

Defense Matters

In Pursuit of PNT Assurance

Civil and Military User Equipment Standards Initiatives

There are two distinct, but separate, efforts underway by the civil and military communities to establish a means of assuring positioning, navigation, and timing (PNT) capabilities to meet the diverse set of requirements for domestic critical infrastructure and military utility.

Although both efforts are focused on the development of standards for PNT user equipment (UE), each is taking a different approach to development activity and are at different places on the path to completion.

DHS and IEEE P1952

In ION's Fall 2021 newsletter, I wrote about the Department of Homeland Security's (DHS) initiative to develop PNT user equipment (UE) standards focused on critical infrastructure needs for PNT beyond just GPS. This civil-focused DHS effort, which is being pursued through the Institute of Electrical and Electronics Engineers Standards Association (IEEE SA), is called Project 1952 (P1952).¹

As defined in the P1952 Project Authorization Request (PAR), the scope of work is limited to the reception, ingestion, processing, handling, and output of PNT data, information, and signals. The PAR specifically does not include standards relating to the characteristics of any PNT sources.

The stakeholders for P1952 include "manufacturers of PNT UE, public and private sector users of PNT UE, and providers of PNT services focused on critical infrastructure. These include power generation and utility, telecommunications, finance, transportation, agriculture, space, and emergency services sectors."²

The first meeting was held on



The IEEE Operations Center in Piscataway, NJ. IEEE is the nexus for the development of PNT user equipment standards focused on critical infrastructure needs.

Photo courtesy of IEEE

September 15, 2021, and conducted virtually using Microsoft Teams by working group Chair Shelby Savage (The MITRE Corporation), Vice Chair Steve Guendert (IBM), and Secretary Patricia Larkoski (The MITRE Corporation).

All attendees (55+) provided their names and affiliations and indicated their intention to participate either as voting or non-voting members.

Every meeting is announced with an agenda and followed with formal meeting minutes which are approved and maintained in IEEE's iMeet Center, a secure database that is username and password-protected with log-in credentials assigned individually to each member.

Progress to date includes the development of an outline of the future standard, and the establishment of two active subgroups—the Use Case Subgroup and the Resilience Definition Subgroup.

The tempo of meetings occurring since the start of 2022 has the two subgroups and the plenary working group meetings occurring on a three-week rotating cycle.

The Use Case Subgroup is focused on addressing four of the critical infrastructure sectors (e.g., telecom, energy, transportation, and finance).

The Resilience Definition Subgroup is wrestling with the definition of "user equipment," the various levels of what constitutes resilience, and how UE can withstand and recover across a finite set of resilience levels.

Future subcommittees that have been identified but have not as yet been formed include a Level-Definition Subcommittee, an Editing Subcommittee, and an Evaluation Subcommittee. This latter subcommittee will be responsible for developing the principles to guide a downstream IEEE-required Conformity Assessment Program (ICAP). The ICAP's mission will be to



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develop and implement programs that couple the PNT UE standards development activities with conformity assessment efforts to help accelerate market adoption while reducing implementation costs.

Six months into the P1952 effort, the work ahead to generate a set of draft standards cannot as yet be predicted, but the meetings of the two subgroups and the plenary continues to have 50+ attendees.

DOD and MOSA

The DOD wants to implement a multi-source PNT architecture so that each service can tailor combinations of PNT capability for applications in diverse platforms and mission areas. Their approach to doing this is presented in the DOD CIO's *Strategy for the Department of Defense Positioning, Navigation, and Timing Enterprise*. This overarching PNT strategy document is dated November 2018 and was cleared for open publication in August 2019.³

The strategy incorporates a flexible, open-system architecture approach to delivering multi-source PNT capabilities using common input/output standards that interface with various military platform data busses to enable flexible, multi-source PNT operations.

This strategy embraces the DOD's Modular Open Systems Approach (MOSA) concept that was mandated by the National Defense Authorization Act for Fiscal Year 2017 (P.L. 114-328 2017). MOSA is further required by DOD Instruction

4650.08, the DOD issuance for PNT and Navigation Warfare (NAVWAR) policy.

A foundational component of the standards enabling the DOD PNT MOSA strategy is a DARPA-developed software program referred to as All Source Positioning and Navigation (ASPN).

A presentation on ASPN was briefed to the National Space-Based PNT Advisory Board in June of 2019.⁴ The ASPN standard has evolved since its introduction as a DARPA initiative and the latest version, ASPN 3.0, was published in May 2021. The ASPN standard works with other essential enablers of the DOD PNT MOSA concept including a reference architecture, modeling and simulation tools, and a flexible PNT fusion processor employing variable plug-in module capabilities. These key elements are products of the Laboratory University Collaboration Initiatives sponsored by the Office of the Under Secretary of Defense for Research & Engineering (OUSD [R&E]) over the last several years.

In January 2022, the OUSD (R&E) held a follow-up Open Architecture Collaborative Initiative meeting to engage the DOD user community and industry in further evolving the ASPN 3.0 standard

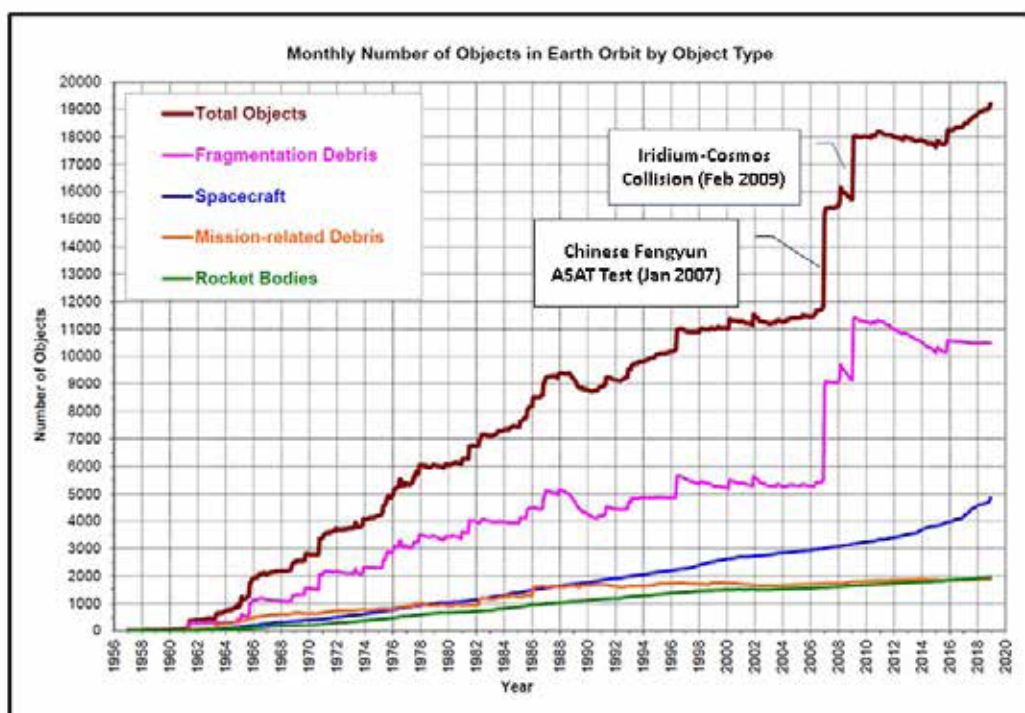
toward ASPN 3.1.

Restating a point made in the Fall 2021 article, the development and pursuit of standards has many benefits. From the perspective of equipment design, standards serve as fundamental building blocks that contribute to compatibility and interoperability, reduce risk, and speed development. Standards also make it easier to understand and compare competing products. Additionally, they are often used as references in procurement contracts to baseline a product's requirements and measure the degree of conformance.

Success for both of these distinct and different PNT UE standard initiatives will ultimately be measured by their respective abilities to satisfy the PNT requirements of the systems, platforms, and missions they are being designed to serve.✧

Footnotes

1. <https://sagroups.ieee.org/p1952/>
2. <https://development.standards.ieee.org/myproject-web/public/view.html#pardetail/9060>
3. <https://rntfnd.org/wp-content/uploads/DOD-PNT-Strategy.pdf>
4. <https://www.gps.gov/governance/advisory/meetings/2019-06/burke.pdf>



CORRECTION
This chart detailing the rise in the number of objects in Earth orbit, including space debris, should have been included with the Defense Matters column in the Winter 2022 issue of the ION newsletter. / Chart courtesy of NASA's Orbital Debris Program Office.