

U.S. GOVERNMENT SPACE ECOSYSTEM

THE FEDERAL ORGANIZATIONS THAT LEAD, ENABLE, SECURE, AND USE SPACE CAPABILITIES ACROSS THE UNITED STATES GOVERNMENT | CURRENT AS OF AUGUST 2026

1 POLICY, BUDGET, AND OVERSIGHT



PRESIDENT / EXECUTIVE OFFICE OF THE PRESIDENT



ASSISTANT TO THE PRESIDENT FOR SCIENCE AND TECHNOLOGY



OFFICE OF SCIENCE AND TECHNOLOGY POLICY (OSTP)



NATIONAL SECURITY COUNCIL (NSC)



OFFICE OF MANAGEMENT AND BUDGET (OMB)



CONGRESS

- AUTHORIZATION COMMITTEES**
 - Senate Committee on Commerce, Science, and Transportation
 - House Committee on Science, Space, and Technology
 - Senate Armed Services Committee
 - House Armed Services Committee
- APPROPRIATIONS COMMITTEES**
 - Senate Appropriations Committee
 - House Appropriations Committee



GOVERNMENT ACCOUNTABILITY OFFICE (GAO)



INSPECTORS GENERAL (IGs AND DOD IG)

CENTRAL MASTER ECOSYSTEM MAP: HOW ORGANIZATIONS CONNECT



2 CIVIL SPACE



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

MISSION DIRECTORATES



Science



Space Operations



Exploration Systems Development



Aeronautics



Earth Science

STEM Engagement
(Office of STEM Engagement)

MAJOR NASA CENTERS

- Ames Research Center
- Armstrong Flight Research Center
- Glenn Research Center
- Goddard Space Flight Center
- Johnson Space Center
- Kennedy Space Center
- Marshall Space Flight Center
- Langley Research Center
- Jet Propulsion Laboratory (Caltech)

SPACE INTELLIGENCE



OFFICE OF THE DIRECTOR OF NATIONAL INTELLIGENCE (ODNI)



NATIONAL RECONNAISSANCE OFFICE (NRO)



NATIONAL GEOSPATIAL-INTELLIGENCE AGENCY (NGA)



DEFENSE INTELLIGENCE AGENCY (DIA)



NATIONAL SECURITY AGENCY (NSA)



CENTRAL INTELLIGENCE AGENCY (CIA)



NATIONAL SPACE INTELLIGENCE CENTER (NSIC)



SERVICE AND AGENCY SPACE INTELLIGENCE ELEMENTS

RESEARCH AND TECHNOLOGY



DEFENSE ADVANCED RESEARCH PROJECTS AGENCY (DARPA)



AIR FORCE RESEARCH LABORATORY (AFRL)



NAVAL RESEARCH LABORATORY (NRL)



DEPARTMENT OF ENERGY (DOE)

- Key National Laboratories
- Lawrence Livermore National Laboratory
- Los Alamos National Laboratory
- Sandia National Laboratories



NATIONAL SCIENCE FOUNDATION (NSF)



NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

3 MILITARY SPACE



DEPARTMENT OF DEFENSE (DoD)



DEPARTMENT OF THE AIR FORCE (DAF)



U.S. SPACE FORCE (USSF)



U.S. SPACE COMMAND (USSPACECOM)



COMBAT FORCES COMMAND (U.S. Space Force)



MISSILE DEFENSE AGENCY (MDA)



SPACE SYSTEMS COMMAND (U.S. Space Force)



ARMY SPACE AND MISSILE DEFENSE COMMAND



SPACE TRAINING AND READINESS COMMAND (U.S. Space Force)



NAVY SPACE COMMAND



SPACE DEVELOPMENT AGENCY (SDA)



MARINE CORPS FORCES SPACE COMMAND



AIR FORCES SPACE (AF/A4S)



SECURITY AND RESILIENCE



DEPARTMENT OF HOMELAND SECURITY (DHS)



CYBERSECURITY AND INFRASTRUCTURE SECURITY AGENCY (CISA)



OFFICE OF THE NATIONAL CYBER DIRECTOR (ONCD)



FEDERAL BUREAU OF INVESTIGATION (FBI)



U.S. CYBER COMMAND (USCYBERCOM)



NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)



DEFENSE COUNTERINTELLIGENCE AND SECURITY AGENCY (DCSA)

PUBLIC SERVICES



NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA)



NEEDS (National Environmental Satellite, Data, and Information Service)



NATIONAL WEATHER SERVICE (NWS)



SPACE WEATHER PREDICTION CENTER (NOAA)



U.S. GEOLOGICAL SURVEY (USGS) (Land and Earth Observation)



GPS/PNT GOVERNANCE

- Civil: Department of Transportation (PNT Advisory Board)
- Military: DoD (GPS/M-Code and PNT)



U.S. COAST GUARD (USCG)



FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA)

KEY DISTINCTIONS (IN PLAIN LANGUAGE)



NASA IS THE CIVIL SPACE AGENCY: NASA leads U.S. civilian space exploration, science, Earth observation, aeronautics research, and space technology development.



THE SPACE FORCE AND U.S. SPACE COMMAND ARE NOT THE SAME: The U.S. Space Force is a military service that organizes, trains, equips, and presents space forces. U.S. Space Command (USSPACECOM) is the unified combatant command responsible for employing military space forces in global operations.



NRO AND NGA ARE INTELLIGENCE ORGANIZATIONS: The National Reconnaissance Office (NRO) builds and operates intelligence satellites. The National Geospatial-Intelligence Agency (NGA) analyzes imagery and geospatial data for national security.



FAA, FCC, AND NTIA REGULATE DIFFERENT ASPECTS OF SPACE ACTIVITY: FAA licenses launches and reentries for safety; FCC manages spectrum and communications licensing; NTIA manages orbital coordination, spectrum policy, and civil space traffic safety.



MANY FEDERAL ORGANIZATIONS USE OR GOVERN SPACE CAPABILITIES: Space enables national defense, intelligence, economic activity, public services, scientific discovery, and emergency response across the federal enterprise.

INTERNATIONAL, DIPLOMACY, AND TRADE



DEPARTMENT OF STATE
Office of Space Affairs



BUREAU OF INDUSTRY AND SECURITY (BIS)
(Export Administration Regulations)



DEPARTMENT OF THE TREASURY
Office of Foreign Assets Control (OFAC)



NASA
Office of International and Interagency Relations



COMMITTEE ON FOREIGN INVESTMENT IN THE UNITED STATES (CFIUS)



OFFICE OF THE UNITED STATES
TRADE REPRESENTATIVE (USTR)



FCC / NTIA / STATE
Roles in International Coordination and Spectrum/Orbital Policy

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WHO MAKES U.S. SPACE POLICY?

HOW U.S. SPACE POLICY, BUDGET, AND OVERSIGHT WORK • CURRENT AS OF AUGUST 2026



AMERICA'S CIVIL SPACE ENTERPRISE

NASA AND THE U.S. CIVIL SPACE PROGRAM ADVANCING DISCOVERY, EXPLORATION, AND INNOVATION FOR THE BENEFIT OF ALL

CURRENT NASA MISSION DIRECTORATES



HUMAN SPACEFLIGHT MISSION DIRECTORATE

ENABLES SAFE, SUSTAINABLE HUMAN EXPLORATION IN EARTH ORBIT AND BEYOND.



SCIENCE MISSION DIRECTORATE

EXPLORES EARTH, OUR SOLAR SYSTEM, AND THE UNIVERSE.



RESEARCH AND TECHNOLOGY MISSION DIRECTORATE

DRIVES INNOVATION AND MATURING OF TRANSFORMATIVE SPACE TECHNOLOGIES.*



MISSION SUPPORT DIRECTORATE

DELIVERS SERVICES AND INFRASTRUCTURE THAT ENABLE NASA'S MISSION SUCCESS.

SUPPORTING OFFICES



OFFICE OF INTERNATIONAL AND INTERAGENCY RELATIONS

BUILDS PARTNERSHIPS AND COORDINATES GOVERNMENT RELATIONSHIPS.



OFFICE OF SAFETY AND MISSION ASSURANCE

PROMOTES SAFETY AND ENSURES MISSION SUCCESS ACROSS NASA.



OFFICE OF THE CHIEF SCIENTIST

ADVISES ON THE INTEGRATION AND PRIORITIES OF NASA'S SCIENTIFIC ENTERPRISE.



OFFICE OF THE CHIEF ENGINEER

LEADS ENGINEERING EXCELLENCE AND TECHNICAL STANDARDS.

NASA OVERVIEW

NASA IS THE UNITED STATES' CIVIL SPACE AGENCY.

NASA LEADS THE NATION IN SPACE EXPLORATION, SCIENTIFIC DISCOVERY, AND AERONAUTICS RESEARCH. THROUGH PARTNERSHIPS WITH INDUSTRY, ACADEMIA, AND INTERNATIONAL ALLIES, NASA EXPANDS KNOWLEDGE, DRIVES INNOVATION, INSPIRES FUTURE GENERATIONS, AND BENEFITS LIFE ON EARTH.



* NOTE (AUGUST 2026): NASA ANNOUNCED A REALIGNMENT IN 2026, INCLUDING THE RESEARCH AND TECHNOLOGY MISSION DIRECTORATE TO ACCELERATE INNOVATION AND TECHNOLOGY DEVELOPMENT IN SUPPORT OF NASA'S MISSIONS.

KEY DISTINCTIONS



NASA IS THE U.S. CIVIL SPACE AGENCY.

NASA IS A CIVILIAN AGENCY WITHIN THE EXECUTIVE BRANCH. IT LEADS THE NATION IN CIVIL SPACE EXPLORATION, SCIENCE, AND TECHNOLOGY FOR PEACEFUL PURPOSES TO BENEFIT THE NATION AND ALL HUMANITY.



JPL IS A NASA FFRDC MANAGED BY CALTECH.

THE JET PROPULSION LABORATORY (JPL) IS A FEDERALLY FUNDED RESEARCH AND DEVELOPMENT CENTER (FFRDC) OPERATED BY CALIFORNIA INSTITUTE OF TECHNOLOGY FOR NASA TO CONDUCT UNIQUE AND COMPLEX SPACE MISSIONS AND RESEARCH.

MAJOR NASA CENTERS



AMES RESEARCH CENTER

RESEARCH IN AERONAUTICS, SPACE, AND INFORMATION TECHNOLOGY.



ARMSTRONG FLIGHT RESEARCH CENTER

FLIGHT RESEARCH AND TESTING IN AIR AND SPACE.



GLENN RESEARCH CENTER

AEROSPACE RESEARCH, PROPULSION, AND ENGINE SYSTEMS.



GODDARD SPACE FLIGHT CENTER

SPACE SCIENCE, EARTH SCIENCE, AND ASTROPHYSICS MISSIONS.



JOHNSON SPACE CENTER

HUMAN SPACEFLIGHT, CREW OPERATIONS, AND TRAINING.



KENNEDY SPACE CENTER

LAUNCH OPERATIONS AND GROUND SYSTEMS.



LANGLEY RESEARCH CENTER

AERONAUTICS RESEARCH AND ANALYSIS.



MARSHALL SPACE FLIGHT CENTER

SPACE LAUNCH SYSTEMS, PROPULSION, AND SPACECRAFT.



STENNIS SPACE CENTER

ROCKET TESTING AND ENGINE TEST STANDS.



JET PROPULSION LABORATORY

ROBOTIC EXPLORATION OF THE SOLAR SYSTEM AND BEYOND.



WALLOPS FLIGHT FACILITY

SUBORBITAL LAUNCH AND RANGE OPERATIONS.



WHITE SANDS TEST FACILITY

TESTING AND VALIDATION OF SPACE SYSTEMS.



MICHOUD ASSEMBLY FACILITY

MANUFACTURING AND ASSEMBLY OF SPACE HARDWARE.

THE U.S. MILITARY SPACE ENTERPRISE

STRUCTURE AND KEY ORGANIZATIONS AS OF AUGUST 2026

DEPARTMENT LEVEL



DEPARTMENT OF DEFENSE
LEADS AND OVERSEES THE NATION'S
MILITARY SPACE ENTERPRISE



DEPARTMENT OF THE AIR FORCE
ORGANIZES, TRAINS, AND EQUIPS
SPACE FORCES AND CAPABILITIES



**OFFICE OF THE ASSISTANT SECRETARY
OF THE AIR FORCE FOR
SPACE ACQUISITION AND INTEGRATION**
ACQUIRES AND INTEGRATES SPACE
CAPABILITIES ACROSS THE ENTERPRISE

MILITARY SERVICE



U.S. SPACE FORCE

MISSION: ORGANIZE, TRAIN, AND EQUIP
SPACE FORCES TO WIN IN COMPETITION
AND CONFLICT.



**HEADQUARTERS
U.S. SPACE FORCE**



COMBAT FORCES COMMAND
GENERATE, PRESENT, AND SUSTAIN
SPACE FORCES



SPACE SYSTEMS COMMAND
DEVELOP, ACQUIRE, AND DELIVER
SPACE WARFIGHTING CAPABILITIES



**SPACE TRAINING AND
READINESS COMMAND**
TRAIN, DEVELOP, AND ASSESS
SPACE PROFESSIONALS AND UNITS

COMBATANT COMMAND



U.S. SPACE COMMAND

THE UNIFIED COMBATANT COMMAND
FOR SPACE OPERATIONS.



U.S. SPACE FORCES-SPACE
COMBINED JOINT FORCE SPACE COMPONENT



COMBINED SPACE OPERATIONS CENTER
INTEGRATES AND SYNCHRONIZES SPACE
OPERATIONS GLOBALLY



NATIONAL SPACE DEFENSE CENTER
DETECTS, MONITORS, AND WARNS OF
THREATS TO U.S. AND ALLIED SPACE SYSTEMS



**JOINT FUNCTIONAL COMPONENT
COMMAND FOR MISSILE DEFENSE**
INTEGRATES MISSILE DEFENSE FORCES
AND CAPABILITIES



KEY DISTINCTIONS



U.S. SPACE FORCE

ORGANIZES, TRAINS, AND EQUIPS
SPACE FORCES.



DEVELOPS DOCTRINE AND CONCEPTS



BUILDS AND ACQUIRES CAPABILITIES



TRAINS AND READIES FORCES

VS.



U.S. SPACE COMMAND

EMPLOYS SPACE FORCES
FOR OPERATIONS.



PLANS AND CONDUCTS OPERATIONS



INTEGRATES JOINT AND ALLIED FORCES



DEFENDS AND ENABLES NATIONAL
AND ALLIED OBJECTIVES

SERVICE PREPARES THE FORCE.
COMMAND EMPLOYS THE FORCE.



THEATER AND COMPONENT ORGANIZATIONS



**U.S. SPACE
FORCES-
INDO-PACIFIC**



**U.S. SPACE
FORCES-
CENTRAL**



**U.S. SPACE
FORCES-
EUROPE-SPACE
FORCES AFRICA**



**U.S. SPACE
FORCES-
NORTHERN**



**U.S. SPACE
FORCES-
SOUTHERN**



**U.S. SPACE
FORCES-
KOREA**



**U.S. SPACE
FORCES-
JAPAN**



OTHER MILITARY SPACE ORGANIZATIONS



**SPACE
DEVELOPMENT
AGENCY**
PROTOTYPES AND
DELIVERS DISRUPTIVE
SPACE CAPABILITIES



**MISSILE
DEFENSE
AGENCY**
DEVELOPS AND
FIELDS MISSILE
DEFENSE SYSTEMS



**ARMY SPACE AND
MISSILE DEFENSE
COMMAND**
INTEGRATES SPACE AND
MISSILE DEFENSE
FOR THE ARMY



**NAVY
SPACE
COMMAND**
DELIVERS SPACE
CAPABILITIES TO
THE NAVY AND JOINT
FORCE



**MARINE CORPS
FORCES
SPACE COMMAND**
INTEGRATES SPACE
CAPABILITIES FOR
THE MARINE CORPS



**AIR FORCES
SPACE**
INTEGRATES SPACE
CAPABILITIES FOR
THE AIR FORCE



THE STRUCTURE REFLECTS ORGANIZATIONS AND RELATIONSHIPS PUBLICLY ACKNOWLEDGED AS OF AUGUST 2026.

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THE U.S. SPACE INTELLIGENCE ENTERPRISE

ORGANIZATIONS THAT COLLECT, ANALYZE, AND USE SPACE-RELATED INTELLIGENCE AS OF AUGUST 2026

1 NATIONAL LEADERSHIP



OFFICE OF THE DIRECTOR OF NATIONAL INTELLIGENCE (ODNI)

- LEADS THE U.S. INTELLIGENCE COMMUNITY
- SETS INTELLIGENCE PRIORITIES AND GUIDANCE
- OVERSIGHT, INTEGRATION, AND RESOURCE ALIGNMENT
- PRODUCES NATIONAL INTELLIGENCE ESTIMATES

2 COLLECTION AND GEINT ORGANIZATIONS



NATIONAL RECONNAISSANCE OFFICE (NRO)

- DESIGNS, BUILDS, LAUNCHES, AND OPERATES U.S. INTELLIGENCE SATELLITES
- PROVIDES IMAGERY AND SIGNALS FROM SPACE



NATIONAL GEOSPATIAL-INTELLIGENCE AGENCY (NGA)

- PROVIDES GEINT, MAPPING, AND EARTH OBSERVATION
- MAINTAINS GEINT FOUNDATIONAL DATA
- SUPPORTS SPACE SYSTEMS AND MISSION OPERATIONS

3 ANALYSIS AND THREAT ASSESSMENT



DEFENSE INTELLIGENCE AGENCY (DIA)

- PRODUCES DEFENSE INTELLIGENCE AND ALL-SOURCE ANALYSIS
- SUPPORTS COMBATANT COMMANDS AND THE DOD ENTERPRISE



MISSILE AND SPACE INTELLIGENCE CENTER (MSIC)

- LEADS MISSILE WARNING, TRACKING, AND SPACE ANALYSIS
- PROVIDES THREAT ASSESSMENTS ON MISSILES AND SPACE SYSTEMS



NATIONAL AIR AND SPACE INTELLIGENCE CENTER (NASIC)

- FOCUSES ON ADVERSARY AIR AND SPACE CAPABILITIES
- SUPPORTS FORCE PLANNING AND OPERATIONAL INTELLIGENCE



NATIONAL SPACE INTELLIGENCE CENTER (NSIC)

- INTEGRATES ALL-SOURCE SPACE INTELLIGENCE
- PRODUCES SPACE SITUATIONAL AWARENESS AND INDICATORS
- SUPPORTS NATIONAL, DOD, AND ALLIED DECISION-MAKING

INTELLIGENCE FROM SPACE



IMAGERY AND IMAGING INTELLIGENCE (IMINT)



SIGNALS INTELLIGENCE (SIGINT)



GEINT AND ENVIRONMENTAL DATA (GEINT)



MEASUREMENT AND TECHNICAL INTELLIGENCE (MASINT)

INTELLIGENCE ABOUT SPACE



ADVERSARY SPACE SYSTEMS AND CAPABILITIES



SPACE LAUNCH, MISSILES, AND COUNTERSPACE THREATS



SPACE DOMAIN AWARENESS AND SPACE SITUATIONAL AWARENESS



SPACE POLICY, INTENTIONS, AND PROGRAM ANALYSIS

7 WHY IT MATTERS



SATELLITE RECONNAISSANCE

U.S. SATELLITES PROVIDE UNIQUE VIEWS FROM SPACE, DELIVERING CRITICAL INTELLIGENCE ON GLOBAL ACTORS AND ACTIVITIES.



GEOSPATIAL INTELLIGENCE

GEINT ENABLES MAPPING, TARGETING, NAVIGATION, AND UNDERSTANDING OF THE PHYSICAL AND HUMAN TERRAIN.



FOREIGN THREAT ANALYSIS

ANALYSES ADVERSARY SPACE SYSTEMS, MISSILES, AND COUNTERSPACE CAPABILITIES TO ANTICIPATE THREATS AND INFORM STRATEGY.



SUPPORT TO NATIONAL DECISION-MAKING

INTELLIGENCE DRIVES WARFIGHTING, DETERRENCE, DIPLOMACY, AND RESILIENCE BY INFORMING LEADERS AT EVERY LEVEL OF GOVERNMENT.

4 SIGNALS AND NATIONAL SECURITY



NATIONAL SECURITY AGENCY (NSA)

- COLLECTS AND ANALYZES FOREIGN SIGNALS
- SUPPORTS SPACE SYSTEMS SECURITY AND RESILIENCE
- PROVIDES CRITICAL SIGINT TO THE ENTERPRISE



CENTRAL INTELLIGENCE AGENCY (CIA)

- CONDUCTS HUMINT AND TECHNICAL COLLECTION ON SPACE-RELATED PROGRAMS
- PRODUCES STRATEGIC ANALYSIS AND WARNINGS

5 MILITARY AND SERVICE ELEMENTS



U.S. SPACE FORCE INTELLIGENCE ORGANIZATIONS

- SPACE FORCE S2 (INTELLIGENCE) DIRECTORATE
- SPACE DELTA 10 - INTELLIGENCE, SURVEILLANCE, AND RECONNAISSANCE
- SPACE SYSTEMS INTELLIGENCE AND ANALYSIS



COMBAT SUPPORT ELEMENTS

- JOINT FORCE HEADQUARTERS-SPACE (JFHQ-SPACE)
- COMBATANT COMMAND J2 INTELLIGENCE DIRECTORATES



SERVICE INTELLIGENCE ORGANIZATIONS

- ARMY, NAVY, MARINE CORPS, AND AIR FORCE INTELLIGENCE
- PROVIDE SERVICE-SPECIFIC AND THEATER SUPPORT

6 SMALL SUPPORTING ORGANIZATIONS



FEDERAL BUREAU OF INVESTIGATION (FBI)

- COUNTERINTELLIGENCE AND INSIDER THREAT INVESTIGATIONS
- PROTECTS U.S. SPACE AND INTELLIGENCE PROGRAMS



DEPARTMENT OF ENERGY (DOE)

- OFFICE OF INTELLIGENCE AND COUNTERINTELLIGENCE (OICI)
- PROTECTS NUCLEAR AND DUAL-USE TECHNOLOGIES
- SUPPORTS COUNTERINTELLIGENCE AND THREAT AWARENESS



DEPARTMENT OF HOMELAND SECURITY (DHS)

- OFFICE OF INTELLIGENCE AND ANALYSIS (I&A)
- INTEGRATES INTELLIGENCE TO PROTECT THE HOMELAND
- ASSESSES TERRORIST AND TECHNOLOGICAL THREATS

WHO PROTECTS U.S. SPACE INFRASTRUCTURE?

CYBERSECURITY, HOMELAND SECURITY, RESILIENCE, AND COUNTERINTELLIGENCE AS OF AUGUST 2026



NATIONAL CYBER AND SECURITY LEADERSHIP

OFFICE OF THE NATIONAL CYBER DIRECTOR
LEADS NATIONAL CYBER STRATEGY AND COORDINATION ACROSS THE U.S. GOVERNMENT.

NATIONAL SECURITY COUNCIL
DEVELOPS AND COORDINATES NATIONAL POLICY TO PROTECT SPACE SYSTEMS AND DATA.

HOMELAND SECURITY

DEPARTMENT OF HOMELAND SECURITY (DHS)
LEADS NATIONAL EFFORTS TO PROTECT CRITICAL INFRASTRUCTURE.

CYBERSECURITY AND INFRASTRUCTURE SECURITY AGENCY (CISA)
REDUCES RISK TO SPACE SYSTEMS AS CRITICAL INFRASTRUCTURE; SHARES THREAT INFORMATION.

CISA SPACE SYSTEMS CRITICAL INFRASTRUCTURE WORKING GROUP
COORDINATES PUBLIC-PRIVATE RISK MANAGEMENT FOR THE SPACE ECOSYSTEM.

FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA)
SUPPORTS RESILIENCE PLANNING, CONTINUITY, AND RECOVERY FOR SPACE-DEPENDENT SERVICES.

U.S. COAST GUARD
PROTECTS UNDERSEA CABLES AND MARITIME COMMUNICATIONS RELATED TO SPACE OPERATIONS.

DEFENSE AND INTELLIGENCE SECURITY

U.S. CYBER COMMAND (USCYBERCOM)
DEFENDS DOD NETWORKS AND CONDUCTS CYBER OPERATIONS TO DISRUPT ADVERSARY THREATS.

NATIONAL SECURITY AGENCY (NSA)
PROVIDES SIGNALS INTELLIGENCE, CYBER DEFENSE SUPPORT, AND CRYPTOGRAPHIC ASSURANCE.

UNITED STATES SPACE FORCE (USSF) CYBER ORGANIZATIONS
MISSION DELTA 6 DEFENDS SPACE SYSTEMS AND ENABLES RESILIENT SPACE OPERATIONS.

DEFENSE COUNTERINTELLIGENCE AND SECURITY AGENCY (DCSA)
PROTECTS DOD AND SPACE INDUSTRY FROM INSIDER THREATS, FOREIGN INTELLIGENCE, AND SUPPLY CHAIN RISKS.

LAW ENFORCEMENT AND COUNTERINTELLIGENCE

FEDERAL BUREAU OF INVESTIGATION (FBI)
INVESTIGATES CYBERCRIME, COUNTERINTELLIGENCE THREATS, AND FOREIGN MALIGIN INFLUENCE TARGETING SPACE SYSTEMS AND DATA.

STANDARDS AND BEST PRACTICES

NIST
NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY

- DEVELOPS CYBERSECURITY FRAMEWORKS, CONTROLS, AND GUIDELINES.
- PROVIDES PNT RESILIENCE AND TIMING SECURITY RECOMMENDATIONS.
- SUPPORTS POST-QUANTUM CRYPTOGRAPHY TRANSITION AND SUPPLY CHAIN ASSURANCE.

RISKS AND RESPONSES

CYBER INTRUSION UNAUTHORIZED ACCESS, MALWARE, RANSOMWARE. RESPONSE: STRONG ACCESS CONTROLS, MONITORING, AND INCIDENT RESPONSE.	JAMMING DEGRADATION OF SIGNALS AND COMMUNICATIONS. RESPONSE: ANTI-JAMMING TECHNOLOGIES, SPECTRUM AWARENESS, REDUNDANCY.	SPOOFING FAKE SIGNALS AND NAVIGATION DECEPTION. RESPONSE: AUTHENTICATION, MULTI-CONSTELLATION PNT, ANOMALY DETECTION.	SUPPLY-CHAIN RISK COMPROMISED HARDWARE, SOFTWARE, OR SERVICES. RESPONSE: VENDOR RISK MANAGEMENT, ATTESTATION, AND TRANSPARENCY.	INSIDER THREAT MALICIOUS OR NEGLIGENT INSIDER ACTIONS. RESPONSE: VETTING, LEAST PRIVILEGE, TRAINING, AND CONTINUOUS MONITORING.	RESILIENCE PLANNING DISRUPTIONS AND CASCADING IMPACTS. RESPONSE: CONTINUITY PLAN TESTING, BACKUPS, AND EXERCISES.
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SHARED RESPONSIBILITY. STRONG PARTNERSHIPS. RESILIENT SPACE INFRASTRUCTURE.

WHO REGULATES U.S. SPACE ACTIVITIES?

AN OVERVIEW OF THE FEDERAL REGULATORY STRUCTURE FOR COMMERCIAL AND CIVIL SPACE ACTIVITIES AS OF AUGUST 2026

1 LAUNCH, REENTRY, AND SPACEPORTS



DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
OFFICE OF COMMERCIAL
SPACE TRANSPORTATION

Licenses and oversees commercial launches, reentries, and spaceports to protect public safety and property.

4 COMMERCIAL REMOTE SENSING



DEPARTMENT OF COMMERCE
OFFICE OF SPACE COMMERCE
COMMERCIAL REMOTE SENSING
REGULATORY AFFAIRS

Licenses and regulates commercial remote sensing systems and the collection and distribution of remote sensing data.

2 SATELLITE COMMUNICATIONS AND ORBIT/SPECTRUM FILINGS



FEDERAL COMMUNICATIONS COMMISSION
SPACE BUREAU
OFFICE OF ENGINEERING AND TECHNOLOGY
OFFICE OF INTERNATIONAL AFFAIRS

Authorizes satellite communications, processes orbital filings, and manages use of the radio spectrum for space services.

5 CIVIL SPACE TRAFFIC COORDINATION



DEPARTMENT OF COMMERCE
OFFICE OF SPACE COMMERCE
TRACSS (TRAFFIC COORDINATION
SYSTEM FOR SPACE)

Coordinates civil space traffic information and conjunction assessments to enhance space safety and situational awareness.

3 FEDERAL SPECTRUM USE



NATIONAL TELECOMMUNICATIONS
AND INFORMATION ADMINISTRATION

INTERDEPARTMENT RADIO
ADVISORY COMMITTEE

Manages federal use of the radio spectrum and coordinates interagency positions on spectrum matters.

7 WHO REGULATES WHAT?

ACTIVITY	PRINCIPAL FEDERAL BODY
 LAUNCH, REENTRY, AND SPACEPORTS	DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION OFFICE OF COMMERCIAL SPACE TRANSPORTATION
 SATELLITE COMMUNICATIONS AND ORBIT/SPECTRUM FILINGS	FEDERAL COMMUNICATIONS COMMISSION SPACE BUREAU
 FEDERAL SPECTRUM USE	NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION AND THE INTERDEPARTMENT RADIO ADVISORY COMMITTEE
 COMMERCIAL REMOTE SENSING	DEPARTMENT OF COMMERCE OFFICE OF SPACE COMMERCE COMMERCIAL REMOTE SENSING REGULATORY AFFAIRS
 CIVIL SPACE TRAFFIC COORDINATION	DEPARTMENT OF COMMERCE OFFICE OF SPACE COMMERCE TRACSS
 OTHER FEDERAL AUTHORITIES THAT CAN AFFECT PROJECTS	MULTIPLE AGENCIES (SEE SECTION 6)

6 OTHER FEDERAL AUTHORITIES THAT CAN AFFECT PROJECTS



COUNCIL ON
ENVIRONMENTAL
QUALITY

Oversees federal environmental review processes.



ENVIRONMENTAL
PROTECTION
AGENCY

Regulates environmental protection under federal environmental laws.



U.S. FISH AND
WILDLIFE SERVICE

Protects endangered species and habitats under the ESA.



NOAA
FISHERIES

Conserves marine resources and protected species.



U.S. COAST GUARD

Conserves navigable waters, marine safety, and security.



U.S. ARMY CORPS
OF ENGINEERS

Regulates activities in waters of the U.S. under Section 404 of the CWA.

KEY NOTE: FAA, FCC, NTIA, AND THE DEPARTMENT OF COMMERCE HAVE DIFFERENT RESPONSIBILITIES.

THE FAA FOCUSES ON PUBLIC SAFETY AND TRANSPORTATION RELATED TO LAUNCH AND REENTRY.
THE OVERSEE TRAFFIC AND SPACEPORTS.

NTIA FCC AUTHORIZES COMMUNICATIONS AND MANAGES ORBIT AND SPECTRUM USE.
INTERAGENCY SPECTRUM POLICY.

INTERAGENCY SPECTRUM POLICY. IJ THE DEPARTMENT OF COMMERCE REGULATES REMOTE SENSING AND COORDINATES
CIVIL SPACE TRAFFIC.

THE FEDERAL SPACE RESEARCH AND TECHNOLOGY NETWORK

THE U.S. GOVERNMENT ORGANIZATIONS THAT INVENT, TEST, AND MATURE SPACE TECHNOLOGY | CURRENT AS OF AUGUST 2026

② NASA RESEARCH AND TECHNOLOGY



RESEARCH AND TECHNOLOGY MISSION DIRECTORATE (RTMD)

Leads agency-wide research and technology to expand the frontiers of knowledge, advance exploration, and benefit life on Earth.

MAJOR NASA RESEARCH CENTERS



NASA ENGINEERING AND SAFETY CENTER

Provides independent technical authority to ensure the safety, mission success, and reliability of NASA programs and projects.

① FEDERAL SPACE INNOVATION ECOSYSTEM



③ DEFENSE INNOVATION



DEFENSE ADVANCED RESEARCH PROJECTS AGENCY (DARPA)

High-risk, high-payoff research to create transformational capabilities.



AIR FORCE RESEARCH LABORATORY (AFRL) - SPACE WARFARE DIRECTORATE

Research, development, and transition of space technologies for the U.S. Space Force and joint warfighter.



SPACEWERX

U.S. Space Force program that connects innovators with the space enterprise.



SPACE DEVELOPMENT AGENCY (SDA)

Proliferates architectures and data transport for a resilient space domain.



DEFENSE INNOVATION UNIT (DIU)

Accelerates adoption of commercial technology to solve national security needs.



ARMY SPACE AND MISSILE DEFENSE TECHNICAL CENTER (SMDC)

Develops and delivers space and missile defense capabilities for the U.S. Army and joint forces.



NAVAL RESEARCH LABORATORY (NRL)

Research and development of foundational and applied space science and technology.



NAVAL CENTER FOR SPACE TECHNOLOGY (NCST)

Transitions S&T to capability for space programs across the Department of the Navy.

④ ENERGY AND NUCLEAR SPACE SYSTEMS



U.S. DEPARTMENT OF ENERGY (DOE)

Advances energy and nuclear technologies that enable power, propulsion, and sustenance for space systems and missions.



OFFICE OF NUCLEAR ENERGY (NE)

Leads research and development of nuclear fission, radioisotope, and related technologies for space power and propulsion.

SELECTED DOE NATIONAL LABORATORIES



IDAHO NATIONAL LABORATORY



Los Alamos NATIONAL LABORATORY



SANDIA NATIONAL LABORATORIES



OAK RIDGE NATIONAL LABORATORY

⑤ SCIENCE INFRASTRUCTURE



NATIONAL SCIENCE FOUNDATION (NSF)

Supports fundamental research and the infrastructure that advances knowledge of the universe, Earth, and geospace.

SELECTED FEDERALLY SUPPORTED RESEARCH INFRASTRUCTURE (WITH SPACE OR GEOSPACE RELEVANCE)



OBSERVATORIES AND TELESCOPES



SUPERCOMPUTING FACILITIES



GEOSPACE INSTRUMENT NETWORKS



EDUCATION AND WORKFORCE PROGRAMS

These are federally supported infrastructure and resources, not federal agencies.

⑥ STANDARDS AND MEASUREMENT



NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

Develops and promotes standards, measurements, and technology to enhance innovation, security, and interoperability.

TIME AND FREQUENCY FUNCTIONS



U.S. TIME AND FREQUENCY SERVICE
Provides official time to agencies and the public.



TIME SCALE AND DISTRIBUTION
Maintains time scales and distributes timing signals.

⑦ HOW THESE ORGANIZATIONS WORK TOGETHER



FEDERAL AGENCIES

Executive branch organizations with specific authorities and missions. They set priorities, fund programs, and develop or acquire capabilities to meet national needs.



NATIONAL LABORATORIES

Federally funded research institutions that conduct mission-driven science and engineering. They partner with agencies, industry, and academia to advance and transition technology.



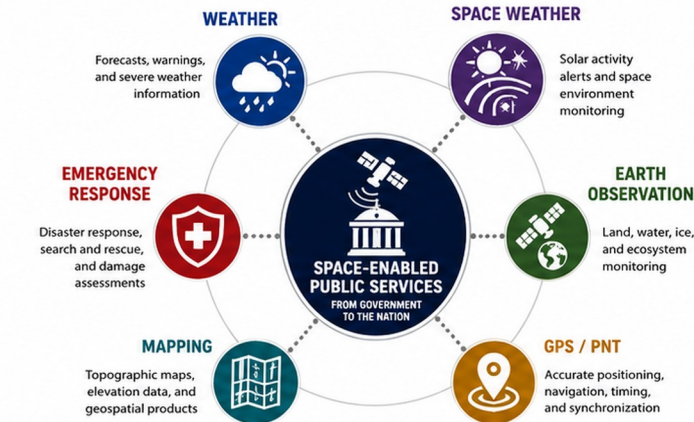
FFRDCs (FEDERALLY FUNDED RESEARCH AND DEVELOPMENT CENTERS)

Long-term partnerships between federal agencies and independent research institutions or universities. FFRDCs provide specialized research, analysis, and technical support to advance agency missions.

WHO PROVIDES AMERICA'S SPACE-BASED PUBLIC SERVICES?

HOW U.S. GOVERNMENT AGENCIES DELIVER CRITICAL SERVICES FROM SPACE TO THE PUBLIC | CURRENT AS OF AUGUST 2026

 NOAA AND SATELLITE SERVICES
 NOAA Oversees national environmental satellites and delivers data, models, and services for the public good.
 NESDIS Operates environmental satellites, produces data and imagery, and manages distribution to users.
 NATIONAL WEATHER SERVICE Provides forecasts, watches, warnings, and hazard information using satellite data and models.
 OFFICE OF GEOSTATIONARY EARTH ORBIT OBSERVATIONS Operates GOES satellites that monitor weather, storms, and space environment from geostationary orbit.
 OFFICE OF LOW EARTH ORBIT OBSERVATIONS Manages polar-orbiting satellites for weather, oceans, climate, and land observations.
 OFFICE OF SPACE WEATHER OBSERVATIONS Operates space weather sensors and supports monitoring of the Sun–Earth space environment.
 OFFICE OF SATELLITE AND PRODUCT OPERATIONS Runs ground systems, processes data, and delivers timely environmental products and alerts.
 CENTER FOR SATELLITE APPLICATIONS AND RESEARCH Advances satellite data use, research, and decision-support applications for public benefit.



 MAPPING
 USGS TOPOGRAPHIC MAPPING PROGRAM Creates and maintains the National Map and 3D Elevation Program.
 NATIONAL GEOSPATIAL PROGRAM Sets standards and coordinates federal geospatial data for consistent, high-quality mapping.
 BUREAU OF RECLAMATION (USBR) Uses satellite and mapping data to manage water, land, and infrastructure.

 EMERGENCY RESPONSE
 FEMA Uses satellite data and tools for disaster response and recovery operations.
 NOAA / NWS Provides real-time hazards information and impact forecasts.
 USGS / NASA Provide satellite imagery and assessments of damage, fires, floods, and other hazards.

 SPACE WEATHER
 SPACE WEATHER PREDICTION CENTER (SWPC) NOAA office that monitors solar activity and space weather impacts and issues alerts and forecasts.
 NOAA OPERATIONAL SPACE WEATHER FUNCTIONS Observations, modeling, and warnings to protect satellites, power grids, communications, aviation, and astronauts.

 EARTH OBSERVATION AND LAND IMAGING
 NASA / USGS LANDSAT PARTNERSHIP Joint program that acquires and maintains Landsat satellites and open data for the Nation.
 U.S. GEOLOGICAL SURVEY Stewards Landsat data and provides scientific leadership for land imaging and analysis.
 NATIONAL LAND IMAGING PROGRAM Coordinates civil land imaging requirements and improves access to high-quality satellite data.
 EROS CENTER USGS facility that archives, manages, and distributes Landsat and other Earth observation data.

 GPS, PNT, AND TIMING
 U.S. SPACE FORCE (GPS) Acquires, operates, and sustains the GPS constellation and provides assured PNT services.
 DEPARTMENT OF TRANSPORTATION (PNT) Leads national civil PNT policy and coordinates transportation PNT needs.
 COAST GUARD NAVIGATION CENTER Provides maritime PNT solutions, GPS monitoring, and navigation services.
 NATIONAL EXECUTIVE COMMITTEE FOR SPACE-BASED PNT Senior interagency body that sets PNT policy and resolves cross-cutting issues.
 NATIONAL COORDINATION OFFICE FOR SPACE-BASED PNT Manages implementation of the National PNT Strategy and interagency coordination.
 NIST TIME AND FREQUENCY DIVISION Maintains U.S. national time standards and supports timing dissemination.

 FEDERAL USERS	 FEMA Preparedness, response, recovery, and mitigation operations.	 COAST GUARD Maritime safety, search and rescue, and domain awareness.	 DEPARTMENT OF AGRICULTURE Crop monitoring, food security, and natural resource management.	 DEPARTMENT OF THE INTERIOR Land management, wildlife monitoring, and natural resource stewardship.	 EPA Air quality, water quality, releases tracking, and environmental monitoring.	 OTHER AGENCIES DOD, State, Commerce, Homeland Security, Energy, and others rely on space-enabled services daily.
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 KEY TAKEAWAY
WEATHER FORECASTS, GPS ON YOUR PHONE, DISASTER ALERTS, MAPS, AND MANY OTHER EVERYDAY SERVICES RELY ON SATELLITES AND THE U.S. GOVERNMENT AGENCIES THAT OPERATE THEM—EVEN WHEN YOU NEVER SEE THE SPACECRAFT.

U.S. SPACE DIPLOMACY, TRADE, AND INTERNATIONAL CONTROLS

HOW THE U.S. GOVERNMENT MANAGES THE INTERNATIONAL DIMENSION OF SPACE ACTIVITIES AS OF AUGUST 2026

1 CIVIL AND COMMERCIAL SPACE DIPLOMACY



DEPARTMENT OF STATE OFFICE OF SPACE AFFAIRS

Leads U.S. space diplomacy, negotiates international agreements, and advances peaceful uses of space.



BUREAU OF OCEANS AND INTERNATIONAL ENVIRONMENTAL AND SCIENTIFIC AFFAIRS (OES)

Supports international environmental monitoring, Earth observation, and scientific cooperation.



NASA OFFICE OF INTERNATIONAL AND INTERAGENCY RELATIONS

Builds international partnerships, coordinates missions, and advances collaborative research.



OFFICE OF SPACE COMMERCE

Promotes U.S. commercial space leadership, market access, standards, and policy coordination with international partners.



2 NATIONAL SECURITY SPACE COOPERATION



DEPARTMENT OF DEFENSE (DOD)

Builds and sustains partnerships, security cooperation, and capacity building with allies and partners.



U.S. SPACE FORCE

Advances combined space operations, information sharing, and partner integration.



U.S. SPACE COMMAND

Leads global space domain awareness and multinational operations to promote stability and deter threats.



SELECTED INTELLIGENCE PARTNERS

Shares intelligence and analysis on space threats, capabilities, and emerging risks in coordination with allied partners.

3 EXPORT CONTROLS



DEPARTMENT OF STATE DIRECTORATE OF DEFENSE TRADE CONTROLS (DDTC)

Implements the International Traffic in Arms Regulations (ITAR) and controls on defense-related space items and services.



DEPARTMENT OF COMMERCE BUREAU OF INDUSTRY AND SECURITY (BIS)

Implements the Export Administration Regulations (EAR) controlling dual-use space technologies and items.

4 SANCTIONS AND FINANCE



DEPARTMENT OF THE TREASURY

Develops and coordinates U.S. sanctions policy related to space-enabled activities.



OFFICE OF FOREIGN ASSETS CONTROL (OFAC)

Administers and enforces economic sanctions that restrict access to U.S. financial systems and technology.

5 FOREIGN INVESTMENT AND ECONOMIC SECURITY



COMMITTEE ON FOREIGN INVESTMENT IN THE UNITED STATES (CFIUS)

Reviews certain foreign investments that could affect U.S. national security, including in the space sector.



TREASURY-LED INTERAGENCY REVIEW

Coordinates reviews across government agencies to assess risk, impose remedies, or block transactions as needed.

6 INTERNATIONAL COORDINATION: SPECTRUM AND ORBIT



FCC SPACE BUREAU

Manages licensing of U.S. space stations and authorizes spectrum use for space services.



FCC OFFICE OF INTERNATIONAL AFFAIRS

Coordinates U.S. positions and filings in international spectrum and orbital fora.



NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION (NTIA)

Represents the U.S. in ITU and develops policy on spectrum and orbital resources.



DEPARTMENT OF STATE

Leads U.S. engagement in international fora and negotiations to advance rules, norms, and equitable access to space.

7 CROSS-CUTTING ENABLERS



INTERAGENCY COORDINATION

Policy and operational coordination through the National Space Council and interagency bodies.



ALLIANCE AND PARTNER ENGAGEMENT

Deepens cooperation with allies and partners to promote security, resiliency, and shared standards in space.



PRIVATE SECTOR AND INDUSTRY OUTREACH

Engages industry to advance compliance, responsible innovation, and global norms.



LAW, NORMS, AND STANDARDS

Promotes adherence to international law, responsible behavior, and technical standards for safe and sustainable space activities.

WHY IT MATTERS



PROTECTS SAFETY AND SECURITY

Reduces risks of conflict, collisions, and harmful interference in space and on Earth.



PROMOTES TRADE AND GROWTH

Opens markets, supports U.S. industry competitiveness, and attracts investment to the space economy.



STRENGTHENS ALLIANCES AND PARTNERSHIPS

Builds trust, shares capabilities, and advances collective security in the space domain.



PROTECTS TECHNOLOGY AND SUPPLY CHAINS

Uses targeted controls and reviews to safeguard critical space technologies and infrastructure.

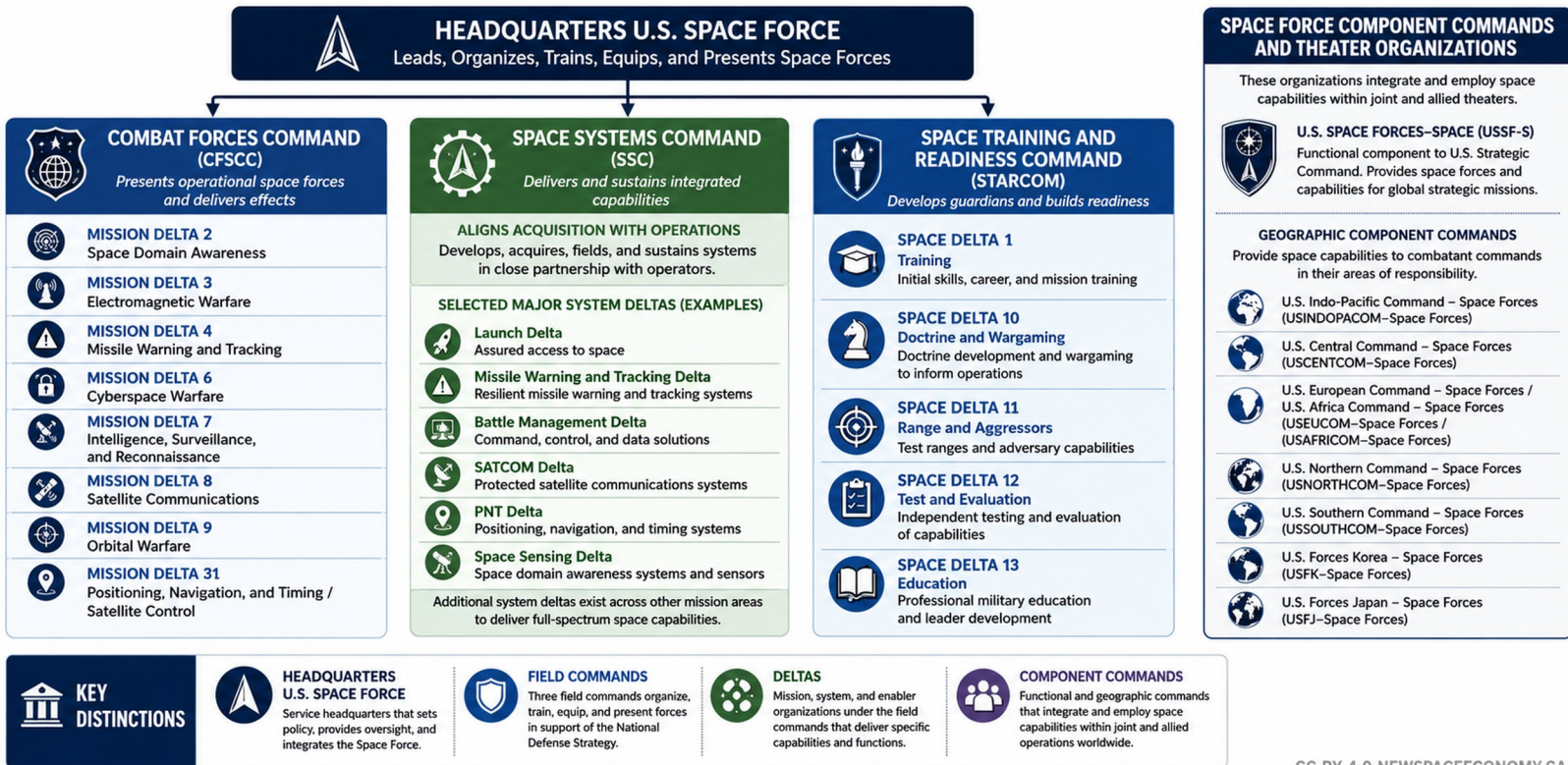


ADVANCES INTERNATIONAL NORMS

Leads efforts to shape rules, standards, and responsible behavior for a stable, sustainable, and peaceful space environment.

HOW IS THE U.S. SPACE FORCE ORGANIZED BELOW THE FIELD-COMMAND LEVEL?

AN OVERVIEW OF THE U.S. SPACE FORCE ORGANIZATION BELOW THE FIELD-COMMAND LEVEL (2026)



WHAT DOES EACH U.S. SPACE FORCE MISSION DELTA ACTUALLY DO?

OPERATIONAL MISSION DELTAS THAT FIGHT AND WIN IN, FROM, AND TO SPACE

MISSION DELTA 2 – SPACE DOMAIN AWARENESS



- CORE MISSION:** Detect, catalog, and characterize objects and events in space.
- EXAMPLE TASKS:** Track satellites and debris; monitor conjunctions; identify threats; maintain space catalog.
- SYSTEMS / MISSION AREA SUPPORTED:** Space traffic management; collision avoidance; all space operations.
- WHY IT MATTERS:** Provides the awareness needed to operate safely, avoid surprises, and make informed decisions.

MISSION DELTA 3 – SPACE ELECTROMAGNETIC WARFARE



- CORE MISSION:** Defend friendly systems and deny, disrupt, degrade, or deceive adversary use of the spectrum.
- EXAMPLE TASKS:** Jam or spoof adversary signals; protect friendly waveforms; sense and characterize adversary emitters.
- SYSTEMS / MISSION AREA SUPPORTED:** Protected communications; ISR; missile warning; PNT; all spectrum-reliant operations.
- WHY IT MATTERS:** Controls the space electromagnetic environment to ensure freedom of action.

MISSION DELTA 4 – MISSILE WARNING AND TRACKING



- CORE MISSION:** Detect, track, and characterize ballistic and hypersonic missile launches and threats.
- EXAMPLE TASKS:** Provide launch detection; track missiles through flight; support alerting and cueing to defenses.
- SYSTEMS / MISSION AREA SUPPORTED:** National and regional missile warning; BMD; homeland defense; allies.
- WHY IT MATTERS:** Delivers timely warning to enable defense, protect populations, and deter attacks.



MISSION DELTA 31 – POSITIONING NAVIGATION AND TIMING + SATELLITE CONTROL



- CORE MISSION:** Provide precise PNT services and command and control of space systems.
- EXAMPLE TASKS:** Deliver GPS and timing; monitor and control satellites; conduct maneuvers; ensure space system health.
- SYSTEMS / MISSION AREA SUPPORTED:** PNT for joint operations; all space systems.
- WHY IT MATTERS:** Enables precise operations and sustains the health of our satellites.

MISSION DELTA 6 – CYBERSPACE WARFARE



- CORE MISSION:** Defend space systems and conduct offensive cyber operations to achieve effects in and through space.
- EXAMPLE TASKS:** Defend networks; hunt threats; conduct cyber effects; support space system resilience.
- SYSTEMS / MISSION AREA SUPPORTED:** Space enterprise networks; ground systems; encryption and key management.
- WHY IT MATTERS:** Secures the digital backbone that makes space operations possible.

MISSION DELTA 7 – INTELLIGENCE SURVEILLANCE AND RECONNAISSANCE



- CORE MISSION:** Deliver space-based ISR to inform decisions and enable operations.
- EXAMPLE TASKS:** Collect, image, and monitor targets; provide indications and warning; support targeting.
- SYSTEMS / MISSION AREA SUPPORTED:** Joint force operations; targeting; planning; assessments.
- WHY IT MATTERS:** Provides precise insights to understand adversaries and shape outcomes.

MISSION DELTA 8 – SATELLITE COMMUNICATIONS



- CORE MISSION:** Provide assured, resilient, and protected satellite communications.
- EXAMPLE TASKS:** Provide voice, data, and video links; support global operations; enable coalition connectivity.
- SYSTEMS / MISSION AREA SUPPORTED:** Command and control; mission data transport; joint and coalition forces.
- WHY IT MATTERS:** Connects the joint force—anytime, anywhere.

MISSION DELTA 9 – ORBITAL WARFARE



- CORE MISSION:** Deter aggression and, when directed, conduct operations to achieve superiority in space.
- EXAMPLE TASKS:** Counter adversary space capabilities; protect friendly forces; develop options and effects.
- SYSTEMS / MISSION AREA SUPPORTED:** All space operations; freedom of action in the space domain.
- WHY IT MATTERS:** Deters attacks and ensures the U.S. can operate freely in and through space.

HOW MISSION DELTAS SUPPORT THE JOINT FORCE



THE JOINT FORCE

MISSION DELTAS PROVIDE OPERATIONAL EFFECTS THAT ENABLE AND PROTECT JOINT OPERATIONS



COMBAT FORCES COMMAND (CFC)
Employs Mission Deltas and presents space forces to the joint force.



U.S. SPACE COMMAND (USSPACECOM)
Provides command and control, planning, and coordination for space operations.



SPACE SYSTEMS COMMAND (SSC)
Acquires and delivers space capabilities through the System Deltas.

OPERATE vs. ACQUIRE

DELTA (OPERATE)



- Operate and present forces
- Conduct day-to-day missions
- Deliver effects to the joint force
- Maintain readiness and respond to current operations

DELTA (ACQUIRE)



- Acquire and deliver capabilities
- Develop, build, test, and field systems
- Innovate and modernize
- Sustain capabilities over time

WHY THESE MISSIONS MATTER



DETERRENCE

Credible capabilities and readiness deter aggression and hold adversaries at risk in the space domain.



MISSILE WARNING

Timely detection and tracking provide warning and enable defense of the homeland and our forces.



PROTECTED COMMUNICATIONS

Assured, resilient communications connect commanders and forces for coordinated, effective action around the globe.



GPS / PNT

Precise positioning, navigation, and timing power everything—from precision fires to logistics and critical infrastructure.



CYBER DEFENSE

Cyber operations protect space systems and data, ensuring resilience and freedom of action in a contested domain.



SPACE SUPERIORITY

Control of space enables U.S. and allied freedom of action and decision advantage across all domains.

WHERE ARE AMERICA'S GOVERNMENT SPACE FACILITIES?

A NATIONWIDE VIEW OF MAJOR CIVIL, MILITARY, INTELLIGENCE, WEATHER, AND RESEARCH INFRASTRUCTURE

FACILITY CATEGORIES



CIVIL

NASA AND OTHER CIVIL AGENCIES OPERATE SPACE MISSIONS, LAUNCH SYSTEMS, OBSERVATORIES, AND OPERATIONAL SERVICES.



MILITARY

U.S. SPACE FORCE AND AIR FORCE BASES PROVIDE LAUNCH, RANGE, COMMAND AND CONTROL, AND SPACE OPERATIONS.



INTELLIGENCE

INTELLIGENCE AGENCIES DELIVER SPACE-BASED SURVEILLANCE, ANALYSIS, AND WARNING TO SUPPORT NATIONAL SECURITY.



WEATHER / EARTH OBSERVATION

AGENCIES MONITOR WEATHER, OCEANS, CLIMATE, AND EARTH SYSTEMS FROM SPACE AND GROUND.



RESEARCH / TECHNOLOGY

LABORATORIES AND CENTERS ADVANCE SPACE TECHNOLOGY, SCIENCE, AND INNOVATION FOR CURRENT AND FUTURE MISSIONS.



KEY OBSERVATION

AMERICA'S SPACE ENTERPRISE IS GEOGRAPHICALLY DISTRIBUTED ACROSS LAUNCH, OPERATIONS, INTELLIGENCE, SCIENCE, AND RESEARCH INFRASTRUCTURE. THIS DISTRIBUTION ENHANCES RESILIENCE, LEVERAGES REGIONAL EXPERTISE, AND SUPPORTS THE FULL RANGE OF SPACE MISSIONS AND NATIONAL NEEDS.

PACIFIC NORTHWEST



BUCKLEY SPACE FORCE BASE (AURORA, CO)



AFRL - SPACE VEHICLES DIRECTORATE (KIRTLAND AFB, NM)



VANDENBERG SPACE FORCE BASE (CALIFORNIA)



NATIONAL RECONNAISSANCE OFFICE (NRO) HEADQUARTERS (CHANTILLY, VA)



NATIONAL GEOSPATIAL-INTELLIGENCE AGENCY (NGA) CAMPUS WEST (EL SEGUNDO, CA)



LOS ANGELES AIR FORCE BASE / SPACE SYSTEMS COMMAND (EL SEGUNDO, CA)



JET PROPULSION LABORATORY (JPL) (PASADENA, CA)

WHITE SANDS TEST FACILITY (NEW MEXICO)

CHEYENNE MOUNTAIN COMPLEX (COLORADO SPRINGS, CO)

PETERSON SPACE FORCE BASE (COLORADO SPRINGS, CO)

SCHRIEVER SPACE FORCE BASE (COLORADO SPRINGS, CO)

JOHNSON SPACE CENTER (HOUSTON, TX)

MARSHALL SPACE FLIGHT CENTER (HUNTSVILLE, AL)

STENNIS SPACE (STENNIS, MS)

UPPER MIDWEST



USAF RESEARCH LAB (AFRL) - SPACE VEHICLES DIRECTORATE (WRIGHT-PATTERSON AFB, OH)



GLENN RESEARCH CENTER (CLEVELAND, OH)

NORTHEAST



NOAA - NESDIS SATELLITE OPERATIONS FACILITY (CAMP SPRINGS, MD)



USGS EROS CENTER (SIOUX FALLS, SD)

NATIONAL CAPITAL REGION



NASA HEADQUARTERS (WASHINGTON, DC)



NATIONAL RECONNAISSANCE OFFICE (NRO) HEADQUARTERS (CHANTILLY, VA)



NATIONAL GEOSPATIAL-INTELLIGENCE AGENCY (NGA) CAMPUS EAST (SPRINGFIELD, VA)



NATIONAL SPACE INTELLIGENCE CENTER (NSIC) (CHANTILLY, VA)



MISSILE AND SPACE INTELLIGENCE CENTER (MSIC) (REDSTONE ARSENAL, AL)



GODDARD SPACE FLIGHT CENTER (GREENBELT, MD)



LANGLEY RESEARCH CENTER (HAMPTON, VA)



AMES RESEARCH CENTER (MOFFETT FIELD, CA)



Wallops Flight Facility (Wallops Island, VA)



CAPE CANAVERAL SPACE FORCE STATION (FLORIDA)



PATRICK SPACE FORCE BASE (FLORIDA)



KENNEDY SPACE CENTER (FLORIDA)



CAPE CANAVERAL SPACE FORCE STATION - LAUNCH RANGE

CATEGORY LEGEND



WHO BUILDS AND BUYS U.S. GOVERNMENT SPACE SYSTEMS?

THE FEDERAL SPACE ACQUISITION AND PROCUREMENT ECOSYSTEM



NASA ACQUISITION AND PROGRAM OFFICES

- Civil space missions for science, exploration, and Earth.
- Acquires satellites, launch services, instruments, and mission operations.
- Offices include: SMD, HEOMD, STMD, and ARMD.



DEPARTMENT OF THE AIR FORCE ASSISTANT SECRETARY FOR SPACE ACQUISITION AND INTEGRATION (SAF/SQ)

- Sets policy, oversees acquisition strategy, and integrates capabilities for the Space Force.
- Aligns requirements, budgets, and industry with warfighter needs.
- Champions speed, innovation, and affordability.



SPACE SYSTEMS COMMAND (SSC)

- Primary acquisition and fielding arm of the Space Force.
- Delivers resilient space capabilities across launch, satellites, ground systems, and data.
- Manages programs from concept through operations.

SYSTEM DELTAS



- Fast, focused units within SSC.
- Organize around mission areas:
 - Delta 1 – Launch
 - Delta 2 – Battlespace Awareness
 - Delta 3 – Command & Control
 - Delta 4 – Space Mobility & Logistics
 - Delta 5 – Cyber & Intel
- Accelerate delivery with empowered teams.



SPACE DEVELOPMENT AGENCY (SDA)

- Builds and operates the National Defense Space Architecture.
- Prototypes and fields proliferated, resilient space layers.
- Uses Other Transaction Authority for speed and innovation.



MISSILE DEFENSE AGENCY (MDA)

- Develops and acquires systems to defend the homeland.
- Operates missile warning, tracking, and intercept capabilities.
- Works closely with Space Force and other partners.



NATIONAL RECONNAISSANCE OFFICE (NRO)

- Acquires and operates national security space systems.
- Delivers intelligence, surveillance, and reconnaissance from space.
- Partners with industry through innovative acquisition.

NOAA + NASA PARTNERSHIP FOR ENVIRONMENTAL SATELLITES



- Collaborate on Earth observation missions for weather, climate, oceans, and coasts.
- Share data, expertise, and satellite systems to serve the public good.



DEPARTMENT OF ENERGY (DOE) FOR SPACE-NUCLEAR TECHNOLOGY

- Develops and qualifies space nuclear power and propulsion technologies.
- Supports national security and deep space missions.
- Partners with NASA and DoD on advanced capabilities.



- DARPA – High-risk, high-payoff technology for future advantage.
- DIU – Commercial solutions to meet urgent DoD needs.
- SpaceWERX – Connects innovators to the Space Force and accelerates transition to the field.



MISSION
NEED



RESEARCH



PROTOTYPE



ACQUISITION



CONTRACT



DEPLOYMENT



OPERATIONS

FEEDBACK LOOP: LESSONS LEARNED AND OPERATIONAL DATA INFORM FUTURE NEEDS

MAJOR PROCUREMENT MODELS AND TOOLS



TRADITIONAL ACQUISITION

Structured, phased acquisition for complex systems with defined requirements.



RAPID PROTOTYPING

Iterative development and testing to validate concepts quickly and reduce risk.



COMMERCIAL SERVICES

Buy proven services—like launch, data, and communications—from the commercial market.



SBIR / STTR

Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) fund early-stage innovation.



FIXED-PRICE CONTRACTS

Contractor agrees to deliver a product or service for a set price and schedule. Transfers cost risk to the contractor.



COST-PLUS DEVELOPMENT

Government reimburses allowable costs plus a fee. Used for research and high-uncertainty programs.



DATA-AS-A-SERVICE

Purchase timely access to data, analytics, and insights rather than owning infrastructure.



PUBLIC-PRIVATE PARTNERSHIPS

Align resources, share risk, and co-invest to deliver capabilities faster together.

Agencies select the right mix of models to balance speed, cost, risk, security, and performance.

WHAT THEY BUY: AGENCIES AT A GLANCE



NASA

Exploration. Science. Earth. Inspiration.

- Science and exploration spacecraft
- Earth observation satellites and instruments
- Launch services
- Deep space missions
- Research and technology



SPACE FORCE

Defend. Deter. Assure.

- Military satellites (comm, PNT, missile warning, ISR, and more)
- Proliferated and resilient space architectures
- Launch and space mobility
- Ground systems and mission operations



NRO

See Tomorrow. Protect Today.

- Intelligence, surveillance, and reconnaissance satellites
- Advanced sensors and imaging systems
- Secure data exploitation and delivery
- Mission operations



NOAA

Science. Service. Stewardship.

- Environmental satellites (weather, climate, oceans, coasts)
- Data and information services for the nation
- Observing systems and mission operations
- Research and modeling



ONE ECOSYSTEM. SHARED PURPOSE. DELIVERING CRITICAL SPACE CAPABILITIES FOR OUR NATION AND THE WORLD.

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WHO OPERATES AMERICA'S GOVERNMENT SATELLITES?

U.S. ORGANIZATIONS THAT OPERATE AND MANAGE MAJOR SATELLITE MISSIONS

CIVIL SCIENCE AND EXPLORATION



NASA

National Aeronautics and Space Administration

OPERATES MISSIONS THAT EXPLORE OUR UNIVERSE AND ADVANCE SCIENCE AND EXPLORATION.

- Planetary Missions
e.g., Mars Reconnaissance Orbiter, Juno, Europa Clipper
- Astrophysics Observatories
e.g., Hubble, James Webb Space Telescope
- Heliophysics
e.g., Parker Solar Probe, Solar Dynamics Observatory
- Human-Spaceflight Support
e.g., TDRS communications, ISS support



WEATHER



NOAA / NESDIS

National Oceanic and Atmospheric Administration / National Environmental Satellite, Data, and Information Service

OPERATES SATELLITE SYSTEMS THAT MONITOR WEATHER, OCEANS, AND THE SPACE ENVIRONMENT.

- GOES (Geostationary Operational Environmental Satellites)
Continuous weather monitoring of the Americas
- JPSS (Joint Polar Satellite System)
Global weather, climate, and environmental data
- Space-Weather Observation
e.g., DSCOVR, SWPC instruments for solar and geomagnetic activity



EARTH OBSERVATION



USGS
science for a changing world

NASA / USGS Landsat Partnership

OPERATES LANDSAT AND OTHER EARTH-SCIENCE MISSIONS THAT MONITOR OUR PLANET.

- Landsat 8/9
Long-term land imaging of Earth
- Surface Water & Topography
e.g., SWOT, ICESat-2
- Ecosystems & Climate
e.g., OCO-2, NISAR, GEDI
- Disasters & Environmental Change
e.g., fires, floods, drought



NAVIGATION / PNT



U.S. SPACE FORCE

Space Systems Command (SSC)

U.S. SPACE FORCE

OPERATES THE U.S. GLOBAL POSITIONING SYSTEM (GPS).

- GPS Constellation
Provides global Positioning, Navigation, and Timing (PNT) services to military, civil, and commercial users.



MILITARY OPERATIONS



U.S. SPACE FORCE

Space Systems Command (SSC)

U.S. SPACE FORCE

OPERATES DEFENSE SPACE SYSTEMS THAT ENABLE AND PROTECT MILITARY OPERATIONS.

- Missile Warning
e.g., SBIRS
- SATCOM (Communications)
e.g., MILSATCOM, AEHF, WGS
- Space Domain Awareness
e.g., tracking and characterizing space objects
- Resilient Navigation & Other Mission Support



INTELLIGENCE



NRO

National Reconnaissance Office

OPERATES THE NATION'S RECONNAISSANCE SATELLITE CAPABILITIES.

- National Reconnaissance Systems
Provides critical intelligence, surveillance, and reconnaissance data to authorized U.S. users.



ROLES CAN BE DIFFERENT ORGANIZATIONS



OWNER

The organization that funds, acquires, and is accountable for the satellite system and mission.



OPERATOR

The organization that operates the spacecraft and ground systems and ensures the mission is performed.



DATA PROCESSOR

The organization that receives raw data, processes it into products, and archives or distributes it.



USER

Federal, state, local, military, commercial, and international users who access data and services for their needs.



Many missions involve partnerships (e.g., NASA/USGS) and data sharing across agencies to serve the nation.

HOW SATELLITE SERVICES REACH USERS

1. SPACECRAFT

Satellites collect or relay data in orbit.



2. GROUND SYSTEMS

Data is downlinked to ground stations and operations centers.



3. DATA PROCESSING

Data is processed, quality-checked, and turned into products or services.



4. DISTRIBUTION

Products are delivered through portals, APIs, broadcasts, or secure networks.



5. END USERS

Information supports decision-making, operations, research, and public services.



Note: Organizations listed are primary operators of the satellites and systems shown. Many missions involve partners and data sharing.

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HOW DOES THE U.S. GOVERNMENT TRACK OBJECTS AND TRAFFIC IN SPACE?

THE U.S. ARCHITECTURE FOR TRACKING OBJECTS IN ORBIT AND SUPPORTING SPACEFLIGHT SAFETY

KEY TERMS: WHAT'S THE DIFFERENCE?



SPACE DOMAIN AWARENESS (SDA)

The broader effort to detect, identify, and characterize everything in space—objects, activities, and threats—to understand the space environment.



SPACE SITUATIONAL AWARENESS (SSA)

A key part of SDA focused on maintaining knowledge of the location, orbit, and status of space objects to support safe and reliable operations.



CONJUNCTION ASSESSMENT (CA)

Evaluation of the risk that two objects' orbits will bring them close enough in space and time to pose a potential collision risk.



COLLISION WARNING (CW)

Notification to an operator that their spacecraft faces a potential collision risk, including timing and risk information to support decisions.



SPACE TRAFFIC COORDINATION (STC)

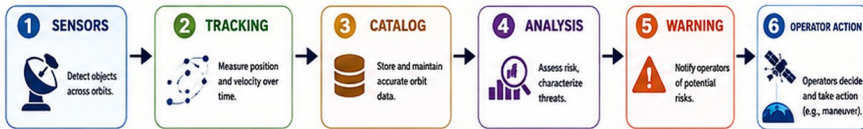
Civil service that shares conjunction information and coordinates maneuvers to reduce collision risk and promote responsible use of space.



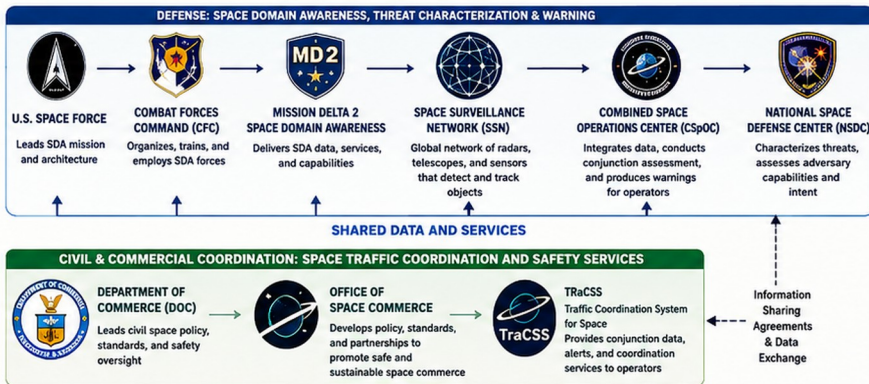
MILITARY THREAT CHARACTERIZATION

Analysis of adversary space capabilities and behaviors to assess intent, capabilities, and threats to U.S. and allied space systems.

END-TO-END PROCESS: FROM DETECTION TO OPERATOR ACTION



U.S. GOVERNMENT ARCHITECTURE



HOW WE DETECT AND TRACK OBJECTS: MAJOR SENSOR TYPES



RADAR

- All-weather, day/night
- Measures range, angle, and speed
- Essential for LEO tracking and small objects



OPTICAL TELESCOPES

- Detect objects by reflected sunlight
- High accuracy for orbit determination
- Best for GEO and higher orbits
- Limited by clouds and daylight



SPACE-BASED SENSORS

- Located above the atmosphere
- Provide persistent coverage
- Detect launches, objects, and unusual activities

WHO DOES WHAT?

MILITARY TRACKING & WARNING



U.S. Space Force leads SDA mission



Space Surveillance Network detects and tracks objects



CSpOC conducts conjunction assessments and issues warnings



NSDC characterizes military threats and adversary space activities



Supports national security and warfighting

CIVIL SAFETY SERVICES & COORDINATION



Department of Commerce leads civil space safety mission



TraCSS provides conjunction data and coordinates with operators



Operators receive civil notifications and coordinate maneuvers



Focus on safety, transparency, and responsible use of space



Supports safe, sustainable, and predictable space operations



WE WORK TOGETHER: The U.S. shares data and coordinates across military, civil, and commercial partners—domestically and with international allies—to keep space safe, secure, and sustainable.



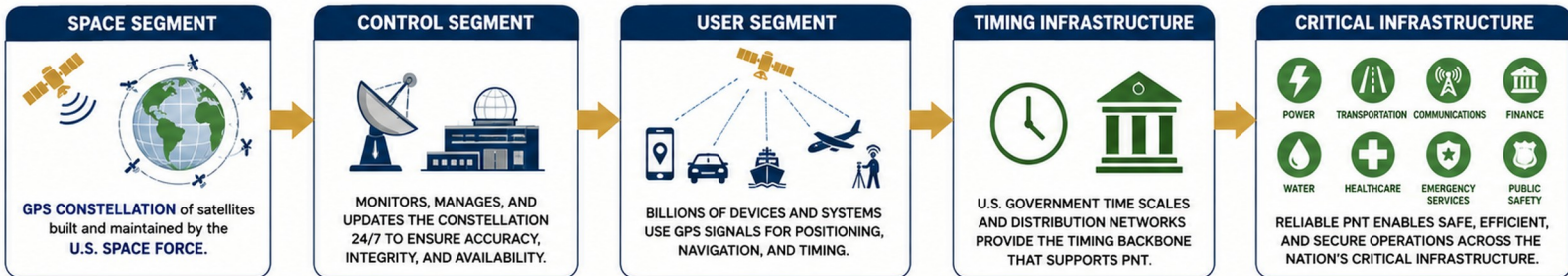
THE TAKEAWAY: THE U.S. GOVERNMENT TRACKS SATELLITES, DEBRIS, AND POTENTIAL THREATS ACROSS ALL ORBITS. THIS ENABLES SAFER SPACEFLIGHT, PROTECTS NATIONAL SECURITY, AND SUPPORTS THE GROWING SPACE ECONOMY.



HOW DOES THE U.S. GOVERNMENT MANAGE GPS AND NATIONAL PNT?



A COORDINATED ENTERPRISE DELIVERING RELIABLE POSITIONING, NAVIGATION, AND TIMING FOR THE NATION



WHO MANAGES AND SUPPORTS PNT IN THE U.S.



MAJOR USERS



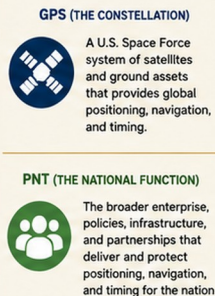
PNT IS FOUNDATIONAL TO MODERN LIFE AND ECONOMIC ACTIVITY.

RISKS AND CHALLENGES



VIGILANCE AND DIVERSITY STRENGTHEN NATIONAL RESILIENCE.

KEY DISTINCTIONS



GPS IS A CRITICAL PART OF PNT. PNT IS BIGGER THAN GPS.



ONE NATION. MANY PARTNERS. ONE PNT ENTERPRISE.

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HOW DOES THE U.S. GOVERNMENT USE COMMERCIAL SPACE COMPANIES?

FEDERAL AGENCIES BUY SERVICES—NOT JUST HARDWARE—TO ACHIEVE MISSION OUTCOMES.

BY CUSTOMER: EXAMPLES OF SERVICES PURCHASED

NASA	DEPARTMENT OF DEFENSE / U.S. SPACE FORCE	INTELLIGENCE COMMUNITY	NOAA	OTHER FEDERAL USERS
				
 LAUNCH SERVICES Put missions and payloads into space	 LAUNCH SERVICES Responsive and assured access to space	 COMMERCIAL IMAGERY High-resolution imagery and change detection	 COMMERCIAL WEATHER DATA Satellite observations for forecasts and warnings	 FEDERAL COMMUNICATIONS COMMISSION (FCC) Spectrum monitoring and data services
 CREW TRANSPORT Transport astronauts to and from orbit	 SATELLITE COMMUNICATIONS Protected communications for forces worldwide	 RF DATA Signals intelligence from commercial sensors	 ENVIRONMENTAL MONITORING Data for oceans, coasts, and severe weather	 U.S. FOREST SERVICE Fire monitoring and environmental data
 CARGO TRANSPORT Deliver supplies and experiments to orbit	 IMAGERY Commercial imagery for situational awareness and targeting	 ANALYTICS Processing, fusion, and insight at scale	 DATA PARTNERSHIPS Leverage commercial data and platforms to enhance public services	 U.S. GEOLOGICAL SURVEY Earth observational and mapping data
 LUNAR SERVICES Lunar landers, logistics, and surface operations	 SPACE DOMAIN AWARENESS Track and monitor objects in space	 CLOUD SUPPORT Secure environments for data hosting and mission applications		 DEPARTMENT OF STATE & USAID Communications and data for humanitarian and development missions
 EARTH-OBSERVATION DATA Satellite data for science and applications	 PROLIFERATED ARCHITECTURES Use of commercial constellations and resilient networks			
 COMMERCIAL SPACE STATIONS Utilize privately built and operated platforms	 CLOUD OR DATA SERVICES Secure storage, computing, and mission applications			



AGENCIES BUY OUTCOMES, NOT JUST HARDWARE. Contracts are performance-based, tailored to mission needs, and compete commercial innovation while maintaining security, resiliency, and responsible use of space.

THE SPECTRUM OF GOVERNMENT / COMMERCIAL ARRANGEMENTS



Note: Examples are illustrative, not exhaustive. Agencies tailor contracts to mission needs, budgets, and risk.

HOW THE GOVERNMENT BUYS COMMERCIAL SPACE SERVICES



LAUNCH-AS-A-SERVICE

Purchase rides to space on commercial rockets for satellites, cargo, or crew.



DATA-AS-A-SERVICE

Access satellite data, analytics, and insights through subscriptions or on-demand services.



HOSTED PAYLOADS

Place government instruments on commercial satellites, landers, or space stations.



PUBLIC-PRIVATE PARTNERSHIPS

Share risk and investment to develop capabilities that serve public missions and markets.



GOVERNMENT-OWNED, COMMERCIALY OPERATED

Government owns the asset; a commercial partner operates and maintains it under contract.



COMMERCIALY OWNED & OPERATED (SERVICE CONTRACTS)

Commercial company owns and operates assets; government buys services to meet mission needs.



SECURITY, RESILIENCY & RESPONSIBLE USE

Contracts include requirements for security, data protection, supply chain integrity, continuity of operations, and compliance with U.S. law and international obligations.

WHO CONTROLS U.S. SPACE TECHNOLOGY, EXPORTS, AND FOREIGN ACCESS?

A NETWORK OF U.S. GOVERNMENT AUTHORITIES PROTECTS SENSITIVE SPACE CAPABILITIES AND REVIEWS FOREIGN INVOLVEMENT



U.S. GOVERNMENT AUTHORITIES AND THEIR ROLES



DEPARTMENT OF STATE DIRECTORATE OF DEFENSE TRADE CONTROLS **ITAR**

Controls exports and temporary imports of defense articles, defense services, and related technical data on the U.S. Munitions List.

KEY AUTHORITIES
Arms Export Control Act (AECA)
Export Administration Regulations (ITAR)
22 C.F.R. Parts 120-130

License required for most defense space items, data, and services.



DEPARTMENT OF COMMERCE BUREAU OF INDUSTRY AND SECURITY **EAR**

Controls exports, reexports, and transfers (including deemed exports) of dual-use items, software, and technology with military or national security applications.

KEY AUTHORITIES
Export Administration Act (EAA)
Export Administration Regulations (EAR) - 15 C.F.R. Parts 730-774

Commerce Control List (CCL) items require licenses based on risk and destination.



TREASURY DEPARTMENT OFFICE OF FOREIGN ASSETS CONTROL **OFAC**

Administers and enforces economic and trade sanctions programs targeting countries, entities, and individuals that pose national security or foreign policy threats.

KEY AUTHORITIES
International Emergency Economic Powers Act (IEEPA)
Trading with the Enemy Act (TWEA)
Various Executive Orders

Blocks transactions and property; restricts exports and services to targets.



COMMITTEE ON FOREIGN INVESTMENT IN THE UNITED STATES **CFIUS**

Reviews certain foreign investments and real estate transactions to determine effects on U.S. national security; can impose mitigation or block deals.

KEY AUTHORITIES
CFIUS Authority (50 U.S.C. § 4565)
FIRMA (Pub. L. 115-232)
National Security Agreement Procedures

Blocks covered investments in U.S. businesses, real estate, and critical technologies.



DEPARTMENT OF JUSTICE

Enforces export control laws, sanctions violations, and procures prosecutions for willful violations and related offenses.

KEY AUTHORITIES
AECA, EAA, IEEPA, TWEA, ITAR, EAR, OFAC Regulations, 18 U.S.C. § 371, § 2339B, § 2320, and others

Investigates and prosecutes violations; seeks penalties, forfeiture, and debarment.



FEDERAL BUREAU OF INVESTIGATION

Investigates counterintelligence threats, economic espionage, theft of trade secrets, and illegal technology transfer involving space and related technologies.

KEY AUTHORITIES
National Security Investigations Authority (28 C.F.R. Part 600)
18 U.S.C. §§ 1831-1839
Economic Espionage Act

Protects against espionage, theft, and illicit technology transfer.



DEFENSE COUNTERINTELLIGENCE AND SECURITY AGENCY **DCSA**

Conducts personnel security investigations and industrial security oversight to protect classified information in the defense industrial base and space programs.

KEY AUTHORITIES
National Industrial Security Program Operating Manual (NISPOM)
Executive Order 12829
DoD Directive 5220.22

Issues clearances and facility access; conducts industrial security inspections.



DEPARTMENT OF DEFENSE

Sets policy, acquires space systems, controls access to classified space information, and implements program security and technological protection measures.

KEY AUTHORITIES
10 U.S.C. §§ 130b, 2320
DoD Directives 5200.01, 5205.07, 5205.21, 5200.48, and others

Protects mission capabilities and controls program access and data.



DEPARTMENT OF ENERGY

Secures sensitive energy technologies and facilities relevant to space (e.g., propulsion, power, nuclear systems) and oversees national laboratories.

KEY AUTHORITIES
Atomic Energy Act (AEA)
10 C.F.R. Part 810 (Export)
DoE O 472.2, 475.x series

Controls exports of nuclear and related dual-use technologies.

WHICH TOOL DOES WHAT?

TOOL	PRIMARY PURPOSE	WHAT IT CONTROLS	HOW IT WORKS	LEGAL BASIS
ITAR	Control defense articles, services, and technical data.	U.S. Munitions List items and related data/services.	License required for export, reexport, or deemed export.	AECA; ITAR (22 C.F.R. 120-130)
EAR	Control dual-use items and technology.	Commerce Control List items, software, and tech.	License based on item, end use, and user, and country risk.	EAA; EAR (15 C.F.R. 730-774)
OFAC SANCTIONS	Restrict transactions with sanctioned targets.	Property, interests in property, and transactions.	Generally prohibited; licenses only when authorized by OFAC.	IEEPA; TWEA; Various E.O.s
CFIUS REVIEW	Review and, if needed, block or mitigate foreign investments.	Covered investments in U.S. businesses and real estate.	Filing, national security review, mitigation, or block.	50 U.S.C. § 4565; FIRMA
COUNTERINTELLIGENCE & INDUSTRIAL SECURITY	Prevent espionage, theft, and unauthorized access.	People, access, facilities, classified and controlled data.	Investigations, clearances, inspections, insider threat programs.	Various laws, DoD and DCSA authorities, NISPOM

WHAT THESE TOOLS CAN AFFECT

	SATELLITES	LAUNCH VEHICLES	PROPULSION SYSTEMS	SENSORS & PAYLOADS	SOFTWARE	TECHNICAL DATA	MANUFACTURING TECHNOLOGY	OWNERSHIP & INVESTMENT	ACCESS TO FACILITIES & DATA
ITAR	●	●	●	●	●	●	●	●	●
EAR	●	●	●	●	●	●	●	●	●
OFAC SANCTIONS	●	●	●	●	●	●	●	●	●
CFIUS REVIEW	●	●	●	●	●	●	●	●	●
COUNTERINTELLIGENCE & INDUSTRIAL SECURITY	●	●	●	●	●	●	●	●	●



NATIONAL SECURITY

Prevent adversaries and terrorists from acquiring technologies that could be used to threaten the U.S., our forces, allies, and interests in space.



TECHNOLOGY PROTECTION

Protect U.S. innovation, intellectual property, and critical advantages that enable space superiority and economic leadership.



WHY THESE CONTROLS EXIST

ALLIANCE MANAGEMENT

Uphold commitments to allies and partners by ensuring responsible technology sharing and maintaining trust in cooperative programs.



LAW AND POLICY

Enforce U.S. laws, regulations, and international obligations that govern exports, sanctions, investment, and security.



SUPPLY-CHAIN SECURITY

Reduce risks from foreign adversary influence and ensure secure, resilient supply chains for critical space systems and components.

KEY TERMS



BUDGET REQUEST
Agency's formal request for funding to support proposed activities.



AUTHORIZATION
Congress establishes laws and policy that define programs, set priorities, and may authorize funding levels.



APPROPRIATION
Congress provides legal authority for the government to incur obligations and incur payments.



OBLIGATION
A legal commitment by the government that will likely result in outlays (payment).



EXPENDITURE
Actual payment of funds, reducing the available budget balance.



CONTRACT
A legal agreement for goods or services in exchange for consideration.



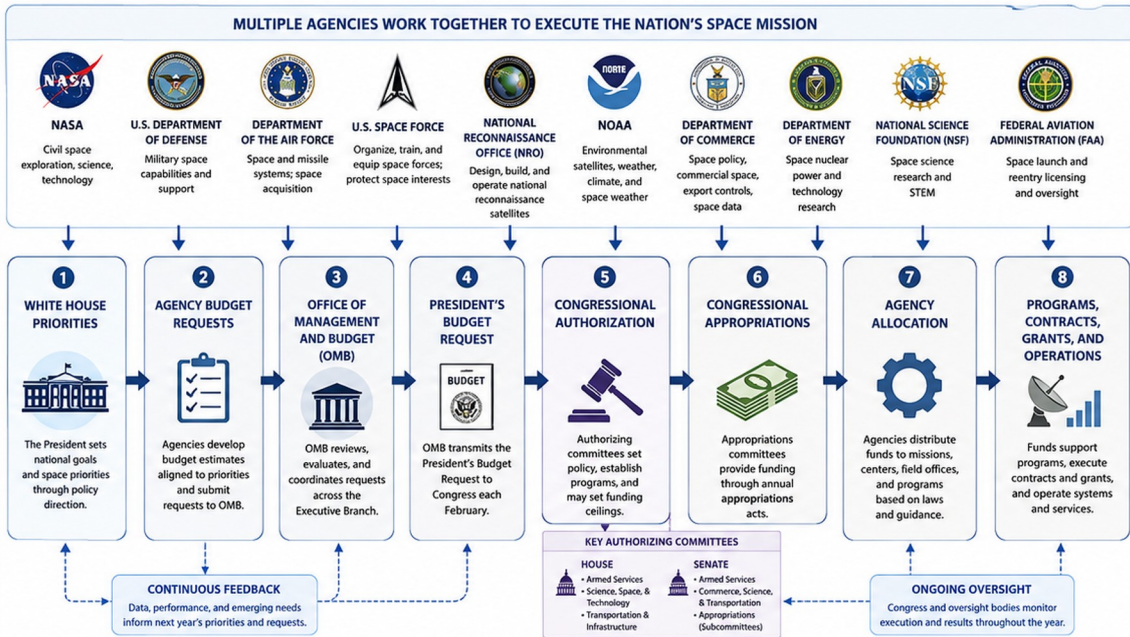
GRANT
Financial assistance to accomplish a public purpose with substantial involvement by the recipient.



COOPERATIVE AGREEMENT
Substantial federal involvement in carrying out a public purpose with a non-federal partner.

HOW DOES MONEY FLOW THROUGH THE U.S. GOVERNMENT SPACE ENTERPRISE?

THE FEDERAL BUDGETING AND FUNDING PROCESS FOR U.S. SPACE ACTIVITIES



WHO AUDITS THE MONEY?



GOVERNMENT ACCOUNTABILITY OFFICE (GAO)
Congress's nonpartisan watchdog that audits programs, evaluates performance, and issues reports and recommendations.



INSPECTORS GENERAL (IGs)
Independent auditors within each agency that investigate fraud, waste, and abuse and promote efficiency and effectiveness.



CONGRESSIONAL OVERSIGHT
Committees conduct hearings, request data, review reports, and hold agencies accountable.

ALL WORK TOGETHER TO ENSURE

- ✓ Proper use of taxpayer dollars
- ✓ Compliance with laws and policies
- ✓ Effective mission outcomes

KEY TAKEAWAYS



WHO ASKS FOR THE MONEY?

Executive Branch agencies—such as NASA, DOD, USSF, NRO, NOAA, DOC, DOE, NSF, and FAA—develop and submit budget requests based on the President's priorities.



WHO APPROVES THE MONEY?

Congress authorizes programs and appropriates funds through its committees and annual appropriations acts.



WHO SPENDS THE MONEY?

Agencies allocate funds and carry out programs through their workforce, contractors, grantees, and partners.



WHO AUDITS THE MONEY?

GAO, Inspectors General, and Congressional oversight bodies ensure accountability, transparency, and results.

HOW DOES THE U.S. GOVERNMENT PROVIDE MISSILE WARNING AND MISSILE TRACKING FROM SPACE?

ALWAYS ON WATCH: SPACE-BASED SENSORS, GLOBAL NETWORKS, AND PARTNERS DELIVER ACTIONABLE WARNINGS AND TRACKS.

1) WHAT THE MISSION DOES



- ✓ Detect missile launches and boost-phase events anywhere in the world.
- ✓ Track and predict missile trajectories and impact areas.
- ✓ Characterize threats and assess intent and capabilities.
- ✓ Deliver timely warnings and precise tracks to decision-makers and defenders.
- ✓ Provide data and cueing to enable defense systems and mission partners.

2) KEY U.S. GOVERNMENT ORGANIZATIONS



U.S. SPACE FORCE
(Operational Lead)

COMBAT FORCES COMMAND (CFSPC)

Owens space domain awareness and conducts missile warning and tracking operations.

MISSION DELTA 4

Missile Warning and Tracking

Operates the global enterprise—sensors, networks, and data—to deliver warning and tracking products 24/7.



SPACE SYSTEMS COMMAND (SSC)

SPACE SENSING (Formerly Space Delta 2)

Acquires, develops, and fields space sensing capabilities and resilient constellations (e.g., SBIRS, Next-Gen OPIR, proliferated missile warning layers).

KEY PARTNERS



MISSILE DEFENSE AGENCY (MDA)

Uses data for missile defense planning, intercept operations, and testing.



NORAD / USNORTHCOM

Provides regional warning and assessment for North America and allied defense.



INTELLIGENCE COMMUNITY (IC)

Provides threat intelligence and analysis.



STATE DEPARTMENT & ALLIES

Share information and coordinate global warning and response.

3) SENSOR LAYERS: 24/7 GLOBAL COVERAGE



SPACE-BASED INFRARED (SATELLITES)

Detects the intense heat of missile launches and boost-phase plumes through cloud cover and from any location on Earth. Includes SBIRS constellation and Next-Gen OPIR satellites.



UPGRADED EARLY WARNING RADARS

Large, ground-based radars (e.g., Beale AFB, Clear AFS, Cape Cod AFS) provide persistent tracking, precision data, and object discrimination.



FORWARD-BASED RADARS & SENSORS

Regional radars and sensors extend coverage and provide tracking support for theater defense and cueing.



RESILIENT & PROLIFERATED LAYERS

Emerging LEO and hosted payloads, data transport, and commercial partnerships add resilience, capacity, and speed.

4) WARNING CHAIN: END-TO-END FROM SPACE

1

DETECT



Space sensors detect the infrared signature of a launch (or other event).

Seconds to minutes

2

TRACK



Data is correlated across space and ground sensors to build and refine the trajectory.

Seconds to minutes

3

CHARACTERIZE



Systems and analysts assess missile type, capabilities, and intent as more data arrives.

Minutes to tens of minutes

4

WARN



Warning messages, impact predictions, and confidence levels delivered to users.

Minutes to tens of minutes

5

SUPPORT DEFENSE & DECISION-MAKING



Tracks, data, and evaluations enable defenders to act and leaders to decide.

Continuous

GLOBAL NETWORK & COMMAND AND CONTROL

Secure satellites, ground stations, data links, and computing connect sensors, operators, and partners worldwide.



5) WHY IT MATTERS



- ✓ Provides early warning of missile threats to the U.S., allies, and partners.
- ✓ Enables missile defense, civil protection, and homeland security.
- ✓ Deters aggression by demonstrating persistent global awareness.
- ✓ Supports force posture, crisis response, and strategic decision-making.
- ✓ Builds a resilient, layered architecture for a more contested world.



GLOBAL COVERAGE

Sensors watch everywhere, from any vantage.



SPEED TO WARNING

Timely alerts save lives and protect forces.



ACCURATE TRACKS

High-fidelity data powers defenders and decisions.



INTEGRATED PARTNERS

One team, shared data, stronger response.



RESILIENT ARCHITECTURE

Multiple layers and paths ensure mission success.

★ ALWAYS ON WATCH. ALWAYS INTEGRATED. ALWAYS READY. ★

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HOW DOES THE U.S. GOVERNMENT PROVIDE MILITARY SATELLITE COMMUNICATIONS?

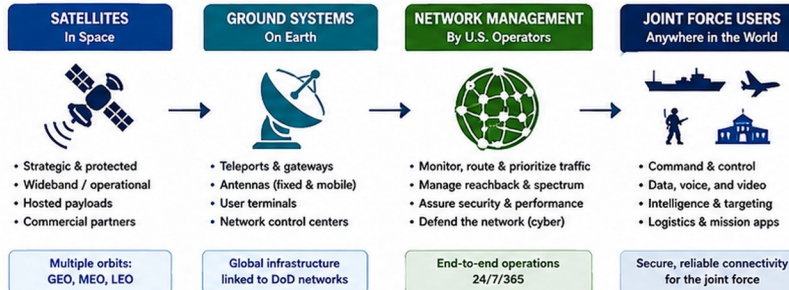
GLOBAL, SECURE, AND RESILIENT CONNECTIVITY FOR THE JOINT FORCE—ANYTIME, ANYWHERE

1 WHAT MILITARY SATCOM DOES

Military satellite communications (SATCOM) provide secure, resilient, and reliable connectivity to command and control forces, share data, and support operations worldwide.

- ENABLES COMMAND AND CONTROL**
Link national leaders to forces globally, including nuclear command and control.
- MOVES DATA AT SCALE**
Supports streaming video, intelligence sharing, mission data, and cloud services.
- PROVIDES SECURE & RESILIENT LINKS**
Protected waveforms, hardened systems, anti-jam, and cyber-secure architectures.
- EXTENDS REACH ANYWHERE**
Global and regional coverage for deployed, expeditionary, and mobile forces.
- SUPPORTS ALL DOMAINS**
Land, air, maritime, space, and cyber operations across the globe.

THE MILITARY SATCOM ENTERPRISE: FROM SPACE TO THE WARFIGHTER



2 WHO OPERATES AND ACQUIRES IT

OPERATIONS



SPACE DELTA 8 – SATELLITE COMMUNICATIONS

U.S. Space Force operational delta responsible for operating and defending the DoD SATCOM enterprise, 24/7, worldwide.



SATELLITE COMMUNICATIONS OFFICE (SCO)

Systems command within Space Delta 8 that operates the satellite ground system, manages terminals and network operations, and delivers global SATCOM services.

ACQUISITION & MODERNIZATION



SPACE SYSTEMS COMMAND (SSC) SATCOM & PNT PORTFOLIO

Leads acquisition, development, and fielding of military SATCOM and PNT systems. Manages programs, industry partners, budgets, and modernization to deliver resilient, next-generation capabilities.

3 MAJOR MISSION CATEGORIES



STRATEGIC / NUCLEAR COMMAND AND CONTROL SATCOM

Assured, protected communications for national leadership and strategic forces.



PROTECTED SATCOM

Resilient, anti-jam network access for high-risk and time-critical operations.



WIDEBAND / OPERATIONAL SATCOM

High-capacity communications for data-heavy missions and day-to-day operations.

EXAMPLES

- AEHF (Advanced Extremely High Frequency)
- MILSTAR (Ultra High Frequency)
- Evolved Strategic SATCOM (next-gen)



Priorities
Survivability
Assurance
Jamming-resistant
Low probability of intercept



Priorities
Protection
Resilience
Deny/Degrade
resistance



Priorities
Capacity
Coverage
Flexibility
Cost effectiveness

- Protected Tactical SATCOM (PT SATCOM)
- Anti-jam waveforms & hardened payloads
- Crosslink and multi-orbit architectures

- Wideband Global SATCOM (WGS)
- Commercial SATCOM (MILSATCOM)
- Hosted & commercial partnerships

4 WHO USES MILITARY SATCOM



NATIONAL LEADERSHIP

President, Vice President, Secretary of Defense, National Command Authorities.



COMBATANT COMMANDS

U.S. Northern, Southern, European, Indo-Pacific, Central, Africa, Strategic, and Transportation.



MILITARY SERVICES

Army, Navy, Air Force, Marine Corps, and Space Force.



U.S. GOVERNMENT AGENCIES

Intelligence Community, DHS, State, DoD agencies, and other mission partners.



ALLIES & PARTNERS

Coalition and partner nations with authorized access to shared or interoperable services.

ASSURED & PROTECTED vs. HIGH-CAPACITY

ASSURED / SURVIVABLE / PROTECTED

Built to fight through denial



- Hardened satellites & ground systems
- Jam-resistant waveforms & encryption
- Low probability of intercept/track
- Dispersed orbits & paths
- Optimized for mission assurance and command and control

Goal: Deliver the right link—when and where it's needed most

HIGH-CAPACITY / WIDEBAND

Built to move more data



- Wide bandwidth & high throughput
- Global coverage & scalability
- Supports streaming, cloud, and large data transfers
- Cost-effective capacity at scale

Goal: Deliver the data—fast, everywhere

VS.

5 WHY IT MATTERS



DECISIVE IN ANY CONFLICT

Enables command and control, situational awareness, and precision operations.



RESILIENT TO ADVERSARIES

Layered architectures, hardened systems, and cyber defenses counter jamming and attack.



GLOBALLY AVAILABLE

Reach the joint force operating anywhere—on land, at sea, in the air, and in space.



BUILDS FUTURE ADVANTAGE

Continuous modernization, commercial partnerships, and innovation ensure we stay ahead.



THE U.S. MILITARY SATCOM ENTERPRISE CONNECTS THE NATION'S LEADERS, FORCES, AND PARTNERS WITH SECURE, RESILIENT, AND HIGH-CAPACITY COMMUNICATIONS.

MULTIPLE ORBITS. MULTIPLE SYSTEMS. ONE MISSION: CONNECT AND PROTECT THE JOINT FORCE.

HOW DOES THE U.S. GOVERNMENT CONDUCT EARTH OBSERVATION FROM SPACE?

A COORDINATED NETWORK OF SATELLITES, SENSORS, DATA, AND EXPERTS DELIVERING INFORMATION THAT HELPS PROTECT LIVES, MANAGE RESOURCES, AND UNDERSTAND OUR PLANET.

1. WHAT EARTH OBSERVATION IS

Earth observation (EO) uses satellites and sensors to gather information about our planet's land, oceans, atmosphere, ice, and living systems.



Remotely senses Earth's systems from space.



Provides consistent, global coverage over time.



Turns data into information, insights, and decisions.



Supports public services, economic activity, and scientific discovery.

2. WHO DOES WHAT



NASA
Research & Innovation



Develops and operates Earth science satellites and instruments.



Conducts research to improve our understanding of Earth.



Advances technologies for tomorrow's missions.



Works with partners to share data and knowledge.

NASA builds the knowledge base and technologies that drive Earth observation forward.



NOAA
Operations & Services



Operates environmental satellites for weather, oceans, and climate.



Delivers forecasts, warnings, and hazards information.



Monitors oceans, coasts, atmosphere, and space weather.



Works with partners nationwide to protect life and property.

NOAA turns satellite observations into timely products and services that protect lives and property.



USGS
Land Imaging & Data



Manages the Landsat program with long-term land observations.



Produces consistent, open land imagery and data.



Supports mapping, land change science, and natural resources.



Provides data access through EarthExplorer and partners.

USGS provides trusted land imagery and data to inform management and decisions.



NASA, NOAA, and USGS partner with other federal agencies, universities, industry, and international organizations to share data, avoid duplication, and maximize public benefit.

3. MAJOR OBSERVATION TYPES



WEATHER – Clouds, storms, temperature, winds, and atmospheric moisture for forecasts and nowcasting.



CLIMATE – Long-term records of temperature, precipitation, sea level, ice, and greenhouse gases.



OCEANS – Sea surface height, temperature, color, salinity, currents, and ocean health.



LAND – Land cover, vegetation, soil moisture, elevation, and land use change.



FIRES – Detects active fires, burn scars, smoke, and fire behavior.



WATER – River and lake levels, streamflow, flooding, snowpack, and water quality.



DISASTERS – Hurricanes, floods, earthquakes, volcanic eruptions, landslides, and damage assessment.

4. FROM SATELLITES TO USERS: THE DATA JOURNEY

1. SATELLITES & SENSORS



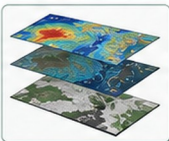
U.S. and partner satellites collect data using a variety of sensors (day and night, all weather).

2. DATA PROCESSING



Data is downlinked to ground stations, calibrated, and processed into high-quality, reliable datasets.

3. PRODUCTS & MAPS



Data is transformed into useful products—maps, models, and alerts tailored to users' needs.

4. DELIVERY & ACCESS



Products are delivered through websites, APIs, dashboards, mobile apps, and data portals (many at no cost).

5. USERS



Continuous feedback improves satellites, models, and services—creating a cycle of better data and better decisions.

5. PUBLIC BENEFITS



SAVES LIVES – Better forecasts, warnings, and disaster information help communities prepare and respond.



MANAGES NATURAL RESOURCES – Supports agriculture, forestry, fisheries, water, energy, and conservation.



INFORMS DECISIONS – Provides objective data for land use, infrastructure, environment, and public health.



STRENGTHENS THE ECONOMY – Enables innovation across industries and supports jobs and investments.



ADVANCES SCIENCE – Expands knowledge of Earth's systems and our changing planet.



SERVES THE PUBLIC – Open data and information empower communities and citizens.



EARTH OBSERVATION IS A NATIONAL ASSET. Through coordinated satellites, open data, and strong partnerships, the U.S. government delivers vital information about our planet—every day, for everyone.



HOW DOES THE U.S. GOVERNMENT MONITOR SPACE WEATHER?

A CONTINUOUS SYSTEM OF OBSERVATION, SCIENCE, AND FORECASTS TO PROTECT OUR TECHNOLOGY AND INFRASTRUCTURE

1. WHAT SPACE WEATHER IS

Conditions on the Sun and in space that can affect Earth and our technology.



SOLAR FLARES

Bursts of radiation that can cause radio blackouts and affect satellites.



CORONAL MASS EJECTIONS (CMEs)

Huge clouds of magnetized plasma that can trigger geomagnetic storms.



SOLAR RADIATION STORMS

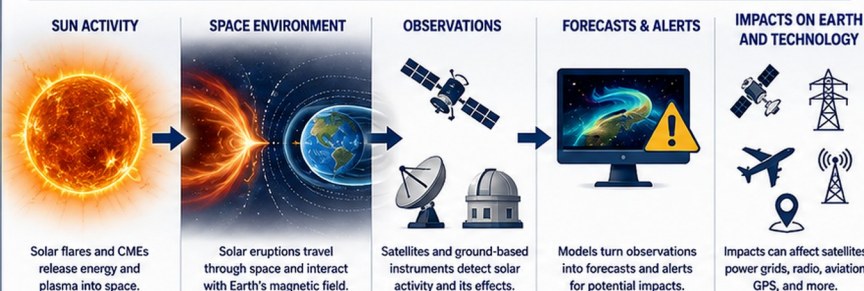
High-energy particles that can pose risks to astronauts and aircraft passengers.



GEOMAGNETIC STORMS

Disturbances in Earth's magnetic field caused by solar activity.

THE BIG PICTURE: FROM THE SUN TO EARTH



2. WHO MONITORS IT



NOAA – SPACE WEATHER PREDICTION CENTER (SWPC)

Official U.S. source for space weather forecasts, watches, warnings, and alerts 24/7.



NASA – HELIOPHYSICS DIVISION

Operates solar and heliophysics missions and provides critical observations and research to understand space weather.



NATIONAL SCIENCE FOUNDATION (NSF)

Supports research and operates facilities that observe the Sun, Earth, and near-Earth space.



U.S. SPACE FORCE

Operational user of space weather information and provides space situational awareness and support to protect national security systems.

3. OBSERVATIONS AND FORECASTING: A CONTINUOUS CYCLE

OBSERVE THE SUN



- Solar telescopes in space (e.g., SOHO, SDO, DSCOVR)
- Measure flares, CMEs, and solar radiation

MONITOR SPACE ENVIRONMENT



- Space-based monitors (ACE, DSCOVR, GOES)
- Ground magnetometers, ionosondes, riometers, and neutron monitors
- Track solar wind, energetic particles, and geomagnetic conditions

DATA & MODELS



- Combine observations with physics-based models
- Estimate arrival time and potential severity

FORECASTS & ALERTS



- SWPC issues forecasts, physics, warnings, and alerts
- Disseminated 24/7 to government, industry, and the public

REVIEW & IMPROVE



- Events are analyzed to improve models, tools, and services
- Advances feed back into the system

4. IMPACTS OF SPACE WEATHER



SATELLITES

Can cause surface charging, increased drag, and electronics anomalies.



POWER GRIDS

Geomagnetic storms can induce currents that stress transformers and grids.



HF RADIO COMMUNICATIONS

Solar flares can cause radio blackouts on the dayside of Earth.



AVIATION

Solar radiation storms can increase radiation exposure on high-latitude flights.



GPS & NAVIGATION

Ionospheric disturbances can degrade GPS signals and accuracy.



COMMUNICATIONS & INTERNET

Signal degradation and disruptions can occur.

5. WHY IT MATTERS



PROTECTS PEOPLE

Reduces risks to astronauts, aircrews, and the public.



PROTECTS CRITICAL INFRASTRUCTURE

Helps safeguard power, communications, transportation, and financial systems.



ENABLED BY PARTNERSHIP

NOAA, NASA, NSF, and the U.S. Space Force work together with federal, state, industry, and international partners.



24/7 READINESS

Continuous monitoring and forecasts provide time to prepare, mitigate impacts, and recover.

NOAA SPACE WEATHER SCALES (EXAMPLES)

Scales describe the potential severity of events to help users take action.



Higher numbers indicate stronger potential impacts. Full details at spaceweather.gov

HOW IS THE U.S. GOVERNMENT DEVELOPING SPACE NUCLEAR POWER AND PROPULSION?

SAFE, RELIABLE NUCLEAR ENERGY AND PROPULSION SYSTEMS TO POWER THE NEXT ERA OF EXPLORATION

1. WHY SPACE NUCLEAR SYSTEMS MATTER



ENABLED MISSIONS

Supports long-duration missions beyond Earth orbit and to distant destinations.



RELIABLE, CONTINUOUS POWER

Delivers steady electricity in environments with long nights, dust, or extreme cold.



HIGHER PERFORMANCE

Enables faster transit times and more ambitious exploration architectures.



ENERGY INDEPENDENCE

Reduces reliance on sunlight and resupply for critical missions and outposts.



TECHNOLOGY LEADERSHIP

Strengthens U.S. leadership in space exploration and advanced energy.

2. WHO IS INVOLVED

U.S. GOVERNMENT LEADERSHIP



NASA

Leads mission needs, systems development, integration, and flight demonstrations.



U.S. DEPARTMENT OF ENERGY (DOE)

Leads R&D on nuclear materials, reactors, fuel, and testing infrastructure.

NATIONAL LABORATORIES



Idaho National Laboratory



Los Alamos National Laboratory



Oak Ridge National Laboratory

Provide research, design, analysis, materials development, and test capabilities.

INDUSTRY AND ACADEMIA PARTNERS



Aerospace & Space Companies

Design, build, and integrate power and propulsion systems.



Nuclear Industry

Supply expertise in reactor design, fuel fabrication, and operations.



Universities & Research Institutes

Advance science, modeling, materials, and experiments.

Partnerships accelerate innovation and strengthen the U.S. industrial base.

3. TECHNOLOGY PATHS

Three complementary paths address different mission needs.



RADIOISOTOPE POWER SYSTEMS (RPS)

Use heat from radioactive decay (e.g., plutonium-238) converted to electricity. Proven, robust, and ideal for small to medium power needs and long-duration missions.



FISSION SURFACE POWER (FSP)

Kilowatt to megawatt-class reactors provide electricity for lunar and planetary surface operations. Supports habitats, industry, life support, and science in permanently shadowed or harsh environments.



ADVANCED NUCLEAR PROPULSION (ANP)

Nuclear thermal and other advanced concepts use reactor heat for high-efficiency propulsion. Enables higher performance exploration architectures and faster transit to deep space.

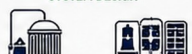
4. DEVELOPMENT PIPELINE: FROM CONCEPT TO MISSION

1. FUEL AND MATERIALS



- Produce and qualify nuclear fuels (e.g., Pu-238, HALEU*)
- Develop and test advanced materials and coatings
- Ensure reliable supply chains

2. REACTOR OR POWER SYSTEM DESIGN



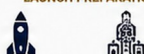
- Conceptual and detailed design
- Thermal, neutronic, and structural analysis
- Prototyping and component tests

3. SAFETY AND TESTING



- Safety by design and redundancy
- Ground testing in specialized facilities
- Environmental and vibration testing
- Quality assurance and reliability

4. INTEGRATION AND LAUNCH PREPARATION



- System integration and reviews
- Launch safety and packaging
- Range and mission safety planning
- Interagency coordination

5. SPACE MISSION USE



- Deploy and operate in space
- Monitor performance and health
- Enable science, exploration, and human presence

*HALEU = High-Assay Low-Enriched Uranium

SAFETY, REGULATION & INTERAGENCY COORDINATION



LAUNCH SAFETY

Design, analysis, and packaging meet rigorous standards to protect the public, crew, and environment.



REGULATION

DOE and NASA work with the Nuclear Regulatory Commission (NRC) on licensing and safety reviews.



INTERAGENCY COORDINATION

Close coordination with DoD, State Department, FAA, NOAA, and other agencies to enable safe and responsible missions.

5. POTENTIAL USES AND IMPACT



LONG-DURATION LUNAR OPERATIONS

Power habitats, rovers, science stations, and resource utilization systems—day and night, throughout the lunar year.



DEEP-SPACE EXPLORATION

Support crewed missions and scientific probes to Mars and beyond with reliable power or higher-performance nuclear propulsion.



CONTINUOUS POWER IN HARSH ENVIRONMENTS

Provide electricity in permanently shadowed regions, extreme cold, or dusty environments where solar is limited.



ENABLING HIGHER-PERFORMANCE ARCHITECTURES

Reduce trip times, increase payload capacity, and open new mission profiles with advanced nuclear propulsion.



SCIENCE AND DISCOVERY

Enable always-on instruments and larger scientific capabilities for breakthrough discoveries.



THE TAKEAWAY

Through strong government leadership, public-private partnerships, and a focus on safety, the U.S. is advancing nuclear power and propulsion to enable the next giant leap in space exploration.

HOW DOES THE U.S. GOVERNMENT DETECT AND RESPOND TO ASTEROID THREATS?

A COORDINATED SYSTEM TO FIND, ASSESS, AND RESPOND TO NEAR-EARTH OBJECT (NEO) HAZARDS

1. WHAT THE THREAT IS

Near-Earth Objects (NEOs) are asteroids and comets with orbits that bring them close to Earth. While most miss us, impacts—though rare—can cause regional to global damage.



EXAMPLES OF POSSIBLE IMPACT CONSEQUENCES



Blast, heat, and airburst



Tsunamis (from ocean impacts)



Widespread damage to infrastructure



Long-term climate effects

2. WHO DOES WHAT



NASA PLANETARY DEFENSE COORDINATION OFFICE (PDCO)

Leads U.S. planetary defense efforts, coordinates data, analysis, and response planning across government and with international partners.



DISCOVERY & OBSERVATIONS

DOE/NOIRLab, NASA, and partner observatories find and observe near-Earth objects.



TRACKING & ANALYSIS

NASA Center for Near Earth Object Studies (CNEOS) calculates orbits and monitors close approaches.



RISK ASSESSMENT

PDCO and CNEOS assess impact probability and potential effects.



COORDINATION & COMMUNICATION

PDCO coordinates within the U.S. government and with international partners and the public.

5. WHY EARLY WARNING MATTERS

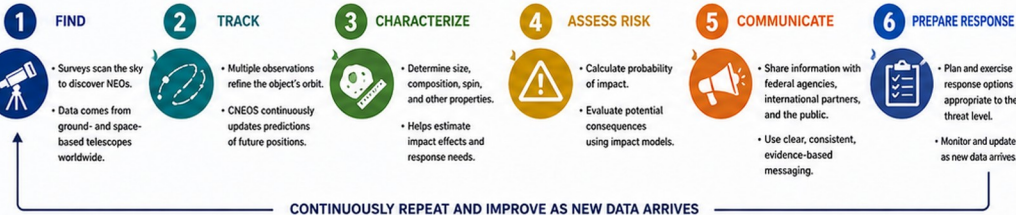


Warning time is the most important factor in reducing impact risk. More time means more observations, better confidence, more mitigation options, and more protection for people and infrastructure.

EXAMPLES OF WARNING TIME VS. OPTIONS

WARNING TIME	WHAT IT MAKES POSSIBLE
Years to decades	Detailed tracking, mission planning, potential deflection, global preparation
Months to years	Improved predictions, emergency planning, exercises, resource staging
Days to weeks	Impact response actions, evacuations, shelter, public safety measures
Hours to days	Local alerts, immediate protective actions

3. DETECTION TO DECISION: THE CONTINUOUS PROCESS



4. RESPONSE OPTIONS

	MORE OBSERVATIONS	Gather additional data to reduce uncertainty and better define the risk.
	TRAJECTORY ANALYSIS	Refine orbit and impact predictions using advanced models and computing.
	EMERGENCY PLANNING	Coordinate with federal, state, local, tribal, and territorial partners; prepare response plans and conduct exercises.
	POSSIBLE DEFLECTION MISSIONS	If a significant impact threat is confirmed with sufficient lead time, a spacecraft mission could alter the asteroid's trajectory.
	IMPACT RESPONSE	If impact is unavoidable, focus on life safety, stress damage mitigation, and rapid recovery.

KEY PARTNERS AND NETWORKS



Leads U.S. planetary defense through PDCO, missions, and research.



Operates major surveys and telescopes that discover and track NEOs.



Provides orbit determination, impact monitoring, and risk analysis.



Supports emergency management planning and response.



Provides impact effects modeling and hazard information.



Engages in international coordination and information sharing.



A global network that shares data and coordinates alerts.



PLANETARY DEFENSE IS A SHARED MISSION

Detect early. Understand. Communicate. Prepare. Together, we can reduce the risk from asteroid impacts.

HOW DOES THE U.S. GOVERNMENT SUPPORT SPACE LAUNCH INFRASTRUCTURE?

FROM SPACEPORTS AND RANGES TO SAFETY AND OPERATIONS—A COORDINATED ECOSYSTEM THAT ENABLES SAFE, RELIABLE, AND RESPONSIBLE LAUNCHES

1) WHAT LAUNCH INFRASTRUCTURE INCLUDES



LAUNCH PADS & COMPLEXES
Structures and systems to assemble, propellant, and launch vehicles.



VEHICLE PROCESSING
Facilities for integration, testing, and rollout.



PROPELLANT & STORAGE
Tanks, pipelines, and handling systems for fuels and gases.



GROUND SUPPORT
Power, data, water, thermal control, and other utilities and equipment.



RANGE & AIRSPACE SYSTEMS
Radar, telemetry, tracking stations, and range safety systems.



MISSION CONTROL & OPERATIONS
Control centers and networks to monitor and command flights.



PAYLOAD & CUSTOMER FACILITIES
Encapsulation buildings, clean rooms, and payload processing.



PUBLIC SAFETY & EMERGENCY SERVICES
Fire protection, medical response, evacuation, and recovery.

2) WHO DOES WHAT?



FAA – OFFICE OF COMMERCIAL SPACE TRANSPORTATION (AST)
Licenses and regulates commercial launch and reentry activities to ensure public safety, national security, and environmental protection.



FAA – OFFICE OF SPACEPORTS
Develops national spaceport policy, provides technical assistance and planning guidance, and promotes safe and efficient spaceport operations.



U.S. SPACE FORCE
Plans, coordinates, and operates ranges and test & training areas; provides space domain awareness, tracking, and range support for national security launches and tests.



NASA
Develops and operates launch infrastructure for government missions at centers such as Kennedy Space Center (KSC) and Wallops Flight Facility; provides technical expertise and facilities to the nation.



STATE & LOCAL GOVERNMENTS
Invest in infrastructure, permitting, workforce, roads, utilities, and community services that support spaceports.



COMMERCIAL SPACEPORT OPERATORS & INDUSTRY
Design, build, and operate spaceport facilities and provide launch services, logistics, and infrastructure.

3) TYPES OF U.S. SPACEPORTS

FAA-LICENSED COMMERCIAL SPACEPORTS



Privately or publicly owned sites licensed by the FAA to conduct commercial launch and reentry operations.

Examples: Space Florida's ports (Cape Canaveral Spaceport, Spaceport Camden, Spaceport America), Mid-Atlantic Regional Spaceport.

U.S. GOVERNMENT-OWNED SPACEPORTS



Owned and operated by federal agencies for government and commercial missions.

Examples: Kennedy Space Center (FL), Wallops Flight Facility (VA), Vandenberg Space Force Base (CA), Kodiak Launch Complex (AK).

ACTIVE PRIVATE / EXCLUSIVE-USE SITES



Private facilities used for development, testing, or exclusive-use missions under FAA oversight.

Examples: Rocket Lab Launch Complex 1 (NZ via U.S. licensing), Blue Origin's launch site (TX).

WHERE THEY ARE: MAJOR U.S. SPACEPORTS AND RANGES

★ SPACEPORTS

- ★ KODIAK, AK
Pacific Spaceport Complex
- ★ VANDENBERG SFB, CA
West Coast launch site
- ★ SPACEPORT AMERICA, NM
Commercial spaceport



★ ATLANTIC CORRIDOR

- ★ WALLOPS, VA
NASA Wallops Flight Facility
Mid-Atlantic Regional Spaceport
- ★ CAPE CANAVERAL, FL
Kennedy Space Center
Spaceport Florida

📍 RANGES

Includes land, maritime, and airspace for safe testing and launch support.

4) THE LAUNCH SUPPORT CHAIN

1. SPACEPORTS & RANGES



Sites, pads, ranges, and support systems are built, maintained, and certified.

2. SAFETY & LICENSING



FAA evaluates risk and issues licenses. Range coordination ensures safe access to airspace and downrange areas.

3. VEHICLE PROCESSING



Vehicles are received, integrated, and tested. Propellant and payload operations follow strict safety procedures.

4. LAUNCH OPERATIONS



Countdown, fueling, launch, and ascent with real-time monitoring and command.

5. RANGE / AIRSPACE / PUBLIC SAFETY SUPPORT



Tracking, telemetry, and range safety protect people and property. Emergency services and recovery stand ready.

5) WHY IT MATTERS



SAFETY FIRST

Coordinated oversight and range support reduce risk to people, property, and the environment.



NATIONAL SECURITY

Assured access to space supports defense, intelligence, early warning, and resilient communications.



ECONOMIC GROWTH

Spaceports create jobs, attract investment, and strengthen U.S. leadership in the global space economy.



INNOVATION & ACCESS

Modern infrastructure lowers barriers for new entrants and accelerates technology development.



RESPONSIBLE USE OF SPACE

Sustainable operations and space traffic coordination protect the long-term space environment.



BUILT ON PARTNERSHIP

U.S. government agencies, commercial operators, state and local partners, and industry work together to design, fund, regulate, and operate the infrastructure that makes space launches possible—safely and responsibly.



SMART POLICY
Clear rules and streamlined processes encourage investment and innovation.



MODERN INFRASTRUCTURE
Resilient, adaptable facilities support a wide range of vehicles and missions.



STRONG WORKFORCE
Skilled teams keep operations safe, efficient, and mission-ready.



SUSTAINABLE FUTURE
Environmental stewardship and community engagement support long-term success.

HOW DOES THE U.S. GOVERNMENT PROTECT SPACE SYSTEMS FROM CYBER THREATS?

A WHOLE-OF-NATION APPROACH TO SECURE, RESILIENT, AND TRUSTED SPACE OPERATIONS

1 THE SPACE CYBER ATTACK SURFACE

Space systems are interconnected—attackers look for any way in.



SPACE SEGMENT

- Satellites, payloads, on-board computers
- On-board networks and software
- Uplink/downlink radios and antennas



LINK SEGMENT

- RF and optical links (TT&C, data downlinks)
- Crosslinks and relay links
- Modems, encryption devices



GROUND SEGMENT

- Ground stations and antennas
- Mission control systems
- Operations networks and operators



DATA / NETWORK SEGMENT

- Data transport and storage systems
- Cloud and enterprise IT environments
- Mission networks and services



USER SEGMENT

- Authorized users and applications
- Mission partners and customers
- End-user devices and access points

CROSS-CUTTING CONSIDERATIONS



SUPPLY CHAIN
RISK



SOFTWARE
INTEGRITY

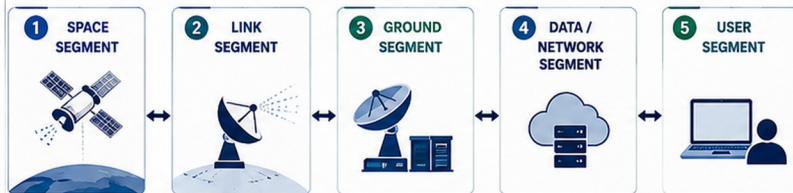


THIRD-PARTY
RISK



GLOBAL
CONNECTIONS

LAYERED ARCHITECTURE OF A SPACE SYSTEM



DATA FLOW: COMMANDS & CONTROL → TELEMETRY → PAYLOAD DATA → SERVICES & APPLICATIONS

SECURITY ACROSS THE LIFECYCLE



DESIGN &
ARCHITECT



BUILD &
INTEGRATE



TEST &
VALIDATE



OPERATE &
MAINTAIN



DECOMMISSION
& DISPOSE

3 THREATS

Adversaries target space systems to disrupt, degrade, or deny operations.



NETWORK INTRUSION
Unauthorized access to systems



MALWARE
Malicious software or firmware



SUPPLY-CHAIN COMPROMISE
Malicious hardware or software



CREDENTIAL THEFT
Stolen passwords or keys



RANSOMWARE
Extortion and data encryption



INSECURE GROUND SYSTEMS
Weak configurations and gaps



LOSS OF COMMAND OR DATA INTEGRITY
Disruption or tampering of control or mission data

4 DEFENSIVE PRACTICES

Defense in depth across people, process, and technology.



ARCHITECT FOR RESILIENCE
Minimize risk with segmentation, least privilege, and zero trust.



ENCRYPT EVERYTHING
Use strong encryption for data in transit and at rest.



AUTHENTICATE STRONGLY
Apply multifactor authentication and role-based access controls.



KEEP SYSTEMS HEALTHY
Patch, harden, and configure to reduce vulnerabilities.



MONITOR CONTINUOUSLY
Use logging, telemetry, and anomaly detection to find issues early.



SHARE THREAT INTELLIGENCE
Exchange indicators and lessons learned across government and industry.



PREPARE & TEST RESPONSE
Maintain incident response plans and conduct regular exercises.



PLAN TO RECOVER
Back up critical data, use redundant systems, and test recovery processes.

THE CYBER MISSION CYCLE



PREVENT
Reduce risk and strengthen defenses



DETECT
Find threats and anomalies early



RESPOND
Contain and mitigate adversary actions



RECOVER
Restore services and improve resilience

2 WHO HELPS PROTECT IT?

A whole-of-government and industry partnership.



CISA (CYBERSECURITY & INFRASTRUCTURE SECURITY AGENCY)

Leads civilian cybersecurity for space systems. Issues guidance, shares threat information, and supports resilience for critical space infrastructure and supply chains.



U.S. SPACE FORCE

Defends space systems and networks, sets cybersecurity standards for DoD space, and protects space capability and freedom of operation.



U.S. CYBER COMMAND

Conducts cyber defense of DOD networks, hunts and disrupts adversary cyber activity, and provides mission assurance for space operations.



NATIONAL SECURITY AGENCY (NSA)

Provides signals intelligence, secure communications, and cybersecurity guidance to protect space systems and data.



FEDERAL BUREAU OF INVESTIGATION (FBI)

Investigates cyber crimes and nation-state activity, supports threat attribution and response, and protects U.S. interests.



NIIST & OTHER PARTNERS

NIIST develops cybersecurity standards and best practices (e.g., SP 800 series). Partners include NASA, DoD, industry, and international allies under Space Policy Directive-5.

5 WHY RESILIENCE MATTERS

Resilient space systems enable national security and everyday life.



PROTECTS NATIONAL SECURITY
Supports deterrence, situational awareness, and mission assurance in all domains.



ENABLES CRITICAL SERVICES
Supports communications, navigation, weather, Earth observation, and disaster response.



SUPPORTS THE ECONOMY
Sustains commercial services and innovation that drive growth and jobs.



STRENGTHENS ALLIANCES
Builds trust through secure operations and responsible behavior in space.



SECURE TODAY. RESILIENT TOMORROW.

Through strong partnerships, smart investments, and proven practices, the U.S. government protects space systems so they remain reliable, available, and ready when the nation needs them most.

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HOW DOES THE U.S. GOVERNMENT CONDUCT ORBITAL WARFARE AND SPACE CONTROL?

PROTECTING U.S. AND ALLIED SPACE CAPABILITIES, PRESERVING FREEDOM OF ACTION IN SPACE, AND, IF DIRECTED, CONDUCTING OPERATIONS AGAINST COUNTERSPACE THREATS

1. WHAT ORBITAL WARFARE MEANS



Orbital warfare is the employment of military forces and capabilities in, from, and to space to protect U.S. and allied interests and, if directed, to contest or defeat adversary counterspace capabilities.

THE MISSION IS TO:

- ✓ Protect U.S. and allied space systems and supporting infrastructure
- ✓ Preserve freedom of action in space and assure access
- ✓ Deter adversaries through credible capabilities and resilient operations
- ✓ If directed, conduct operations to counter, disrupt, or defeat threats to U.S. and allied space capabilities
- ✓ Enable U.S. and allied joint power across all domains

KEY DISTINCTIONS



SPACE CONTROL

The broader effort to ensure freedom of action in space. It includes preventing adversary use of space and denying them the ability to interfere with our space systems.



SPACE DOMAIN AWARENESS (SDA)

The enterprise of detecting, identifying, and characterizing objects and activities in space and understanding the space environment.



ORBITAL WARFARE

The military mission area within space control focused on operations to protect our space capabilities and, if directed, conduct actions against adversary counterspace threats.

2. WHO DOES WHAT



3. CORE FUNCTIONS OF ORBITAL WARFARE (MISSION DELTA 9)



DETER

Build and demonstrate credible capabilities, signal resolve, and dissuade adversary aggression in space.



DEFEND

Defend U.S. and allied space systems and infrastructure from counterspace threats and interference.



PROTECT

Ensure resilience, rapid reconstitution, and protection of critical space capabilities and data.

ENABLE JOINT OPERATIONS

Provide assured space capabilities and effects that enable joint and combined operations across air, land, maritime, cyber, and space.

4. SUPPORTING ENABLERS THAT MAKE ORBITAL WARFARE POSSIBLE



SPACE DOMAIN AWARENESS

Persistent detection and characterization of objects and activities in space.



CYBER DEFENSE

Protect networks, ground systems, and space systems from cyber threats.



RESILIENT ARCHITECTURE

Diverse orbits, robust links, encryption, and redundancy to withstand disruption and attack.



TRAINING & READINESS

Develop tactics, train forces, and conduct exercises to maintain proficiency and interoperability.



RESEARCH & DEVELOPMENT

Innovate and field capabilities that maintain technological advantage and operational adaptability.



INDUSTRY & ALLIED PARTNERS

Partner with industry, allies, and international organizations to strengthen capabilities and norms.

5. WHY IT MATTERS



OUR WAY OF LIFE DEPENDS ON SPACE

Communications, navigation, weather, banking, emergency response, and national security rely on space.



ADVERSARIES ARE INVESTING

Competitors are developing capabilities designed to deny, degrade, or disrupt U.S. and allied space systems.



SPACE IS CONTESTED, NOT A SANCTUARY

Space is a warfighting domain where freedom of action must be earned and sustained.



DETERRENCE PRESERVES STABILITY

Credible capabilities and responsible behavior reduce the risk of conflict and support secure competition.



SUPPORTS ALLIES AND PARTNERS

Strong space control enables the U.S. to uphold commitments and operate effectively with allies and partners.

HOW IT ALL WORKS TOGETHER



THE TAKEAWAY: THROUGH ORBITAL WARFARE AND SPACE CONTROL, THE U.S. GOVERNMENT DETERS THREATS, DEFENDS OUR SPACE CAPABILITIES, PROTECTS FREEDOM OF ACTION, AND ENABLES JOINT POWER TO ACHIEVE NATIONAL OBJECTIVES.

HOW DOES THE U.S. GOVERNMENT MANAGE INTERNATIONAL SPACE PARTNERSHIPS?

WORKING WITH ALLIES AND PARTNERS TO EXPLORE, DISCOVER, PROTECT, AND BENEFIT HUMANKIND

1 WHY INTERNATIONAL PARTNERSHIPS MATTER



ACHIEVE MORE TOGETHER

Pooling resources, expertise, and technology enables missions that go farther, last longer, and cost less.



SOLVE GLOBAL CHALLENGES

Space data helps monitor climate, disasters, oceans, weather, and natural resources—benefiting people everywhere.



STRENGTHEN SECURITY AND STABILITY

Cooperation with allies and partners supports a secure, stable, and peaceful space domain and deters harmful behavior.



BUILD INNOVATION AND ECONOMIC GROWTH

Partnerships expand markets, support jobs, and drive breakthroughs that improve life on Earth and beyond.



UPHOLD INTERNATIONAL NORMS

Working together advances responsible behavior, transparency, and the peaceful uses of outer space for the benefit of all.

2 WHO LEADS THEM

CIVIL SPACE LEADERSHIP



NASA

Leads civil space exploration, mission partnerships, technology development, and scientific cooperation.



U.S. DEPARTMENT OF STATE

Advances international space diplomacy, negotiates agreements, and promotes U.S. space policy and values abroad.



NOAA

Shares Earth observation data, supports environmental monitoring, weather prediction, and disaster response with global partners.



COORDINATION IS KEY:

The National Space Council, National Security Council, and Office of Science and Technology Policy help align policy, resources, and interagency efforts.

DEFENSE & SECURITY LEADERSHIP



U.S. DEPARTMENT OF DEFENSE

Leads security-space cooperation, information sharing, and protects national security space capabilities.



U.S. SPACE FORCE

Develops, operates, and defends space capabilities and partners with allies to promote a secure and stable space domain.



U.S. SPACE COMMAND (USSPACECOM)

Conducts global space operations, builds partner capacity, and integrates space into combined operations with allies and partners.

3 MAJOR PARTNERSHIP TYPES



CIVIL EXPLORATION

Co-develop and operate missions beyond Earth, including the International Space Station (ISS) and Artemis exploration at and around the Moon.



SCIENCE AND DATA SHARING

Share Earth, heliophysics, planetary, and astronomy data; support open science and global research networks.



SPACE SAFETY AND OPERATIONS

Work together on space weather, space domain awareness, collision avoidance, and debris mitigation to keep space safe and sustainable.



SECURITY COOPERATION

Share information, build partner capacity, strengthen resilience, and promote responsible state behavior in space.



STANDARDS / DIPLOMACY

Advance norms, rules, and technical standards; negotiate agreements and participate in international fora.

4 HOW PARTNERSHIPS WORK: FROM POLICY TO IMPACT



1. POLICY AND DIPLOMACY

Engage partners, align interests, and set shared priorities through dialogue and multilateral forums.



2. AGREEMENTS AND PRINCIPLES

Establish the foundation with accords, agreements, MOUs, and principles that guide cooperation.



3. MISSIONS / DATA / OPERATIONS

Plan and execute joint missions, share data and capabilities, and coordinate operations and services.



4. SHARED BENEFITS

Advance science, protect Earth, enable exploration, strengthen security, build economies, and inspire future generations.



5. CONTINUOUS IMPROVEMENT

Review results, adopt lessons learned, update agreements, and expand future cooperation.



A KEY FRAMEWORK: ARTEMIS ACCORDS

A non-binding set of principles for safe, peaceful, and transparent exploration and use of outer space. 60+ SIGNATORIES AND GROWING

EXAMPLES OF U.S. PARTNERSHIPS



Canada



European Union



United Kingdom



France



Italy



Japan



South Korea



Australia



India



Singapore



... and many more

Partners contribute unique capabilities, share data, develop technology, and explore together for the benefit of all.

5 PRINCIPLES AND GUARDRAILS THAT GUIDE U.S. PARTNERSHIPS



TRANSPARENCY AND TRUST

Be open, share information appropriately, and build lasting trust.



INTEROPERABILITY AND STANDARDS

Use compatible systems, standards, and data to work seamlessly together.



PEACEFUL USE AND BENEFIT

Support the peaceful uses of outer space for the benefit of humankind.



RESPONSIBLE BEHAVIOR

Act safely, avoid harmful interference, and comply with international law.



SECURITY AND EXPORT CONTROLS

Protect sensitive technologies and information through appropriate export controls and security practices.



INCLUSIVE COLLABORATION

Engage a diverse network of partners, including emerging space nations, industry, and academia.



ACCOUNTABILITY AND OVERSIGHT

Use clear processes, oversight, and metrics to ensure responsible stewardship.



WORKING TOGETHER
FOR A BETTER FUTURE

Through strong leadership, clear principles, and enduring partnerships, the U.S. helps build a safe, sustainable, and innovative space environment for today and generations to come.



HOW DOES THE U.S. GOVERNMENT PROVIDE SPACE DOMAIN AWARENESS?

UNDERSTANDING WHAT IS IN SPACE, WHAT IT IS DOING, AND WHETHER IT COULD POSE A THREAT TO U.S. INTERESTS

1) WHAT SPACE DOMAIN AWARENESS IS



Space Domain Awareness (SDA) is the continuous understanding of the space environment—objects, activities, and conditions—and how they could affect U.S., allied, and partner interests.

SSA vs. SDA: What's the Difference?



SPACE SITUATIONAL AWARENESS (SSA)

Answers: Where is it and what is it?
Focuses on detecting and tracking objects in space.



SPACE DOMAIN AWARENESS (SDA)

Answers: What is it doing and could it threaten us?
Adds context, behavior, intent, and threat assessment.

SDA IS ABOUT...

- ✓ Understanding capabilities and behaviors
- ✓ Detecting changes and anomalies
- ✓ Assessing intent and potential threats
- ✓ Informing decisions to protect and enable space operations

2) WHO DOES WHAT: THE U.S. SDA ENTERPRISE



U.S. SPACE FORCE

Organizes, trains, and equips forces to provide integrated SDA and enable space superiority.



COMBAT FORCES COMMAND (CSPC)

Responsible for generating, presenting, and integrating SDA products for global Space Force and joint forces.



MISSION DELTA 2 SDA

Develops SDA capabilities, sensors, software, analytics, and data services in partnership with industry and allies.



U.S. SPACE COMMAND (USSPACECOM)

Empowered to plan, direct, and integrate space operations to deter aggression and assure access to, from, and in space.



NATIONAL SPACE DEFENSE CENTER (NSDC)

Operations center for SDA—correlates data, produces assessments, and provides 24/7 space battle management.



SPACE SURVEILLANCE NETWORK (SSN)

Global U.S. government sensor network that detects, tracks, and monitors objects across all orbital regimes.



INTELLIGENCE COMMUNITY (IC)

Provides foreign intelligence, analysis, and assessments on space capabilities, intent, and activities.



COMMERCIAL DATA PROVIDERS

Supplies high-cadence tracking data, imagery, and analytics to expand coverage and increase resilience.



ALLIES & PARTNERS

Share sensor data, indicators, and expertise to improve domain awareness and collective security.

4) FROM DETECTION TO DECISION: THE SDA PROCESS



1 SENSORS

Global sensors collect data across all orbits and domains.



2 DETECTION

Systems detect objects or events and alert analysts.



3 TRACKING

Objects are tracked and orbits determined with high precision.



4 IDENTIFICATION

Objects are correlated and identified (type, owner, function).



5 CHARACTERIZATION

Capabilities, behavior, and changes in activity are characterized.



6 INTENT / THREAT ASSESSMENT

Analysts assess intent, motivations, and potential threats to U.S. interests.



7 OPERATIONAL DECISION

Leaders and operators use SDA insights to make timely, informed decisions and take action.



24/7 INTEGRATION AND SHARING

SDA is a continuous cycle. Information is shared across the enterprise, with allies, partners, and joint forces to enable coordinated responses.



Secure networks, advanced analytics, and artificial intelligence fuse data from multiple sources.



DATA INTEGRATION & SHARING LAYER

Information is shared across government, allies, and partners to build a more complete and resilient understanding of the space domain.



Cybersecurity and data integrity protect sensitive information and mission systems.



5) WHY SPACE DOMAIN AWARENESS MATTERS



DETER AGGRESSION

Understanding adversary capabilities and activities discourages hostile actions in space.



ASSURE ACCESS

Protects satellites and services that support national security, economic prosperity, and daily life.



ENHANCE RESILIENCE

Enables rapid detection of threats and degradation, strengthening the space architecture.



ENABLE OPERATIONS

Provides operators with the information needed to plan, execute, and sustain space missions.



BUILD PARTNERSHIPS

Collaborating with allies and industry expands coverage, sharing, and innovation.



PROTECT OUR WAY OF LIFE

SDA supports the safety and security of the nation and the freedoms we depend on.



SDA IS HOW WE SEE, UNDERSTAND, AND OUTPACE THREATS IN SPACE—EVERY DAY, AROUND THE GLOBE.

HOW DOES THE U.S. GOVERNMENT PROVIDE SECURE POSITIONING, NAVIGATION, AND TIMING WHEN GPS IS DISRUPTED?

DELIVERING RESILIENT PNT TO PROTECT THE NATION, ENABLE COMMERCE, AND SUPPORT EVERYDAY LIFE

1 WHAT PNT IS



PNT stands for **POSITIONING, NAVIGATION, & TIMING**. It provides precise location, movement, and time anywhere on or near Earth.



WHY GPS DISRUPTION MATTERS

Adversaries can jam, spoof, or interfere with GPS signals—disrupting safety, critical infrastructure, defense operations, and economic activity.

2 HOW GPS SUPPORTS MODERN LIFE



TRANSPORTATION
Aviation, maritime, rail, and road safety and efficiency



CRITICAL INFRASTRUCTURE
Power grids, telecom, pipelines, water, and finance



EMERGENCY SERVICES
911 response, location awareness, and coordination



FINANCIAL SYSTEMS
Transaction timing, trading, and fraud prevention



AGRICULTURE
Precision farming and equipment guidance



DEFENSE & INTELLIGENCE
Force positioning, munitions guidance, and situational awareness



TIMING REFERENCE
Synchronizes networks, sensors, and scientific measurements



EVERYDAY LIFE
Smartphones, mapping, wearables, and connected devices

THE NORMAL PNT CHAIN: HOW IT WORKS WHEN GPS IS AVAILABLE



SPACE SEGMENT
GPS satellites transmit precise signals from space.



CONTROL SEGMENT
Ground stations monitor and control satellites, maintain accuracy, and upload updates.



USER SEGMENT
Receivers use signals to determine position, navigate, and keep perfect time.



ESSENTIAL SERVICES
Safe travel, secure communications, reliable infrastructure, and economic activity.

THE RESILIENCE CHAIN: HOW WE STAY ON TIME AND ON TARGET WHEN GPS IS DISRUPTED



1 GPS DEGRADED

Jamming, spoofing, interference, cyberattack, or space segment disruption detected.



2 DETECT

Sensors, monitoring networks, and analytics detect anomalies and assess impact.



3 PROTECT

Mitigate and harden systems: anti-jam, authentication, encryption, and spectrum management.



4 SWITCH / AUGMENT

Switch to resilient alternatives or add complementary PNT sources to maintain accuracy and timing.



5 CONTINUE ESSENTIAL SERVICES

Operations continue safely and securely with resilient PNT enabling mission success and public services.

3 THREATS TO PNT



JAMMING

Overwhelms GPS signals with noise, blocking legitimate reception.



SPOOFING

Sends fake GPS signals to deceive receivers and change reported position.



INTERFERENCE

Unintentional or malicious signals that degrade GPS performance.



CYBERATTACK

Targets networks and systems that rely on or manage PNT services.



SPACE SEGMENT DISRUPTION

Anti-satellite threats, solar events, or satellite anomalies reduce availability.

4 RESILIENCE TOOLS: HOW WE DELIVER PNT WHEN GPS IS DISRUPTED



ANTI-JAM & HARDENED RECEIVERS

- Anti-jam antennas
- Adaptive beamforming
- Signal authentication
- Encrypted signals



ALTERNATIVE TIMING SOURCES

- Atomic clocks
- Chip-scale atomic clocks
- Optical time transfer
- Local timing networks



INERTIAL NAVIGATION SYSTEMS (INS)

- Self-contained navigation when signals are lost
- No external emissions
- Ideal for aircraft, ships, submarines, and missiles



TERRESTRIAL PNT BACKUPS

- eLORAN (terrestrial radio navigation)
- Timing over fiber
- Cell network timing
- Local positioning systems



COMPLEMENTARY PNT SOLUTIONS

- Multi-constellation GNSS (BDS, Galileo, GLONASS)
- Low Earth Orbit (LEO) PNT
- Commercial & emerging PNT services



LAYERED APPROACH = GREATER RESILIENCE

Diverse tools and sources reduce risk, improve accuracy, and ensure continuous PNT under all conditions.

5 WHO DELIVERS RESILIENT PNT



U.S. SPACE FORCE

Fields and operates the GPS constellation and protects PNT in space.



MISSION DELTA 31

Delivers integrated space operations and defends the space domain.



SPACE SYSTEMS COMMAND (SSC)

Acquires, develops, and sustains resilient PNT capabilities.



DEPARTMENT OF TRANSPORTATION (DOT)

Leads national PNT policy; advances resilient PNT for transportation.



DEPARTMENT OF HOMELAND SECURITY (DHS)

Protects critical infrastructure and supports PNT risk management.



NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

Provides official time (UTC), timing services, and PNT research.



FEDERAL AVIATION ADMINISTRATION (FAA)

Ensures safe and efficient aviation with resilient navigation and timing.



U.S. COAST GUARD

Enables safe maritime navigation and timing for critical missions.



DEPARTMENT OF DEFENSE (DoD)

Builds, hardens, and employs PNT for joint operations and readiness.

6 WHY IT MATTERS



NATIONAL SECURITY

Enables joint operations, deterrence, and mission success worldwide.



PUBLIC SAFETY

Supports first responders, search & rescue, and emergency alerts.



ECONOMIC STRENGTH

Protects commerce, supply chains, and financial markets.



INFRASTRUCTURE RESILIENCE

Keeps critical services running and communities connected.



TECHNOLOGICAL LEADERSHIP

Invests in innovation to stay ahead of evolving threats and needs.



TRUSTED TIME, EVERYWHERE

Accurate time underpins nearly every digital transaction and system.



OUR COMMITMENT

The U.S. Government—together with industry, academia, and international partners—delivers and advances resilient, trusted PNT to keep the nation safe, our economy strong, and our future on time.

HOW DOES THE U.S. GOVERNMENT COMMAND AND CONTROL SATELLITES?

A SECURE, GLOBAL SYSTEM THAT OPERATES SPACECRAFT, ENSURES MISSION SUCCESS, AND DELIVERS CRITICAL BENEFITS TO THE NATION AND THE WORLD.

1) WHAT SATELLITE COMMAND AND CONTROL IS



Satellite Command and Control (C2) is the end-to-end system of people, processes, networks, and ground infrastructure that operates spacecraft, monitors their health and status, and ensures they perform safely and reliably throughout their mission.

- ✓ **COMMAND & CONTROL (C2):** Operate and protect the satellite platform—attitude, power, propulsion, thermal, and configuration.
- ✓ **PAYLOAD OPERATIONS:** Manage the instruments and sensors to collect data or perform missions.
- ✓ **USER SERVICES:** Deliver data, products, and services to government agencies, partners, and the public.



C2 KEEPS THE SPACECRAFT ALIVE AND ON MISSION. PAYLOADS DO THE WORK. USERS GET THE BENEFITS.

2) MAIN COMPONENTS OF SATELLITE COMMAND AND CONTROL



OPERATIONS CENTER

Mission controllers plan, monitor, and command spacecraft 24/7. Includes

flight dynamics, systems engineers, mission planning, and anomaly teams.



GROUND STATIONS & ANTENNAS

Global network of antennas that send commands (uplink) and receive data

(downlink). Includes government-owned and commercial partner stations.



CONTROL NETWORK

Secure, resilient networks that connect operations centers, ground stations,

mission partners across the globe.



TELEMETRY & MONITORING

Continuous streams of spacecraft health and status data are collected, stored,

and visualized in real time.



AUTOMATION & SOFTWARE

Automated routines, fault protection, and enable rapid, precise operations.

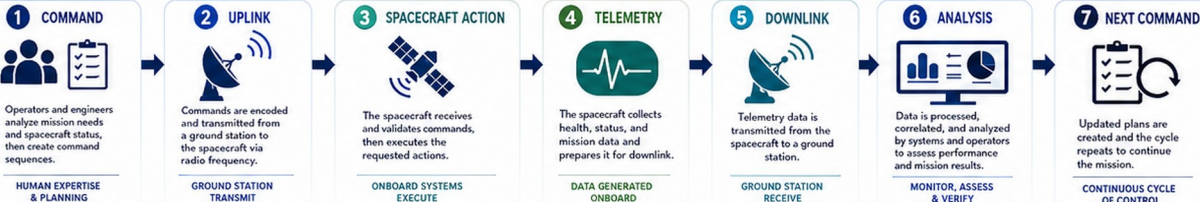
scripting, and planning tools reduce risk

SECURITY BY DESIGN: ENCRYPTED LINKS, AUTHENTICATION, AND ACCESS CONTROLS PROTECT EVERY COMMAND AND DATA FLOW.

3) WHO OPERATES WHAT

ORGANIZATION	PRIMARY RESPONSIBILITIES	EXAMPLES OF MISSIONS
 U.S. SPACE FORCE (USSF)	Military satellite C2 for Space Force-owned and operated systems. Provides resilient operations, space domain awareness integration, and mission assurance.	MILSATCOM, navigation, missile warning, GPS, space surveillance.
 MISSION DELTA 31 (USSF)	Delivers and operates resilient military space communications. Includes satellite C2 capabilities, ground architectures, and cross-domain support.	WGS, MILSATCOM, tactical SATCOM, data transport.
 NASA MISSION OPERATIONS	Operates NASA spacecraft and instruments for science, exploration, and human spaceflight. Uses NASA's Deep Space Network (DSN) and Near Space Network.	Hubble, JWST, Earth observing, planetary missions.
 NOAA SATELLITE OPERATIONS	Operates environmental satellites for weather, climate, oceans, and space weather. Uses NOAA's Satellite Operations Facility (NSOF).	GOES (weather), JPSS (polar), DSCOVR.
 NATIONAL RECONNAISSANCE OFFICE MISSION OPERATIONS	Operates national security reconnaissance satellites. Missions are classified.	Reconnaissance, surveillance, intelligence.
 GROUND NETWORKS (GOVERNMENT & PARTNERS)	Provide global ground station access, data relay, and tracking support for U.S. government satellite missions.	SCaN, NGA, commercial partners, allied access.

4) THE SATELLITE COMMAND CYCLE: FROM DECISION TO ACTION AND BACK



THIS CYCLE REPEATS 24/7 TO KEEP SATELLITES HEALTHY, SAFE, AND ON MISSION.



COMMAND AUTHENTICATION AND ENCRYPTION PROTECT EVERY STEP.



AUTOMATION AND SCRIPTS ENABLE SPEED, PRECISION, AND CONSISTENCY.



MULTIPLE GROUND STATIONS PROVIDE GLOBAL COVERAGE AND RESILIENCE.

5) RISKS AND RESILIENCE



CYBERSECURITY

Defense-in-depth security, continuous monitoring, and threat hunting protect systems and data.



REDUNDANCY & DIVERSITY

Multiple ground stations, networks, and critical components ensure operations even if a site or system is degraded.



AUTOMATION & FAULT PROTECTION

Onboard safing, autonomy, and automated responders reduce risk and enable recovery from anomalies.



CLOUD & DATA SERVICES

Secure cloud environments and data platforms scale analytics, storage, and collaboration across missions.



BACKUP GROUND STATIONS

Partner and commercial stations provide contingency access when primary sites are unavailable.



COMMAND AND CONTROL = MISSION ASSURANCE

People, processes, and technology working together to operate satellites safely, securely, and effectively for the benefit of the nation and the world.



COMMUNICATIONS



NATIONAL SECURITY



WEATHER & CLIMATE



NAVIGATION & TIMING



EARTH OBSERVATION



SPACE EXPLORATION

HOW DOES THE U.S. GOVERNMENT USE SPACE FOR INTELLIGENCE, SURVEILLANCE, AND RECONNAISSANCE?

SPACE-BASED CAPABILITIES DELIVER PERSISTENT AWARENESS TO INFORM DECISIONS AND PROTECT U.S. INTERESTS.

1) WHAT SPACE-BASED ISR IS

Space-based Intelligence, Surveillance, and Reconnaissance (ISR) uses satellites and related space systems to collect information about activities, intentions, and capabilities around the world.



- ✓ Global reach and persistence
- ✓ All-weather, day-and-night coverage
- ✓ Timely information for decision-makers
- ✓ Supports national security, defense operations, and crisis response

2) WHO DOES WHAT

SENSOR OPERATORS (COLLECT)

Design, build, launch, and operate space-based systems and sensors.



NATIONAL RECONNAISSANCE OFFICE (NRO)

Acquires, launches, and operates a diverse fleet of reconnaissance satellites.



U.S. SPACE FORCE ISR ELEMENTS

Organizes, trains, and equips Guardians to operate and defend ISR systems and supporting space capabilities.



COMMERCIAL IMAGERY & DATA PROVIDERS

Operate commercial satellites and provide imagery and data services to U.S. government customers.

ANALYSIS ORGANIZATIONS (EXPLOIT, ANALYZE, FUSE)

Process and analyze data, produce intelligence, and support decision-makers.



NATIONAL GEOSPATIAL-INTELLIGENCE AGENCY (NGA)

Leads in geospatial intelligence—produces maps, imagery analysis, and geospatial data.



NATIONAL SECURITY AGENCY (NSA)

Leads foreign signals intelligence (SIGINT) collection, processing, and analysis.



DEFENSE INTELLIGENCE AGENCY (DIA)

Provides all-source intelligence and supports military and national decision-making.



INTELLIGENCE COMMUNITY PARTNERS

Other agencies contribute specialized analysis and expertise.

USERS & DECISION-MAKERS



COMBATANT COMMANDS

Integrate intelligence into operations and planning.



U.S. GOVERNMENT LEADERS

Use intelligence to shape policy and strategy.



WARFIGHTERS

Receive timely information to accomplish missions and protect forces.

4) FROM SENSOR TO DECISION: THE ISR PROCESS

1 COLLECT



Sensors collect data from space across the electromagnetic spectrum.

2 DOWNLINK



Data is transmitted to ground stations via secure satellite links.

3 PROCESS



Data is received, validated, and processed into usable formats.

4 EXPLOIT



Specialized tools and techniques extract information from the data.

5 ANALYZE



Analysts examine data to identify patterns, objects, and activities.

6 FUSE



Multiple data sources are combined to build a complete picture.

7 DISTRIBUTE



Intelligence products are disseminated securely to authorized users.

8 DECISION



Decision-makers act on timely, relevant intelligence to achieve objectives.



SECURE NETWORKS, ENCRYPTION, AND ACCESS CONTROLS PROTECT DATA AND ENABLE TRUSTED SHARING ACROSS THE U.S. GOVERNMENT.



5) WHY IT MATTERS



SEE FIRST

Detect and monitor developments early around the world.



UNDERSTAND BETTER

Gain context on adversary capabilities, intentions, and activities.



ACT FASTER

Deliver timely intelligence to respond to crises and opportunities.



PROTECT FORCES

Support planning and operations to reduce risk to U.S. personnel.



INFORM STRATEGY

Provide leaders with the information needed to shape policy and strategy.



STRENGTHEN ALLIANCES

Share intelligence with partners to advance shared security and stability.



MAINTAIN ADVANTAGE

Sustain U.S. leadership through innovation, resilience, and teamwork.

HOW DOES THE U.S. GOVERNMENT DEFEND SATELLITES AGAINST JAMMING AND ELECTRONIC WARFARE?

PROTECTING SPACE SERVICES THROUGH DETECTION, RESILIENCE, AND PARTNERSHIP

1) WHAT ELECTRONIC WARFARE THREATS LOOK LIKE



COMMUNICATIONS JAMMING

Deliberate radio noise overwhelms satellite signals, preventing reliable communications.



GPS (PNT) JAMMING

Broadband noise drowns out GPS signals, degrading navigation and timing.



SPOOFING

False signals mimic legitimate satellites to mislead receivers about time, position, or data.



UPLINK INTERFERENCE

Disruption of signals sent from Earth to a satellite, preventing commands or data from getting through.



DOWNLINK INTERFERENCE

Interference on signals from satellite to Earth, blocking or degrading data delivery.



ELECTROMAGNETIC DECEPTION

Techniques that confuse, misdirect, or manipulate sensors and operators without overt jamming.

2) HOW INTERFERENCE AFFECTS SPACE SERVICES



SATELLITE COMMUNICATIONS



POSITIONING, NAVIGATION & TIMING (PNT)



EARTH OBSERVATION



MISSILE WARNING & DEFENSE SUPPORT



MILITARY & CIVIL MISSIONS

NORMAL SIGNAL ENVIRONMENT



- ✓ Reliable connectivity
- ✓ Accurate timing & navigation
- ✓ Timely data & decision advantage

JAMMED / SPOOFED ENVIRONMENT



- ✗ Loss of link or degraded throughput
- ✗ Position & timing errors
- ✗ Delayed or denied data
- ✗ Reduced mission effectiveness



Electronic warfare can be fleeting or persistent, local or global. U.S. forces are built to operate through it—and fight through it.

3) DEFENSIVE TOOLS AND TECHNOLOGIES



PROTECTED WAVEFORMS

Advanced signal designs that resist jamming and interference while maintaining performance.



ENCRYPTION & AUTHENTICATION

Protect data integrity and ensure only authorized users can access and control systems.



ANTI-JAM ANTENNAS

Adaptive, nulling, and multi-beam antennas that avoid, reject, or reduce interference.



FREQUENCY AGILITY

Rapidly shift frequencies and waveforms to avoid jammers and maintain connectivity.



GEOLOCATION OF INTERFERENCE

Detect, analyze, and locate interference sources to inform mitigation and attribute malicious activity.



REDUNDANCY & DIVERSITY

Use of multiple satellites, orbits, paths, and providers to ensure continuity of service.

4) THE DEFENSE CYCLE: CONTINUOUS PROTECT, DETECT, AND RESPOND

1 DETECT



- Monitor the spectrum and space domain
- Identify unusual activity or signal anomalies
- Leverage global sensors and partner data



2 IDENTIFY



- Determine the type of threat
- Assess intent and potential impact
- Correlate with intel and mission data



3 LOCATE



- Geolocate interference sources
- Map affected areas and assets
- Track adversary tactics and patterns



4 MITIGATE



- Apply defensive tools and procedures
- Re-route, re-task, or shift waveforms
- Coordinate with partners and allies

5 RESTORE



- Re-establish mission services
- Validate performance and security
- Learn, adapt, and strengthen resilience



THE CYCLE IS CONTINUOUS. WE ADAPT FASTER THAN THE THREAT.

KEY U.S. ORGANIZATIONS AND PARTNERS IN SPACE DEFENSE

U.S. SPACE FORCE



Organizes, trains, and equips Guardians to operate, defend, and win in space. Leads space warfighting doctrine and capabilities.

MISSION DELTA 3



Delivers combat-ready space capabilities. Leads space control, electromagnetic warfare, and assurance efforts.

U.S. SPACE COMMAND



Plans, integrates, and synchronizes joint space operations to ensure freedom of action and mission success.

PROTECTED SATCOM ORGANIZATIONS



Provide resilient military communications through protected satellites, terminals, and operations.

GPS / PNT ORGANIZATIONS



Deliver resilient positioning, navigation, and timing services and develop next-generation PNT capabilities.

INTELLIGENCE SUPPORT



Provide threat intelligence, attribution, and warning to anticipate and counter electronic warfare threats.

SPECTRUM MANAGEMENT



Manage and defend the electromagnetic spectrum to ensure access, deconfliction, and operational advantage.

5) WHY RESILIENCE MATTERS



Adversaries invest in electronic warfare—we invest in resilience.



Resilient architectures protect warfighters, allies, and partners.



Resilience ensures continuity of critical services for national security and the global economy.



Strength today, advantage tomorrow. We deter, we defend, we prevail.



PROTECTING SPACE. DEFENDING FREEDOM. ENABLING VICTORY.



RESILIENT SPACE CAPABILITIES POWER OUR NATION'S ADVANTAGE ON EARTH AND IN SPACE.



DETER AGGRESSION

Deny adversaries the ability to disrupt with impunity.



ASSURE ALLIES AND PARTNERS

Deliver trusted, resilient space services.



OPERATE GLOBALLY

Maintain freedom of action across domains.



WIN IN CONTESTED ENVIRONMENTS

Built to fight, built to endure, built to win.



SPACE IS A WARFIGHTING DOMAIN

We defend it so the joint force can succeed.

HOW DOES THE U.S. GOVERNMENT BUILD RESILIENT SATELLITE CONSTELLATIONS?

PROLIFERATE. DISAGGREGATE. DIVERSIFY. SECURE. RESPOND. ASSURING PERSISTENT SPACE CAPABILITIES FOR AMERICA AND OUR ALLIES.

1) WHY RESILIENCE MATTERS



DETER THREATS & ASSURE DENIAL

Resilient constellations complicate adversary targeting and ensure mission continuity.



PERSISTENT COVERAGE

Maintain global awareness, communications, and data even under attack or in contested environments.



RAPID RECOVERY

Loss of individual satellites does not degrade the overall mission.



ALLIANCE & PARTNER ASSURANCE

Reliable space services strengthen combined operations and shared security.



TECHNOLOGY & INDUSTRY ADVANTAGE

Leverage commercial innovation and production at scale to outpace threats.

2) TRADITIONAL VS. DISTRIBUTED ARCHITECTURES

TRADITIONAL (VULNERABLE)

FEW LARGE SATELLITES



- ✗ Few high-value assets
- ✗ Concentrated capabilities
- ✗ Single points of failure
- ✗ Long build & replacement times
- ✗ Limited orbits and links
- ✗ Higher risk of mission loss

VS.

RESILIENT DISTRIBUTED (SURVIVABLE)

MANY SMALLER NODES



- ✓ Many low-cost satellites
- ✓ Disaggregated capabilities
- ✓ No single point of failure
- ✓ Rapid build & replacement
- ✓ Multiple orbits & inter-satellite links
- ✓ Graceful degradation, mission assured

3) BUILDING BLOCKS OF RESILIENCE



PROLIFERATION

Large numbers of satellites make targeting costly and ineffective.



DISAGGREGATION

Distribute mission functions across many satellites and ground systems.



REDUNDANCY

Overlap coverage, links, and capabilities to ensure continuity.



MULTIPLE ORBITS

Use LEO, MEO, GEO and inclined orbits for coverage and diversity.



CROSSLINKS

Inter-satellite links route data around threats and reduce reliance on ground paths.



RAPID REPLACEMENT

On-orbit spares and responsive launch replenish constellations in days—not years.



HOSTED PAYLOADS

Third-party payloads add capability and increase mission flexibility.



COMMERCIAL AUGMENTATION

Partner services and data expand coverage, capacity, and innovation.

4) HOW A RESILIENT CONSTELLATION WORKS

1

SENSE & COLLECT



Distributed sensors collect data worldwide across multiple orbits.

2

ROUTE & CONNECT



Crosslinks and multiple paths move data securely through the mesh.

3

PROCESS & DISSEMINATE



Edge and cloud processing fuses and delivers data to users and partners.

4

MAINTAIN & ADAPT



Health monitoring, autonomous re-routing, and on-orbit spares preserve the mission.

5

REPLENISH & GROW



Rapid launches restore losses and add capacity, keeping the constellation ahead of threats.



DESIGNED FOR GRACEFUL DEGRADATION: Even if satellites, links, or ground sites are lost, the mission continues.

HIGH-LEVEL U.S. ORGANIZATIONS & PARTNERS



U.S. SPACE FORCE

Sets doctrine, requirements, and operational concepts.



SPACE SYSTEMS COMMAND (SSC)

Acquires and fields resilient space systems and services.



SPACE DEVELOPMENT AGENCY (SDA)

Builds proliferated transport and tracking layers (e.g., Tranche 0, Transport Layer).



MISSILE DEFENSE AGENCY (MDA)

Leverages resilient space sensors and tracking to defend the Homeland and deployed forces.



NATIONAL RECONNAISSANCE OFFICE (NRO)

Delivers resilient, assured intelligence capabilities from space.



COMMERCIAL & ALLIED PARTNERS

Provide launch, satellites, ground systems, data, and innovation at scale.

5) KEY TAKEAWAYS



RESILIENCE BY DESIGN

Plan for threat environments. Assume satellites, links, and sites can be lost.



PROLIFERATION + DISAGGREGATION

More satellites with simpler functions reduce risk and increase survivability.



DIVERSE ORBITS & LINKS

Combine LEO, MEO, GEO, crosslinks, and multiple ground paths for assured connectivity.



SPEED IS A WEAPON

Build fast, launch often, replace quickly, and iterate continuously.



SECURE BY DEFAULT

Harden satellites, links, and ground systems with zero-trust and continuous monitoring.



STRONG PARTNERSHIPS

Integrate U.S. government, commercial industry, and allies to outpace adversaries together.

★★★★
**RESILIENT CONSTELLATIONS
DELIVER ASSURED ADVANTAGE—
TODAY AND TOMORROW.**
★★★★



A RESILIENT SATELLITE CONSTELLATION ENSURES PERSISTENT, PROTECTED SPACE CAPABILITIES FOR THE JOINT FORCE, ALLIES, AND THE AMERICAN PEOPLE.

HOW DOES THE U.S. GOVERNMENT RAPIDLY RECONSTITUTE LOST SPACE CAPABILITY?

RESTORE CRITICAL SPACE SERVICES FAST THROUGH ASSESSMENT, REALLOCATION, PARTNERSHIPS, AND RAPID REPLACEMENT.

1) WHAT RECONSTITUTION IS



Reconstitution is the rapid restoration of a lost space-based capability—or the service it provides—so missions can continue and national objectives are protected.

- ✓ Restore essential services quickly
- ✓ Adapt with available or alternative means
- ✓ Strengthen and harden for the future

2) TYPES OF LOSS

KINETIC ATTACK



Enemy weapons physically destroy or damage space assets.

TECHNICAL FAILURE



Hardware or system failure renders an asset inoperable.

CYBER ATTACK



Malicious cyber activity disrupts or disables space systems.

JAMMING / INTERFERENCE



Adversary jamming or interference degrades or denies service.

SPACE DEBRIS



Collisions or debris impacts damage or destroy assets.

3) IMMEDIATE RESPONSE OPTIONS (RESTORE SERVICE NOW)



REALLOCATE EXISTING CAPACITY

Shift healthy satellites, adjust orbits, re-task assets, and prioritize critical users.



USE COMMERCIAL / ALLIED SERVICES

Leverage commercial constellations, hosted payloads, and allied capabilities to fill service gaps.



DEGRADED MODE OPERATIONS

Operate with reduced performance or alternate methods while higher-capacity options are fielded.



INTEGRATE ACROSS DOMAINS

Combine space, air, terrestrial, and cyber capabilities for mission continuity.

RAPID RECONSTITUTION RESPONSE SEQUENCE

1

CAPABILITY LOSS



Detect and confirm loss of satellite, service, or mission capability.

2

ASSESS IMPACT



Evaluate mission impact, users affected, and time sensitivity.

3

REALLOCATE EXISTING CAPACITY



Re-task, re-point, or re-configure available assets to restore service.

4

USE COMMERCIAL / ALLIED SERVICES



Activate commercial or allied solutions to bridge gaps quickly.

5

DEPLOY REPLACEMENT



Launch and field spare or new assets through the fastest available pathway.

6

RESTORE / IMPROVE ARCHITECTURE



Restore full capability, rebalance the architecture, and harden for the future.

WHO LEADS & SUPPORTS RAPID RECONSTITUTION



U.S. SPACE FORCE
Owns space warfighting capabilities, assesses needs, prioritizes missions, and directs response.



SPACE SYSTEMS COMMAND (SSC)
Acquires, fields, and sustains space systems and spares; executes rapid procurement and integration.



COMBAT FORCES COMMAND (CFFC)
Provides mission requirements, sets priorities, and integrates space into operations.



U.S. SPACE COMMAND (USSPACECOM)
Synchronizes global response, deconflicts efforts, and integrates with allied and partner nations.



SPACE DEVELOPMENT AGENCY (SDA)
Delivers proliferated architectures and tranche growth to provide resilient, rapid replacement.



DEFENSE INNOVATION UNIT (DIU)
Accelerates adoption of commercial technology and new solutions for rapid fielding.



SPACEWERX
Bridges industry solutions to operational needs through prototypes and partnerships.



COMMERCIAL LAUNCH & SERVICE PROVIDERS | Supply launch, hosted payloads, in-space services, data services, and resilient communication and navigation alternatives.



ALLIED & PARTNER NATIONS | Share data, services, and infrastructures for mutual support and rapid recovery.

4) RAPID REPLACEMENT PATHWAYS

USE AVAILABLE SPARES



- On-orbit spares or standby assets
- Pre-integrated and tested
- Fast re-tasking and commissioning

RIDE EXISTING LAUNCH



- Leverage scheduled launch launches
- Hosted payloads or secondary payloads
- Weeks to months

RESPONSIVE LAUNCH



- Dedicated small or medium launches
- Tactical timelines (days to weeks)
- High-priority payloads

PROLIFERATED ARCHITECTURES



- Large constellations with many nodes
- Incremental replacement
- Resilient and adaptive by design

KEY ENABLERS



Pre-planned options and playbooks



Standardized interfaces and modular payloads



Real-time data and decision tools



Secure and resilient communications



Trained teams and regular exercises

5) WHY IT MATTERS



PRESERVES MISSION ASSURANCE
Keeps essential services available to warfighters, leaders, and the nation.



REDUCES DOWNTIME
Rapid actions limit loss of service and operational impact.



DETERS ADVERSARIES
Resilient, adaptive capabilities complicate enemy planning.



LEVERAGES INVESTMENTS
Uses existing assets, commercial markets, and allied partnerships.



BUILDS A STRONGER ARCHITECTURE
Continuous improvement creates a more resilient and survivable space force.



PROTECTS NATIONAL SECURITY
Ensures the U.S. can fight, win, and achieve objectives in any domain.



DELIVERS STRATEGIC ADVANTAGE
Dominates in space to enable decisive advantages on Earth and beyond.

HOW DOES THE U.S. GOVERNMENT USE COMMERCIAL SATELLITE DATA?

COMMERCIAL DATA. MISSION IMPACT. PUBLIC SERVICE.

1) WHY GOVERNMENT BUYS COMMERCIAL DATA



FILL CRITICAL GAPS

Augment government satellites and provide coverage, revisit, and capability where needed.



TIMELINESS & RESPONSIVENESS

Rapid collection and delivery for time-critical decisions.



COST EFFECTIVE & SCALABLE

Leverage commercial innovation and avoid costs of building everything in-house.



RESILIENCE & REDUNDANCY

Diverse sources increase reliability and reduce single points of failure.



FOCUS ON CORE MISSIONS

Buy what's best from industry; focus government resources on unique needs.

2) WHO USES IT



NSA
National Geospatial-Intelligence Agency
Geospatial intelligence, mapping, and analytics for national security and missions.



NRO
National Reconnaissance Office
Satellite imagery and signals intelligence for national security.



DoD
Department of Defense
Joint operations, targeting, intelligence, maritime awareness, and logistics.



U.S. SPACE FORCE
Space domain awareness, tracking, and assurance of space systems.



NOAA
National Oceanic and Atmospheric Administration
Weather forecasting, environmental monitoring, and disaster support.



NASA
National Aeronautics and Space Administration
Earth science, climate research, and mission planning.



FEMA
Federal Emergency Management Agency
Disaster response, damage assessment, and recovery support.



USDA
U.S. Department of Agriculture
Crop monitoring, food security, forestry, and resource management.



DOI
Department of the Interior
Land and water management, natural resources, and conservation.



USGS
U.S. Geological Survey
Hazards monitoring, mapping, and science for decision support.

3) WHAT TYPES OF DATA ARE BOUGHT



OPTICAL IMAGERY

High-resolution visible/infrared images of Earth, day and night.



SAR (SYNTHETIC APERTURE RADAR)

All-weather, day/night imaging; detects surface structure and change.



RF GEOLOCATION & DETECTION

Locate and characterize radio frequency emissions and transmitters.



WEATHER & ATMOSPHERIC DATA

Global forecasts, storm tracking, and atmospheric composition.



SPACE SITUATIONAL DATA

Track objects and events in space; conjunction alerts and debris data.



MARITIME DOMAIN AWARENESS

Ship detection, tracking, and behavior for security and commerce.



MAPPING & ELEVATION DATA

Baseline maps, terrain, bathymetry, and 3D elevation.



ANALYTICS & INSIGHTS

Change detection, time series, machine learning, and decision-ready products.

4) HOW PROCUREMENT WORKS



SUBSCRIPTIONS

Ongoing access to data streams, products, and updates.



DATA LICENSES

License to use specific datasets or archives for defined purposes.



TASKING & COLLECTION ON DEMAND

Government requests specific collection targets and timing.



API ACCESS

Programmatic, machine-to-machine access to data and services.



DATA-AS-A-SERVICE (DAAS)

Scaleable access to data with storage, compute, and tools.



ANALYTICS-AS-A-SERVICE (AaaS)

Access to advanced analytics, AI/ML models, and expert tools.



Procurements follow FAR and agency policies, using vehicles such as IDIQ contracts, BPAs, and GWACs (e.g., SEWP, NASA SEWP, NRO Lunar, etc.) and competitive task orders.

5) BENEFITS AND LIMITS

KEY BENEFITS

- ✓ Broader coverage and higher revisit
- ✓ Faster delivery for time-sensitive needs
- ✓ Access to commercial innovation
- ✓ Cost savings and flexible scaling
- ✓ Stronger decision quality and awareness

KEY LIMITS & CONSIDERATIONS

- ⚠ Weather, cloud cover, and illumination limits
- ⚠ Variable quality and data continuity
- ⚠ Data security and foreign ownership risks
- ⚠ Policy, classification, and export controls
- ⚠ Dependence management and resiliency

Government validates, secures, and integrates commercial data to meet mission and security requirements.

THE COMMERCIAL SATELLITE DATA VALUE CHAIN

1 COMMERCIAL SATELLITE



Constellations and taskable satellites collect data in space across multiple spectrums and domains.

2 DATA PROVIDER



Receives, downlinks, calibrates, and manages data. Applies quality control and packages products and services.

3 GOVERNMENT PROCUREMENT



Agencies identify needs, select procurement model, and acquire data/services under contract vehicles and policies.

4 PROCESSING / ANALYSIS



Data is ingested, fused, analyzed, and converted into actionable intelligence or decision-ready products.

5 FEDERAL USER



Authorized government users access products and insights through secure systems and workflows.

6 MISSION / PUBLIC SERVICE



Data enables missions and improves outcomes—from national security to public safety and stewardship.

CROSS-CUTTING ENABLERS



SECURITY & COMPLIANCE

Ensuring data integrity, cybersecurity, and compliance with laws and policies.



INTEROPERABILITY

Standards and open architectures enable seamless integration.



DATA GOVERNANCE

Quality, provenance, lineage, and responsible use of data.



PARTNERSHIPS

Strong government-industry collaboration drives capability and mission success.



SUSTAINABILITY

Resilient architectures and diverse sources ensure long-term access.



FOUNDATIONAL PRINCIPLES

- LAWFUL AND ETHICAL USE
- PROTECT SENSITIVE INFORMATION
- ADVANCE NATIONAL INTERESTS
- DELIVER PUBLIC VALUE

HOW DOES THE U.S. GOVERNMENT MANAGE ORBITAL DEBRIS?

COORDINATING POLICY, OPERATIONS, AND PARTNERSHIPS TO KEEP SPACE SAFE AND SUSTAINABLE

1) WHAT ORBITAL DEBRIS IS

Orbital debris (space junk) includes human-made objects in orbit that are no longer functional.



RANGE IN SIZE

From tiny paint flecks to inactive satellites and rocket bodies.



TRAVEL AT HIGH SPEEDS

Orbital debris can travel up to ~17,500 mph (28,000 km/h), making even small particles dangerous.



THREATENS SPACE ASSETS

Can damage satellites, spacecraft, and the International Space Station, and create more debris.

COMMON SOURCES



ROCKET STAGES

Upper stages left in orbit after launch.



DEFUNCT SPACECRAFT

Satellites no longer in operation.



FRAGMENTATION EVENTS

Explosions, collisions, and anti-satellite tests.



MISSION-RELATED OBJECTS

Dropped tools, lens caps, bolts, and other hardware.



DEBRIS CAN REMAIN IN ORBIT FOR YEARS OR DECADES.

2) WHO DOES WHAT



NASA

Conducts research, develops tools and standards, and partners on debris measurement, tracking technology, and mitigation solutions.



U.S. SPACE FORCE

Operates the Space Surveillance Network, catalogs objects, provides conjunction data, and warns of potential collisions (18th Space Control Squadron).



U.S. SPACE COMMAND

Integrates space domain awareness, assesses threats, and coordinates with allies and partners to promote safety and stability in space.



DEPARTMENT OF COMMERCE

Provides civil space policy leadership and stewardship of space situational awareness (SSA) data and services through the Office of Space Commerce.



OFFICE OF SPACE COMMERCE

Leads U.S. civil space SSA, operates the public data portal and services, and convenes industry, government, and international partners.



FEDERAL AVIATION ADMINISTRATION (FAA)

Licenses commercial space launches and reentries, ensures public safety, and enforces debris mitigation requirements for launch and reentry operations.



FEDERAL COMMUNICATIONS COMMISSION (FCC)

Authorizes satellite communications systems and requires debris mitigation compliance as a condition of licensing.



SATELLITE OPERATORS & OWNERS

Design, operate, and responsibly dispose of spacecraft, share data, and follow mitigation standards to reduce the creation of new debris.



INTERNATIONAL PARTNERS

Share data, coordinate standards, and collaborate through forums like the UN Committee on the Peaceful Uses of Outer Space (COPUOS) to address debris.

3) HOW RISK IS MANAGED

1 DETECT & TRACK



Space Surveillance Network radars and optical telescopes track more than 54,000 cataloged objects ≥ 10 cm.

2 CONJUNCTION ASSESSMENT



Potential close approaches are identified using orbital data and models.

3 COLLISION RISK ESTIMATION



Probability of collision is calculated based on uncertainty, object size, and miss distance.

● LOW ● MODERATE ● HIGH

4 WARN & NOTIFY



U.S. Space Force provides conjunction data and alerts to operators and other government partners.

5 OPERATOR RESPONSE



Operators assess the alert and may maneuver or adjust operations to reduce risk.

6 POST-EVENT ANALYSIS



Events and near-misses are analyzed to improve models, processes, and space safety.



Data from U.S. and commercial sensors are combined.



Shared with government agencies, operators, and international partners.



Public SSA data is available through the Office of Space Commerce Data Portal.



Global sharing improves prediction, reduces risk, and builds trust.

WHEN DEBRIS IS CREATED



FRAGMENTATION EVENTS

Explosions, collisions, or breakups create thousands of new pieces.



COLLISIONS

Accidental impacts can destroy spacecraft and generate new debris clouds.



ON-ORBIT WEAR & RELEASES

Normal operations can release debris (e.g., covers, bolts, or small parts).

4) LIFECYCLE PRACTICES: REDUCING DEBRIS AT EVERY STAGE

1 DESIGN



- Follow standards and guidelines (e.g., NASA, Inter-Agency Space Debris Coordination Committee).
- Plan for safe operations and disposal.

2 LAUNCH



- Reduce release of debris during launch.
- Track and account for all mission-related objects.

3 OPERATE



- Monitor for conjunctions.
- Maintain control and maneuver when needed.
- Avoid intentional breakups and releases.

4 MANEUVER



- Conduct collision avoidance maneuvers when risk is high.
- Minimize fuel use and fragmentation risk.

5 END-OF-LIFE



- Prepare spacecraft for disposal.
- Passivate: remove stored energy (batteries, fuel, pressure).

6 DISPOSAL



- Dispose in a compliant orbit:
 - LEO: reenter within 25 years.
 - GEO: move to graveyard orbit.



Responsible actions by operators—supported by clear rules and accurate data—prevent new debris and protect the space environment.

5) WHY SUSTAINABILITY MATTERS



SAFE OPERATIONS

Reduces risk to satellites, astronauts, and future missions.



ECONOMIC BENEFITS

Protects critical services like communications, GPS, Earth observations, and weather.



ACCESS FOR FUTURE GENERATIONS

Preserves orbits and spectrum so future innovators can thrive.



U.S. LEADERSHIP

Promotes responsible behavior, stability, and trust in space.



THE U.S. GOVERNMENT WORKS WITH INDUSTRY, ALLIES, AND THE INTERNATIONAL COMMUNITY TO ENSURE SPACE REMAINS SAFE, SECURE, AND SUSTAINABLE FOR ALL.



HOW DOES THE U.S. GOVERNMENT PREPARE FOR HUMAN MISSIONS TO THE MOON AND MARS?

A COORDINATED, SUSTAINABLE APPROACH TO EXPLORE, LEARN, AND BENEFIT HUMANKIND

1) WHAT THE GOAL IS



EXPLORE FARTHER

Send astronauts to the Moon, then prepare for human missions to Mars.



LEARN MORE

Advance science and discovery about the Moon, Mars, and our universe.



PREPARE FOR THE FUTURE

Develop technologies, test systems, and build experience for safe, long-duration missions.



BENEFIT HUMANITY

Drive innovation, create jobs, inspire the next generation, and strengthen national leadership.

2) WHO SUPPORTS THE ARCHITECTURE



NASA
Leads exploration architecture, mission development, and human spaceflight.



U.S. SPACE FORCE
Provides space domain awareness, launch support, satellite operations, and space control for missions.



U.S. DEPARTMENT OF ENERGY
Develops and provides advanced power systems, nuclear technology, and radiation research.



NOAA
Provides space weather monitoring, Earth and lunar environment data, and communication support.



FEDERAL AVIATION ADMINISTRATION
Licenses and regulates commercial launches and reentries to ensure safety.



NATIONAL SCIENCE FOUNDATION
Supports fundamental research, instruments, and discovery that enable exploration.



U.S. DEPARTMENT OF STATE
Leads international partnerships, agreements, and diplomacy to promote peaceful exploration.



COMMERCIAL PARTNERS
Industry, universities, and startups innovate, build systems, provide services, and expand capabilities.

3) MAIN BUILDING BLOCKS OF HUMAN EXPLORATION

LAUNCH SYSTEMS



Powerful, reliable rockets and spacecrafts safely deliver crews and cargo to space.

SPACECRAFT



Crew vehicles and cargo transports move people and supplies beyond Earth.

HABITATS



Pressurized modules provide living and working space for crews on the Moon and in transit.

SURFACE SYSTEMS



Rovers, landers, tools, and robotics enable exploration, mobility, and sample return.

COMMUNICATIONS



High-data-rate links connect crews, systems, and mission control across vast distances.

NAVIGATION & TIMING



Precise navigation, positioning, and timing ensure safe operations from Earth to Mars.

POWER SYSTEMS



Solar arrays, batteries, and advanced nuclear power provide reliable, resilient energy.

LIFE SUPPORT



Environmental control, air, water, food, and waste systems keep crews healthy and missions going.

SCIENCE & PAYLOADS



Instruments and experiments reveal new knowledge and support mission objectives.

SPACE WEATHER



Monitoring and forecasting protect crews, systems, and communications from space weather.

4) THE EXPLORATION ARCHITECTURE: STEP BY STEP

1

EARTH



Research, design, test, and train. Build systems and plan missions.

2

LAUNCH



Launch crew and cargo using powerful rockets from U.S. spacecrafts.

3

CISLUNAR TRANSIT



Travel beyond Earth in transit to the Moon's orbit.

4

LUNAR ORBIT



Operate in lunar orbit, verify systems, and prepare for landing.

5

LUNAR SURFACE



Land astronauts, explore, conduct science, and use lunar resources.

6

LONG-DURATION OPERATIONS



Sustain crews, expand capabilities, and build a long-term presence.

7

MARS PREPARATION



Use lunar experience to develop and test technologies for human missions to Mars.

5) FROM THE MOON TO MARS



PROVING GROUND
The Moon is our testbed for living and working in a challenging environment.



TECHNOLOGY MATURATION
Test power, life support, habitats, robotics, and autonomy for Mars.



CREW EXPERIENCE
Build skills and operational experience for deep space and long-duration missions.



BUILDING BLOCKS
Develop and assemble systems needed for Mars missions.



HUMANITY'S NEXT GIANT STEP
Enable safe, sustainable human exploration of Mars and beyond.



NATIONAL LEADERSHIP
Strengthens U.S. leadership in space, science, and technology.



ECONOMIC GROWTH
Drives innovation, creates high-quality jobs, and grows the economy.



INSPIRING GENERATIONS
Inspires students and builds a diverse future workforce.



GLOBAL COLLABORATION
Works with allies and partners to achieve peaceful and sustainable exploration.



BENEFITS ON EARTH
Space advances lead to new solutions for life on Earth.

6) WHY IT MATTERS

★ BOLDLY EXPLORING. RESPONSIBLY LEADING. TOGETHER FOR THE FUTURE. ★

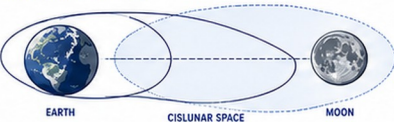
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HOW IS THE U.S. GOVERNMENT BUILDING A CISLUNAR SPACE INFRASTRUCTURE?

A SECURE, INTEROPERABLE, AND SUSTAINABLE NETWORK OF CAPABILITIES THAT CONNECTS EARTH AND THE MOON TO ENABLE EXPLORATION, SCIENCE, AND ECONOMIC GROWTH.

1. WHAT IS CISLUNAR SPACE?

Cislunar space is the region around Earth and the Moon where the U.S. is building the infrastructure that enables sustained operations, exploration, and innovation.



- INCLUDES:** Low Earth Orbit (LEO), Geostationary Orbit (GEO), cislunar space, lunar orbit, and the lunar surface.
- PURPOSE:** Provide communications, navigation, power, logistics, situational awareness, and services across the Earth–Moon system.
- FOCUS:** Resilient, secure, interoperable, and extensible infrastructure that supports government, commercial, and international partners.

2. CORE INFRASTRUCTURE LAYERS



LAUNCH & TRANSPORTATION
U.S. and commercial launch systems and in-space transportation deliver crew, cargo, and hardware.



COMMUNICATIONS & NETWORKS
End-to-end links using Earth assets, lunar relays, and surface networks for voice, data, and video.



NAVIGATION & TIMING
Positioning, navigation, and timing services from Earth and lunar sources for precise operations.



SPACE DOMAIN AWARENESS
Detect, track, identify, and predict objects and events in the cislunar environment to ensure safety and security.



POWER & ENERGY
High-power systems, solar arrays, storage, and surface power—including lunar fission concepts—to enable sustained missions.



LOGISTICS & SUPPLY CHAIN
Sustained delivery of cargo, propellant, spares, and supplies to support exploration and a future cislunar economy.



EXPLORATION INFRASTRUCTURE
Sustainable lunar orbit and surface systems, habitats, landing sites, mobility, and science instruments to support Artemis.



DATA & SERVICES PLATFORM
Open standards and interoperable services that enable data sharing, mission operations, and partner integration.



SECURITY & CYBER
Protect systems, data, and communications across the cislunar architecture from cyber and physical threats.



GOVERNANCE & POLICY
Policies, standards, spectrum access, traffic coordination, and norms that enable safe, responsible operations.

3. WHO DOES WHAT



NASA

Leads Artemis and exploration systems; builds lunar missions, space communications, navigation, lunar infrastructure, and the Gateway in lunar orbit.



U.S. SPACE FORCE

Monitors and defends the cislunar domain; operates space surveillance; provides resilient MILSATCOM and protected positioning, navigation, and timing.



DEPARTMENT OF ENERGY

Develops advanced power systems, including lunar surface fission concepts; funds technology to enable long-duration energy solutions.



FAA

Licenses commercial launches and reentries; advances safety standards for emerging launch and reentry operations.



FCC

Manages spectrum policy and authorizations to ensure reliable communications and minimal interference.



OFFICE OF SPACE COMMERCE

Promotes a pro-innovation environment; facilitates commercial space activities and responsible use of cislunar resources.



DEPARTMENT OF STATE

Advances international partnerships and norms; supports diplomacy, agreements, and capacity building.



COMMERCIAL & ALLIED PARTNERS

Provide launch, landers, habitats, rovers, communications, data services, logistics, and innovative technologies.

4. THE ARCHITECTURE CHAIN: FROM EARTH TO THE LUNAR SURFACE

1

EARTH



Launch sites, mission control, and ground stations send assets and commands.

2

GEOSTATIONARY ORBIT (GEO)



Communications, weather, and data relay to and from Earth and cislunar assets.

3

CISLUNAR SPACE



Deep Space Network (DSN) and Space Communications and Navigation (SCaN) provide tracking, telemetry, and command.

4

LUNAR ORBIT



Gateway and lunar relay satellites extend coverage, store data, and support crewed and robotic operations.

5

LUNAR SURFACE



Surface systems communicate, navigate, generate power, and conduct science and resource activities.

CROSS-CUTTING ENABLERS ACTIVE ACROSS THE ENTIRE ARCHITECTURE



Space Domain Awareness
Protects assets and people with continuous monitoring and alerts.



Secure Communications
Resilient links and encryption ensure safe command and data exchange.



Navigation & Timing
Accurate PNT enables precise rendezvous, landing, and surface operations.



Interoperability
Open standards connect government, commercial, and allied systems.



Traffic Coordination
Deconfliction and shared situational awareness promote safe operations.

5. WHY IT MATTERS



ENABLES EXPLORATION

Supports Artemis goals and long-term human exploration of the Moon and beyond.



DRIVES SECURITY & STABILITY

Strengthens U.S. leadership, deters threats, and ensures safe operations.



POWERS INNOVATION & ECONOMIC GROWTH

Creates new markets, jobs, and technologies with commercial and international partners.



ADVANCES SCIENCE

Enables discoveries about the Moon, Earth, and the universe.



BENEFITS LIFE ON EARTH

Improves communications, navigation, disaster response, and energy solutions.



BUILDING TODAY. SUSTAINING TOMORROW. The U.S. government is investing in a resilient cislunar infrastructure—built with partners and industry—to ensure safe, sustainable access to the Moon and to unlock opportunities for generations to come.



STRONG PARTNERSHIPS



RESPONSIBLE STEWARDSHIP



OPEN & INTEROPERABLE BY DESIGN



FOR THE BENEFIT OF ALL

HOW DOES THE U.S. GOVERNMENT GOVERN ACTIVITIES ON AND AROUND THE MOON?

A FOUNDATIONAL TREATY, MULTIPLE DOMESTIC AUTHORITIES, AND INTERNATIONAL COOPERATION ENSURE SAFE, RESPONSIBLE, AND SUSTAINABLE LUNAR ACTIVITIES.

1. THE LEGAL & POLICY FRAMEWORK



OUTER SPACE TREATY (1967) Foundational International Law

The cornerstone of space law. It establishes that outer space, including the Moon, is the province of all humankind; prohibits national appropriation; and requires peaceful use and due regard for others.



ARTEMIS ACCORDS (2020+) Non-Binding Principles

A voluntary set of principles for cooperation in the civil exploration and use of the Moon, Mars, comets, and asteroids. They complement the Outer Space Treaty—not a replacement.



U.S. SPACE POLICY DIRECTIVE-1 Policy Leadership

Directs the U.S. to lead a safe, sustainable, and transparent approach, encourages commercial involvement and international partnerships, and advances U.S. interests in space.



NOT A SINGLE REGULATOR Whole-of-Government Approach

The U.S. does not have a single "Moon regulator." Instead, multiple agencies and offices share responsibilities tailored to their missions and authorities.

INTERNATIONAL LAW U.S. POLICIES & PRINCIPLES DOMESTIC AUTHORITIES COOPERATIVE PRINCIPLES

2. WHO GOVERNS WHAT? A SHARED-AUTHORITY MODEL



DEPARTMENT OF STATE Diplomacy & Treaty Leadership

Leads U.S. relations on space, negotiates agreements, and represents the U.S. in international forums.



NASA Exploration & Science

Leads civilian space exploration, missions to the Moon, and research. Shares data, standards, and best practices.



WHITE HOUSE Policy & Coordination

Sets national space policy and priorities. Coordinates interagency actions through bodies such as the National Space Council.



CONGRESS Laws & Oversight

Enacts laws and appropriations, oversees agencies, and affirms U.S. authorities in space law and policy.



U.S. COMMERCIAL STAKEHOLDERS Industry & Innovation

Companies, universities, and researchers conduct missions and operations under U.S. law and agency authorizations and licenses.

KEY TAKEAWAY

Each authority covers a piece of the end-to-end lunar activity lifecycle—from launch to landing, operations, communications, safety, and returning data and samples.

5. KEY GOVERNANCE ISSUES ON & AROUND THE MOON



SAFETY & DECONFLICTION

Agencies promote space situational awareness, share information, and encourage best practices to reduce collision and interference risks.



LUNAR RESOURCE ACTIVITIES

The U.S. recognizes the right of U.S. citizens to engage in commercial recovery and use of space resources consistent with the Outer Space Treaty and U.S. law.



PLANETARY PROTECTION & HERITAGE

Agencies require compliance with planetary protection standards and encourage the protection of scientifically and culturally significant sites.



INTEROPERABILITY & STANDARDS

The U.S. promotes open standards and compatibility to enable safe operations and effective international cooperation.



ENVIRONMENTAL SUSTAINABILITY

Encouraging responsible practices that minimize lunar surface impacts and orbital debris.



SECURITY & INTELLIGENCE

Protecting U.S. assets, information, and technologies operating on and around the Moon.

3. U.S. DOMESTIC AUTHORITIES: END-TO-END LUNAR ACTIVITIES

LAUNCH AUTHORIZATION



FAA / AST Office of Commercial Space Transportation

Licenses commercial launch and reentry activities to ensure public safety.

COMMUNICATIONS LICENSING



FCC Space Bureau

Licenses space stations and Earth stations for voice, video, telemetry, and data communications.

SPECTRUM COORDINATION



NTIA National Telecommunications & Information Administration

Coordinates U.S. spectrum use internationally and represents the U.S. in the ITU.

EXPORT CONTROLS



Commerce / BIS Bureau of Industry and Security

Controls exports of items, software, and technology for national security and foreign policy reasons.

DATA, IMAGERY & EARTH OBSERVATION



DOC / NOAA / USGS & Other Agencies

Set policies and licenses for commercial remote sensing, data distribution, and Earth observation.

U.S. REGISTRATION & SUPERVISION



Department of State

U.S. launches and space objects are registered with the UN. The U.S. supervises their activities in accordance with international law.

ON-ORBIT & SURFACE OPERATIONS



Lead Operator with Agency Oversight

Operators follow license conditions, safety and environmental practices, and share information to support deconfliction.

✓ All activities must comply with U.S. law, international obligations, and license/authorization conditions.

4. INTERNATIONAL COORDINATION & PARTNERSHIPS



UN COMMITTEE ON THE PEACEFUL USES OF OUTER SPACE (COPUOS)

The U.S. participates in UN forums to advance norms, guidelines, and transparency in space activities.



BILATERAL & MULTILATERAL AGREEMENTS

The U.S. negotiates agreements on data sharing, safety, technology safeguards, and cooperation.



ARTEMIS ACCORDS PARTNERS
U.S. works with partner nations to implement principles such as transparency, interoperability, deconfliction, and the responsible use of lunar resources.



INFORMATION SHARING
Partners share data on missions, space weather, communications, and hazards to support safe and efficient operations.



THE BIG PICTURE

U.S. lunar governance is built on international law, U.S. policy leadership, and a coordinated network of agencies and partners.



SUPPORTS EXPLORATION
Advancing science, discovery, and innovation.



PROTECTS PEOPLE & ASSETS
Promoting safety, security, and responsible operations.



PROMOTES PEACEFUL USE
Upholding the principles of the Outer Space Treaty.



BUILDS PARTNERSHIPS
Working together for a sustainable future on the Moon.



A SAFE, SUSTAINABLE, AND COOPERATIVE
PRESENCE ON AND AROUND THE MOON
BENEFITS ALL OF HUMANITY.

HOW DOES THE U.S. GOVERNMENT MANAGE SPACE SPECTRUM AND ORBITAL RESOURCES?

A COORDINATED SYSTEM THAT ALLOCATES LIMITED RESOURCES, PREVENTS HARMFUL INTERFERENCE, AND SUPPORTS INNOVATION AND NATIONAL INTERESTS.

1) WHAT ARE SPECTRUM AND ORBITAL RESOURCES?



SPECTRUM

The invisible radio frequencies used to send signals to, from, and between satellites.



UPLINKS – Signals sent from Earth stations to satellites.



DOWNLINKS – Signals sent from satellites to Earth stations.



CROSSLINKS – Signals sent between satellites in space.



FREQUENCY BANDS – Ranges of frequencies with specific uses and rules.



INTERFERENCE – Unwanted signals that can disrupt communications.

Spectrum is a shared, finite resource that must be used efficiently.



ORBITAL RESOURCES

The valuable locations and paths in space where satellites operate.



GEOSTATIONARY (GEO) SLOTS – Fixed longitudes above the equator used by GEO satellites.



NON-Geo ORBITS – Including Low Earth Orbit (LEO), Medium Earth Orbit (MEO), and inclined orbits.



ORBITAL PATHS – Routes and altitude ranges satellites use to operate.



COORDINATION ZONES – Areas managed to avoid collisions and harmful interference.

Orbital resources are limited and must be coordinated to ensure safe access.

2) WHO DOES WHAT?



FEDERAL COMMUNICATIONS COMMISSION (FCC)
Regulates non-federal users.



- FCC Space Bureau issues licenses and grants for satellite services.
- FCC Office of Engineering and Technology develops technical rules and promotes efficient spectrum use.



NASA
Explores and uses space for the benefit of all.



- Uses spectrum for missions and data.
- Coordinates to avoid interference with other users.



COMMERCIAL SATELLITE OPERATORS & EARTH STATIONS

- Design, build, and operate systems that rely on spectrum and orbital resources.
- Develop systems and file with regulators.
- Coordinate with other licensees to avoid harmful interference.
- Operate within license terms and technical rules.



NATIONAL TELECOMMUNICATIONS INFORMATION ADMINISTRATION (NTIA)
Manages federal spectrum use.



- NTIA Office of Spectrum Management allocates and manages spectrum for federal agencies.
- NTIA leads U.S. positions on international spectrum matters.



NOAA
Protects life and property.



- Uses spectrum for weather, ocean, climate, and environmental data.
- Coordinates to ensure reliable observations.



DEPARTMENT OF DEFENSE & U.S. SPACE FORCE

- Defend the nation and operate in space.
- Uses spectrum for national security and resilience.
- Coordinates through NTIA for spectrum matters.



DEPARTMENT OF STATE
Leads international engagement.



- Coordinates U.S. positions at the International Telecommunication Union (ITU).
- Negotiates treaties and resolves international disputes.

3) THE COORDINATION & MANAGEMENT PROCESS



INTERNATIONAL FRAMEWORK: THE ITU

An intergovernmental organization that manages global radio spectrum and orbital resources.

- Allocates frequency bands for services worldwide.
- Coordinates geostationary (GEO) orbital slots.
- Maintains rules to prevent harmful interference.

4) COMMON CHALLENGES



SPECTRUM CONGESTION – Growing demand in popular bands increases the risk of interference and limits available capacity.



INTERFERENCE – Unwanted signals can disrupt services for users on the ground, in the air, and in space.



ORBITAL CONSTRAINTS – Limited GEO slots and busy orbits require careful coordination to avoid physical and radio-frequency conflicts.



SPACE WEATHER – Solar storms can affect communications and satellite performance.



CYBER & SIGNAL SECURITY – Protecting systems and data from jamming, spoofing, and other threats is essential.



SHARED RESOURCES. SHARED RESPONSIBILITY.

By coordinating spectrum and orbital resources at home and abroad, the U.S. government helps ensure that space remains open, safe, and beneficial for everyone.

KEY DOMESTIC ROLES AT A GLANCE

NON-FEDERAL USES (PRIVATE & COMMERCIAL)



FEDERAL COMMUNICATIONS COMMISSION
Licenses and regulates non-federal satellite operators and earth stations.



FCC SPACE BUREAU – Manages licensing, market access, and space policy.



FCC OFFICE OF ENGINEERING & TECHNOLOGY – Develops technical rules and advances efficient use of spectrum and orbits.



COORDINATION IS CONTINUOUS

Agencies, industry, and international partners work together every day to share information, resolve conflicts, and keep space services reliable and accessible.

FEDERAL USES (GOVERNMENT)



NTIA OFFICE OF SPECTRUM MANAGEMENT
Allocates and manages radio spectrum for federal agencies.



INCLUDES IRAC (INTERDEPARTMENT RADIO ADVISORY COMMITTEE) – Brings federal agencies together to coordinate U.S. positions and actions on spectrum and orbital matters.



COORDINATE TO PREVENT INTERFERENCE



FOLLOW RULES. RESPECT OTHERS. SHARE SPACE.



INNOVATE RESPONSIBLY



KEEP SPACE SAFE, SECURE, AND SUSTAINABLE



BENEFIT PEOPLE HERE, THERE, AND EVERYWHERE

5) WHY IT MATTERS



RELIABLE COMMUNICATIONS – Keeps the internet, TV, phones, aviation, maritime, and emergency services connected.



NATIONAL SECURITY – Ensures resilient, interference-free operations for defense and critical missions.



ECONOMIC GROWTH – Enables innovation, competition, and jobs in the space and satellite industries.



SCIENCE & ENVIRONMENT – Supports weather forecasting, disaster response, climate monitoring, and scientific discovery.



GLOBAL LEADERSHIP – Promotes responsible use of space and strengthens U.S. leadership in international forums.

HOW DOES THE U.S. GOVERNMENT SECURE THE SPACE INDUSTRIAL BASE AND SUPPLY CHAIN?

ENSURING RELIABLE, RESILIENT, AND SECURE SPACE CAPABILITIES FOR OUR NATION, ALLIES, AND PARTNERS

1. WHAT THE SPACE INDUSTRIAL BASE INCLUDES

A broad ecosystem of companies, facilities, people, and technologies that design, build, launch, operate, and sustain space capabilities.



MATERIALS & MINERALS

Metals, rare earths, composites, chemicals, and advanced materials.



MANUFACTURING & FABRICATION

Machining, casting, additive manufacturing, assembly, and testing.



ELECTRONICS & MICROCHIPS

Integrated circuits, sensors, power devices, and microelectronics.



SUBSYSTEMS & PAYLOADS

Avionics, power, comms, propulsion, structures, and instruments.



LAUNCH SERVICES

Launch vehicles, range services, and integration.



GROUND SYSTEMS

Ground stations, networks, mission operations centers.



SOFTWARE & DATA SERVICES

Flight software, analytics, AI/ML, simulation, and data services.



OPERATIONS & MAINTENANCE

On-orbit operations, upgrades, sustainment, and end-of-life services.

2. SPACE SUPPLY CHAIN LAYERS (THE CHAIN THAT BUILDS SPACE CAPABILITIES)



RAW MATERIALS

Sourced minerals, metals, gases, and chemicals.



MICRO-ELECTRONICS

Wafers, chips, sensors, semiconductors, and boards.



COMPONENTS

Parts and materials: fasteners, batteries, optics, connectors, valves, etc.



SUBSYSTEMS

Integrated assemblies: power units, radios, ADCS, propulsion modules, etc.



SPACECRAFT & LAUNCH VEHICLES

Final integration of payloads and vehicles for mission execution.



GROUND SYSTEMS

Communications, tracking, command & control, and data networks.



SOFTWARE & OPERATIONS

Mission planning, operations, analytics, and customer services.



INTEGRATED ASSURANCE ACROSS EVERY LAYER

Security, quality, and resilience must be built in from raw materials through mission operations—including suppliers, transportation, facilities, and the digital systems that connect them.

3. THREATS & VULNERABILITIES



SINGLE-SOURCE SUPPLIERS

Overreliance on unique suppliers or parts creates points of failure and disruption.



FOREIGN DEPENDENCE

Critical materials, components, or manufacturing concentrated in foreign regions of concern.



CYBER COMPROMISE

Attacks on suppliers, software, and networks can operate or degrade missions.



COUNTERFEITS & TAMPERING

Fake, substandard, or malicious parts can undermine safety and reliability.



INDUSTRIAL ESPIONAGE

Theft of data, designs, and proprietary information by nation-states or insiders.



EXPORT LEAKAGE & DIVERSION

Sensitive technology diverted to unauthorized entities or end uses.



WORKFORCE BOTTLENECKS

Shortages of skilled talent threaten innovation and production capacity.

4. WHO HELPS SECURE THE SPACE INDUSTRIAL BASE



DEPARTMENT OF DEFENSE

Sets strategy and priorities; funds, acquires, and integrates capabilities; strengthens industrial capacity and resilience.



U.S. SPACE FORCE

Defines space warfighting needs, partners with industry, and ensures resilient space architectures.



SPACE SYSTEMS COMMAND (SSC)

Acquires and fields resilient space systems; ensures supply-chain assurance and product integrity.



NASA

Drives innovation, sets technical standards, and works with industry, universities, and partners.



DEPARTMENT OF COMMERCE (DOC)

Advances U.S. industry, supports export controls, and promotes trusted supply chains.



BUREAU OF INDUSTRY AND SECURITY (BIS)

Administers export controls, screening, and enforcement to prevent diversion of sensitive items and technology.



DEPARTMENT OF ENERGY (DOE)

Invests in critical materials, advanced manufacturing, and energy-resilient industrial capacity.



DHS / CISA

Protects critical infrastructure, partners with industry on risk management and resilience.



FBI

Investigates threats, cyber intrusions, and transnational crimes impacting the supply chain.



DEFENSE COUNTERINTELLIGENCE AND SECURITY AGENCY (DCSA)

Detects and counters espionage; conducts facility clearances and insider threat mitigation.



DEFENSE LOGISTICS AGENCY (DLA)

Delivers logistics support, strategic materials, and risk reduction across the enterprise.



These organizations coordinate through interagency councils, information sharing, joint assessments, and public-private partnerships to reduce risk, remove checkpoints, and strengthen the U.S. space industrial base.

5. HOW WE BUILD A SECURE, RESILIENT SPACE SUPPLY CHAIN



DIVERSIFY & DE-RISK

Avoid single points of failure; qualify alternative suppliers and production sites.



STRENGTHEN DOMESTIC CAPACITY

Invest in U.S. materials, chip fabrication, manufacturing, and advanced infrastructure.



SET & ENFORCE STANDARDS

Use rigorous technical, quality, cybersecurity, and product assurance standards.



CYBERSECURE THE CHAIN

Harden suppliers and systems; require strong cybersecurity practices.



TRUSTED SUPPLIERS & SCREENING

Screen suppliers, conduct due diligence, and maintain oversight throughout lifecycle.



STOCKPILES & STRATEGIC RESERVES

Maintain reserves of critical materials and parts to absorb disruptions.



ASSURE TRANSPORT & FACILITIES

Secure logistics, protect facilities, and plan for continuity of operations.



WORKFORCE DEVELOPMENT

Expand STEM pipeline, apprenticeships, and training for a world-class workforce.



INNOVATE & COLLABORATE

Co-invest in R&D, advance resilient architectures, and share best practices.



CONTINUOUS MONITORING

Use data, analytics, and threat intelligence for early warning and rapid responses.



A SECURE SPACE INDUSTRIAL BASE STARTS WITH A STRONG SUPPLY CHAIN—PROTECTED TODAY, READY FOR TOMORROW. Resilient supply chains enable mission success, protect our warfighters, support allies, drive economic strength, and ensure U.S. leadership in space.

HOW DOES THE U.S. GOVERNMENT USE ARTIFICIAL INTELLIGENCE AND AUTONOMY IN SPACE?

ENABLING SMARTER MISSIONS, RESILIENT OPERATIONS, AND BETTER DECISIONS ACROSS THE SPACE ENTERPRISE.

1) WHAT AI AND AUTONOMY MEAN IN SPACE



ARTIFICIAL INTELLIGENCE (AI)
Systems that learn from data, recognize patterns, make predictions, and support or augment human decision-making.



WHY IT MATTERS

Operate faster in dynamic and distant environments



Increase resilience to disruptions and degraded communications



Turn large volumes of data into timely insights



Reduce risk to people and enable more ambitious missions



AUTONOMY
The ability of space systems to sense, decide, and act with minimal or no real-time human control.

2) MAJOR USE CASES



SATELLITE HEALTH MONITORING
AI analyzes telemetry to predict component health and prevent failures.



ANOMALY DETECTION
Detects unusual behavior in systems or data for early response.



AUTOMATED MISSION PLANNING
AI generates and optimizes schedules, tasks, and resource plans.



AUTONOMOUS NAVIGATION
Spacecraft navigate, avoid hazards, and replan in real time.



ROBOTIC EXPLORATION
Autonomous rovers and robots explore, collect data, and adapt.



EARTH-OBSERVATION ANALYTICS
AI extracts insights from imagery for environment, resources, and disasters.



ISR & GEOSPATIAL ANALYSIS
AI fuses data to detect activity, estimate intent, and produce products.



SPACE DOMAIN AWARENESS
AI tracks and characterizes objects and events in space.



CONJUNCTION ANALYSIS
AI predicts close approaches and recommends collision avoidance actions.



COMMUNICATIONS OPTIMIZATION
AI adapts links, routes, and spectrum use for reliability and throughput.



CYBER DEFENSE IN SPACE
AI detects and responds to cyber threats across space systems and data.

4) LEVELS OF AUTONOMY: A CONTINUUM



HUMAN-IN-THE-LOOP
Humans make all critical decisions; AI provides data and recommendations.



HUMAN-ON-THE-LOOP
AI executes tasks and monitors outcomes; humans supervise and intervene as needed.



HIGHER AUTONOMY
AI makes time-critical decisions within approved boundaries with human oversight.



CONDITIONALLY AUTONOMOUS
Systems adapt and act in complex environments; humans set goals and review results.



Autonomy is mission-dependent. The right level balances speed, risk, communications, and human judgment.

5) BENEFITS AND SAFEGUARDS



FASTER DECISIONS
Responds quickly to changing conditions and threats.



GREATER RESILIENCE
Operate through disruptions and in denied or distant environments.



MORE EFFICIENT OPERATIONS
Optimize resources, extend asset life, and reduce operational burden.



BETTER INSIGHTS
Turn data into actionable knowledge across missions and agencies.



ENABLING THE FUTURE
Make ambitious exploration, science, and national security missions possible.



VALIDATION & TESTING
Rigorous evaluation across scenarios and environments.



MISSION ASSURANCE
Transparency, verification, and risk management throughout the lifecycle.



CYBERSECURITY
Protect systems, data, and models from threats.



EXPLAINABILITY
AI decisions are understandable, traceable, and auditable.



DATA QUALITY
Trusted, representative data powers reliable AI performance.



HUMAN OVERSIGHT
People remain responsible for outcomes and can intervene at any time.

SAFEGUARDS



RESPONSIBLE INNOVATION FOR THE NATIONAL INTEREST The U.S. government advances AI and autonomy in space to protect national security, drive scientific discovery, support civilian needs, and expand human presence—safely, securely, and responsibly.

HOW DOES THE U.S. GOVERNMENT PROVIDE WEATHER SATELLITE SERVICES?

OBSERVING EARTH FROM SPACE TO DELIVER DATA, FORECASTS, AND WARNINGS THAT PROTECT LIVES AND SUPPORT OUR NATION.

1) WHY WEATHER SATELLITES MATTER

-  Save lives and property by enabling accurate forecasts and timely warnings.
-  Keep aviation safe and efficient with real-time conditions aloft and on the ground.
-  Support maritime safety, navigation, and ocean observations.
-  Monitor wildfires and smoke to protect communities and air quality.
-  Provide climate records that inform decisions and build resilience.
-  Deliver trusted information to the public, partners, and decision makers.

2) THE OBSERVING SYSTEMS

GEOSTATIONARY WEATHER SATELLITES (GOES SERIES)



- Operate in geostationary orbit over the Americas.
- Provide continuous monitoring of the same region.
- Track storms, lightning, fires, fog, and atmospheric motion in near real time.
- High temporal resolution for nowcasting and warnings.



VISIBLE & INFRARED IMAGERY



LIGHTNING MAPPER



SEVERE STORMS & FIRES



ATMOSPHERIC MOTION & MOISTURE



POLAR-ORBITING SATELLITES (JPSS SERIES)

- Operate in low Earth orbit on sun-synchronous paths.
- Provide global coverage, including the poles.
- Revisit the entire globe frequently (up to multiple times per day).
- Rich environmental data for forecasts and climate records.



TEMPERATURE & HUMIDITY PROFILES



SEA SURFACE TEMPERATURE



ICE & SNOW COVER



OZONE & AEROSOLS



COMMERCIAL DATA SUPPORT

Commercial satellite data, including microwave, radio occultation, and constellation observations, supplement government systems to improve coverage, speed, and resilience.



Partnerships and procurements ensure access to diverse, innovative, and cost-effective space-based data.

3) WHO DOES WHAT



NOAA

Leads the nation's weather, water, and climate mission. Operates the observing system, delivers forecasts, warnings, and data services.



NESDIS (NOAA)

Designs, builds, and operates environmental satellites and sensors. Manages data downlink, calibration, and data stewardship.



National Weather Service (NWS)

Uses data and models to produce forecasts, watches, and warnings for the U.S. and its territories.



National Centers for Environmental Prediction (NCEP)

Runs global and regional models and produces analyses, forecasts, and environmental guidance.



Office of Geostationary Earth Orbit Observations (NOAA)

Oversees requirements, program direction, and performance of the GOES series.



Office of Low Earth Orbit Observations (NOAA)

Oversees requirements, program direction, and performance of the JPSS series.



Office of Satellite and Product Operations (NOAA)

Operates ground systems, downlinks data, generates products, and ensures data quality and availability.



NASA PARTNER

Collaborates on research, sensor technology, missions, and data to advance weather and climate capabilities.

4) FROM OBSERVATION TO WARNING: THE DATA & INFORMATION FLOW



 Quality, security, and resilience are built in at every step to ensure trusted, timely information.

5) KEY PUBLIC BENEFITS & APPLICATIONS



HURRICANES

Track storms, intensity, and impacts.



AVIATION

Support safe takeoffs, route planning, and turbulence avoidance.



SEVERE WEATHER

Detect and monitor thunderstorms, tornadoes, and flash flooding.



OCEANS & COASTS

Measure sea surface temperature, waves, and coastal hazards.



WILDFIRE SMOKE

Monitor smoke transport and air quality.



CLIMATE RECORDS

Provide long-term observations for research and decision making.



FLOODING

Observe heavy rain, river levels, and flood extent.



SPACE WEATHER

Monitor the Sun and space environment affecting technology.



Continuity: Overlapping satellite systems and partnerships ensure continuous observations.



Open & Accessible: Most NOAA satellite data and products are open, free, and available to all.



Global Collaboration: NOAA works with international partners to share data and strengthen forecasts worldwide.



Innovation: New sensors, technologies, and commercial partnerships expand capabilities and improve services.



Weather satellite services are a national capability—built on space, delivered by NOAA—for the safety, prosperity, and resilience of all.

HOW DOES THE U.S. GOVERNMENT MOVE CARGO, FUEL, EQUIPMENT, AND PEOPLE THROUGH SPACE?

A COORDINATED ECOSYSTEM OF LAUNCH, TRANSPORT, STORAGE, AND DELIVERY THAT POWERS EXPLORATION, DEFENSE, SCIENCE, AND COMMERCIAL ACTIVITY.

1. WHAT IS SPACE LOGISTICS?



Space logistics is the end-to-end process of moving, staging, and sustaining cargo, fuel, equipment, and people from Earth to destinations in space and on the Moon—and returning when needed.



It connects industrial production on Earth with operations in orbit and on the lunar surface.



It is an enabling layer for exploration, national defense, scientific discovery, and commercial growth.



It ensures the right assets, in the right place, at the right time.

2. THE SPACE LOGISTICS CHAIN: FROM EARTH TO THE MOON

1 EARTH MANUFACTURING



Industry, suppliers, and government facilities build vehicles, equipment, and supplies.

2 SPACEPORT PREPARATION



Payloads are integrated, tested, and readied at spaceports for safe and efficient launch.

3 LAUNCH



Commercial and government launch systems deliver payloads and crew into orbit.

4 ORBITAL DELIVERY



Spacecraft reach orbit and rendezvous with destinations, depots, or transfer vehicles.

5 TRANSFER VEHICLE



Transfers cargo, fuel, equipment, and crew between orbits and trajectories (e.g., LEO to lunar orbit).

6 STAGING & STORAGE



Assets are stored, configured, and refueled at depots or staging points in orbit or cislunar space.

7 LUNAR DELIVERY



Landers deliver cargo and crew from lunar orbit to the surface safely and precisely.

8 SURFACE DISTRIBUTION



Systems move, place, and support cargo and crew on the lunar surface and at exploration sites.

RETURN LOGISTICS: Samples, data, equipment, and crew are returned to Earth for analysis, refurbishment, and reuse.

3. WHO PARTICIPATES



NASA
Leads exploration logistics strategy, mission planning, and operations for human and robotic missions.



U.S. SPACE FORCE
Provides launch, space domain awareness, assured access, and logistics for national security.



SPACE SYSTEMS COMMAND
Delivers resilient space capabilities, prototypes, and sustainment systems including logistics solutions.



DARPA
Develops breakthrough technologies for on-orbit servicing, depots, autonomy, and advanced propulsion.



FEDERAL AVIATION ADMINISTRATION (FAA)
Licenses and regulates launch and reentry operations to keep the National Airspace System safe.



DEPARTMENT OF ENERGY (DOE)
Provides power systems, nuclear propulsion technology, and early-stage research to sustain missions.



COMMERCIAL LAUNCH & CARGO PROVIDERS
Deliver launch, in-space transportation, landers, cargo, and crew services.



INTERNATIONAL PARTNERS
Share payloads, capabilities, and logistics services to reduce risk and expand reach.



Industry, academia, and allies form a connected ecosystem that multiplies capability and drives innovation.

4. KEY LOGISTICS CAPABILITIES



CREW TRANSPORTATION
Safely moves astronauts to and from orbit and the lunar surface.



CARGO DELIVERY
Delivers equipment, experiments, and supplies to orbit, lunar orbit, and the lunar surface.



ORBITAL TRANSFER
Transfers assets between orbits and trajectories using in-space propulsion.



PROPELLANT DELIVERY
Delivers fuel and oxidizer to depots and vehicles to enable deep space missions.



DEPOTS & ON-ORBIT SERVICING
Stores, refuels, and services spacecraft to extend range and mission duration.



STORAGE & PRE-POSITIONING
Positions supplies and spare parts in orbit or on the lunar surface before crews arrive.



LUNAR CARGO & LANDING
Landers deliver heavy cargo and critical systems to support surface operations.



SURFACE MOBILITY & DISTRIBUTION
Moves cargo and equipment across the lunar surface to where it is needed.



POWER & ENERGY SYSTEMS
Provides power generation, storage, and distribution to run missions and infrastructure (led by DOE).



RETURN LOGISTICS
Returns samples, data, hardware, and crew to Earth for analysis and reuse.

5. WHY IT MATTERS



ENABLES EXPLORATION
Sustains human missions to the Moon and prepares for Mars.



STRENGTHENS NATIONAL SECURITY
Delivers resilient space capabilities and assured access when it matters most.



ADVANCES SCIENCE
Delivers instruments and samples that expand human knowledge.



DRIVES ECONOMIC GROWTH
Builds markets, creates jobs, and enables new industries in space.



BUILDS PARTNERSHIPS
Works with allies and industry to share risk, reduce costs, and achieve more.



SPACE LOGISTICS IS THE BACKBONE THAT MOVES THE NATION FORWARD — FROM EARTH, TO ORBIT, TO THE MOON, AND BEYOND.

LOGISTICS IS AN ENABLING LAYER THAT MAKES THE MISSION POSSIBLE.



CONNECTS EARTH TO SPACE.



DELIVERS CAPABILITY WHERE IT'S NEEDED.



ADAPTS, REPLENISHES, AND SUSTAINS.



POWERED BY PARTNERSHIPS. BUILT FOR THE FUTURE.

HOW DOES THE U.S. GOVERNMENT SERVICE, REPAIR, REFUEL, AND EXTEND THE LIFE OF SATELLITES?

A COORDINATED APPROACH USING ROBOTICS, ADVANCED TECHNOLOGIES, AND PARTNERSHIPS TO KEEP SPACE SYSTEMS MISSION-READY FOR LONGER.

1) WHY SERVICING SATELLITES MATTERS



KEEP CRITICAL SYSTEMS MISSION-READY

Extend the life and performance of satellites that support communications, navigation, science, and national security.



LOWER COSTS OVER TIME

Servicing can reduce the need to build and launch replacements, saving taxpayer dollars.



SUSTAIN SPACE SUSTAINABLY

On-orbit servicing, reuse, and responsible end-of-life actions help reduce space debris and protect the space environment.



ENABLE FUTURE CAPABILITIES

Servicing supports agile operations, rapid upgrades, and new missions that are hard to achieve from Earth.



STRENGTHEN RESILIENCE

The ability to repair, refuel, and reposition satellites improves deterrence and continuity of operations.

2) WHAT ACTIVITIES ARE INVOLVED?

INSPECTION & HEALTH CHECKS



Assess condition, systems health, fuel levels, and performance.

RENDEZVOUS & PROXIMITY OPS



Safely approach and station-keep near the target satellite.

DOCKING & CAPTURE



Secure connection using docking ports, grapples, or robotic capture.

REFUELING



Transfer propellant to extend mission life and support new maneuvers.

RELOCATION



Move satellites to new orbits or slots to avoid congestion or threats.

LIFE EXTENSION & RESET



Restore function, update software, and reset operational parameters.

COMPONENT REPLACEMENT



Replace failed or degraded parts such as batteries, computers, or sensors.

ASSEMBLY & UPGRADES



Add new modules or instruments to increase capabilities.

MANUFACTURING IN SPACE



Fabricate parts or structures using space-qualified manufacturing.

RECYCLING & END-OF-LIFE SERVICES



Safely deorbit or repurpose satellites and recover valuable materials.

DEBRIS-RELATED SERVICES



Inspect, capture, and remove orbits debris and defunct satellites to reduce risk and protect valuable space assets.

3) WHO IS INVOLVED?



NASA

Leads research and technology development for in-space servicing, assembly, and manufacturing through programs like ISAM and collaborations across NASA centers.



DARPA

Invests in advanced robotics, autonomy, docking, refueling, and novel servicing concepts to accelerate breakthrough capabilities.



U.S. SPACE FORCE

Identifies needs, defines operational concepts, and integrates servicing into resilient space architectures.



SPACE SYSTEMS COMMAND (SSC)

Acquires, fields, and sustains space systems and explores servicing solutions to enhance capability and value.



U.S. GOVERNMENT LABORATORIES

Conduct research, testing, and validation of materials, robotics, propellants, and space systems technologies.



COMMERCIAL SERVICING COMPANIES

Provide innovative platforms, robotic systems, refueling services, and on-orbit solutions through public-private partnerships.

4) THE SERVICING SEQUENCE: FROM APPROACH TO EXTENDED MISSION

1



LAUNCH

Servicer launches and separates from its ride.

2



APPROACH

Navigate to target satellite using precision guidance.

3



INSPECT

Gather data and assess condition, resources, and operational status.

4



DOCK

Establish secure connection to enable data and power exchange.

5



SERVICE

Perform needed actions: repair, replace, refuel, or upgrade.

6



REFUEL

Transfer propellant to extend mission life and support maneuvers.

7



UPGRADE

Install new hardware or software to boost capabilities and cybersecurity.

8



VERIFY

Test systems and confirm performance meets mission requirements.

9



RELEASE & DEPART

Undock, move to a safe distance, and secure the area.

10



CONTINUE OPERATIONS

Satellite continues its mission with extended life and improved capability.

OLD DISPOSABLE MODEL VS. EMERGING SERVICEABLE MODEL

TRADITIONAL DISPOSABLE MODEL



EMERGING SERVICEABLE MODEL



5A) BENEFITS



ENHANCED RESILIENCE – Keep critical assets operational and adaptable.



COST EFFICIENCY – Extend value and reduce total lifecycle costs.



SUSTAINABILITY – Reduce debris and support long-term space use.



FLEXIBILITY – Upgrade capabilities and repurpose assets on orbit.



RAPID RESPONSE – Address issues quickly without waiting for new launches.

5B) CHALLENGES TO OVERCOME



STANDARD INTERFACES – Common ports and protocols are essential.



ROBOTICS & AUTONOMY – Complex tasks require trustworthy systems.



SAFETY & RELIABILITY – Operations must protect assets and people.



LEGAL & POLICY COMPLEXITY – Rules for ownership, liability, and operations continue to evolve.



COST & ACCESS – Developing capabilities and increasing launch access remain important.



SERVICING SATELLITES IS KEY TO A SECURE, SUSTAINABLE, AND PROSPEROUS FUTURE IN SPACE. Through innovation, partnerships, and responsible stewardship, the U.S. government is building the capabilities to maintain, adapt, and protect the space systems our nation and the world rely on every day.



TECHNOLOGY
DRIVEN



PARTNERSHIP
POWERED



MISSION
FOCUSED



FUTURE
READY

HOW DO U.S. STATES AND LOCAL GOVERNMENTS PARTICIPATE IN THE SPACE ENTERPRISE?

STATES AND COMMUNITIES INVEST, BUILD, AND COLLABORATE TO POWER AMERICA'S SPACE ECONOMY AND STRENGTHEN NATIONAL LEADERSHIP.

1. WHY STATE AND LOCAL ROLES MATTER



Expand National Capacity
States and communities extend America's space capabilities beyond federal centers.



Drive Economic Growth
Attract investment, create jobs, and strengthen local and regional economies.



Support Resilience & Security
Build critical infrastructure and emergency preparedness for a safer nation.



Develop the Workforce
Educate and train the next generation of scientists, engineers, and technicians.



Foster Innovation & Partnerships
Connect government, industry, academia, and communities to solve real-world challenges.

2. WHAT STATES AND LOCAL GOVERNMENTS DO



SPACEPORT OWNERSHIP OR SUPPORT

Own or support spaceports and launch sites; invest in facilities, safety systems, and operations.



INFRASTRUCTURE INVESTMENT

Fund roads, bridges, water, power, broadband, and airports that support space activities.



ROADS AND UTILITIES

Ensure reliable utilities and heavy-haul road access for rockets, payloads, and equipment.



ZONING & LAND USE

Establish zoning, permits, and land-use plans that enable launch, testing, payloads, and operations.



EMERGENCY RESPONSE

Provide fire, EMS, law enforcement, and public safety for sites and surrounding communities.



WORKFORCE & EDUCATION

Fund K-12 STEM programs, community colleges, and apprenticeships to build a skilled workforce.



UNIVERSITIES & RESEARCH

Support universities and research centers advancing space science, technology, and commercialization.



ECONOMIC-DEVELOPMENT INCENTIVES

Offer tax incentives, grants, loans, and workforce training to grow the space sector.



ENVIRONMENTAL REVIEW

Conduct environmental reviews and stewardship to protect natural and cultural resources.



BUSINESS RECRUITMENT & SUPPORT

Market their regions, assist companies, and connect them to local resources and partners.

4. STATE LEADERSHIP IN ACTION



3. MAJOR AREAS OF STATE AND LOCAL PARTICIPATION



LAUNCH & SPACEPORTS

Build and operate launch sites and spaceports; enable vertical and horizontal launch.



GROUND SYSTEMS

Host satellite ground stations, control centers, and tracking facilities.



MANUFACTURING & SUPPLY CHAIN

Attract and grow space manufacturing, suppliers, and component makers.



NATIONAL SECURITY & DEFENSE SUPPORT

Support test ranges, space domain awareness, and resilient operations.



COMMUNITY BENEFITS

Expand broadband, inspire students, and improve quality of life in local communities.

5. HOW STATES AND LOCAL GOVERNMENTS CONNECT TO THE FEDERAL SYSTEM

FEDERAL GOVERNMENT: REGULATORY AUTHORITY



Sets national policy and space strategy.
Regulates safety, licensing, and national security.
Manages airspace, orbital slots, and international obligations.
Funds missions, research, and strategic programs.



STATE & LOCAL GOVERNMENTS: ECONOMIC & ECOSYSTEM ROLES



Invest in infrastructure and build local capacity.
Develop talent and support education.
Attract businesses and drive innovation.
Ensure public safety, resiliency, and community benefits.

STRONG PARTNERSHIPS = A STRONGER SPACE NATION

By working together, federal, state, and local leaders unlock innovation, create jobs, and advance America's leadership in space.



LOCAL ROOTS.
NATIONAL IMPACT.



EVERY COMMUNITY
CAN CONTRIBUTE.



BUILDING TODAY
FOR TOMORROW IN SPACE.



TOGETHER, WE LAUNCH
AMERICA'S FUTURE.



STATES AND COMMUNITIES ARE
ESSENTIAL PARTNERS IN THE
U.S. SPACE ENTERPRISE.

HOW DOES THE U.S. GOVERNMENT PREPARE FOR SPACE EMERGENCIES AND CONTINGENCIES?

COORDINATED PLANNING, RAPID RESPONSE, AND RESILIENT OPERATIONS TO PROTECT PEOPLE, INFRASTRUCTURE, AND NATIONAL INTERESTS

1. WHAT KINDS OF EMERGENCIES CAN HAPPEN?



LAUNCH ACCIDENTS
Explosions, fires, or failures during launch that threaten people or property.



SPACECRAFT EMERGENCIES
Loss of control, power, or life support affecting crew or mission safety.



SATELLITE FAILURES
Hardware or software failures that degrade or stop satellite operations.



CYBERATTACKS
Malicious intrusions that disrupt space systems or ground infrastructure.



GPS OUTAGES
Disruptions to GPS signals that impact navigation, timing, and critical services.



COMMUNICATIONS OUTAGES
Loss of satellite or ground communications affecting emergency response and the public.



SEVERE SPACE WEATHER
Solar flares, radiation, and geomagnetic storms that can harm satellites, people, and power grids.



ORBITAL DEBRIS EVENTS
Collisions or debris clouds that damage space assets or create risk to operations.



UNCONTROLLED REENTRIES
Spacecraft or rocket stages reentering Earth's atmosphere without control.



ASTRONAUT EMERGENCIES
Medical events, fires, depressurization, or other hazards during space missions.



Emergencies in space can affect people on the ground, national security, the economy, and essential services we all depend on.

2. THE RESPONSE CHAIN: FROM DETECTION TO RECOVERY



Coordinated decision-making and information sharing at every step ensure the right response at the right time.

3. WHO RESPONDS?



NASA

Leads space operations safety, mission support, and spacecraft emergency response.



U.S. SPACE FORCE

Provides space domain awareness, protects space systems, and supports defense operations.



U.S. SPACE COMMAND

Coordinates national and global space operations during crises and contingencies.



FAA

Manages launch and reentry safety, space traffic coordination, and airspace protection.



FEMA

Leads federal response to disasters and supports states and communities.



DHS

Coordinates homeland security efforts across federal agencies.



CISA

Protects critical infrastructure and ensures cyber and physical resilience.



NOAA

Monitors space weather and provides environmental warnings.



U.S. COAST GUARD

Supports search and rescue and maritime safety operations.



U.S. DEPARTMENT OF STATE

Coordinates international notifications and partner communications.



U.S. DEPARTMENT OF COMMERCE

Supports positioning, timing, and export-control and spectrum issues.



U.S. DEPARTMENT OF ENERGY

Protects energy infrastructure and supports resilience.



FBI

Investigates threats, cyber incidents, and criminal activity.



STATE, LOCAL & TRIBAL EMERGENCY-MANAGEMENT ORGANIZATIONS

Lead on-the-ground response, coordination, and public communication.

4. CONTINUITY OF ESSENTIAL SERVICES

KEEPING AMERICA CONNECTED, SAFE, AND SECURE



NATIONAL SECURITY
Maintain defense, intelligence, and surveillance capabilities.



COMMUNICATIONS
Sustain voice, data, and emergency communications for responders and the public.



POSITIONING, NAVIGATION & TIMING
Support GPS services for transportation, finance, utilities, and public safety.



ENERGY
Help protect and restore power grids and energy infrastructure.



WEATHER & ENVIRONMENT
Continue forecasting, warnings, and climate monitoring to save lives and resources.



TRANSPORTATION
Support aviation, maritime, rail, and ground systems that keep our economy moving.



Backup systems, resilient networks, and pre-planned alternatives help ensure services keep working when it matters most.

TYPES OF EVENTS & HOW THEY ARE HANDLED



SPACECRAFT EMERGENCY

Threat to a spacecraft or crew safety. Handled by NASA with support from partners.



PUBLIC-SAFETY EMERGENCY

Impact to people or communities on Earth. Led by FEMA and state/local authorities.



NATIONAL-SECURITY EVENT

Threat or attack on U.S. space systems or national interests. Led by USSPACECOM, with DoD and Intelligence Community.



CRITICAL-INFRASTRUCTURE DISRUPTION

Disruption to essential services or systems. Coordinated by DHS and CISA with sector partners.

5. WHY PREPAREDNESS MATTERS



PROTECTS LIVES
Quick action saves lives and reduces harm.



SAFEGUARDS THE ECONOMY
Supports jobs, trade, and the services we depend on.



DEFENDS OUR NATION
Ensures we can deter, respond, and prevail in space and on Earth.



BUILDS PARTNERSHIPS
Working with allies, industry, and communities makes us stronger together.



IMPROVES RESILIENCE
Planning, training, and innovation help us adapt and recover faster.



PREPARED TODAY, STRONGER TOMORROW
Investment in readiness creates a more secure and prosperous future.



SPACE EMERGENCIES CAN HAPPEN ANYTIME. TOGETHER, WE PREPARE.

Through planning, partnership, and readiness, the U.S. government is committed to protecting people, our way of life, and our nation's leadership in space.



PLAN AHEAD



SHARE INFORMATION



TRAIN & EXERCISE



WORK TOGETHER



BE READY



SAVE LIVES

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