



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

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

DSI Assured PNT Summit

30 May 24
CDR Dan Follett
Surface PNT PAPM (PMW/A 170)

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*Deliver threat-based C4I and space capabilities to enable
the fleet to compete, deter and win – tonight*



Agenda

- PMW/A 170 Mission/Vision/Overview
- PNT Family of Systems
- Retaining and Improving APNT Solutions
- Industry Involvement



PMW/A 170 Strategic Alignment

Mission:

PMW/A 170 is the premier provider of advanced, resilient, and adaptive communication and assured position, navigation, and timing capabilities, delivering operational dominance across all domains.

Vision:

Accelerate delivery of innovative Communications and Positioning, Navigation, and Timing capabilities to the Fleet to deter, compete, and dominate from Seabed to Space.

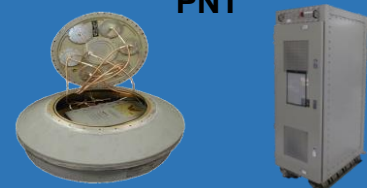
SATCOM



TACCOMS



PNT



LCI



Key Drivers



CNO Priorities

- Enable voice, video, and data transmission/receipt for naval platforms
- COMSAT and MILSAT provide Transport for bandwidth and Reach back
- Leverage existing architectures to improve Navy's Resilient Command and Control (RC2) posture



Fleet Demand

- Enable C2 between naval, joint, and coalition platforms
- Provide secure voice, video, and data connectivity using LOS, BLOS, and SATCOM waveforms (2MHz and 15 GHz)
- Align to Cryptographic Modernization Mandates



Technology Roadmap

- Delivers APNT from seabed to space via a PNT Family of Systems
- Provides access to GPS in challenged environments
- Improves cryptography, anti-jam performance, anti-spoofing algorithms, and robust PNT accuracy and distribution



Threat Environment

- Lead for E2E C4I architecture to enable C2D2E
- Ensuring capability provides established a "Family of Systems" approach for holistic capability integration
- Align to portfolio level execution for end to end capability to support strategic advantage initiatives

SAILORS

Real time and on-going collaboration with warfighters to maximize capability and rapidly upgrade



READINESS

Proactive approach to sustainment to ensure Fleet is always ready



PMW/A 170 is executing future Navy Priorities, Today



CAPABILITIES

Active engagement with industry partners to invest in future technology and capability that beats the threat



CAPACITY

Revolutionizing communications capability Seabed to Space to own the Communications and PNT domain

Leading a Portfolio of 60 programs & projects to deliver Resilient Communications & Assured PNT Solutions to the Fleet

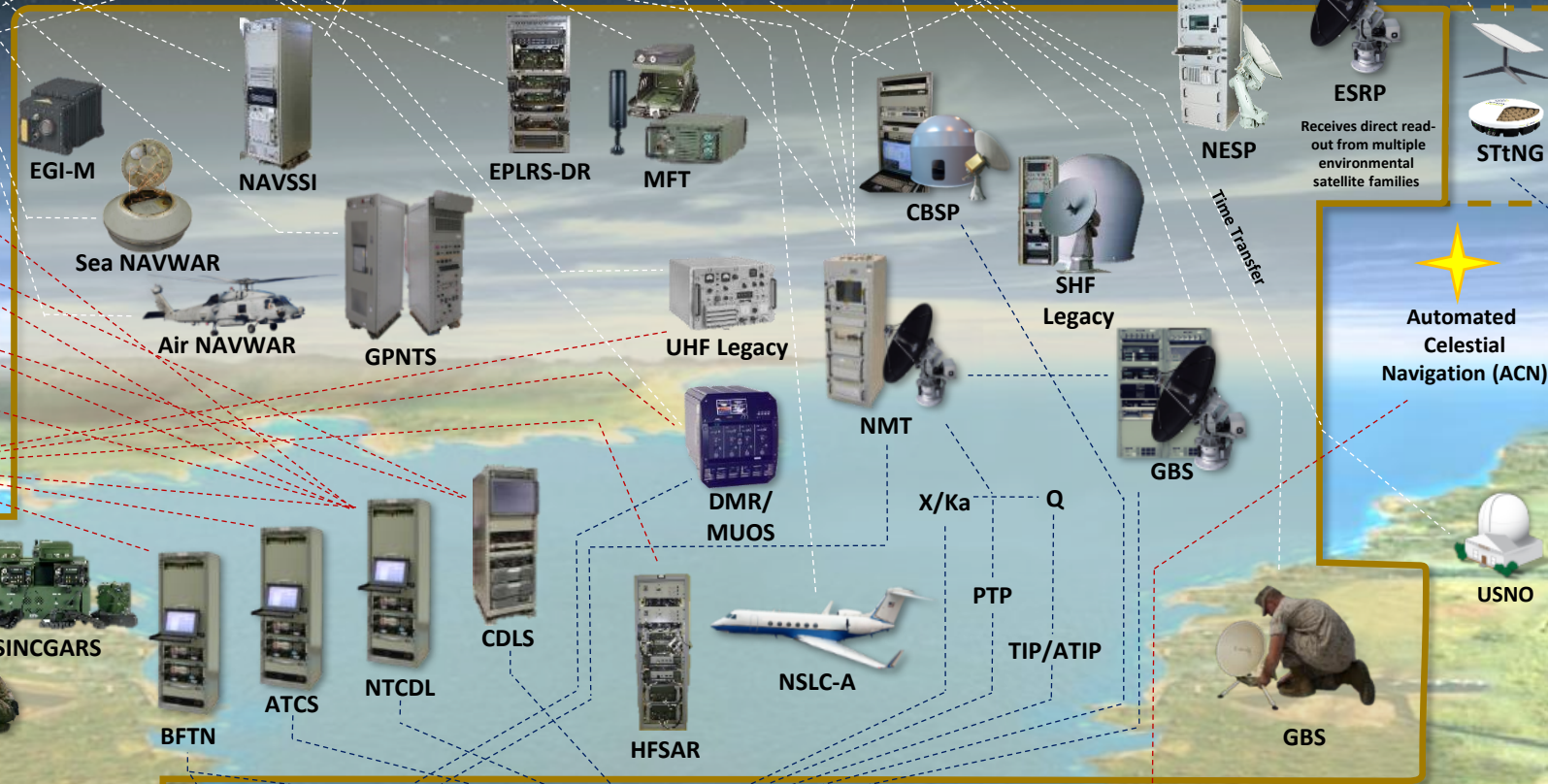
COMMUNICATIONS AND GPS NAVIGATION PROGRAM OFFICE (PMW/A 170)

SATELLITE SUITES



DoDIN
Fleet NOC

- Stingray
- ISR
- Triton
- JSF
- LOS/BLOS

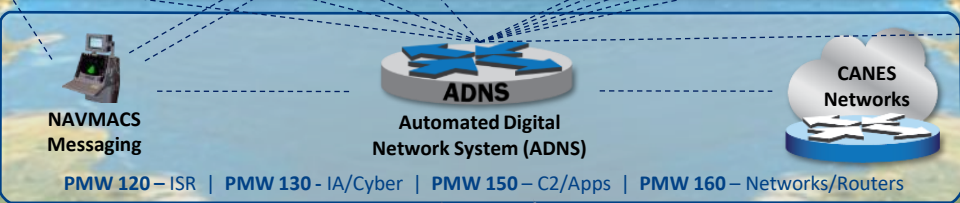


ESRP
Receives direct read-out from multiple environmental satellite families

STtNG

Automated
Celestial
Navigation (ACN)

PMW/A 170



PMW 120 – ISR | PMW 130 – IA/Cyber | PMW 150 – C2/Apps | PMW 160 – Networks/Routers

Collaborative
Navigation

KEY	
-----	SATCOM
-----	Voice/Data
-----	LOS/BLOS





PMW/A 170 leads GPS and GPS anti-jam efforts for aircraft, ships, and subs

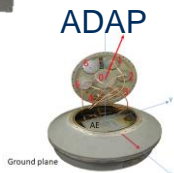


PNT Family of Systems

- PMW/A 170 Programs and Projects that provide PNT to Surface, Sub-Surface, and Air platforms
 - GPS based Positioning, Navigation, and Timing Service (GPNTS) – Current and modernized surface PNT system (replaces NAVSSI)
 - GPNTS Hull Optimized System Tactical (GHOST) targeted for Size Weight and Power, Cost (SWAP-C) constrained platforms
 - GPS Modernization – Integrating Embedded GPS and Inertial (EGI-M) and Miniaturized Advanced GPS Receiver 2000 M-code (MAGR2K-M), Next generation aviation PNT systems Software Defined User Equipment (SDUE)/Digital Antenna Electronics
 - Sea NAVWAR- Advanced Digital Antenna Production (ADAP) & Multi-platform Anti-jam GPS Navigation Antenna (MAGNA) – GPS Anti-Jam (AJ) Antennas for surface
 - Air NAVWAR – GPS AJ Antennas for Aviation platforms
 - Legacy PNT: Navigation Sensors Systems Integration (NAVSSI), AN/WRN-6, Defense Advanced GPS Receiver (DAGR)

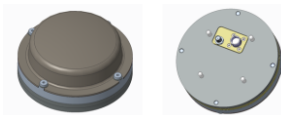


GPNTS/Non GPS Aided PNT for Surface Ships (NoGAPSS)



GHOST

Multi-Platform Anti-Jam GPS Navigation Antenna (MAGNA)



High Integrity – GPS Anti-jam/Inertial Measurement Unit (IMU) Navigation System (HI-GAINS)

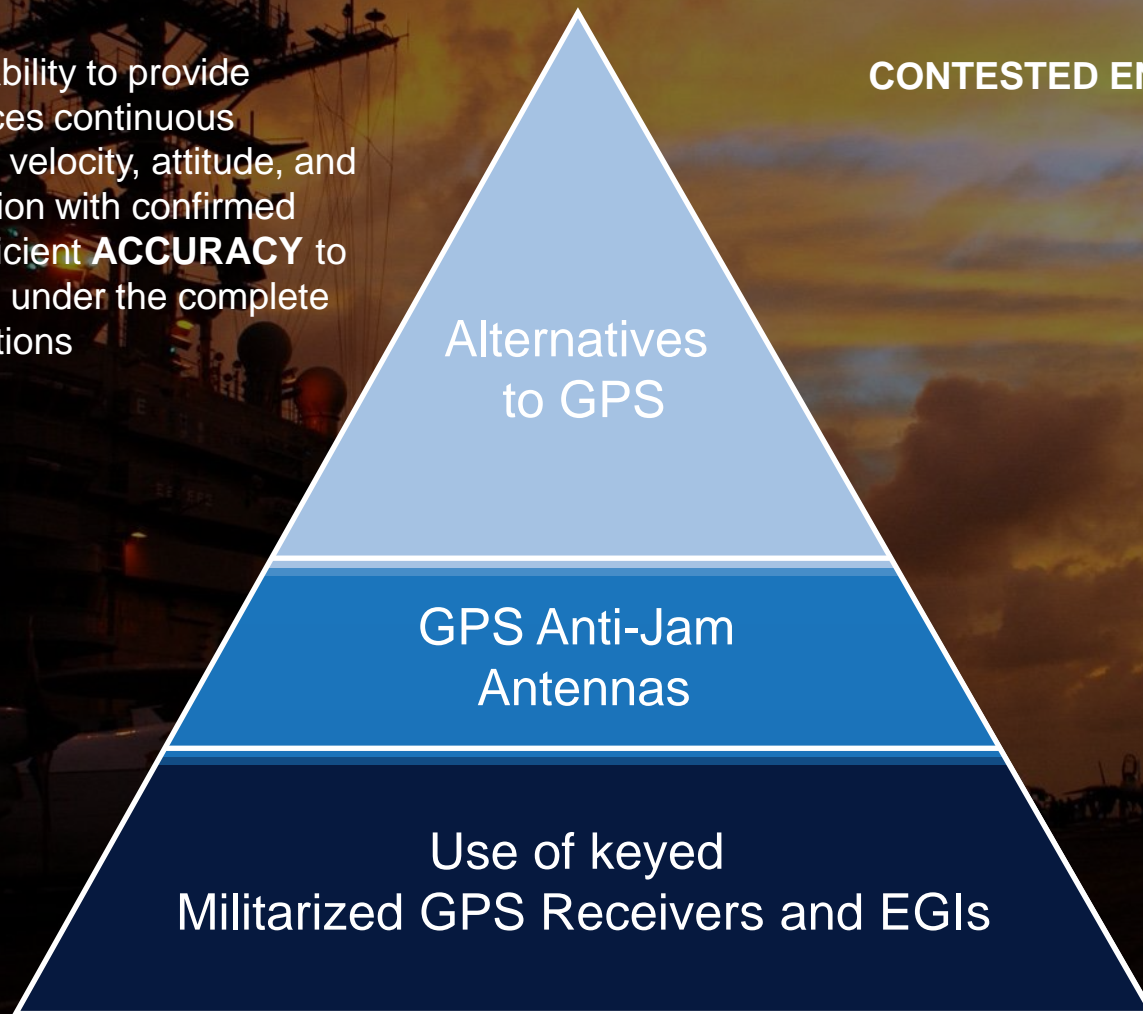


EGI-M and MAGR-2K-M

Assured PNT Pyramid

Assured PNT: The ability to provide operational Navy forces continuous **ACCESS** to position, velocity, attitude, and time (PVAT) information with confirmed **INTEGRITY** and sufficient **ACCURACY** to perform their mission under the complete range of threat conditions

CONTESTED ENVIRONMENT



APNT Capability requires scalable open architecture to integrate complimentary technologies



Retaining and Improving PNT Capability



- Scalable and affordable advancements in AJ Antennas and Receivers
 - Smaller and cheaper while still meeting threshold requirements
 - Ex: MAGNA, Hi-GAINS, GHOST
 - Ensuring SWaP constrained platforms have access to capability and program of record sustainment resources
- Leveraging Modular Open Systems Architecture (MOSA) for rapid integration of new PNT sensors and modifying SW algorithms to respond to threats
 - Ex: Non GPS Aided PNT for Surface Ships (NoGAPSS) Future Naval Capability (FNC) integrates PMW/A 170, IWS 6, and ONR efforts to provide APNT capability to surface platforms
 - Increases access to PNT data throughout GPS contested environment
 - Added data integrity through additional PNT sensors and advanced APNT algorithms
 - Better accuracy in GPS contested environments by bounding inertial and clock drift



Industry Involvement

- Current PMW/A 170 efforts focused on Surface APNT, looking to industry for viable technology to extend capability enhancements to Air platforms
- Active Small Business Innovative Research (SBIR) efforts:

Project Name	S&T Venue & Performer	\$ Value	Transition Program	Objective(s)
Satellite Terminal (transportable) Non-Geostationary (STtNG)	SBIR ØII Topic: N112-170 [Bascom Hunter]	\$7.7M	CBSP	Develop a universal satellite terminal for Non-Geostationary Satellite Orbit (NGSO) capabilities
High-Q Filters for GPS and SATCOM Resiliency	STTR ØII Topic: N11A-T016 [Indiana Micro]	\$1.75M	GPNTS, SATCOM Systems	Develop a tunable bandpass filter for the suppression of interference and jamming sources
Satellite Communications Antenna Pointing for Positioning (SCAPP)	SBIR ØII Topic: N193-149 [Caliola Engineering]	\$1.75M	GPNTS, NMT	Develop an algorithm that utilizes “angles only” based satellite tracking to derive highly accurate ship positioning data
Positioning using Magnetic Anomalies Correlation of Earth (PUMACE)	SBIR ØII Topic: N213-141 [Toyon Research]	\$1.75M	GPNTS	Develop GPS independent sensors for accurate positioning, utilizing the Earth’s magnetic anomalies
GPS Interference Direction of Arrival (DoA) Initiative for User Purposes (GIDI-UP)	SBIR ØII Topic: N224-130 [TBD]	\$1.75M	GPNTS	Develop a GPS interference direction finding sensor to provide situational awareness of jamming and/or spoofing signals
Proliferated Low Earth Orbit (PLEO) for PNT	SBIR ØI Topic: N224-131 [TBD]	\$1.75M	GPNTS, PLEO	Develop a solution that augments PLEO satellites to provide an alternate PNT source
Navigation Warfare (NAVWAR) Situational Awareness (SA) Tool	SBIR ØI Topic: N234-P07 [Caliola Engineering, and BlueRISC]	\$240k x2	GPNTS	Develop a software based tool that uses Artificial Intelligence (AI) to sift data and identify potential GPS threats in near real-time

Industry engagement and innovation crucial for long-term continued viability and effectiveness of U.S. warfighting superiority



PMW/A 170 Surface PNT Points of Contact



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**Accelerated delivery of required capability that is
affordable, integrated and interoperable**

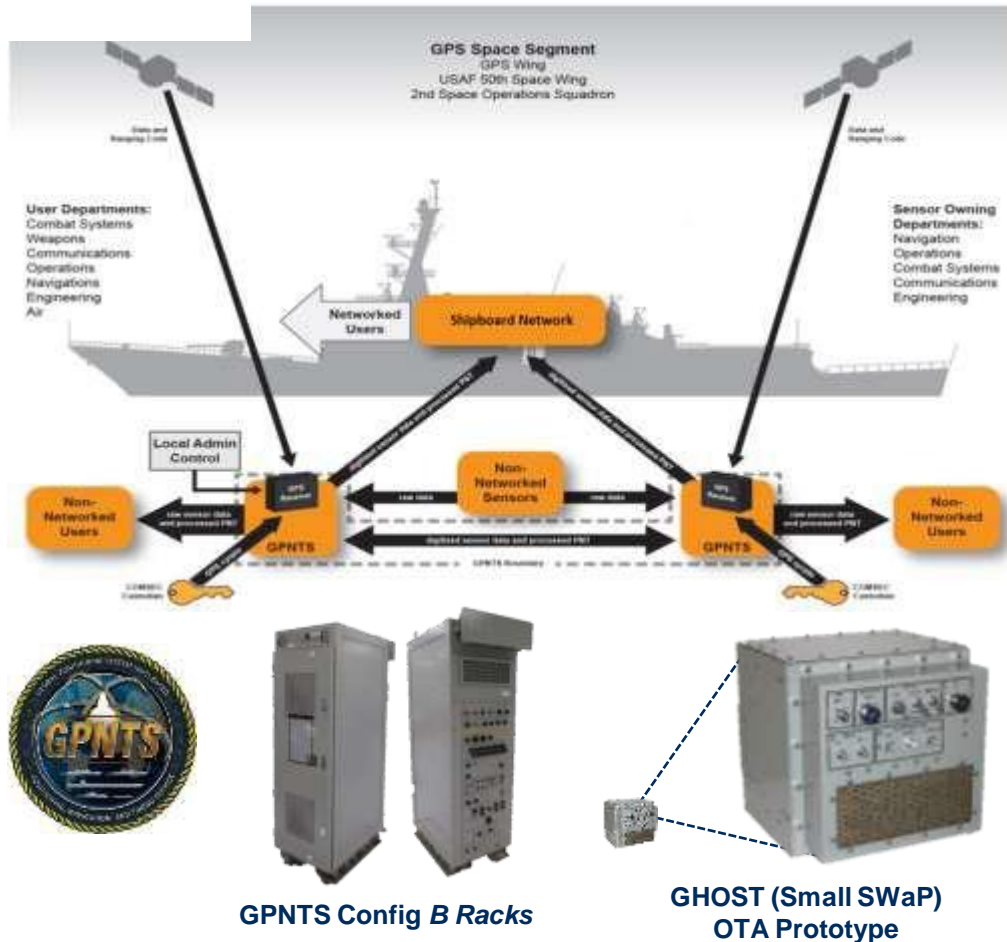


Global Positioning System (GPS) Based Positioning, Navigation and Timing Service (GPNTS)



GPNTS is the current and modernized real time GPS-based PNT data fusion and distribution system for Navy surface platforms, replacing the current Navigation Sensor System Interface (NAVSSI). GPNTS integrates signals from navigation-related sensors, incorporates position, velocity, and time information from an embedded military-grade GPS receiver, and provides users with a reliable and accurate blended navigation solution.

- Provides improved PNT with **Anti Spoofing and Time Integrity Monitoring**
- Provides a **Service Oriented Architecture (SOA)** for PNT data distribution
- **Open, extendable, and scalable APNT solution** for all platforms
- Addresses fleet **obsolescence issues**, providing a **cost effective and secure PNT solution**
- **Single SW release** supports 3 HW configurations
- GPNTS with Military GPS User Equipment (MGUE) is the **Navy's Lead Platform for GPS M-Code****
- GPNTS Hull Optimized System –Tactical (GHOST) is a prototype development to provide GPNTS functionality in a **Small Size, Weight, and Power (SWaP)** package



GPNTS Config B Racks

GHOST (Small SWaP) OTA Prototype

**MGUE delays compounded by EOL and obsolescence challenges have potential to impact fielding and ability to meet new construction timelines

GPNTS will be on Navy Surface Ships, Foreign Military Sales (FMS), US Coast Guard (USCG), etc. GHOST is targeted for smaller platforms/crafts and Military Sealift Command (MSC)



GPS Anti-Jam Solutions

	HI-GAINS	MAGNA-I	ADAP
Antennas			
Size	2.6" diameter, 1.33"	4.45" diameter, 2" high	14" diameter x 1.5" high CRPA, 8"x13"x2" AE
Weight	0.42 lbs / 190 grams	1.0 lbs	18.6 lb
Power	28 VDC, < 12W	28VDC, 17W	50W
Platforms	SWaP-C constrained platforms; ex. Group 1-3 UAS	Larger SWaP-C constrained platforms; ex. UH-1Y helicopter	Large non SWaP-C constrained platforms: ex. F/A-18, E-6B, P-8
M-code Capable	Yes	Yes	Yes