BAA 09-018
High-Bandwidth Free-Space Lasercomm
Industry Day
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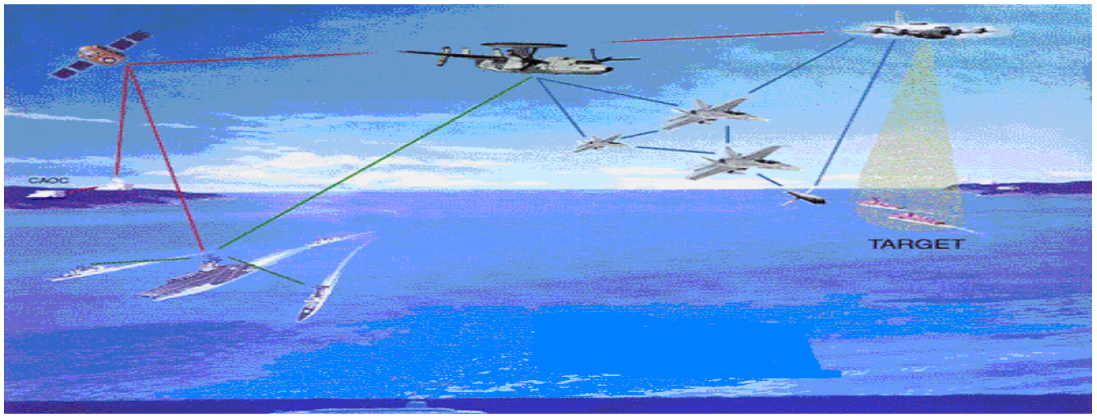
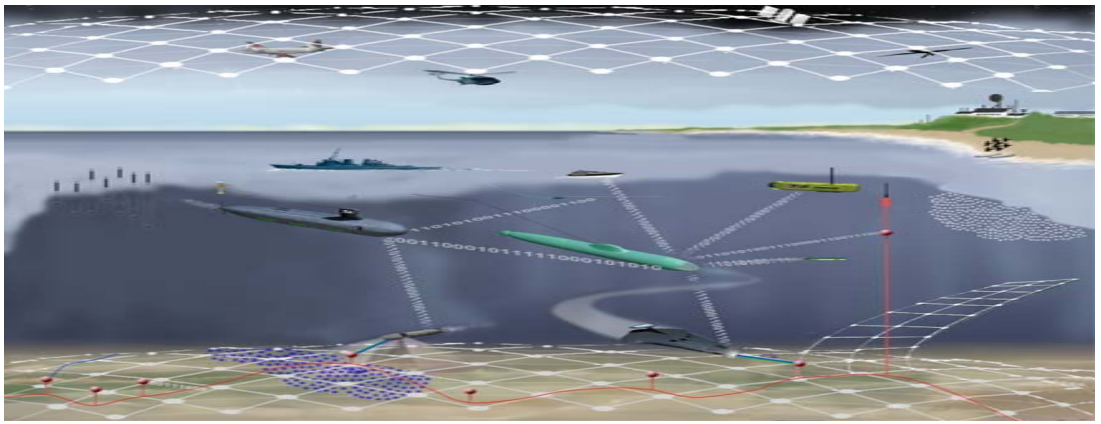
Outline

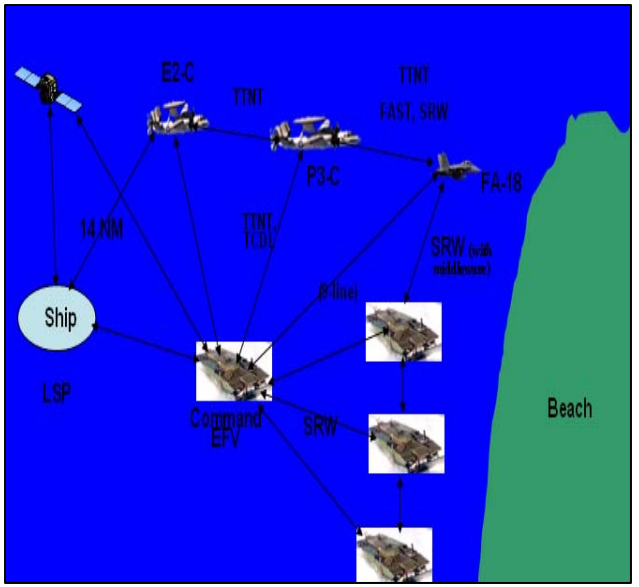
- Overall Communication S&T Initiatives
- Naval Requirements from OPNAV N6
- Software and Tools from NRL
- Related ONR S&T
- Joint Service Efforts
- Issues

Critical Naval Missions



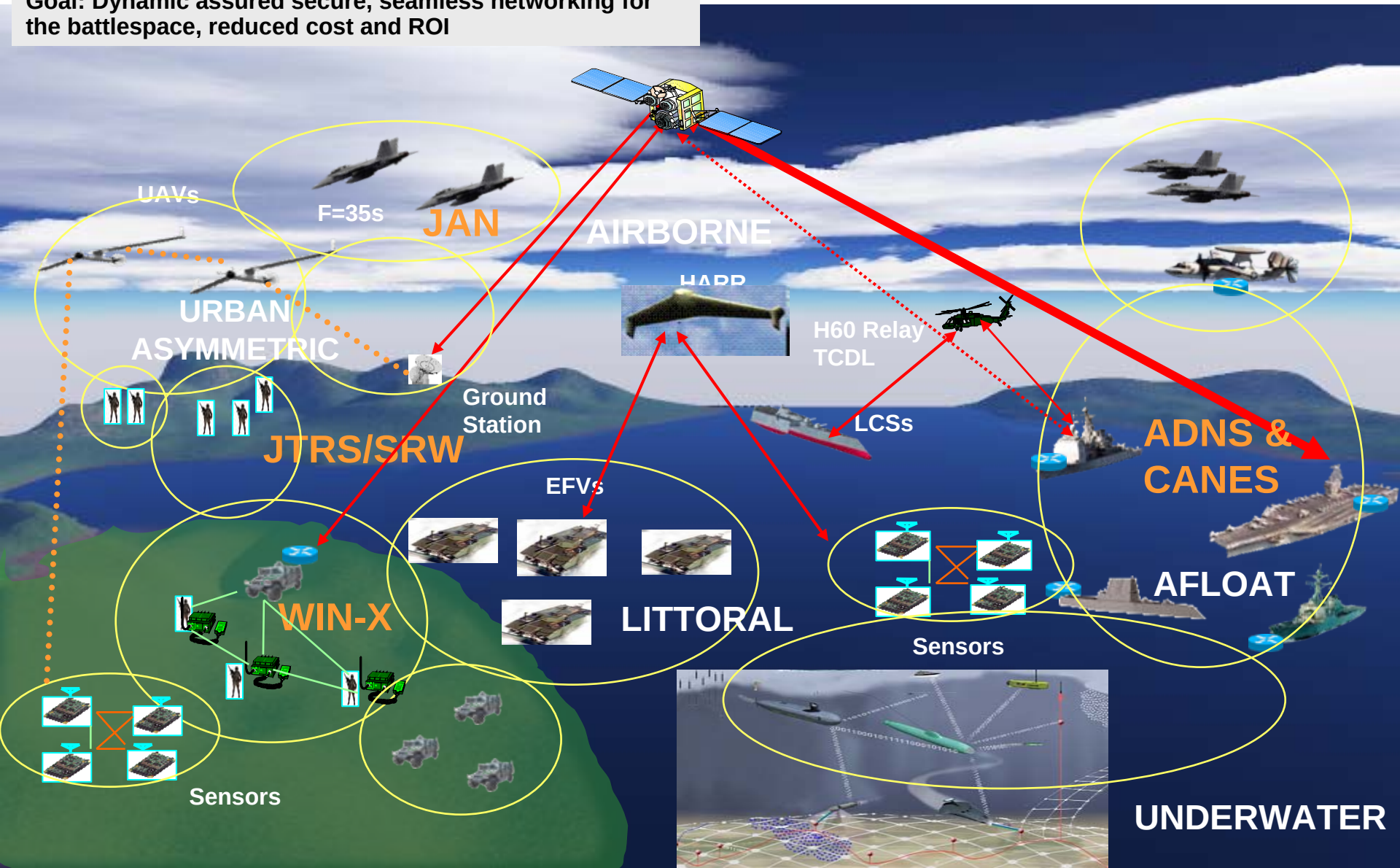


- Joint Maritime Interdiction (JIT)/ Anti-Surface Warfare (ASuW)
- Anti Submarine Warfare (ASW)
- Ballistic Missile Defense (BMD)
- Global War Against Terror (GWOT) and MIOs
- Expeditionary Warfare



ONR OV-1 for Tactical Communications

Goal: Dynamic assured secure, seamless networking for the battlespace, reduced cost and ROI



NTN Strawman Architecture Core Tactical Edge Network

Multiple SATCOM paths

BAMS

MPA(s)

EP-3E

Mobile Networking Hi-Band (HNW, WiFi)

E-2C/D

F-35

Mobile Networking Mid-Band (MNM)

VLF

Reachback Facilities

F/A-18 A+/C/D

F/A-18 E/F

EA-18G

ATDLs

CEC

EA-6B

NEW

MH-60

CSD buoy

DDG/CG/FFG/LCS/Other Surface

LCC/JCC(X)
OPS CDR
MOC

SNR HF/IP (ADNS)

Acoustic

Acoustic

SSN

SSGN

CVN/LHD/LHA/LSD
OPS/TAC CDR

Relay

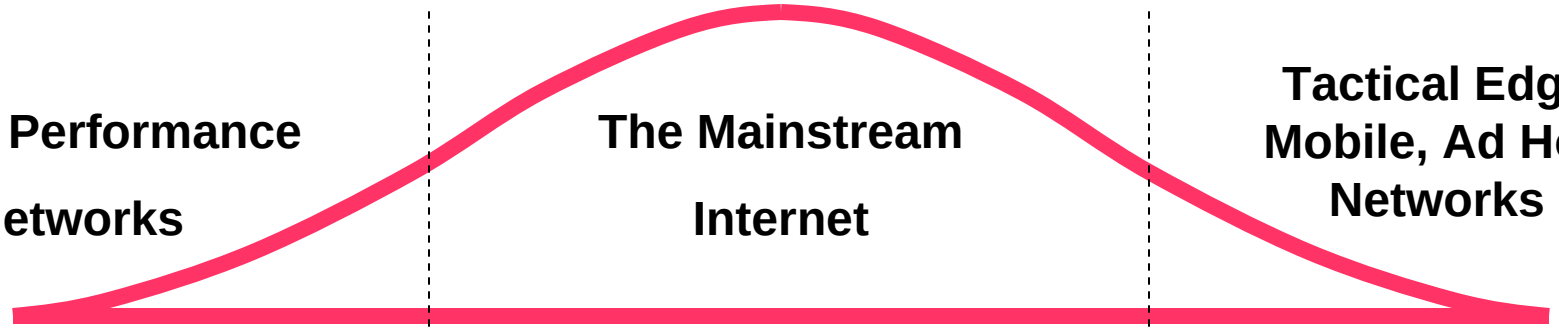
Objective Gateway

HF/VHF/UHF voice/data not shown, but assumed

Summary: Focus Areas

- Tactical Level data links –
  - Assess current capabilities against current and future mission requirements
  - Improving cross-banding capability to meet C2 needs
  - Investigate capabilities to support NTISR
- High Band width networking –
  - HNW (Ku-band), backwards compatible with current TCDLs
  - Diversified antenna configurations
  - Application of commercial standards, Wi-Fi and Wi-Max, to the tactical edge
- Mobile Ad-hoc Net working (MANET) – dynamic networking
  - Networking Emulation capability to all the services
  - network performance monitoring tools and network management services for the tactical edge
- ADNS Future Capability – networking in-depth
  - Prioritize information routing
  - Decentralized autonomous policy-based network management
  - Auto-configuration and continuous network adaptation
  - Mobile security architectures

Commercial vs. Military Technology



Some Common Characteristics

- Stable infrastructure
- Fiber optic/High-speed RF/wireless optical
- Higher bandwidth
- Low latency
- Connection-oriented links
- Policy-based QoS

Some Common Characteristics

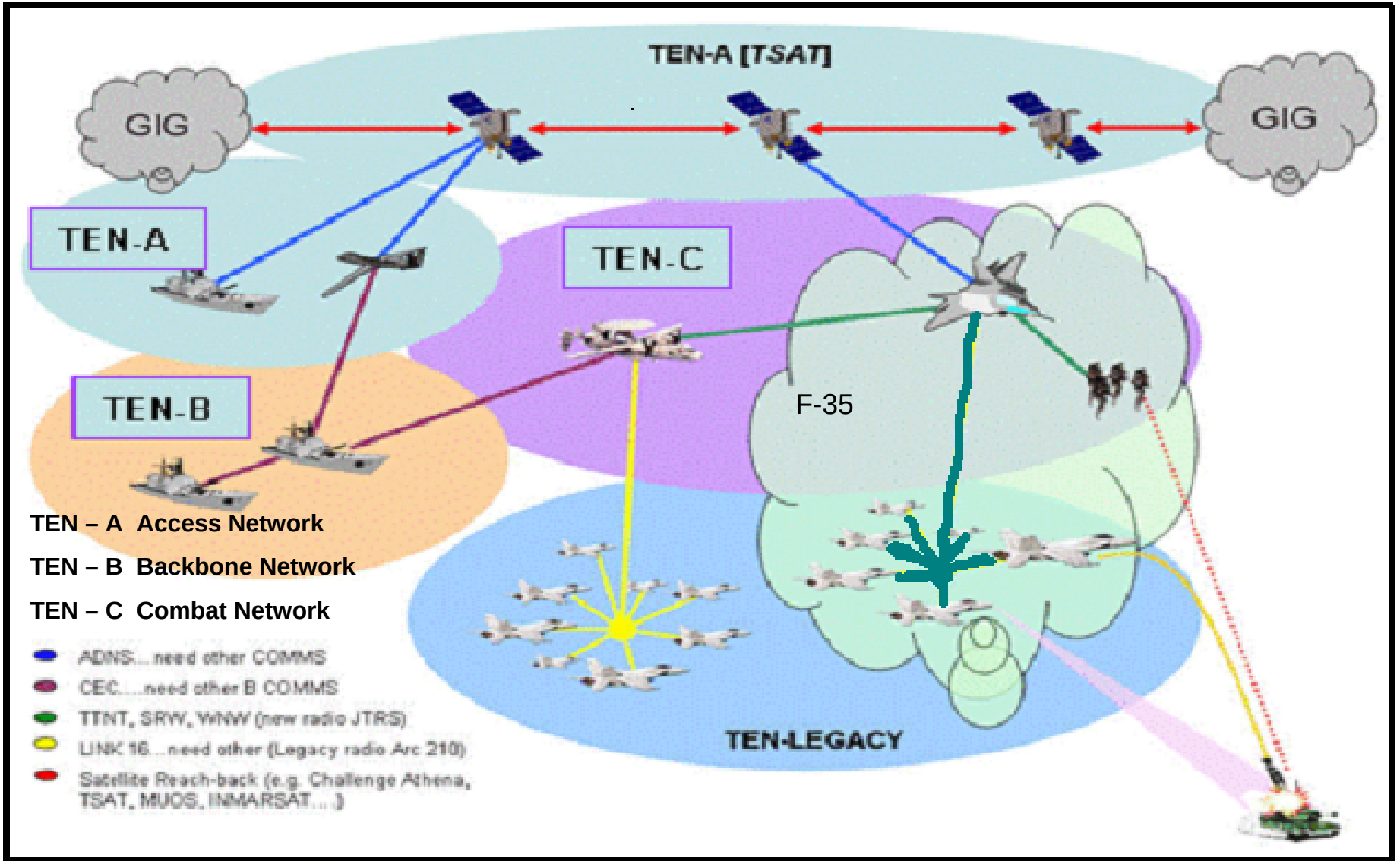
- Mixed range of assets
- Mixed media
- Tending to higher bandwidth
- Low to high latency
- Table-based routing
- Mixed policies in forwarding and QoS

Some Common Characteristics

- Ad hoc assets
- Generally wireless
- Design for degraded operation
- Large variability in latency and bandwidth
- Highly dynamic routing
- More distributed service models
- Change is the norm

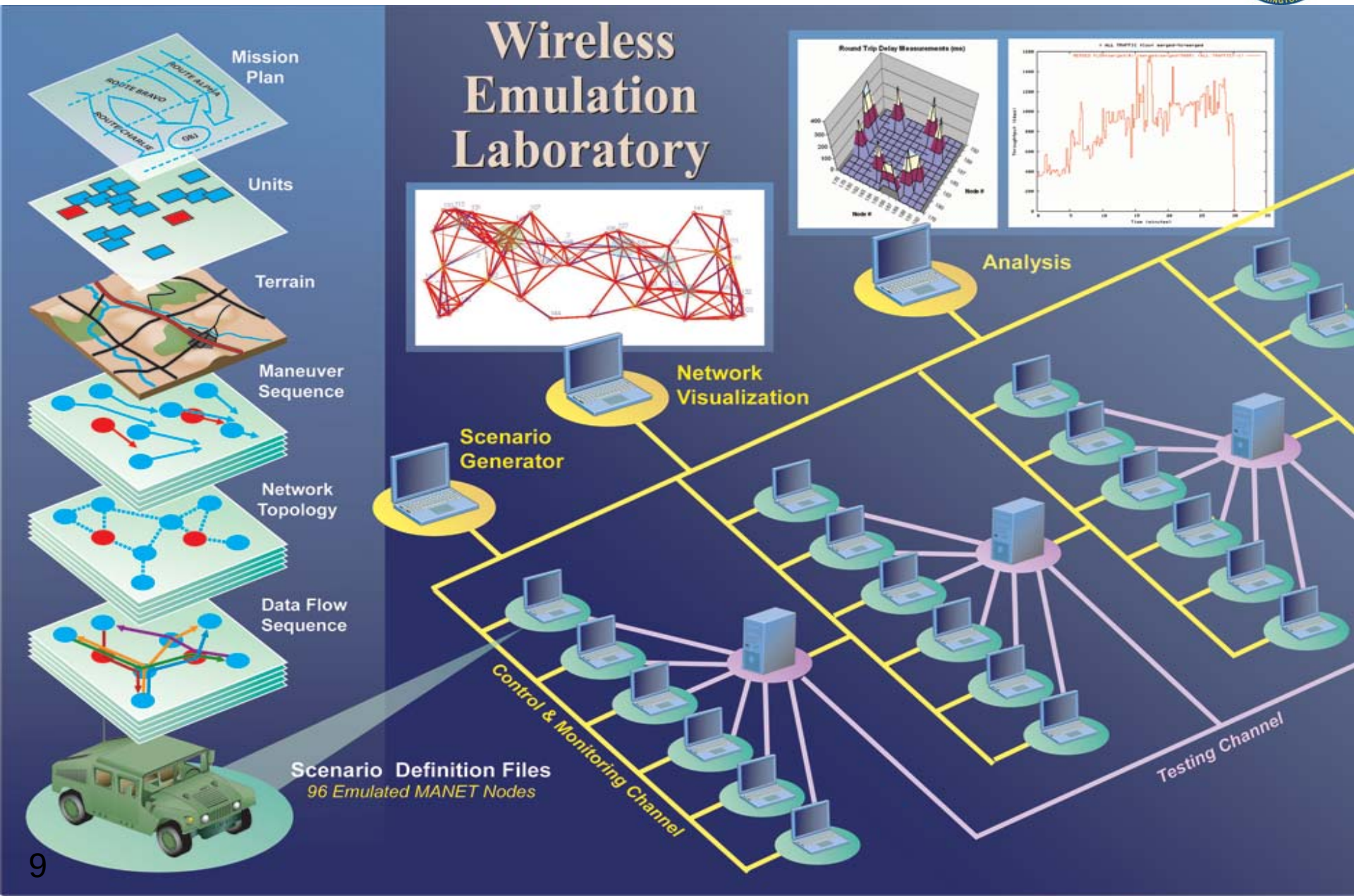
Strategic Advantage | **Industry Base** | **Tactical Advantage**

Joint GIG Tactical Edge Networking Working Group



Wireless Network Emulation

MANE Architecture



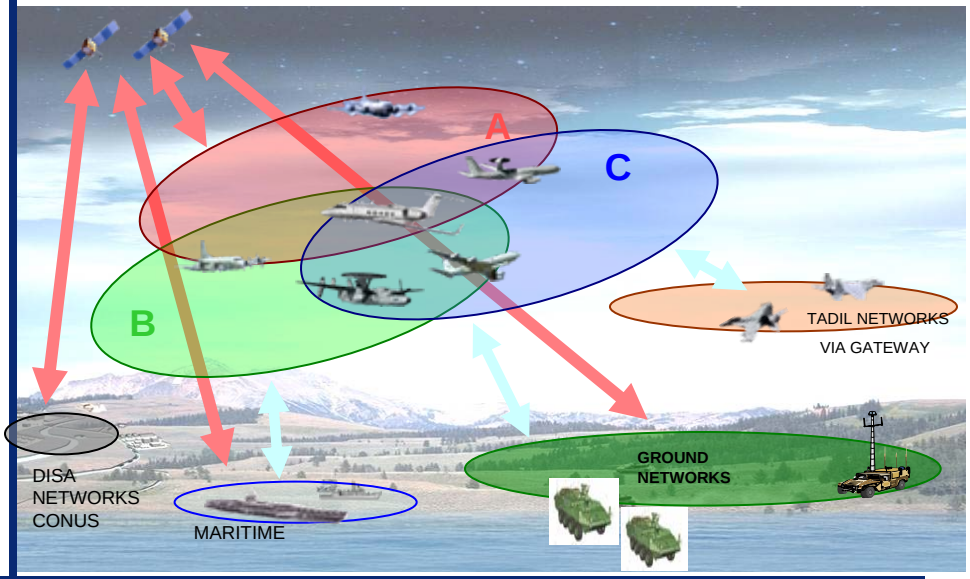
JCTD: COMMUNICATIONS AIRBORNE LAYER EXPANSION (CABLE)

Problem :

Service Aerial Layer & networking efforts are service-centric and not focused on the Joint Forces and Federal Government agency response to crises.

Objective:

- Implement a Joint airborne layer wide area network with intelligent gateways as a near-term net-centric capability that enables rapid, accurate digital information exchange over IP.
- High capacity backbone provides distributed operators and decision makers a fully integrated network to enhance the performance of C2ISR activities.
- Provide a baseline architecture available for gov't agencies and coalition partners participation in global missions.



Participants:

OM/User Sponsor: USSTRATCOM and JFCOM
TM: ESC
Dep TM: NRL
XM: GCIC
Dep XM: PMW 750
Oversight Executive: OSD(AS&C)
Lead Service: Air Force

Schedule:

FY 08 CAPSTONE II
FY09 Bold Quest 09
FY10 TBD

Solution:

Integrate network technologies into aircraft platform radios, develop network architecture and standards, and integrate with existing afloat and terrestrial infrastructure.

Technologies:

MR-TCDL, HNW, ADNS, Mobile Routing, ICAN/JCAN, Airborne Server, Cell phone, EPLRS, HFIP, SubNet Relay, INMARSAT, TTNT, UHF/VHF, gateways to legacy links (VMF, Link-16).

Residuals:

- CONOPS for joint and government wireless communications
- CABLE architecture for joint platforms (AWACS, E2…)
- Baseline architecture and risk reduction development for Objective Gateway and Naval Tactical Networking (NTN)

Highband Networking Waveform

Highband Networking Radio (HNR)

HARRIS

Available November 2006 - Directive Beam Ad Hoc Mobile Networking

Highband Networking Radio V2.0

- Hosts Highband Networking Waveform V2.0
- Compact and rugged ½ ATR Radio for both ground and airborne applications
- Lightweight switched beam antenna at C or Ku band
- Embedded Mobile Ad Hoc Router
- FIPS Certified AES 256 TRANSEC with OTAR

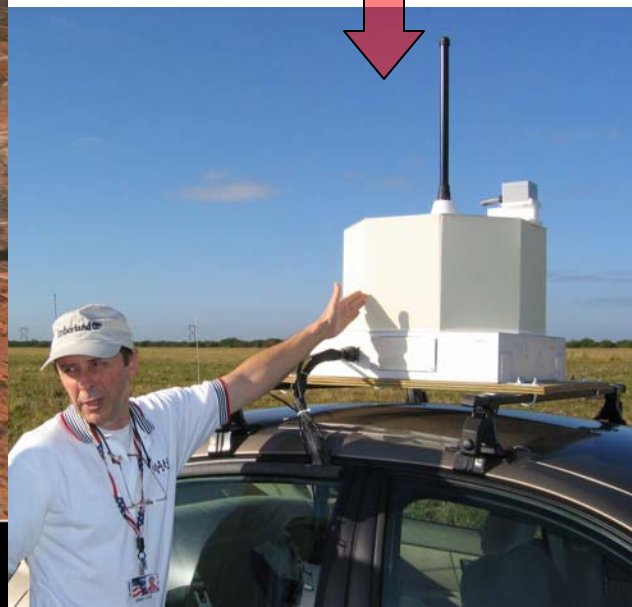
Highband Networking Waveform V2.0

- Provides both IPv4/v6 based converged data link and Communication networking in a single waveform
- Creates self-forming and self-healing networks allowing complete mobility for ISR Comm platforms
- 40 Mbps of information throughput per network link
- Adaptive data rate and modulation
- Autonomously forms and manages up to 40 nodes per subnet

assuredcommunications™

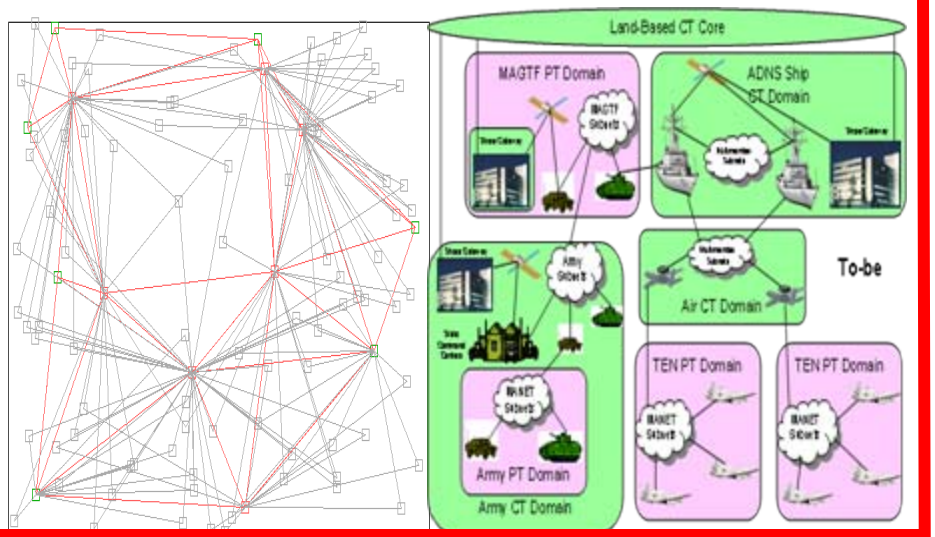
COTS available in C band today and Ku this summer

Capability originally developed by ONR/NRL and selected for WIN-T



ONR FY-09 Enabling Capability

Dynamic Tactical Communications Networks



- **Product 1. Self-Organizing Networks:**
  - Decentralized autonomous policy-based network management
  - Auto-configuration and continuous network adaptation
  - Mobile security architectures
  - Middleware-enabled user application control
- **Product 2. Assured Communications Exchange**
  - fully connect autonomous routing and security domains
  - Link diversification among multiple heterogeneous LOS and SATCOM facilities and load balancing
  - Loss and disruption tolerance

Self-organizing networking will adapt to available links of opportunity at lower echelons and assure priority movement of critical data intra-network and through reachback gateway networks that interface with the GIG to provide:

– Timely exchange of SA and C2 information for the Naval Expeditionary Combatant forces.

– Shortened kill chain for tactical engagement missions.

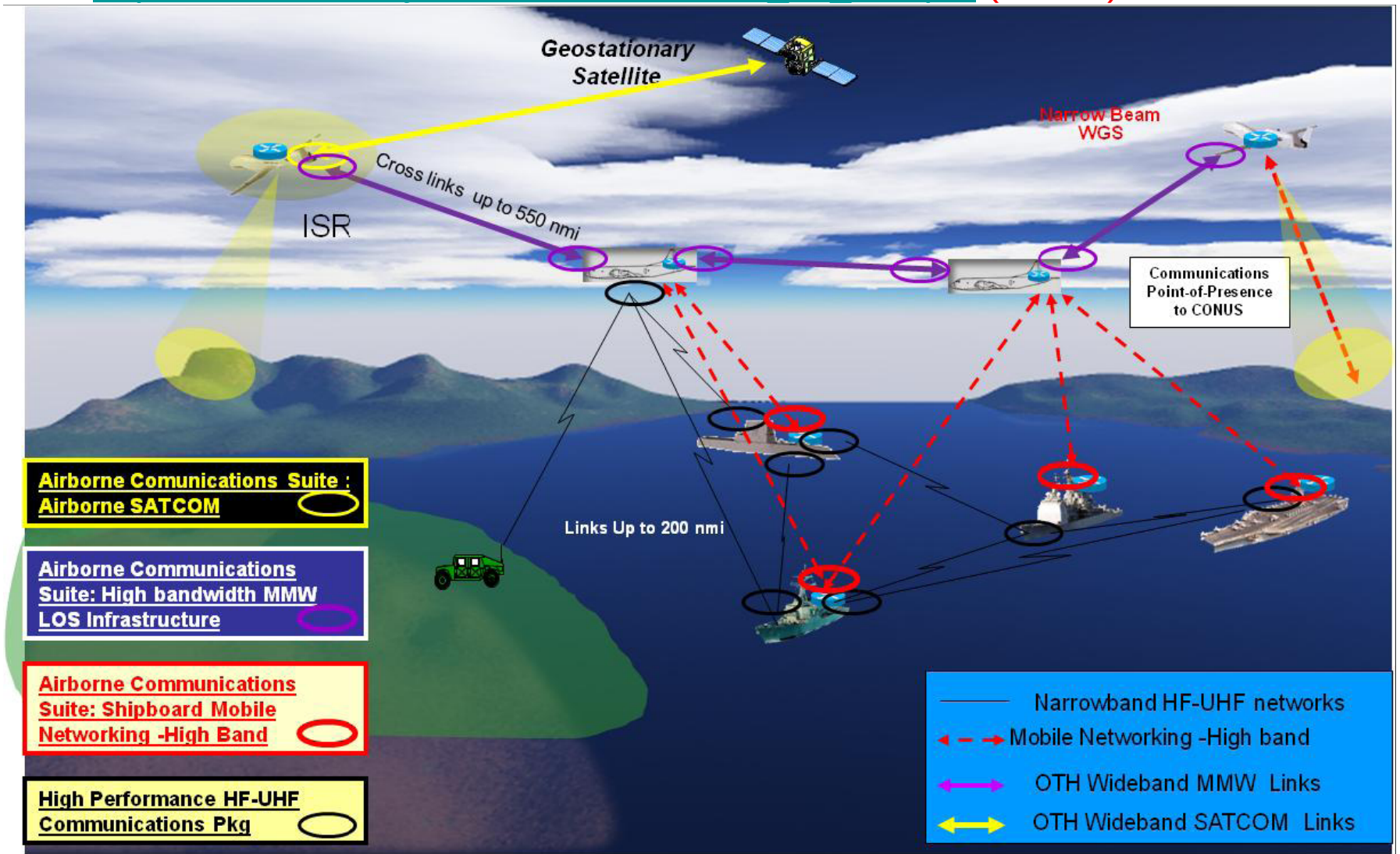
–Ad-Hoc re-tasking and targeting of warriors, weapons and sensors with minimum human intervention.

–Enabling tactical internet access/delivery and *SOA* proliferation through a reliable communications grid to support the thousand-ship navy and coalition interoperability.

ONR FY10 EC HIGH THROUGHPUT NETWORKING INFRASTRUCTURE

ONR BAA announcement SATCOM VULNERABILITY MITIGATION:

http://www.onr.navy.mil/02/baa/docs/baa_09_009.pdf (closed)



Communication Issues Currently Being Addressed

- Networking and Routing
- Network Management
- Point-to-Point vs. Networking
  - Networking with Directional Antennas
  - Discovery
- Terminal Security
  - Classification of platform location
  - Desire to avoid NSA certification issues
- Standard Interfaces

How to do S&T with the Navy

http://www.onr.navy.mil/doing_business/

http://heron.nrl.navy.mil/contracts/

NRL Networking Technical Papers and Publications

http://cs.itd.nrl.navy.mil/pubs/

NRL Software for Tactical Networking

http://cs.itd.nrl.navy.mil/products/