

Space Development Agency
Next-Generation Space Architecture
Request for Information
SDA-SN-19-0001

The Space Development Agency (SDA) seeks ideas, methodologies, approaches, technologies, and systems related to the development of an agile, responsive next-generation space architecture. All responses received to this Request for Information (RFI) are solely for information and planning purposes. Responses to this RFI may be used to support potential new efforts.

BACKGROUND

The National Defense Strategy¹ (NDS) acknowledges that space is vital to the U.S. way of life, our national security, and modern warfare. In an era of renewed great power competition with an emergent China and a resurgent Russia, maintaining our advantage in space is critical to winning these long-term strategic competitions. Potential adversaries seek to undermine this goal by employing strategies that exploit real or perceived vulnerabilities in our current and planned National Security Space systems. In addition, these potential adversaries are developing and demonstrating multi-domain threats to national security much faster than we can deploy responsive space-based capabilities.

The Acting Secretary of Defense officially established the SDA on March 12, 2019. The new agency's charter is to rapidly develop and deploy a threat-driven, next-generation space architecture to counter near-peer efforts to contest or deny our space-based systems. To accomplish this, SDA has adopted an agile approach to rapidly develop a proliferated, multi-functional constellation of small satellites to counter current and emerging threats. SDA intends to leverage investments made by the private sector in space capabilities (e.g., hardware and software reuse, leasing of services), as well as industry best practices (e.g., mass production techniques for spacecraft buses, sensors, and user terminals). Using a spiral development model, SDA will maintain its flexibility to allow integration of hardware and software upgrades to address emerging threats on short timelines (less than two years between upgrades).

SDA is focused on the eight essential capabilities described in the Department's August 2018 *Report on Organizational and Management Structure for the National Security Space Components of the Department of Defense*. These capabilities include:

1. Persistent global surveillance for advanced missile targeting,
2. Indications, warning, targeting, and tracking for defense against advanced missile threats,
3. Alternate positioning, navigation, and timing (PNT) for a GPS-denied environment,
4. Global and near-real time space situational awareness,
5. Development of deterrent capability,
6. Responsive, resilient, common ground-based space support infrastructure (e.g., ground stations and launch capability),

¹ *Summary of the 2018 National Defense Strategy of the United States of America: Sharpening the American Military's Competitive Edge*, December 21, 2018

7. Cross-domain, networked, node-independent battle management command, control, and communications (BMC3), including nuclear command, control, and communications (NC3), and
8. Highly-scaled, low-latency, persistent, artificial-intelligence-enabled global surveillance.

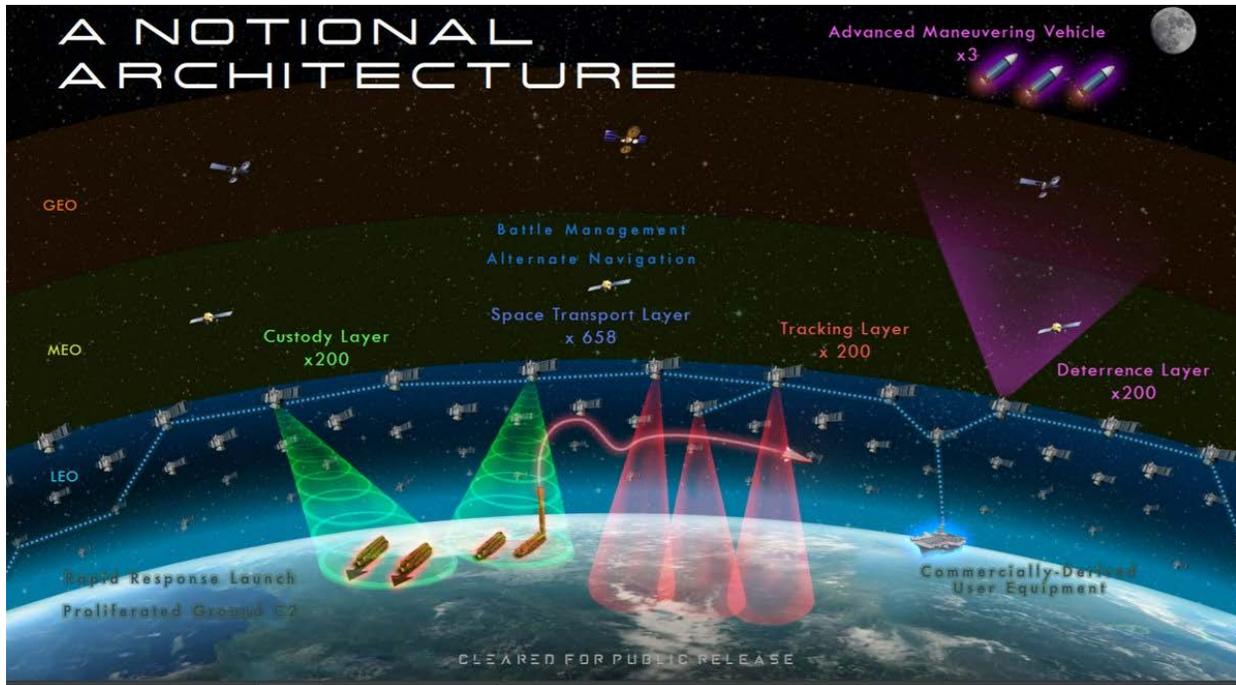


Figure 1. Notional Architecture (from SDA 60-Day Study).

DESCRIPTION

SDA requests information from industry related to satellite bus, payload, applique, and launch concepts that can contribute to an agile, responsive next-generation space architecture. SDA has developed a notional suite of capabilities, as depicted in Figure 1, to include multiple constellations (or "layers") addressing the eight priorities listed above. Each layer provides an integral and integrated capability to the overall architecture. The SDA's notional architecture is predicated on the availability of a ubiquitous data and communications transport layer and assumes the use of small, mass-produced satellites (50-500 kg) and associated payload hardware and software. The SDA is considering the use of transport layer spacecraft as substrates for other layers, allowing for the integration of appropriate payloads based on each layer's needs. Seven layers are proposed:

1. **Space Transport Layer:** Global, persistent, low-latency data and communications proliferated "mesh" network to provide 24x7 global communications.
2. **Tracking Layer:** Indications, warning, targeting, and tracking of advanced missile threats.
3. **Custody Layer:** 24x7, all-weather custody of all identified time-critical targets.
4. **Deterrence Layer:** Space Situational Awareness (SSA) of, and rapid access to, the cislunar volume.
5. **Navigation Layer:** Alternate Positioning, Navigation and Timing (PNT) for GPS-denied environments.

6. **Battle Management Layer:** Distributed, artificial intelligence-enabled Battle Management Command, Control and Communications (BMC3), to include self-tasking, self-prioritization (for collection), on-board processing, and dissemination, supporting delivery of perishable space sensor-derived data products directly to tactical users.
7. **Support Layer:** Mass-producible ground command and control capabilities, user terminals, and rapid-response launch services (small- to medium-class).

Proposed concepts should align to one or more of the layers described above. SDA prefers comprehensive solutions that include open architectures (e.g., buses that support multiple payloads and software appliques, and payloads/software capable of integration aboard multiple buses) and leverage commercial capabilities, existing or planned.

SUBMISSION INSTRUCTIONS AND CONTACT INFORMATION

Responses to this notice shall include the following information:

1. Vendor's Company Name, Address, and Contact Information.
2. Company Capability Statement/Overview.
3. Current teaming arrangements to provide SDA with a complete capability solution.
4. Summary of existing or conceptual satellite buses, payloads, software appliques, and rapid-response launch concepts, and approaches to developing and deploying relevant space architectures that incorporate these elements. At a minimum, vendors shall include the following:
 - Expected performance characteristics with substantiation
 - Sensing modalities/phenomenologies
 - Size, Weight, and Power (SWaP) requirements
 - Technology readiness and required technology maturation plans
 - Manufacturing considerations, including supply chain management
 - Suggestions to achieve interoperability with buses, payloads, and software produced by other vendors
 - Cost estimate (preferred but not required)
5. Emerging technologies that increase mission effectiveness with reduced SWaP.
6. Concepts for rapid prototyping, risk-reduction efforts that could be demonstrated in less than 18 months with demonstrated traceability to objective architecture, such as:
 - Low-cost, low-SWaP optical communication payload for high-bandwidth, space-to-space intersatellite links (ISL)
 - Software algorithms to support tracking of advanced missile threats from Low-earth Orbit (LEO)
 - Software algorithms to facilitate autonomous on-board space sensor tasking, collection, processing, and dissemination
 - Alternative PNT

7. Provide feedback on the following:

- SDA's notional architecture
- Private/public partnerships including cost sharing
- Security and protection
- Data rights
- Acquisition approaches, including contract types and proposal evaluation criteria
- Bidders' library
- Phasing and competition

Responses are limited to no more than 10 pages, and shall use a minimum of 12-point font and 1 inch margins.

All responses to this RFI must be received no later than 10:00 am (Eastern) on 5 August 2019:

- Submit unclassified responses to: carolyn.l.guy.civ@mail.mil
- Submit classified responses to: carolyn.l.guy.civ@mail.smil.mil

When submitting a response, please use the subject "SDA RFI Response – [Vendor Name]". Any responses submitted through different channels or to a different email address will not be considered. Organizations may submit multiple responses. The SDA will acknowledge receipt of all submissions but is under no obligation to provide feedback. SDA will review the RFI responses to assess relevance and potential performance capability.

DISCLAIMERS AND IMPORTANT NOTES

This announcement contains all information required to submit a response. No additional forms, kits, or other materials are needed. This is an RFI issued solely for information and planning purposes; it does not constitute a formal solicitation for proposals. In accordance with FAR 15.201(e), responses to this notice are not offers and cannot be accepted by the Government to form a binding contract. Submission of a response is strictly voluntary and is not required to propose to a subsequent SDA solicitation. No solicitation exists; therefore, do not request a copy of the solicitation. If a solicitation is released, it will be synopsisized on the Federal Business Opportunities website. It is the responsibility of any potential offerors/bidders to monitor this site for release of any solicitation or synopsis. The SDA will NOT provide reimbursement for costs incurred in responding to this RFI or participating in any subsequent workshop.

To the maximum extent possible, please submit non-proprietary information. If proprietary information is submitted, it must be appropriately and specifically marked. It is the submitter's responsibility to clearly define to the Government what is considered proprietary data. Any proprietary information should be clearly labeled as "Proprietary." The SDA will not publicly disclose proprietary information obtained as a result of the RFI. To the full extent that it is protected pursuant to the Freedom of Information Act and other laws and regulations, information properly identified by a respondent as "Proprietary" will be appropriately controlled. Submissions may be reviewed by Government personnel and support contractors bound by appropriate non-disclosure agreements. Responses to this RFI will not be returned. Intellectual or other privileged or proprietary information contained in responses to this RFI will not be distributed outside of the Department of Defense or United States Government employees from other Government agencies who are working with the SDA on this RFI. Respondents are advised that the SDA is under no obligation to acknowledge

receipt of the information received or provide feedback with respect to any information submitted under this RFI. Responses to this RFI do not bind the SDA to any further actions.