



SPACE-BASED POSITIONING
NAVIGATION & TIMING
NATIONAL ADVISORY BOARD

PTA Subcommittee Update

PTA Subcommittee
3 May 2023



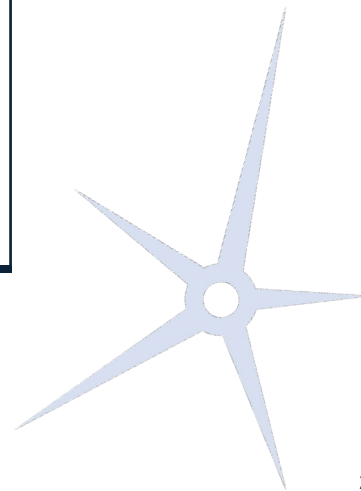
PTA Subcommittee Members and Charter

Members:

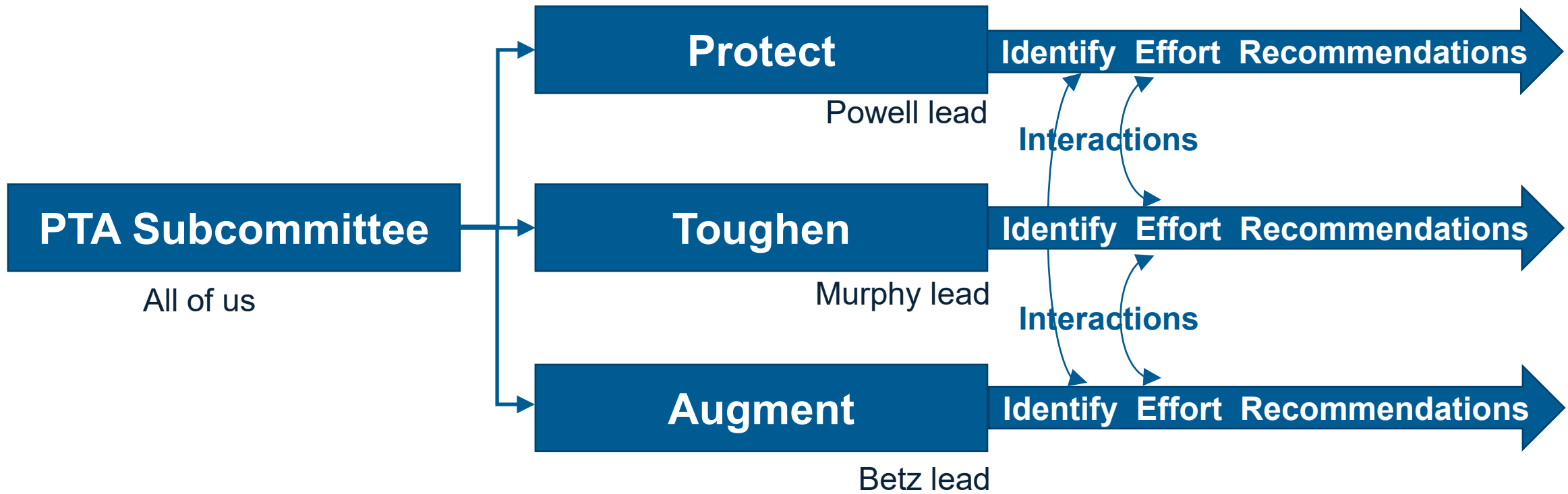
- John Betz, Chair
- Tim Murphy, 1st Vice-Chair
- Tom Powell, 2nd Vice-Chair
- Scott Burgett
- Pat Diamond
- Renato Filjar
- Michael Hamel
- Larry James
- Vahid Madani
- Todd Walter

Role/ Study Areas:

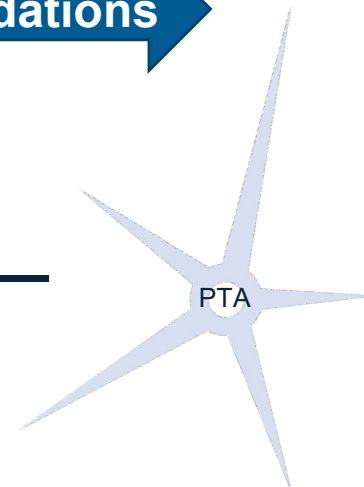
- **Protect:** Transparent & balanced spectrum management, preventing or removing harmful interference sources
- **Toughen:** Ensure ITAR does not unduly constrain civil & commercial interests, other steps that help receivers resist attacks and anomalies
- **Augment:** GDGPS, Complementary PNT, GNSS Signal Monitoring



PTA Subcommittee Parallel Focus



**Identify and work with key implementers of our recommendations—
not just the EXCOM**



PTA Framework

		Challenges and Threats			
		Space Weather	Interference	Physical Attack	...
Defenses and Mitigations	Protect				
	Toughen				
	Augment				

- Consider whether Protect, Toughen, or Augment is needed against different challenges or threats
- Users have finite resources—risk management is needed
- Need to assess toughness of augmentations against common and unique challenges and threats



Obstacles to Protecting, Toughening, and Augmenting Critical Infrastructure

- Protecting remains a challenge
 - Still potential for strong adjacent band interference to GNSS receivers
 - Some progress toward a nationwide capability for interference monitoring and removal, but a long way to go
- Lacking needed information concerning Toughening and Augmenting
 - Investment in Toughening vs. Augmenting depends on likelihood that GPS provides useful signals—2022 recommendation that USG provide that info
 - Difficult to discern critical infrastructure progress in Toughening and Augmenting
 - DHS/CISA's May 2023 presentation provides initial insights
- Export controls block the most capable GNSS receiver toughening—adaptive antennas
 - 2023 white paper and recommendation targeting that obstacle
- Proliferation of timing technologies—how should owner/operators choose?



Protect Working Group Update

- Activity
 - Fact-finding session #3: 8 March – Defense Innovation Unit (DIU) and DOT
- Outcome
 - Harmonious Rook Interference Detection
 - Networked GNSS devices as sensors
 - Machine Learning based detection
 - Visualization “Heat Maps”
- Way Ahead
 - Shift focus from detection to mitigation and enforcement
 - Identify cognizant government officials and agencies with authority and funds



Toughen Working Group Update

■ Activity

- Investigation of effect of export restrictions on civil applications of adaptive antennas for GNSS
- Five fact finding meetings held over the last year – involving government and industry stakeholders
- Developed a White Paper

■ Outcomes

- White paper completed
 - Documents the investigation and information discovered
 - Includes a proposed general recommendation for deliberation by PNT Advisory Board:
 - “... recommends that the U.S. and its allies modify current export controls to enable widespread production, use, and export of civil, commercial, GNSS adaptive arrays and associated receivers. ”
 - Three suggested approaches for modification for USML limitations

Way Ahead

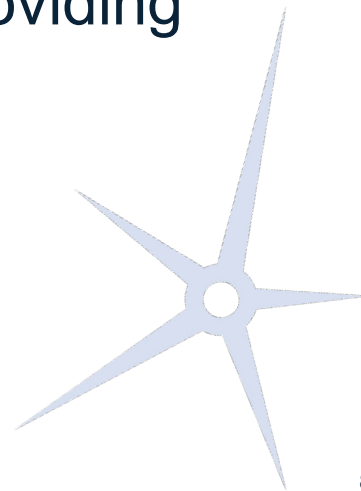
- Next steps depend on the outcome of the PNT Advisory Board deliberations



PTA Endorses GPS High Accuracy and Robustness Service

- The Emerging Capabilities, Applications, and Sectors Subcommittee is advocating a GPS HARS that would provide information to receivers over the internet with multiple benefits:
 - Higher accuracy for applications like lane-dependent driving guidance and precise positioning of drones
 - Toughening receiver operations, enabling more robust receiver processing and providing data resistant to environmental effects or malicious actions
 - Maintaining competitiveness with Galileo and BeiDou, which are providing similar services

PTA Subcommittee Endorses the Proposed GPS HARS



Augment Working Group Update

- Discussing next steps:
 - Establish and publish framework for describing and evaluating alternate/complementary/backup PNT technologies
 - Relevance to canonical set of use cases
 - Potential attacks and robustness to them
 - Costs and schedule of providing the service
 - Fees if fee for service
 - Any Government costs for development, acquisition, installation, sustainment, operation
 - Followon to DHS/CISA May 2023 presentation on progress in toughening and augmenting—what actions could/should we take?
 - Possible working group activity addressing available timing technologies

