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Charting a Path to Space Superiority: The Cross-Domain Imperative

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Space Superiority Through Cross-domain Operations

Space functions underpin everything in modern life: military and civilian

↳ Space superiority must be gained/maintained to protect our space systems providing the services

↳ Since 2007, space is no longer a sanctuary

↳ Space eventually declared warfighting domain

↳ Space systems' elements (orbital, terrestrial, link segments) span all domains: air, maritime, land, cyber, space

↳ Adversary engagement opportunities and friendly vulnerabilities exist in all segments and therefore all domains

↳ All services, through all COCOMs, coordinated by USSPACECOM, can and must contribute to space superiority

Space superiority is a degree of control that allows forces to operate at a time and place of their choosing without prohibitive interference from space or counterspace threats while also denying the same to an adversary.

Source: Military Space Operations Terms of Reference, 24 September 2024, paragraph 3.1.

Changes are required to gaining/maintaining Space Superiority



Space Effects Underpin All Military and Countless Economic Functions

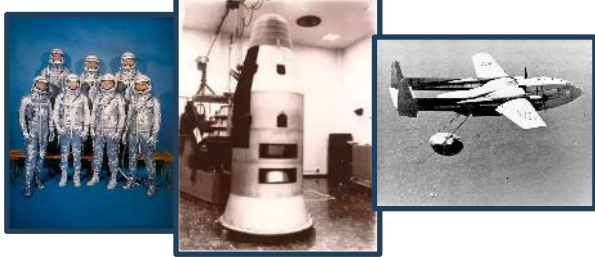
- Space functions underpin global power projection
 - Navigation
 - Timing
 - Communications
 - Weather
 - Intelligence, surveillance, reconnaissance
 - Missile warning
 - Civil and commercial systems are intertwined in military space operations
- Every military and economic function depends on assured space access
- Adversaries are contesting every orbital regime and space segment
 - China and Russia target satellites, ground nodes, and data links
- Space superiority => freedom of action in all other domains



Future wars will be won or lost on the ability to fight through space disruption



How We Got Here: The Three Space Ages

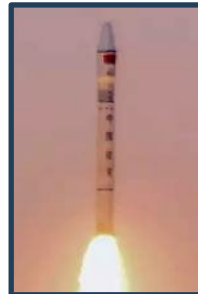


• First Space Age (1957–1990s)

- Cold War competition and scientific investigation
- Space seen as a sanctuary; deterrence over warfighting
- Uncontested environment → fragile, undefended architectures

• Second Space Age (1990s–2000s)

- Wide-spread integration and exploding dependence on space capabilities
- Desert Storm proved space as enabler for precision warfare
- Treated as a supporting function
- Uncontested environment further encouraged exquisite, bespoke, costly, ultimately vulnerable architectures



• Third Space Age (2007–Present)

- Chinese ASAT test shattered “space as sanctuary”
- Contested and growing belligerence

Space Superiority must now be gained, maintained, and regained if lost



Adversaries Threaten Space Superiority

- **China:** deliberate, rapid militarization of space
 - Road-mobile ASATs
 - Damaging and dazzling laser weapons
 - 200+ ISR satellites
 - Global tracking network
 - Reorganization of military service to further enable space operations growth and application
 - PLA Aerospace Force integrates space into every kill chain
- **Russia:** reckless and escalatory behavior in orbit
 - Co-orbital inspection vehicles
 - Nuclear-capable ASAT testing
 - Cyber and EW attacks like ViaSat foreshadow future tactics

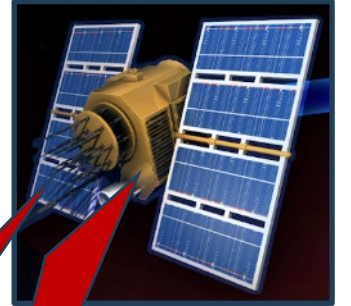


Adversaries view control of space as a prerequisite for victory



Every System Element is a Friendly Vulnerability or Adversary Opportunity

- Space systems span all domains: air, land, sea, space, cyber
 - Orbital segment: satellites
 - Terrestrial segment: ground stations and user elements
 - Link segment: electromagnetic spectrum
- Every service can contribute to defense of friendly or antagonism of adversary space systems:
 - Air: conduct deep-strike & contribute to ISR
 - Land: engage in missile defense
 - Sea: conduct sea-based sensing & deep-strike operations
 - Cyber: conduct network defense and attack
- Novel supporting/supported relationships
 - SPACECOM must be supported
 - Other COCOMs must be in support



Space superiority requires unity of effort across combatant commands



Recommendation #1: Conduct Roles & Missions Review

Conduct comprehensive DoD and IC review of space responsibilities

- Map and resource gaps for unity of effort
- Resolve duplication for efficiency
- Among:
 - Services
 - SPACECOM
 - NRO
 - NGA

Institutional clarity = operational clarity

Clarify supported/supporting relationships for space operations

- Clarify how other Combatant Commands aid SPACECOM in conflict
- Authorized, but unprecedented arrangements are likely to occur
 - e.g. CENTCOM in support of SPACECOM for prosecution of space-related ground targets in CENTCOM AOR

Unusual future command relationships



Recommendation #2: More Technology and Capacity Investment

- Invest in delivery and integration of cross-domain effects
- Modernize forces without unplanned duplication
- Prioritize cross-domain capabilities that close space vulnerabilities
 - Optical comms
 - PWSA tracking layer
 - Counter-link EW systems
- Integrate and scale existing platforms into space kill chains
 - F-35
 - B-21
 - Aegis
 - Patriot



Fund R&D and field aggressively to maintain space superiority



Recommendation #3: Improve Education & Advance Culture

- Build space literacy across all services
- Emphasize space superiority in all field-grade Professional Military Education (PME)
 - Encourage examination of cultural biases reinforcing space as supporting functions only
- Establish advanced space-focused PME for joint strategists
 - Parity with SAMS/SAASS/MAWS/SAW programs
- Continue work to declassify unnecessarily over-classified systems



A shared lexicon & operational understanding are crucial to domain superiority



Recommendation #4: Train Like We Fight

- Invest in exercises and training to build experience
 - Regularly occurring exercises for new personnel
 - Challenges in overclassification, allocated personnel, training materials, etc
- Incorporate contested space scenarios in major joint exercises
 - Space effects must be fully played out, not scripted
 - Use organic space personnel resource
- SPACECOM must practice being the supported command
 - Other COCOMs practice supporting SPACECOM with or without a conflict in their AOR
 - Allies and partners included in realistic space campaigns
 - Reps accumulated for personnel in novel scenarios



Exercises pinpoint operational deficiencies and speed corrective measures



Space Superiority is Foundational to National Security and the American Way of Life

- Space is a warfighting domain
- We built a combatant command and a military service to lead and fight in that domain
- The DoD and sister services must support the Space Force and USSPACECOM to gain and maintain space superiority
 - Conduct a roles and missions review across the department
 - Further invest in technology and advance capacity
 - Improve education and culture
 - Train like we fight



Reform must be joint, deliberate, and immediate



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