

Positioning, Navigation, and Timing Systems for Critical Infrastructure

Direct Injection Testing



Science and Technology

CRITICAL SIGNIFICANCE OF TESTING AND EVALUATION OF POSITIONING, NAVIGATION, AND TIMING (PNT) SYSTEMS IN CRITICAL INFRASTRUCTURE

Accurate Positioning, Navigation, and Timing (PNT) is necessary for the operation of many Critical Infrastructure (CI) sectors. With an evolving landscape, increased vulnerability of multi-PNT ecosystems, greater PNT dependency being built into future technologies, and adverse impacts to PNT disruption becoming more widespread and longer lasting, precision timing becomes more important for continued resilience within CI systems such as the electric grid, communication networks, and financial institutions.

INDUSTRY ENGAGEMENT AS KEY TO DEVELOPING RESILIENT SYSTEMS

Through coordination with CI Owners and Operators (CI O&O), the Department of Homeland Security Science and Technology Directorate (S&T) aims to improve Direct Injection Test and Evaluation capabilities through development of common representative configurations for Systems of Systems (SoS). This work will focus on several sectors such as but not limited to communications, the electrical subsector, and emergency services, to better understand the impacts of potential disruption. This effort will identify high criticality systems and applications, including systems models and configurations. It will also develop testing and evaluation methodologies to identify test environments, develop technical descriptions of possible test scenarios, and report details for potential test environments, including capabilities and drawbacks.

OBSERVABLE IMPACTS THROUGH DISRUPTION SCENARIO TESTING

Using data collected through coordination with CI O&O, direct injection tools will be developed for hardware-in-the-loop testing. These tests will assess and characterize the impact to downstream SoS and provide findings and actionable recommendations.

THE FUTURE OF RESILIENT PNT

Executive Order 13905, Strengthening National Resilience through Responsible Use of PNT Services, promotes the

responsible use of PNT services by the federal government and CI O&O. DHS S&T and the Cybersecurity and Infrastructure Security Agency (CISA) strive to make PNT an integral part of the overall risk analysis process.



Most CI sectors rely heavily on GPS to provide PNT information

RECENT DELIVERABLES/MILESTONES

- Draft report on representative configurations for SoS under study
- Draft report on testing and evaluation methodology
- Technical description of disruption scenario groups for testing

UPCOMING DELIVERABLES/MILESTONES

- Draft report on Potential test environments
- Final cumulative report

PROJECT PERFORMERS & PARTNERS

Performer: Homeland Security Systems Engineering and Development Institute (HSSEDI) Federally Funded Research and Development Centers, MITRE Corp.

Partner(s): DHS CISA, DHS Enterprise, and other federal agencies

Stakeholders: GPS equipment manufacturers, PNT technology providers, CI O&O, industry groups, and federal civilian agencies

