



RESEARCH
AND ENGINEERING

UNDER SECRETARY OF DEFENSE

3030 DEFENSE PENTAGON
WASHINGTON, DC 20301-3000

12 JAN 2024

MEMORANDUM FOR CHAIR, DEFENSE SCIENCE BOARD

SUBJECT: Terms of Reference –Defense Science Board Permanent Subcommittee on Strategic Options Study on Commercial Provision of Navigation Signals for Operational Use

Modern battlefields in Syria, Ukraine, and elsewhere have demonstrated that the Global Positioning System (GPS) is critical but that additional capabilities may be necessary to fulfill position, navigation, and timing (PNT) needs for the Department of Defense during future conflicts in challenging environments. The recent Defense Science Board (DSB) *Task Force on PNT Control* study found that GPS modernization has encountered a series of delays to completing necessary upgrades on its space, control, and user segments. The DSB also issued a series of recommendations, based on innovations in space launch and satellite design, that, if implemented, will accelerate operational capabilities.

Additionally, the recent DSB *Task Force on Commercial Space System Access and Integrity* study found that it is feasible for certain DoD missions to be conducted via commercial satellites. There continues to be much discussion of broadcasting PNT signals as secondary payloads from highly proliferated constellations in low- or medium-Earth orbit as well as dedicated commercial PNT signals-as-a-service initiatives that may have the potential to supplement GPS if technical and logistical challenges can be overcome.

The DSB, working through its *Permanent Subcommittee on Strategic Options* (“the Permanent Subcommittee”), is directed to conduct a study to consider the topic of commercial provision of navigation signals for operational use. The study should include the benefits of commercial constellations broadcasting PNT signals for DoD operational usage. The evaluation of these commercial alternatives must consider issues including security, technical viability, resilience, and industrial capacity. Through this process, the study should answer the following questions:

- Are PNT signals broadcast from low-Earth orbit feasible for military purposes in environments where jamming and spoofing are prevalent? What advantages and risks would such a constellation entail? What threats to these services can be anticipated and how might they be mitigated? Can military GPS user equipment effectively use these signals?
- What models of engagement with the commercial sector are likely to produce technical success and ensured availability at affordable costs? Will commercial PNT services develop without significant government funding? Consider both the military and civil uses of PNT that make GPS so invaluable.
- How can modern launch capacity be leveraged to deploy PNT capabilities as needed?

- What additional infrastructure is needed to broadcast, control, and receive signals from commercial PNT satellites in different orbits?

The Permanent Subcommittee findings, observations, and recommendations will be presented to the full DSB for its thorough, open discussion and deliberation at a properly noticed and public meeting, unless it must be closed in accordance with one or more of the exemptions found in subsection 552b(c) of title 5, United States Code (U.S.C.). The DSB will provide its findings and recommendations to USD(R&E) as the Sponsor of the DSB. The nominal start date of the study period for this terms of reference (ToR) will be within 30 days of when this ToR is signed. In no event will the duration of the study exceed 12 months from the start date of meetings to development of the final briefing/report.

In support of this ToR and the work conducted in response to it, the DSB and the Permanent Subcommittee have my full support to meet with Department leaders. The DSB staff, on behalf of the DSB and the Permanent Subcommittee, may request the Office of the Secretary of Defense and DoD Component Heads to timely furnish any requested information, assistance, or access to personnel to the DSB or the Permanent Subcommittee. All requests shall be consistent with applicable laws; applicable security classifications; DoD Instruction 5105.04, "Department of Defense Federal Advisory Committee Management Program"; and this ToR. As special government employee members of a DoD federal advisory committee, the DSB and the Permanent Subcommittee members will not be given any access to DoD networks, to include DoD email systems.

Once material is provided to the DSB and the Permanent Subcommittee, it becomes a permanent part of the DSB's records. All data and information provided is subject to public inspection unless the originating Component office properly marks the data or information with the appropriate classification and Freedom of Information Act exemption categories before the data or information is released to the DSB and the Permanent Subcommittee. The DSB has physical storage capability and electronic storage and communications capability on both unclassified and classified networks to support receipt of material up to the TS/SCI level.

The DSB and the Permanent Subcommittee will operate in conformity with and pursuant to the DSB charter; chapter 10 of title 5, U.S.C.; subsection 552b(c) of title 5, U.S.C.; and other applicable federal statutes, regulations, and policy. Individual DSB and Permanent Subcommittee members and the Permanent Subcommittee as a whole do not have the authority to make decisions or provide recommendations on behalf of the DSB nor report directly to any Federal representative. The members of the Permanent Subcommittee and the DSB are subject to certain Federal ethics laws, including section 208 of title 18, U.S.C., governing conflicts of interest and the Standards of Ethical Conduct regulations in 5 Code of Federal Regulations, Part 2635.



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cc:
DoD Advisory Committee Management Officer