DHS SCIENCE AND TECHNOLOGY

Resilient PNT Conformance Framework

Civil GPS Service Interface Committee

Homeland Security
Science and Technology

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PNT Risks in Civil Critical Infrastructure

- **PNT in Critical Infrastructure**: Accurate position, navigation and timing (PNT) information is important for many critical infrastructure sectors. GPS is primary source of PNT for many.

- **Problem**: PNT disruptions are becoming recognized as a risk to critical infrastructure.
  - Awareness campaign over past few years.
  - Growing trend of high-profile disruptions across the world as reported on by industry trade publications.

- **DHS Role:**
  - Improve the resilience of critical infrastructure against PNT threats and disruptions via:
    - Engaging with industry for information sharing and risk management.
    - Developing technology and mitigations.

Resilient PNT Conformance Framework

Vision: Develop common language for defining resilient PNT equipment

- Has multiple levels of resilience to account for different user needs & risk tolerance

Definition of Resilience: The ability to "withstand and recover rapidly from disruptions" (PPD-21)

Enables:

- Product differentiation for vendors
- Improved risk management and decision making by CI operators when acquiring new PNT equipment

Approach:

- Developed in collaboration with industry and federal interagency partners
- Outcome-based and PNT source agnostic to encourage industry innovation

Core Functions with embedded detection functionality.

Acknowledgements: Industry Collaborators

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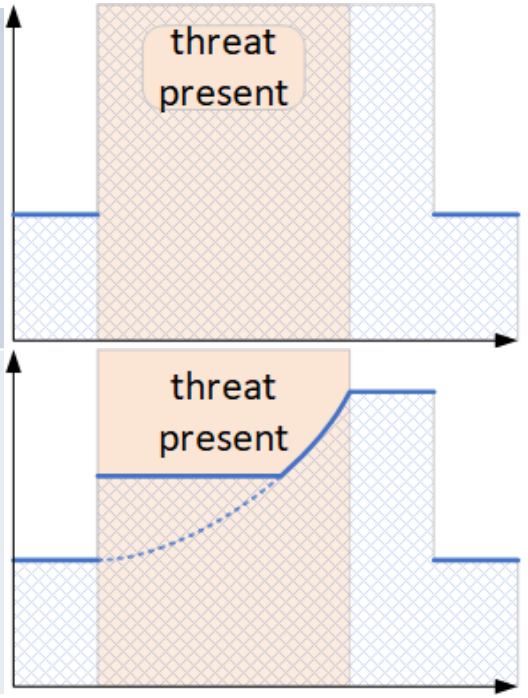
And many others (80+ participants)

Framework Levels 1-2

- Near-term resilience towards most impactful legacy issues.
- Also results in raising difficulty in vulnerability exploitation chains.

Increasing levels align with increasing resilience and expected time-to-market.

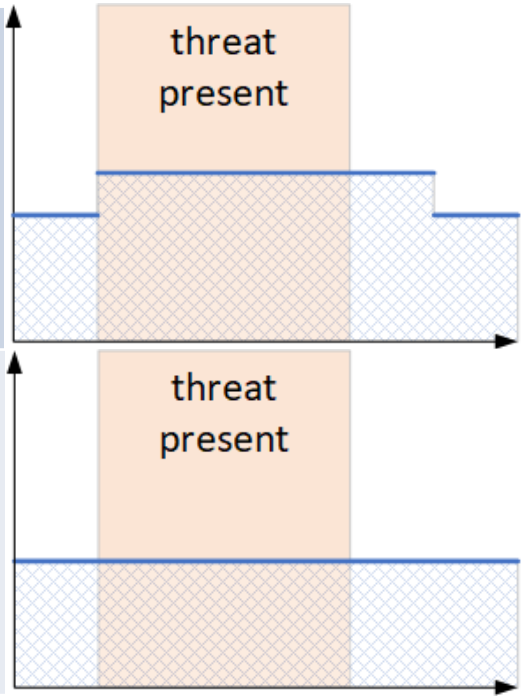
	Minimum Requirements (Cumulative)
Level 1	**Ensures recoverability after removal of the threat.** 1. Must verify that stored data from external inputs adheres to values and formats of established standards. 2. Must support full system recovery by manual means, making all memory clearable or resettable, enabling return to a proper working state, and returning the system to the defined performance after removal of the threat. 3. Must include the ability to securely reload or update firmware.
Level 2	**Provides a solution (possibly with unbounded degradation) during threat.** **Includes capabilities enumerated in Level 1 plus:** 4. Must identify compromised PNT sources and prevent them from contributing to erroneous PNT solutions. 5. Must support automatic recovery of individual PNT sources and system.



Framework Levels 3-4

- Push towards NextGen PNT in mid to long-term.
- May require substantial architectural updates.

	Minimum Requirements (Cumulative)
Level 3	**Provides a solution (with bounded degradation) during threat.** **Includes capabilities enumerated in Levels 1 and 2 plus:** 6. Must ensure that corrupted data from one PNT source cannot corrupt data from another PNT source. 7. Must cross-verify between PNT solutions from all PNT sources.
Level 4	**Provides a solution without degradation during threat.** **Includes capabilities enumerated in Levels 1, 2 and 3 plus:** 8. Must have diversity of PNT source technology to mitigate common mode threats.



Potential Transition Pathways

Document Public Release:
- Targeting Dec2020

Conformance Framework

Industry

- **Standards Development Organizations**
  - Use framework as common guidance for developing voluntary standards across sector SDOs.
- **PNT Equipment Manufacturers**
  - Begin developing to framework concepts and articulate products based on framework levels.
- **Critical Infrastructure End-Users**
  - Incorporate framework behaviors into acquisition requirements.

Federal

- **GSA Schedule**
- **PNT EO Federal Acquisition Requirements**

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DIVERSE PERSPECTIVES + SHARED GOALS = POWERFUL SOLUTIONS