-type: none"> <li>- Global Command and Control System – Maritime (GCCS-M)</li> <li>- Naval Tactical Command Support System (NTCSS)</li> <li>- Distributed Common Ground System - Navy (DCGS-N)</li> </ul>                                                                                                                   | <ul style="list-style-type: none"> <li>- Maritime Tactical Command and Control System (MTC2)</li> <li>- NTCSS</li> <li>- DCGS-N</li> </ul>    |
| Wide Area Network  | <ul style="list-style-type: none"> <li>- Automated Digital Network System (ADNS) Increments I, II, III</li> </ul>                                                                                                                                                                                                                                | <ul style="list-style-type: none"> <li>- ADNS Inc III</li> <li>- ADNS Inc II (Airborne)</li> </ul>                                            |
| Communications     | <ul style="list-style-type: none"> <li>- Super High Frequency (SHF)</li> <li>- Navy Extremely High Frequency Program (NESP)</li> <li>- Global Broadcast System (GBS)</li> <li>- Commercial Wideband Satellite Program (CWSP)</li> <li>- Commercial Broadband Satellite Program (CBSP)</li> <li>- Battle Force Tactical Network (BFTN)</li> </ul> | <ul style="list-style-type: none"> <li>- Navy Advanced EHF Multiband Terminal (NMT)</li> <li>- CBSP</li> <li>- GBS</li> <li>- BFTN</li> </ul> |



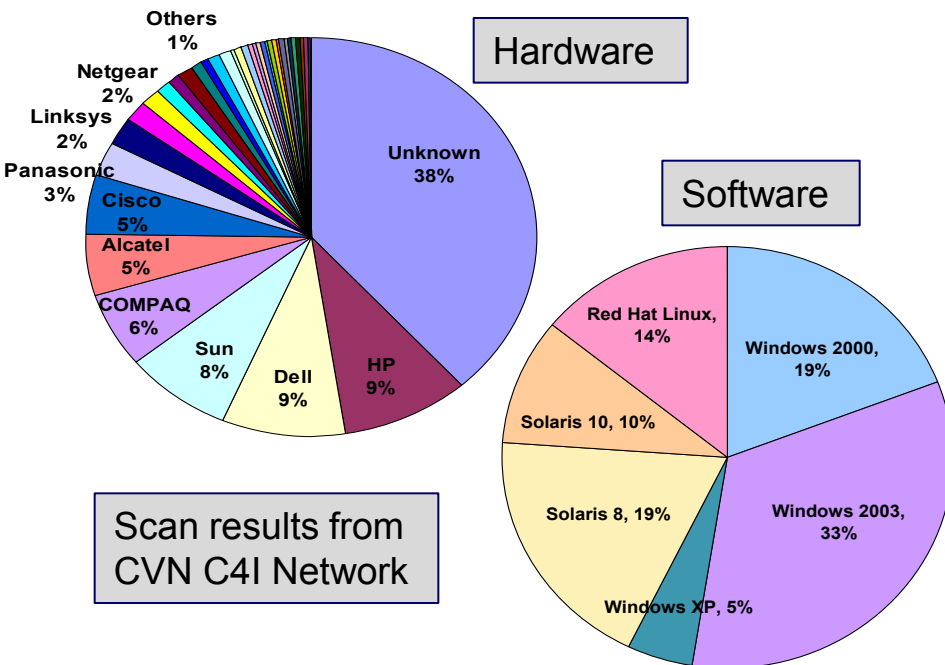


# Network Development

## Status Quo

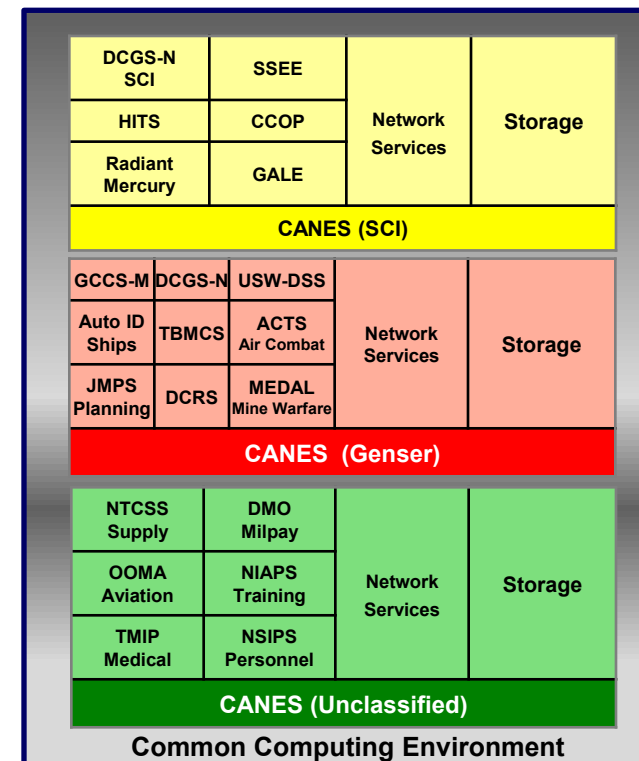
- Multiple security vulnerabilities
  - Inadequate levels of information security / network readiness
- Multiple unique networks & h/w variants
  - 642 legacy variants on 300+ platforms
- Multiple Operating Systems and versions
- Inefficient use of server/storage resources

***Across multiple security enclaves***



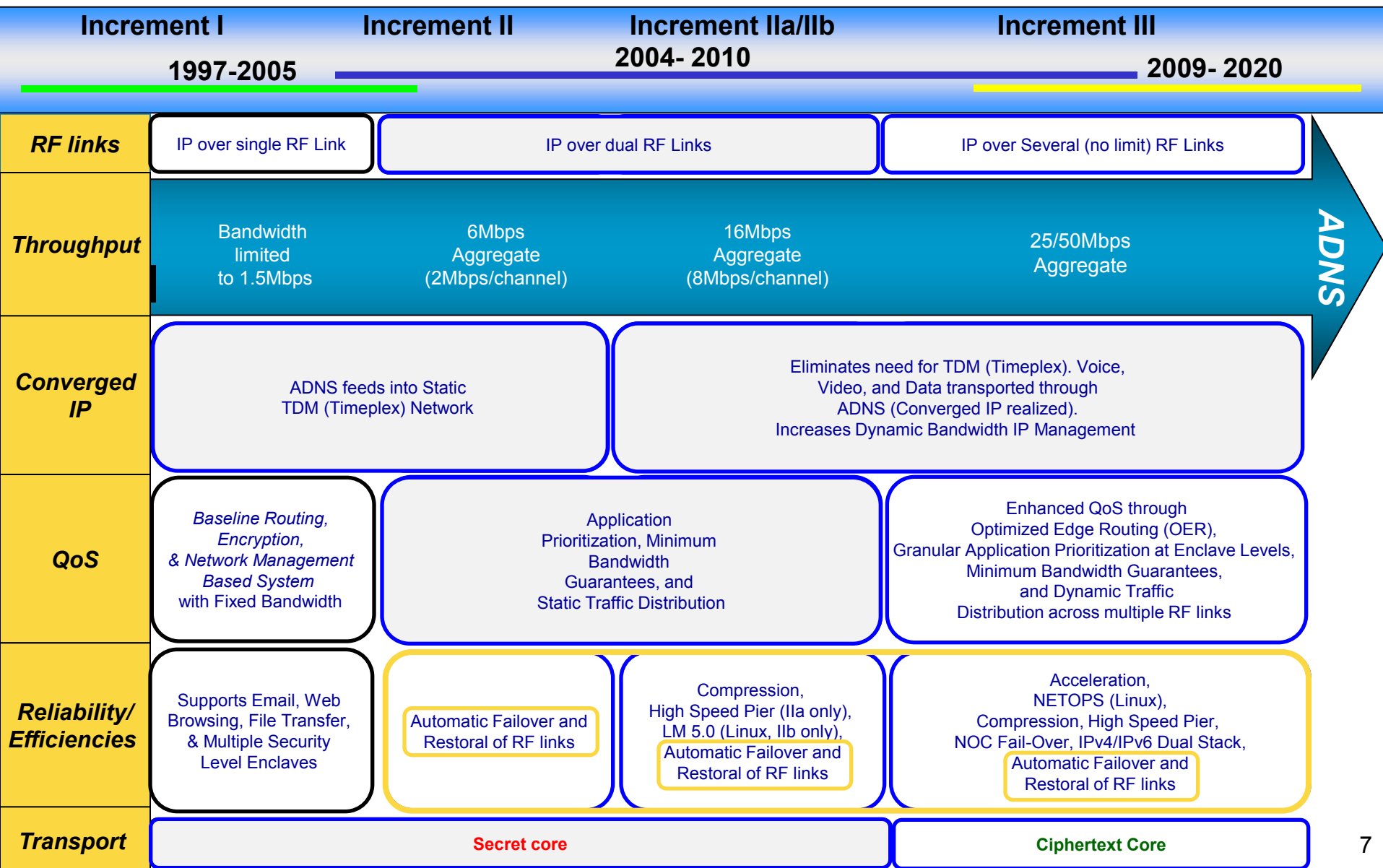
## CANES

- Common Computing and Software Environment
- Cross Domain Solutions (CDS)
- Systems Management
- Technology Refresh





# ADNS Evolutionary Development



ADNS



# Navy SATCOM Capability Growth



## Desert Storm c. 1990

Inmarsat - A  
SALTS (logistics)/FAX  
Official Phones  
2.4-16 kbps

SHF  
Voice @ 16 kbps  
(Command Ships Only)  
16 kbps

UHF  
"Dual DAMA"  
8 2.4 kbps  
Circuits  
(25kHz only)  
Secure Voice/Data  
Netted Comms  
19.2 kbps



Navy barely in the game

## Post Desert Storm

- 1992 "QUICKSAT" SHF for CVNs
- 1994 ORDs define WB SATCOM requirements



### Aggressive fielding schedules deliver:

- WB MILSATCOM for all Surface Combatants
- WB Commercial SATCOM (CWSP) augmentation for Large-decks
- Inmarsat-B HSD for others

...getting into the game

## Today

UHF  
"Quad DAMA"  
16 2.4 kbps  
Networks  
(25kHz only)  
Secure Voice/Data  
Netted Comms  
48 kbps

SHF  
JWICS  
SIPRNET  
NIPRNET  
VTC  
POTS  
MSG TRAFFIC  
CHAT  
384 kbps – 12 Mbps

EHF MDR  
JWICS  
SIPRNET  
NIPRNET  
MDU's  
BMD Net  
SECURE  
VOICE/DATA  
4.8 – 1544 kbps

EHF LDR  
24 LDR Channels  
8 Primary  
(2.4 kbps)  
8 Secondary  
(300 bps)  
8 RCV Only  
(2.4 kbps)  
MDU's, S-TADIL-J  
Secure Voice/  
Data  
21.6 kbps

24 – 45 Mbps  
GBS  
(Receive Only)  
UAV Video  
CNN/FOX NEWS  
Imagery (Weather/Intel)  
Web Site Replication  
(classified/unclassified)  
Immediate File Delivery (IFD)

128 kbps  
Inmarsat - B  
HSD  
NIPRNET  
SIPRNET  
JWICS  
POTS  
FAX

1.544 - 2.048 Mbps  
CWSP/CBSP  
JSIPS/JCA  
JWICS  
SIPRNET  
NIPRNET  
VTC  
POTS  
MSG TRAFFIC

3.6 Mbps  
TV Direct to Sailors  
(Receive Only)  
News  
Sports  
Entertainment  
3 Radio Channels  
1 Data Channel

...staying in the game.



# Some Thoughts on Future Command, Control, Communications, Computers and Intelligence Capability and Capacity



**Rapidly Evolving Requirements Drive Navy Capability Advancements**

**Operational Environment**

- Humanitarian Assistance
- Short and Medium Range Ballistic Missiles
- Complex Threats Employing Advanced Technology in Challenging Environments
- Sub-Sonic Anti-Air & Anti-Surface Missiles
- Super-Sonic Anti-Air & Anti-Surface Missiles
- Advanced Super-Sonic Anti-Air

**Force Integration**

**Force Level Sensor & Weapons Coordination**

- Integrated Force Level Kill Chain
  - Coordination of Netted Force Operations to Counter Mid-Term Threats
  - Joint Weapons and Sensors Coordination to Counter Far-Term Threats

**Improved Mission Capability**

**Enabling**

**Future DoD IT Environment**

|                                                              |                                                                     |                                                |
|--------------------------------------------------------------|---------------------------------------------------------------------|------------------------------------------------|
|                                                              |                                                                     |                                                |
| Reduced costs for data centers and applications              | Improved interoperability for better coordination and collaboration | Improved user satisfaction and mission success |
|                                                              |                                                                     |                                                |
| Faster, more responsive capability deliveries to Warfighters | Improved security to reduce cyber threats                           | Faster adoption of commercial IT breakthroughs |

Reference: DOD CIO

## Future C4I Capability and Capacity drivers?

- **Cyberspace Operationalization**
- **Cyber Defense**
- **Broad Area Maritime Surveillance (BAMS)**
- **UAVs, USVs, UUVs**
- **LCS and Mission Modules**
- **Remote Sensors**
- **Maritime Aerial Layer Network**
- **Full Motion, High Resolution Video**
- **Advances in Computer Technology**
- **Advances in Network Technology**
- **Network and System Management**
- **Competition for Bandwidth**
- **Application Proliferation**
- **New ISR sources**
- **Advances in Waveforms**
- **Growth of Adversary Capabilities**
- **Growth of Coalition/Partner Capabilities**
- **Budget and Fiscal Realities**
- **Others????**



We get IT.

We also integrate it, install it and support it. For today and tomorrow.



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