



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

**Communications and GPS Navigation
Program Office (PMW/A 170)**

NDIA San Diego Fall Industry Event

28 Oct 15
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***Information Dominance;
Anytime, Anywhere...***





Agenda

- PEO C4I PMW/A 170 Vision / Mission / Organizational Structure
- Capabilities
- Portfolio of Programs
- Migration/Consolidation of Systems
- Bandwidth Growth
- Deliverables
- Contracts
- PMW/A 170 Support of Anti Access Area Denial (A2AD)
- Where Industry Can Help



PMW/A 170

Vision/Mission Statements

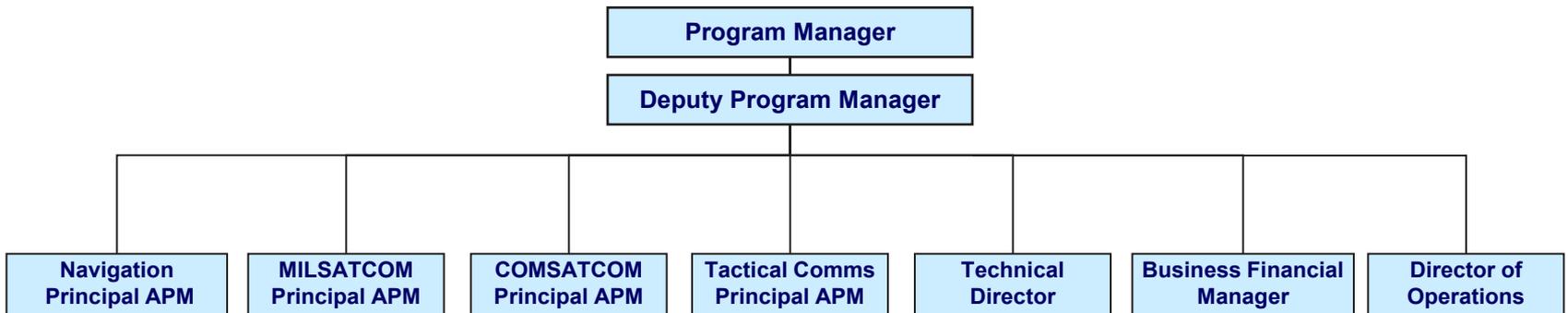
PMW/A 170 VISION:

Assured, Resilient Communications and GPS Navigation: Anytime, Anywhere

PMW/A 170 MISSION:

Provide and support interoperable, cost-effective communications and position, navigation, and timing services, enabling information dominance for maritime forces

PMW/A 170 ORGANIZATIONAL CHART



Capabilities

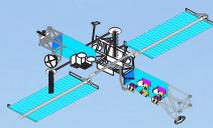
**CWSP/
CBSP**



GBS



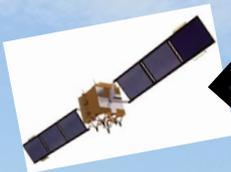
EHF



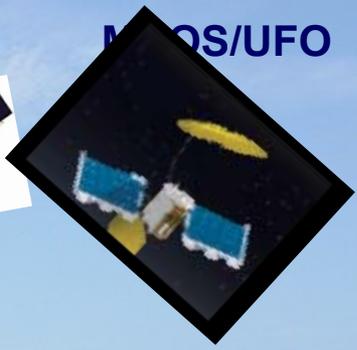
WGS/DSCS



GPS



MOS/UFO



WSC-8

CBSP

GBS

NESP

NMT

BFTN

DMR

GPNTS
(Future)



PMW/A 170 Program Portfolio



ACAT Programs

MILITARY SATELLITE COMMUNICATIONS (MILSATCOM)

- Navy Multiband Terminal (NMT) – ACAT IC
- Global Broadcast Service (GBS) - ACAT III
- SMQ 11 – ACAT IV

COMMERCIAL SATELLITE COMMUNICATIONS (COMSATCOM)

- AN/WSC-8 (V) 1/2 – ACAT III
- Commercial Broadband Satellite Program (CBSP) – ACAT III

TACTICAL COMMUNICATIONS

- Digital Modular Radio (DMR) – ACAT III
- Battle Force Tactical Network (BFTN) – ACAT III
- Network Tactical Common Data Link (NTCDL) – ACAT III

NAVIGATION SYSTEMS

- GPS Positioning, Navigation, & Timing Service (GPNTS) – ACAT III
- Sea Navigation Warfare (Sea NAVWAR) – ACAT III
- Air Navigation Warfare (Air NAVWAR) – ACAT III

Other Programs and Projects

MILITARY SATELLITE COMMUNICATIONS (MILSATCOM)

- FMQ 17
- AAP

COMMERCIAL SATELLITE COMMUNICATIONS (COMSATCOM)

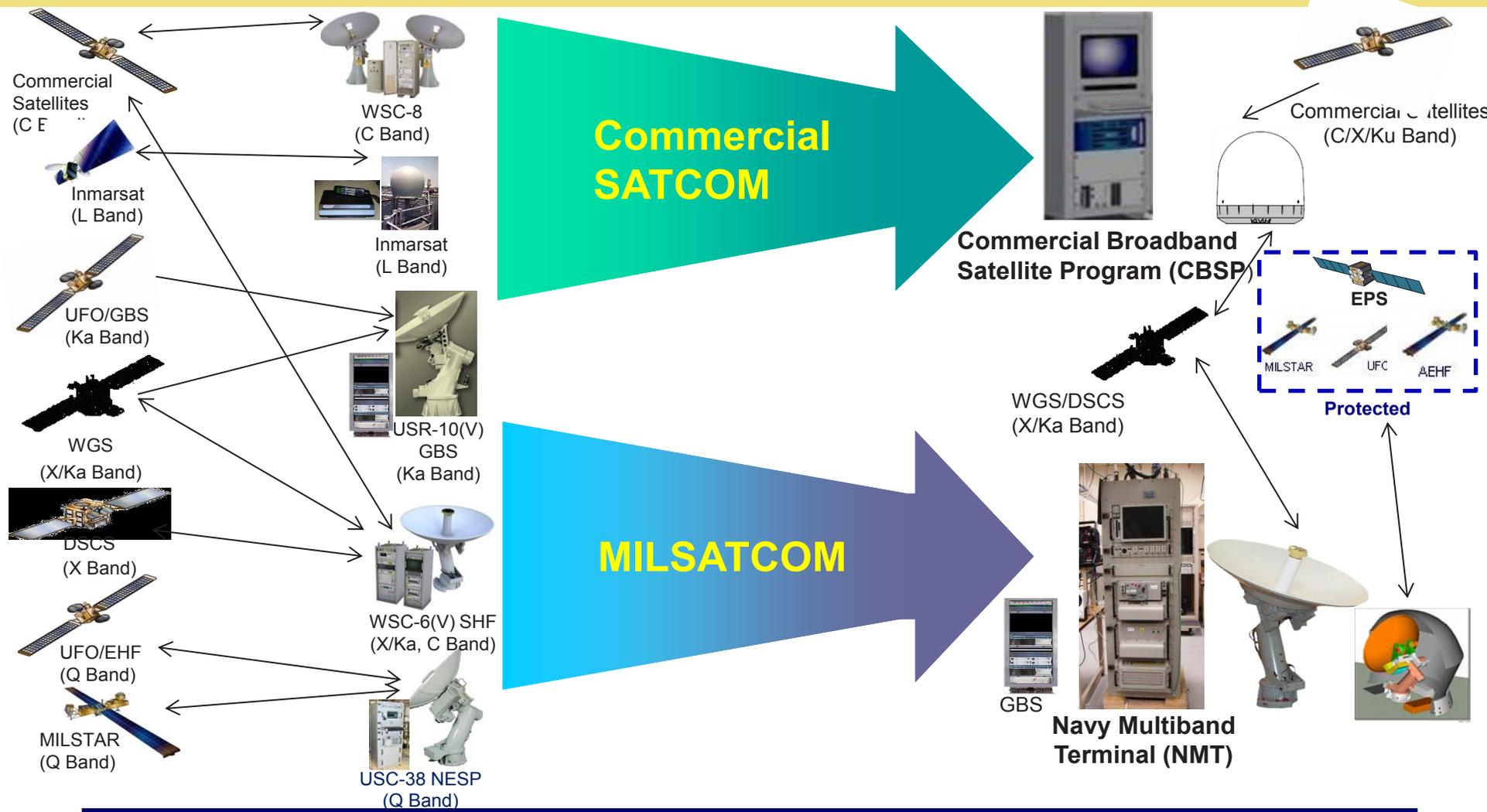
- Naval Senior Leadership Communications – Aircraft (NSLC-A)
- Project

TACTICAL COMMUNICATIONS

- Joint Aerial Layer Network-Maritime (JALN-M)
- Prototype
- Portable Radios (PRP)
- Project
- Digital Wideband Transmission System (DWTS)
- Pre ACAT



Navy SATCOM Migration



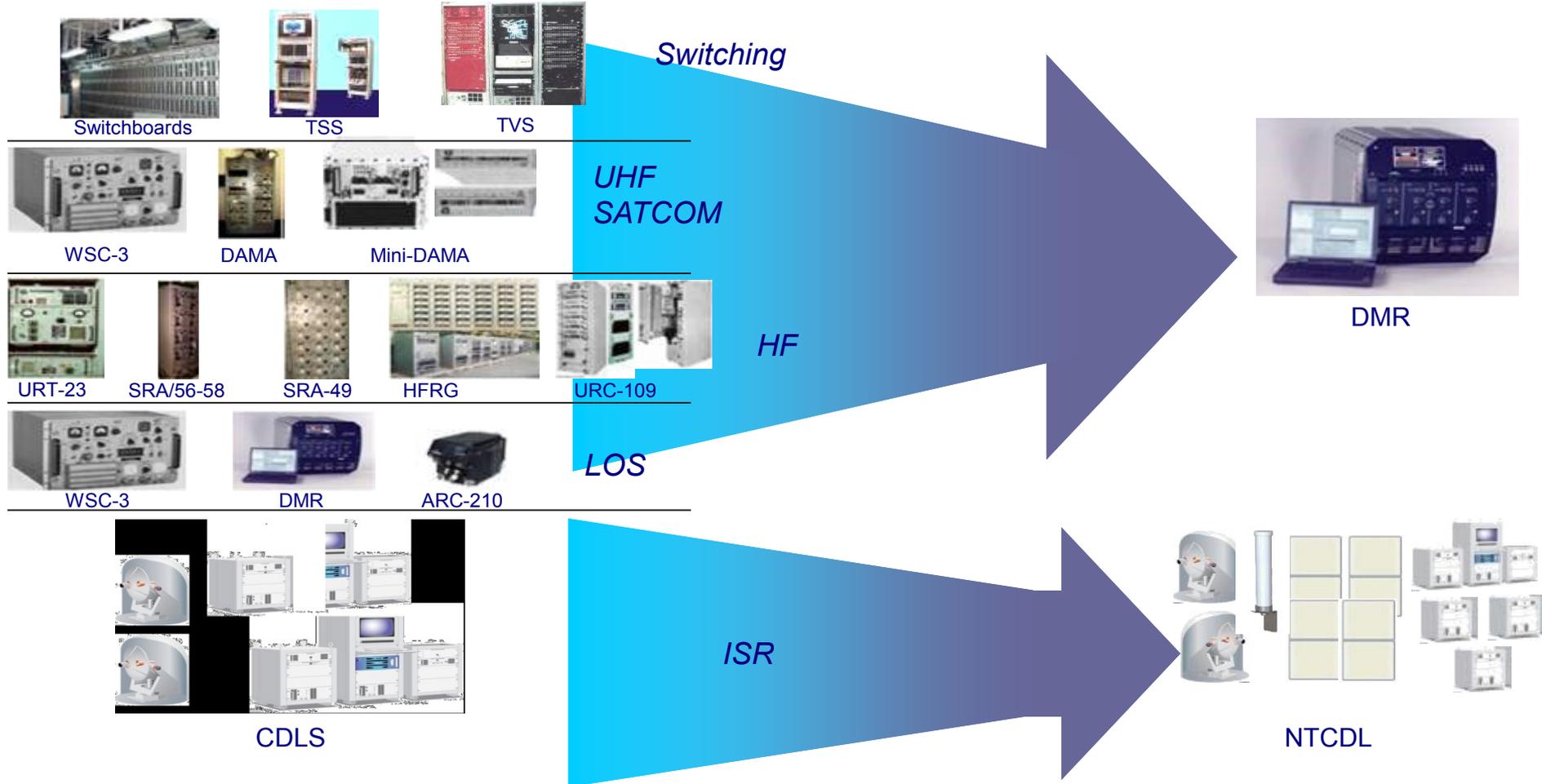
Integrated MILSATCOM & COMSATCOM to Meet Global Communication Needs

AEHF: Advanced Extremely High Frequency
DSCS: Defense Satellite Communications System

NESP: Navy EHF SATCOM Program
GBS: Global Broadcast Service

UFO: UHF Follow On
WGS: Wideband Global Satellite

Tactical Communications Migration



Navy is reducing radio variants and footprint to meet tactical communication needs

LOS: Line of Sight
TSS: Tactical Switch System

HFRG: High Frequency Radio Group
ISR: Intelligence, Surveillance, Reconnaissance

GPS Navigation Migration



GPS Receivers



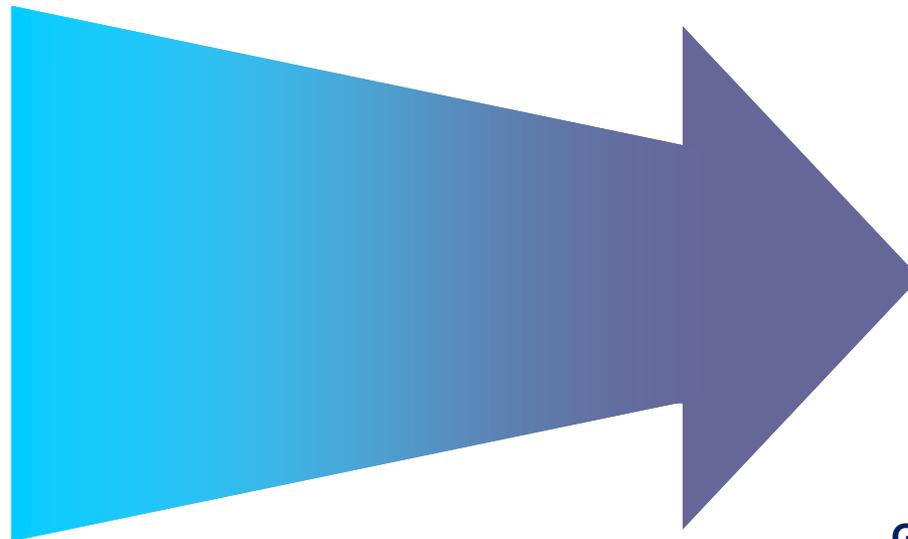
FRPA GPA



NAVSSI



AN/WRN-6(V)



GPS Anti-Jam Antenna



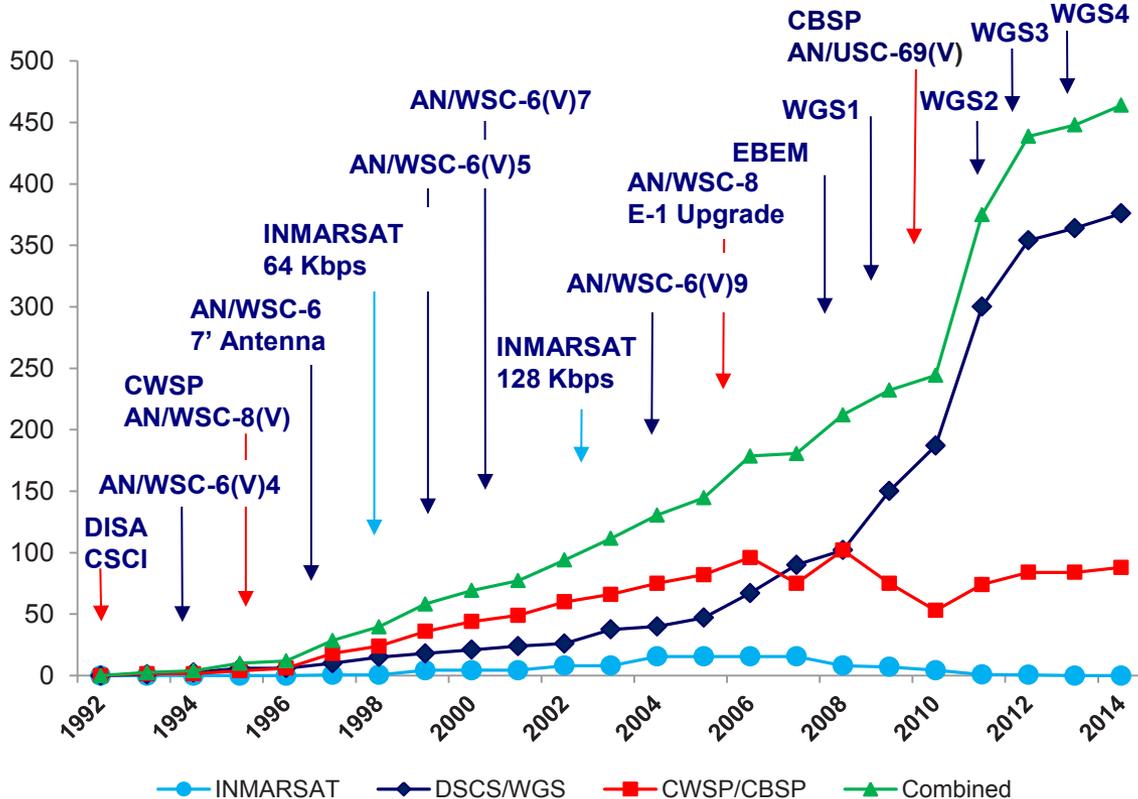
Global Positioning System (GPS) Positioning, Navigation, & Timing Service (GPNTS)

Navy strategy is to provide Assured GPS-based PNT to all sea platforms



Navy Exponential Bandwidth Growth

Worldwide Full-duplex Navy Wideband SATCOM Throughput

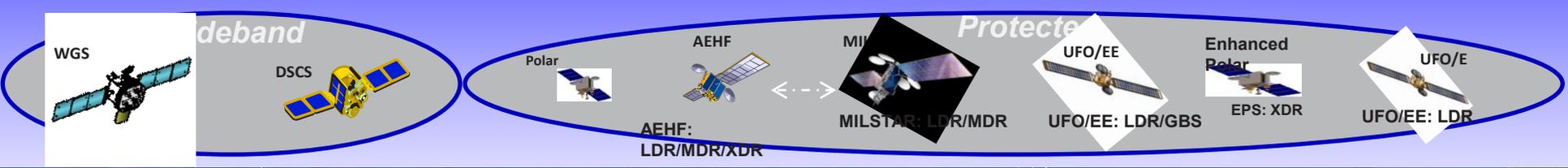


Over 450 Mbps Today

Typical Platform Duplex Allocations Today

CVN – 20 Mbps
 DDG – 2 Mbps
 SSN – 512 Kbps

Bandwidth is THE Key enabler of Information Dominance



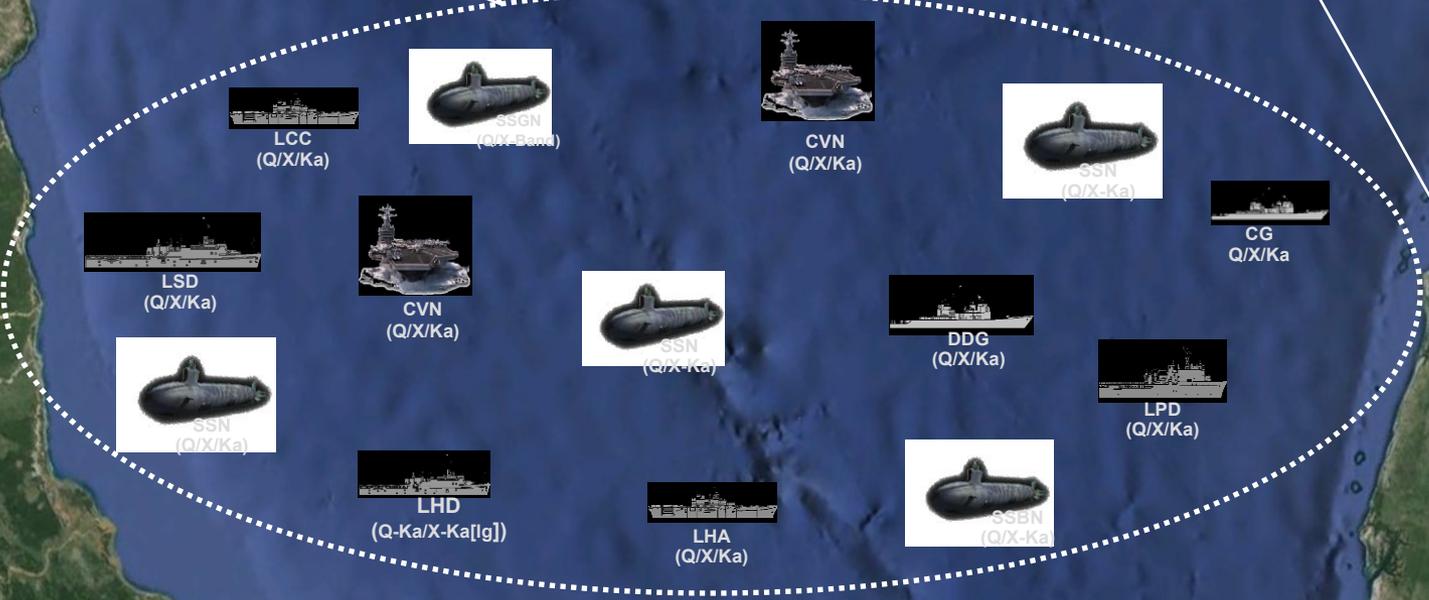
Ship: Ka, X, GBS
Sub: X, GBS

Ship / Sub: LDR/MDR/ XDR,
GBS Ka, X, GBS



**WIDEBAND
SHORE
-Teleport**

Surface/Submarine NMT



Other
Protected waveform
capable terminals



**PROTECTE
D
SHORE
NMT
-Teleport
-NCTAMS
-NCTS
-Sub BCA
-EPS
Gateway**

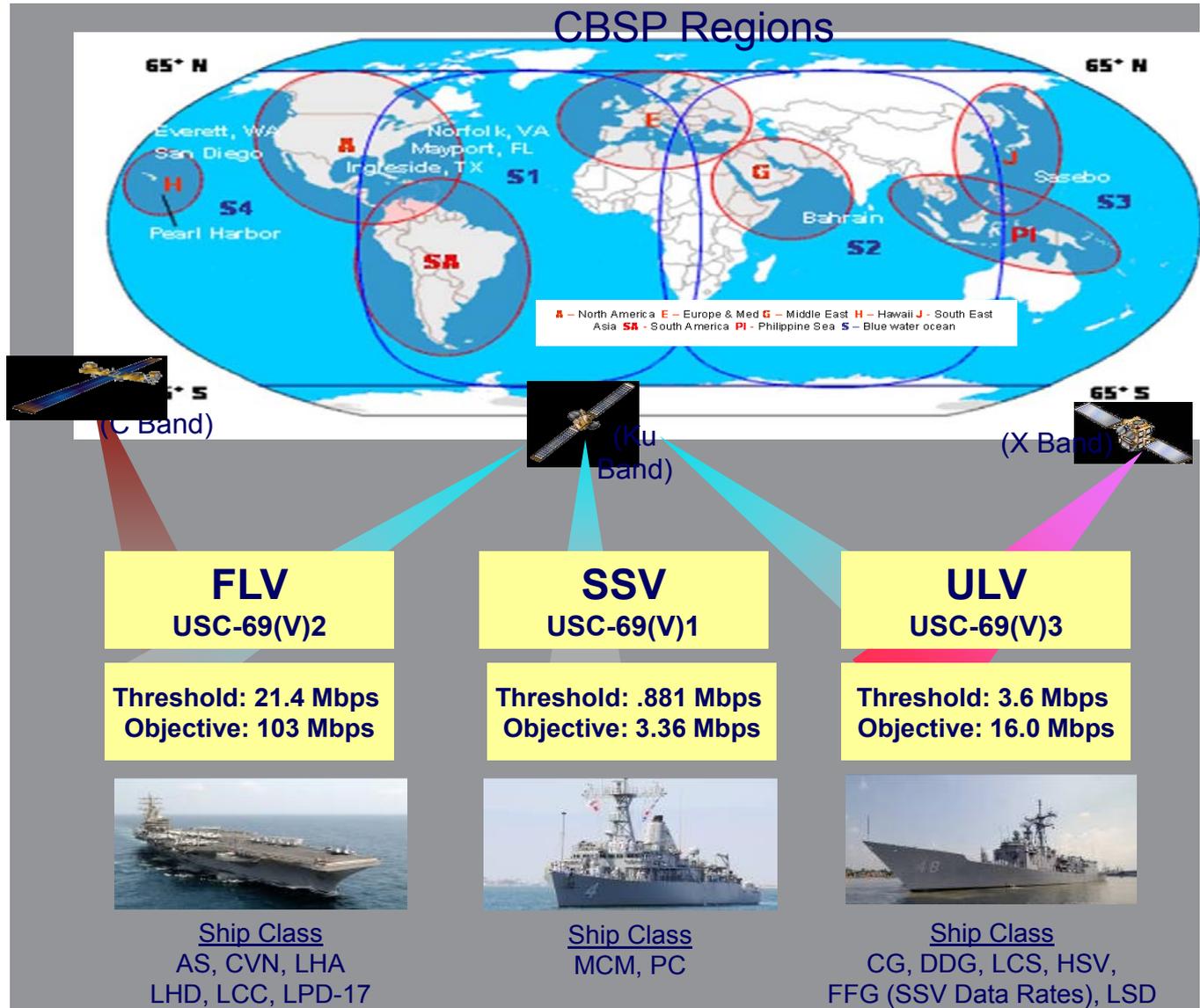


CBSP Flexibility

Meeting Multiple Requirements

Requirements

Space Segment	
Band	Area between 65° Lat
C	95%
X	95%
Ku	95% in Littoral Waters
Terminal	
Operational Availability (Ao)	
Threshold	94%
Objective	99%
System End to End	
Operational Availability (Ao)	
Threshold	91%
Objective	97%



DMR Consolidates Multiple Systems

VHF/UHF Systems

AITG
AN/ARC-210



VHF Systems

AN/GRC-211
AN/VRC-12
AN/VRC-46
AN/SRC-54
AN/VRC 88,89,90...



HF

AN/URT-23
AN/URC-109
AN/URC-131
R-2368/URR
R-1051/URR
AN/FRT-96



UHF Systems

AN/PSC-5 EMUT
AN/VRC-83 HAVEQUICKII
AN/WSC-3
AN/WSC-5
TD-1271
AN/USC-54 (VICS)
AN/USC-42(V)1,2 (MINIDAMA)
AN/URC-93
MD-1324



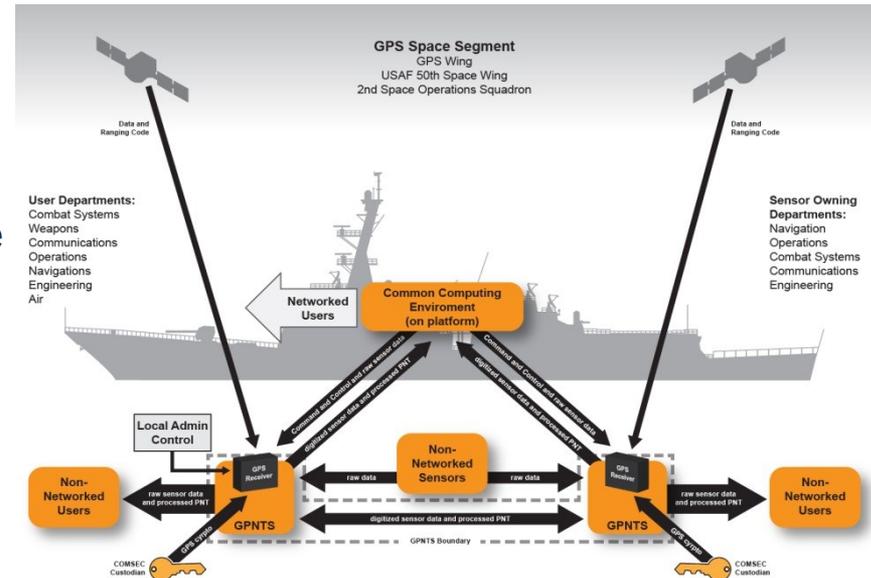
INFOSEC (Embedded)

KY-57/58
KG-84A/C (Applicable Modes)
KGV-11
KGV-10
KWR-46
KYV-5/KY-99



GPNTS System Overview

- GPNTS will be a backfit/forward fit to NAVSSI and WRN-6
- Increment I will:
 - Provide GPS SAASM capabilities (Directorate-Approved GPS Card)
 - Provide software and hardware modularity based on an open system architecture
 - Implement a Service-Oriented Architecture (SOA) for PNT data distribution
 - Provide both real time and non-real time PNT data, the non-real time component can be hosted either within GPNTS or shipboard Common Computing Environment (CCE)



GPNTS Will Address Fleet Obsolescence Issues and Incorporate SAASM



Communications Limiters



TRAINING
CASREPS
PMS
Restoral



RADHAZ



RCS, SIZE, WEIGHT



SHOCK & VIBE



**WAVEGUIDE
& CABLEWAYS**



**MAINTENANCE ACCESSIBILITY
& RELATED STRUCTURES**

Allocation
Legacy Systems
Green Water Loading
Weight and Moment Impact
Atmospheric Conditions
Stack Gas Effects



EMC/EMI



**COMMERCIAL
SATELLITE FAILURES**

Bandwidth Appetite
Blockage
Antenna Handover
Coverage



**UPDATING
ORDs & Ao**



MISSILE/GUN BLAST



Anti-Access/Area Denial (A2AD)



- Architecture
 - New Satellite Constellations - AEHF, WGS, MUOS
 - Developmental Airborne Networks – JALN-M
 - Enhanced C4I System Situational Awareness
- Bandwidth
 - Dynamic Bandwidth Management
 - SATCOM Jammed
 - Adaptive Satellite Links
 - Asymmetric Satellite Links
 - Wideband Anti-Jam Modems
 - SATCOM-denied Throughput Enhancements
- Positioning, Navigation, and Timing (PNT)
 - GPS Anti-jam and Anti-spoof Systems
 - GPS-denied PNT Solutions



Science and Technology Efforts



- **Small Business Innovative Research (SBIR)**
 - Ongoing: Verdant Networks Phase I Option BFTN(e) Multi-Layer Spatial Multiplexer (MLSM) for RF Networking
 - Ongoing: Mayflower Phase II.5 and II.5 Option Prioritized Utilization of Traffic Total Yield (PUTTY) for JALN-M
 - Completed: Bascom Hunter's Phase II Option Wideband Radio Local Interference Optimization Techniques
 - Emerging: Two new SBIR (phase II and II.5) along with one new STTR
- **Rapid Innovation Fund (RIF)**
 - Ongoing: Mayflower's 2013 RIF Multiplatform Anti-jam Navigation GPS Antenna (MAGNA) prototype development
 - Ongoing: Adaptive Dynamics 2014 RIF MAGIC Interference Cancellation prototype development
 - Ongoing: 2015 RIF BAA White Paper evaluation

S&T Efforts Address Emerging Technology Gaps by Leveraging Alternative Funding Sources



Latest Initiatives

- **Network Tactical Common Data Link (NTCDL)**
 - NTCDL will provide warfighters the capability to support multiple, simultaneous, networked operations with currently fielded Common Data Link (CDL) equipped platforms (e.g. F/A-18, P-3, MH-60R, Fire Scout), in addition to next generation manned and unmanned platforms (e.g., P-8, Triton, Unmanned Carrier Launched Airborne Surveillance and Strike [UCLASS], Small Tactical Unmanned Aircraft Systems [STUAS]).
- **Joint Airborne Layer Network – Maritime (JALN-M)**
 - JALN-M will provide airborne relays to enable ship-to-ship and ship-to-shore high-rate anti-jam communications. The two major components of JALN-M are the Airborne XDR relay (AXDR), and the High Capacity Backbone (HCB).
- **Wideband Anti-Jam Modem System (WAMS)**
 - The WAMS will enable the Navy Multiband Terminal to communicate over the Wideband Global Satellites with protection against jamming.



Way Ahead

- **Deliver Assured, Resilient Communications and GPS Navigation Solutions**
 - Continue Development and Fielding of NMT for Protected and Wideband SATCOM
 - Augment MILSATCOM with Commercial Broadband Satellite Program
 - Continue Development of PNT Solutions for All Platforms
 - Integrate Commercial SATCOM Improvements
 - Integrate MUOS into DMR
 - Develop next gen Tactical ISR capabilities
 - Deliver non SATCOM Solutions
- **Reduce Total Ownership Costs of Naval Communications**
 - Reduce Topside & Below-Decks Footprint
 - Common Training, Support, Configurations, etc.



Here's Where Industry/Academia Can Help



- SATCOM Anti-Jam Modem Solutions
- More Efficient Solid State Power Amplifiers (SSPAs)
- RF Anti-jam Capability for BFTN Links
- Inexpensive High Accuracy Timing Sources With Ability to Operate in Absence of the Global Positioning System (GPS)
- GPS-Independent Navigation Solutions
- Metamaterial-based Antenna Solutions That Lower Sidelobes and Increase G/T
- Delay Tolerant Networking
 - Network Outages on the Order of 10s of Seconds
- RF Situational Awareness

Affordability is a Key Driver



PMW/A 170

Current Contracts



Program	Prime Contractor	Contract #	End Date	Contract Value
GPNTS Dev	Raytheon	N00039-11-C-0089	12/28/2015	\$44.9M
NMT Development & Production	Raytheon	N00039-04-C-0012	9/30/2016	\$1.3B
BFTN Services	MetaSoft	N00039-15-C-0003	12/21/2016	\$3.9M
ESRP	Raytheon	N00039-12-C-0002	1/31/2017	\$17.8M
BFTN	Leidos	N00039-12-C-0079	6/9/2017	\$54M
Port Radios	Harris	N00039-12-D-0001	8/29/2017	\$296.7M
DMR Radios	General Dynamics MS	N00039-10-C-0069	9/30/2017	\$300M
BFTN-E Materials	MetaSoft	N00039-15-C-0004	12/3/2017	\$3.5M
DMR HFDAG	Thales	N00039-13-C-0005	12/26/2017	\$11.63M
CBSP FLV	Harris	N00039-13-C-0001	2/26/2018	\$35M
ATIP	Comtech	N00039-13-C-0015	3/31/2018	\$40.6M
DMR 200W PA	EFW	N00039-13-C-0021	5/29/2018	\$11.1M
DMR 200W PA	MNEMONICS	N00039-13-C-0020	5/29/2018	\$4.36M
GBS	Raytheon	N00039-15-C-0002	12/17/2019	\$33.8M
DMR 500W PA	Cubic	N00039-15-C-0224	8/11/2020	\$6.3M
NSCL-A	GoGo LLC	N00039-15-P-0021	9/15/2020	\$139.6K
CBSP ULV	Harris	N00039-14-C-0041	2/26/2022	\$133.4M



PMW/A 170 Market Surveys



Program	Description	Anticipated RFI	Anticipated Award
Multi-Platform AntiJam GPS Navigation Antenna (MAGNA)	Development and production of MAGNA to be deployed on surface, ground and air platforms	Released 10/18/15	TBD
Digital Wideband Transmission System (DWTS)	Develop replacement system for the DWTS radio system to operate in alternate radio frequency	Q2, FY16	TBD
Digital Modular Radio (DMR)	Integration and Production of DMR System Racks	FY16	TBD
Battle Force Tactical Network	Production contract	FY16	TBD
Wideband Anti-Jam Modem (WAM)	Enhanced wideband MILSATCOM capabilities in an Anti-Access Area Denial (A2AD) environment	FY 16	TBD



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Future Opportunities



Program	Description	Anticipated RFP	Anticipated Award	Contract Value	SB Set Aside
Digital Modular Radio (DMR)	Power Amplifiers 100W/200W	RFP Released Closes: 20 Oct 15	Q2, FY16	\$10M - \$50M	Yes
Network Tactical Common Data Link (NTCDL)	Design, development, production, integration, testing and procurement of the NTCDL Surface Terminal	RFP Released Closes: 23 Nov 15	Q4, FY16	\$100M - \$250M	No
PMW 170 SeaPort Support Services	Systems Engineering	Q1 FY16	Q4 FY16	\$50M - \$100M	Yes
PMW 170 SeaPort Support Services	Financial Management/Admin	Q2 FY16	Q4 FY16	\$10M - \$50M	Yes
PMW 170 SeaPort Support Services	Program Management	Q3 FY16	Q3 FY17	\$50M - \$100M	No
Digital Modular Radio (DMR)	Integration and Production of DMR System Racks	TBD	Q3, FY17	\$100M - \$250M	No
Environmental Satellite Receiver Processor (ESRP)	Provide Realtime environmental data	TBD	Q2, FY17	\$10M - \$50M	TBD
Portable Radios Program (PRP)	Tactical Radios	TBD	Q3, FY17	\$100M - \$250M	TBD
Global Positioning System (GPS) Based Positioning, Navigation and Timing (PNT) Service (GPNTS)	Production of GPNTS systems Hardware / Maintenance of GPNTS SW	TBD	TBD	TBD	TBD