



U.S. Space Command Brief to State of the Space Industrial Base Conference

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Astrographic AOR

100km above and beyond

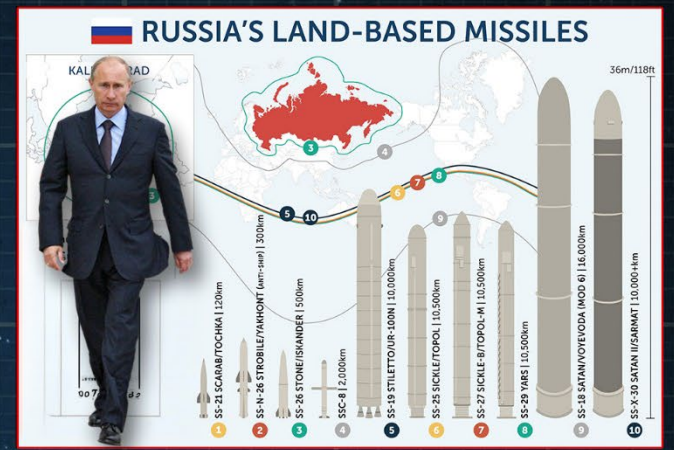
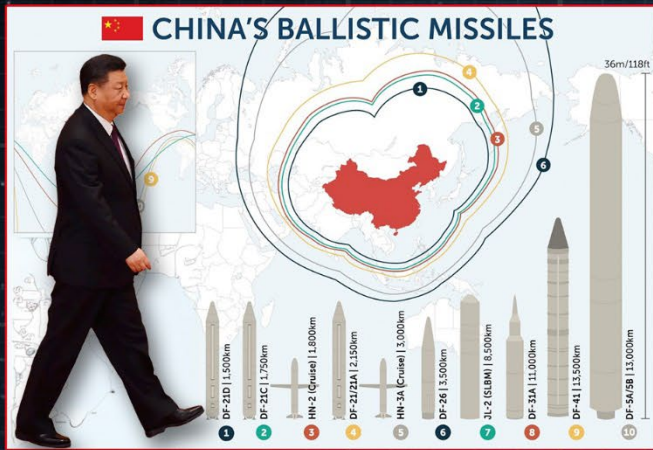
Title 10

Plan for employment of forces
Take actions to deter conflict
Command armed forces

Unified Command Plan

Space Operations
Global Sensor Manager
Global SATCOM Manager
Trans-Regional Missile Defense
Space Joint Force Provider





What is Hot Today?*

- **Integrated Space Fires**
- **Active Protection Measures for Space-Based Assets**
- **Enhanced Battlespace Awareness for Space Operations**
- **Joint Integrated Space Command & Control**
- **Sustained Space Maneuver**
- **Space Defense Critical Infrastructure Cyber Defense – Cyber Defense**
- **Space Defense Critical Infrastructure Cyber Defense – Domain Awareness**
- **Survivable and Endurable NC3 Architecture**
- **Assured Satellite Telemetry, Tracking & Control Architecture**
- **Modernized, Integrated Blue Data Architecture**
- **Flexible Satellite Communications**
- **SATCOM Ground Enterprise**
- **Passive Protection Measures for Space-Based Assets**
- **Integrated Offensive Cyber Effects in support of Space Warfare**
- **Earth-Facing Persistent and Resilient Intelligence, Surveillance, and Reconnaissance**
- **Position, Navigation and Timing Resilience and Modernization**
- **Integrated Sensor Tasking for Space Operations**
- **Common Intelligence Picture Support to Space**
- **C-UAS Protection of Space Defense Critical Infrastructure**
- **Expanded Operations to xGEO**

What is Hot Tomorrow?*

- **Develop technologies that enable order of magnitude improvement in on-orbit mobility (e.g. novel propulsion systems, new fuels, maneuver optimizations, etc.).**
- **On-orbit servicing, assembly, and manufacturing systems that enable refueling, repair, reconfiguration, wireless energy resupply, and rapid replacement of assets.**
- **Cislunar and xGEO characterization, navigation, and communication and control technologies that enable Space Domain Awareness (SDA) and military operations in cislunar space and beyond GEO orbits.**
- **Multi-phenomenology SDA sensor fusion, combining radar, optical, RF and other phenomenology with AI-enabled analytics for rapid space object detection, tracking, characterization, and attribution.**
- **AI-enabled battle management and integrated space Command and Control (C2) to help orchestrate space fires, protection measures, and sensor integration to enable Find, Fix, Track, Target, Engage, and Assess (F2T2EA) cycles.**
- **Assured and alternative Position, Navigation, and Timing (PNT) for the joint force, including for the space service volume and beyond.**
- **Applications of quantum technologies for secure satellite communications and quantum sensing technologies to enable precision PNT and enhanced space object tracking.**

Space Mobility and Logistics Network Future State (2030+)

Commercially Provided Orbit Repositioning

- Move assets at will
- Decommission at end-of-life

Upgrade/Repair via Modularity

- Enable high performance processing
- Upgrade electronics / sensors
- Upgrade with new capabilities
- Evolve capabilities along with missions and threats
- The "Immortal Spacecraft"

Commercially Enabled / Guardian Executed Autonomous RPO-Docking

- Inspection and characterization
- Multi-agent collaboration
- Explore disaggregation beyond LEO

Guardian Executed Dynamic Response & Complexity

- Position orbital assets at time and place dictated by dynamic scenarios
- Create uncertainty through complexity

Civil Focused On Orbit Assembly Manufacturing

- Assembly and construction of large structures
- Basis for space-based logistics chain
- Enable space commodity exchange
- Tailor structures for environment not launch

Novel Orbits

- Learn how novel, low energy orbits can be exploited
- Map the dynamic Earth – Moon LaGrange Points

Commercially Enabled / Guardian Executed Maneuver Without Regret

- Unlock spacecraft from fuel constraints that currently exist
- Maneuver and reposition assets with impunity
- Protect and defend US government, civil and commercial interests
- Enable truly persistent assets and platforms throughout XGEO

Commercially Provided Mid-Flight Refueling

- Use fuel required for the mission
- Decrease transit time/increase revisit rate
- Fly novel flight paths for mission requirements
- Single fuel type multi-mode propulsion
- Decrease launch mass with corresponding cost reduction

Commercially Provided Launch / Space Lift

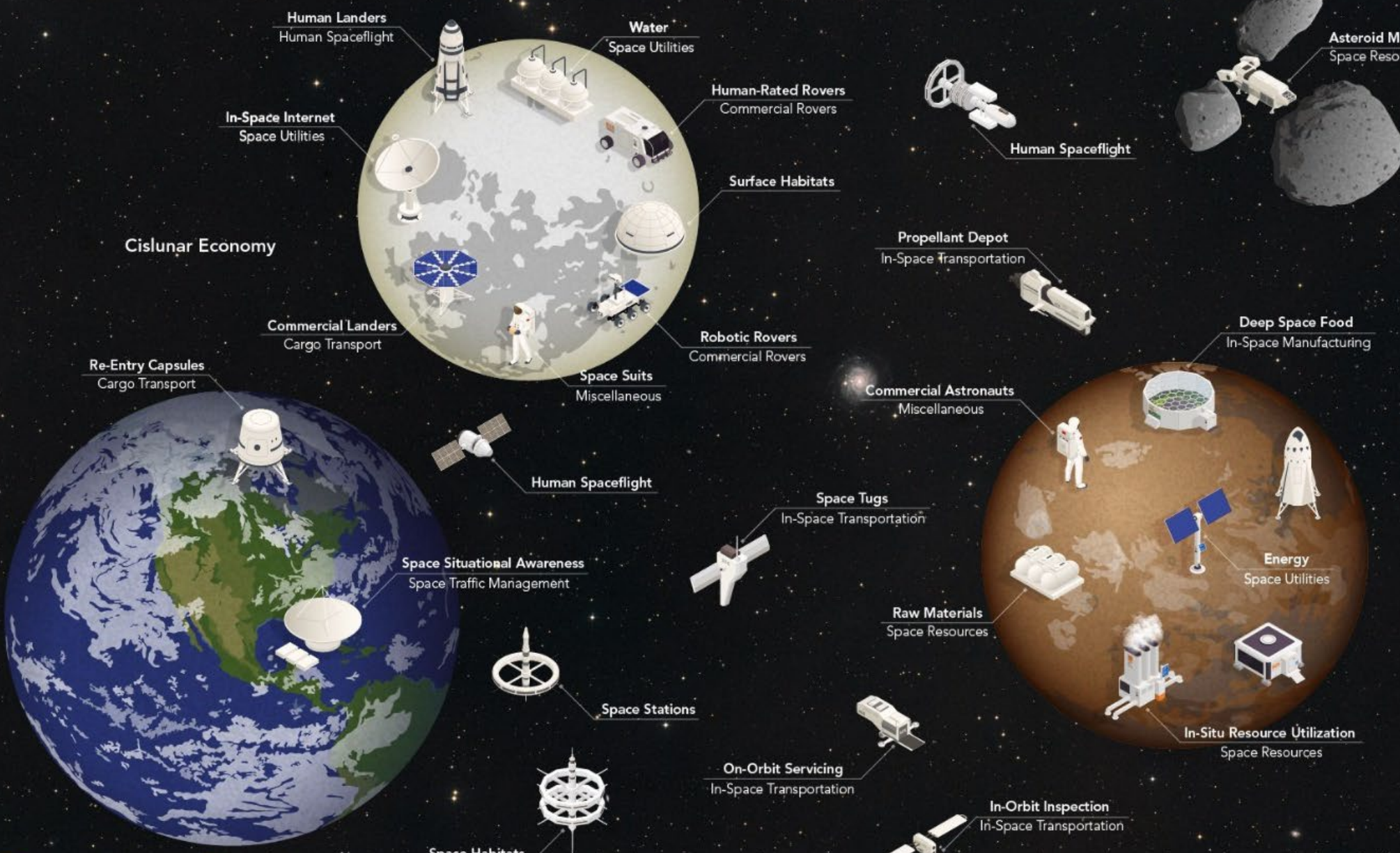
VLEO - MEO

GEO - 2x GEO

3x GEO - L1/L2



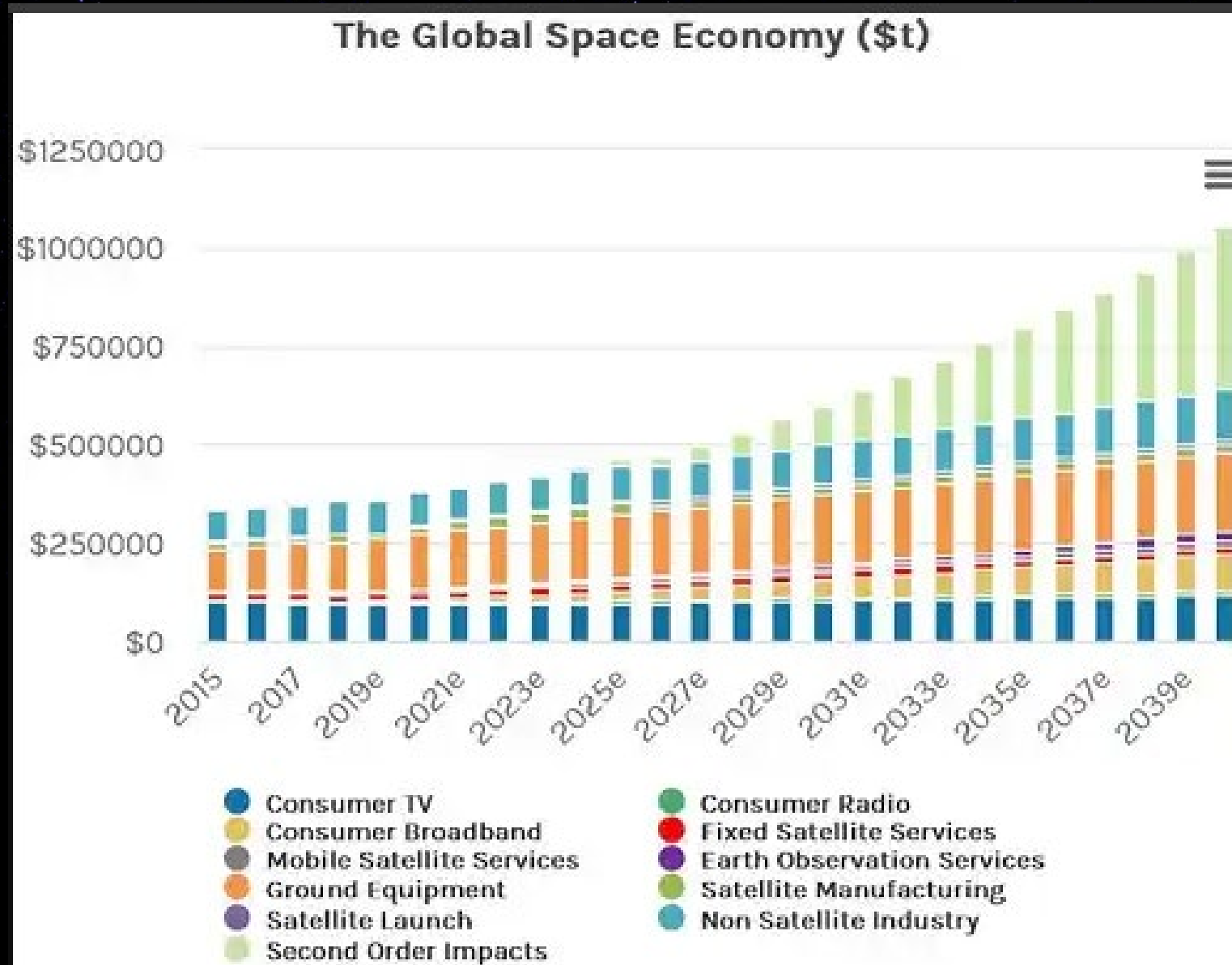
In-Space Economy



- In-Space Economy Classification:**
- 1) Human Spaceflight
 - Human-Rated Spaceships & Shuttles
 - Human Landers
 - 2) Cargo Transport (Spacecraft)
 - Cargo Resupply
 - Landers (Moon, Mars)
 - Re-Entry Capsules (Earth, Mars)
 - 3) Rovers (Surface Spacecraft)
 - Human-Rated Rovers
 - Robotic Rovers/Drones/Hoppers
 - 4) Space Stations & Habitats
 - 5) Surface Habitats & Structures
 - 6) In-Space Manufacturing
 - In-Space Assembly
 - Deep Space Food (Agriculture)
 - Microgravity Manufacturing
 - Additive Manufacturing, etc
 - In-Space Construction, etc
 - 7) Space Resources
 - ISRU (In-Situ Resource Utilization)
 - Raw Materials (Ice, Metals)
 - Prospecting
 - Asteroid Mining & Processing
 - 8) Space Utilities
 - Energy
 - In-Space Internet
 - Navigation
 - Water
 - 9) In-Space Transportation (Space Trucks)
 - Space Mobility & Logistics
 - On-Orbit Servicing
 - Space Tugs
 - Space Transportation Nodes
 - Orbital Transfer Vehicles (OTV)
 - Propellant Refuel Stations (Depot)
 - Active Debris Removal
 - In-Orbit Inspection
 - 10) Miscellaneous
 - Space Suits & Garments
 - Commercial Astronauts
 - Space Entertainment
 - Space Traffic Management
 - Space Tourism Support
 - Space Advocacy, etc

*Original creation by Erik Kulu inspired by E2MC

Power of Commercial Space*



*<https://clresearch.com/articles/space-based-manufacturing-and-logistics-part-three-mining-and-logistics/>

Allies and Partners

Multinational Force Operation Olympic Defender



“Though strengthened partnerships, we build greater collective understanding of threats, a shared burden of space security, the ability to collectively shape norms of responsible behavior in space, and enhanced interoperability for combined space operations should they be needed”

General Stephen Whiting, Commander
MNF OOD & U.S. Space Command

