

Space Systems Command

The Space Domain

Emerging Factors and Threats



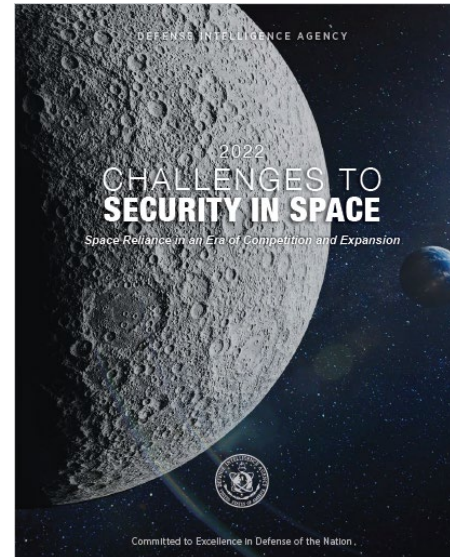
SMSgt Ron Lerch
Senior Enlisted Leader, Intelligence Directorate

The overall classification of this briefing is
UNCLASSIFIED



Overview

- The Modern Space Domain
- Key Competitors
- Russia & China Space
 - Space Launch
 - SSA
- Russia & China Counterspace
 - ASAT Missiles
 - On-orbit ASAT
- Threat Implications





The Modern Space Domain

OUTER SPACE and CYBER SPACE have become new
COMMANDING HEIGHTS in strategic competition among all parties

Chinese Ministry of National Defense, China's Military Strategy, May 2015

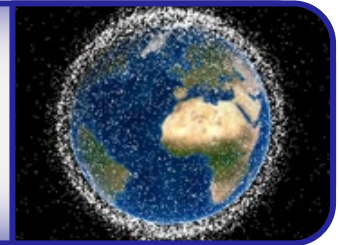
COMMERCIAL

Innovation increasingly driven by private companies
\$450B per year global industry – scaling to \$1T by 2040



CONGESTED

Space domain increasingly accessible to all actors
26,000 large objects (10 cm) in orbit (5,000 satellites)



CONTESTED

Space-enabled warfighting dominant in high-end conflict
Adversaries must match US capabilities or nullify them



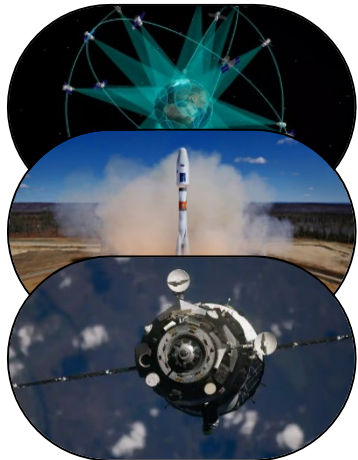


Defining Key Competitors



CHINA is the pacing threat in all aspects of space competition

- ▶ Massive increase in on-orbit presence over last 15 years
- ▶ Working to develop a commercial space ecosystem
- ▶ PLA sees space as critical to modern “informatized” warfare
- ▶ Military space centralized under PLASSF Space Systems Dept
- ▶ Developing a broad array of counterspace weapons



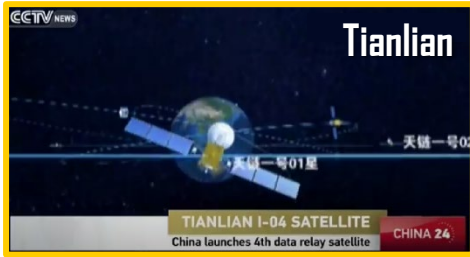
RUSSIA is a struggling power with substantial residual capability

- ▶ Deep technical knowledge and space operations experience
- ▶ Challenges with budget, corruption, workforce, quality
- ▶ Sanctions have caused delays in “dozens” of spacecraft
- ▶ Significant on-orbit presence still a distant third to US & China
- ▶ Aggressively pursuing a diverse set of counterspace weapons

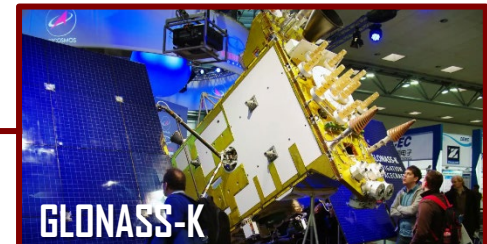
*China & Russia pose **GRAVE THREATS** to US space capabilities...in peace & war*



Russia & China Space



China	SATELLITE TYPE	Russia
48	Communications	81
0	Counterspace (Prototype)	5
6	Data Relay	4
0	ISR (Missile Warning)	3
129	ISR (EO Imagery)	11
14	ISR (Radar Imagery)	1
86	ISR (SIGINT)	5
4	Manned Spaceflight	0
52	Navigation	33
66	Test & Engineering	13
35	Scientific & Environment	13
19	Weather	5
137	UNIDENTIFIED	5
596	TOTAL	179



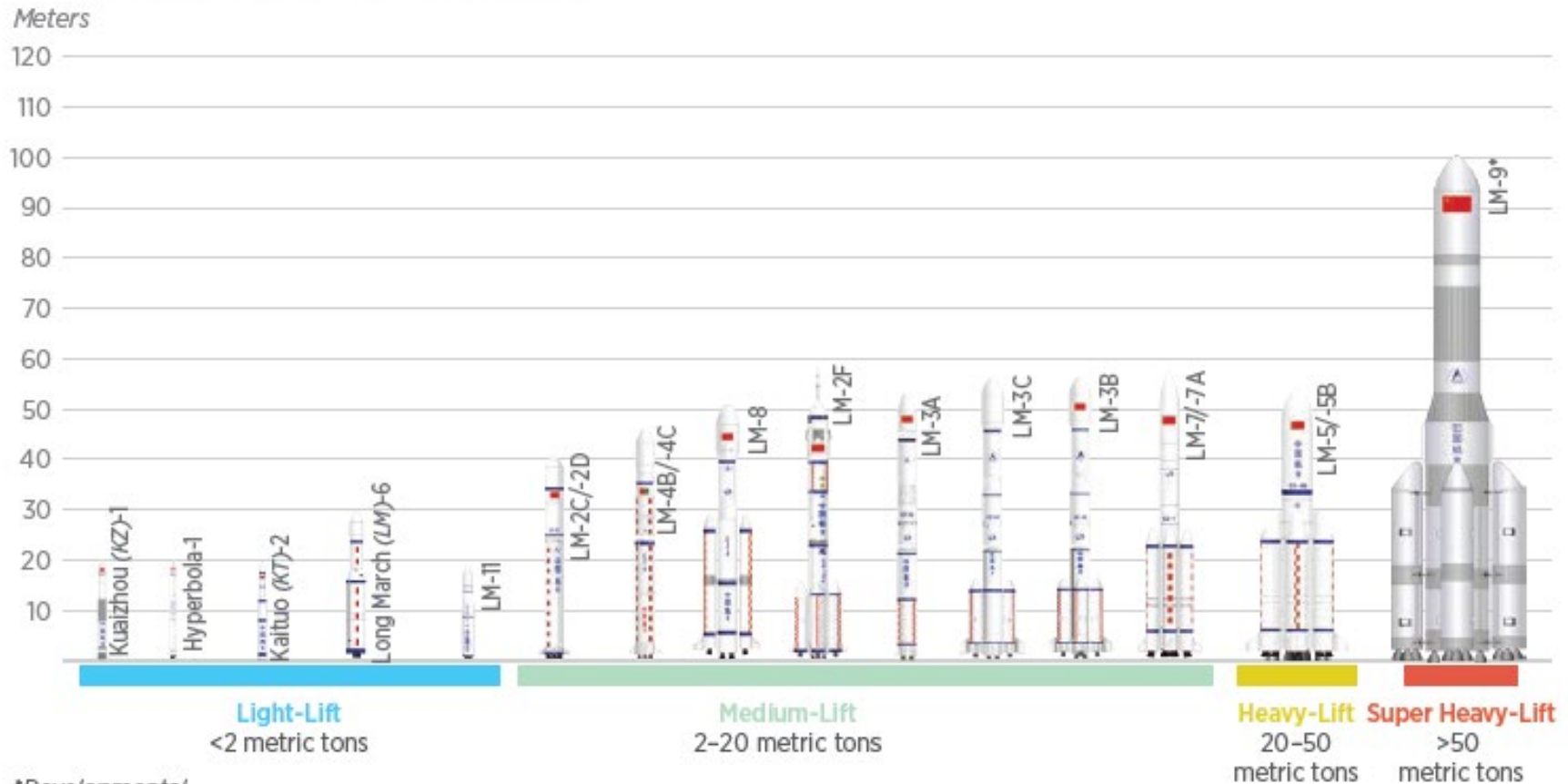
CAO 16 May 2022

China ISR 2nd ONLY TO THE U.S.Russia hindered by CORRUPTION & SANCTIONS



IN FOCUS: China Space Launch

Chinese Space Launch Vehicles



Improving to ensure it has **INDEPENDENT & RELIABLE** access to space



IN FOCUS: China Space SSA

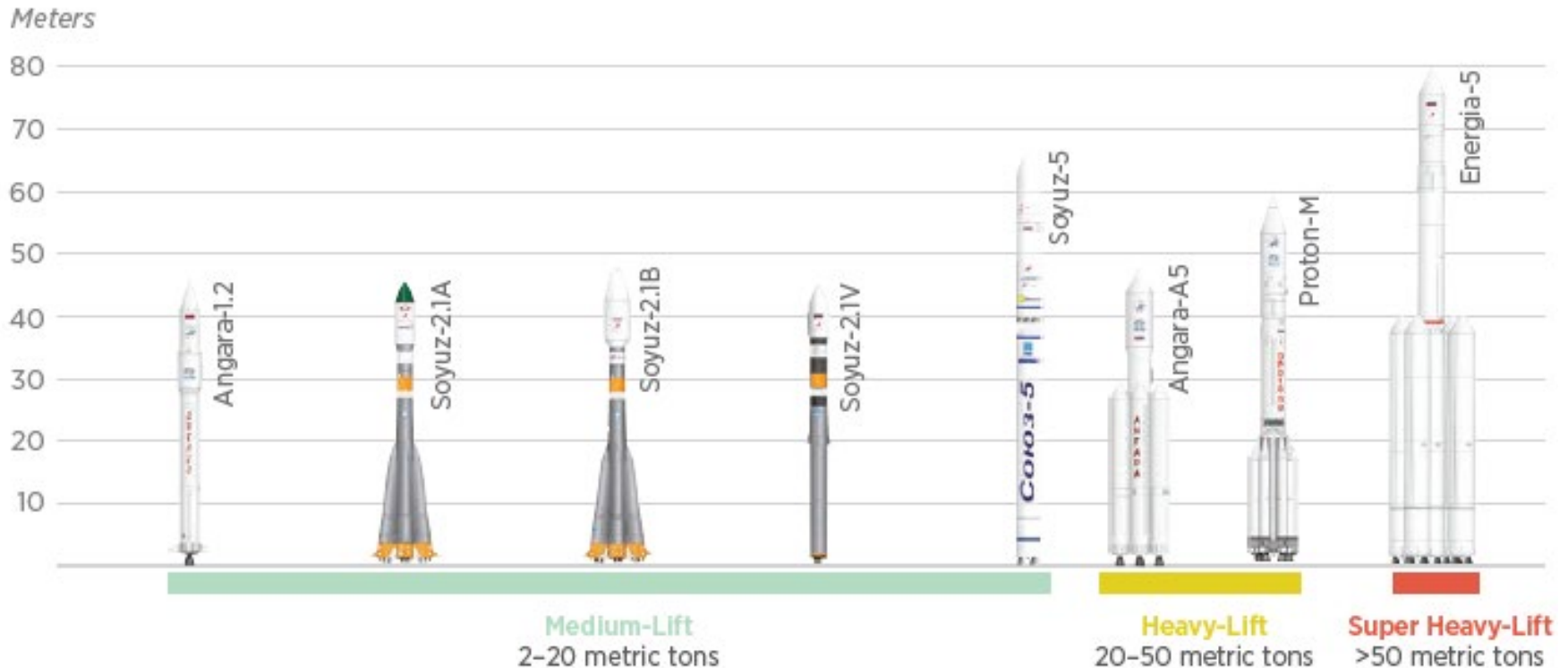


Leverages **ROBUST** network of space surveillance sensors



IN FOCUS: Russia Space Launch

Russian Space Launch Vehicles



NOT focused on light-lift; MULTI-PAYLOAD launches using larger rockets



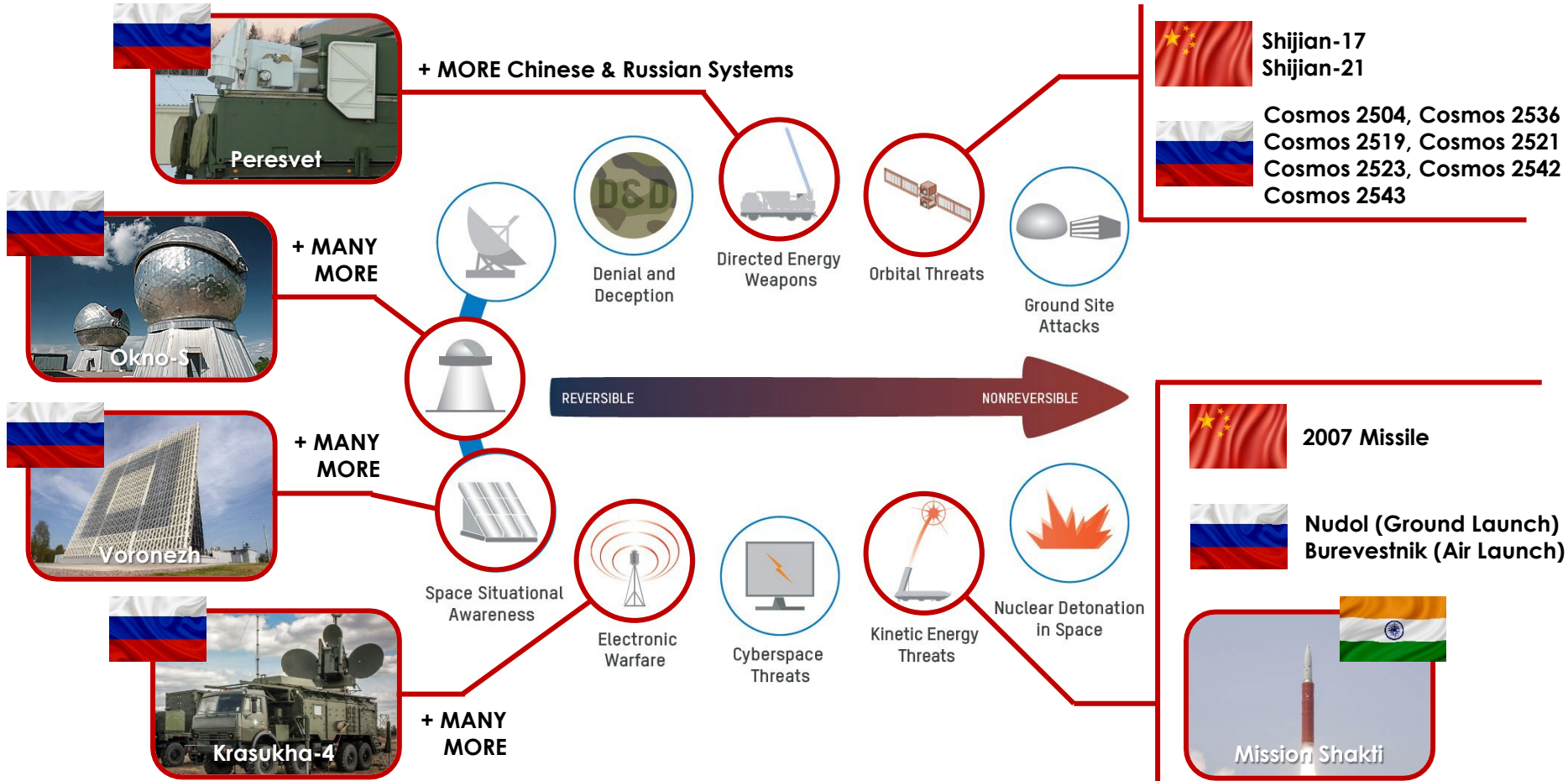
IN FOCUS: Russia Space SSA



*Resources spread throughout country...leverages **LARGEST** optical sensor network*



Russia & China Counterspace



COUNTERSPACE WEAPONS are not a future threat...they are a threat TODAY



IN FOCUS: Antisatellite Missiles

CHINA

Fielded operational ground-based direct-ascent ASAT missile

- ▶ Low Earth orbit (LEO) targets
- ▶ 2007 destructive test
- ▶ PLA actively training

Based on 2013 test, probably also developing a GEO-capable DA-ASAT



RUSSIA

Nudol mobile missile defense complex has inherent counterspace capability

- ▶ “Counterspace attack complex”
- ▶ Destructive test in November 2021
- ▶ 1,500 pieces of trackable debris

Reportedly developing air-launched ASAT missile called Burevestnik



SEVERE THREAT to targeted satellites...and debris drives major long-term problems



IN FOCUS: Orbital ASAT

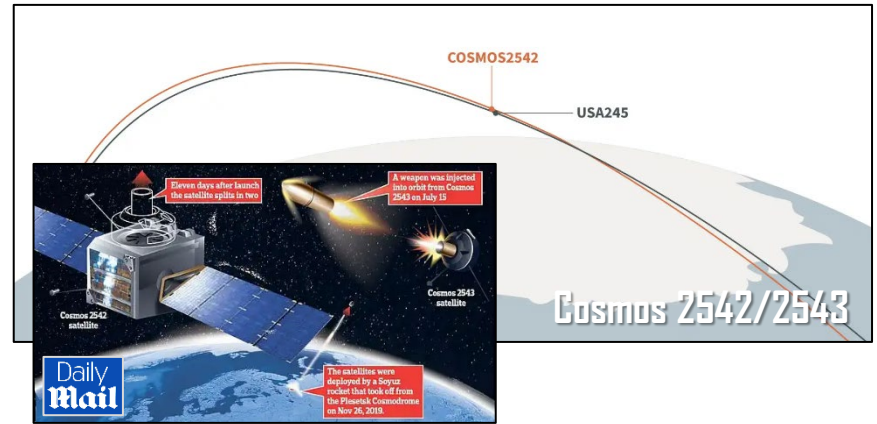
CHINA

RUSSIA



Investing in dual-use space robotics

- ▶ Shijian-17 fitted with robotic arm
- ▶ Shijian-21 designed for debris removal – mechanism unknown
- ▶ Shijian-21 moved derelict BeiDou satellite into graveyard (Jan 2022)



Tested space-based ASAT weapons in both 2017 & 2020 – possible “Nivelir”

- ▶ 2017: Cosmos 2519/2521/2523
- ▶ 2020: Cosmos 2542/2543

Two other kinetic-kill prototypes in orbit: Cosmos 2504 & Cosmos 2536

Orbital ASAT can take **MANY DIFFERENT FORMS**...can **THREATEN** and **DETER**



Threat Implications

- **Time isn't necessarily on our side**
 - Russian invasion of Ukraine
 - All eyes on 2027 (China-Taiwan)
- **“Left of theft”**
 - Mitigate Chinese technological leapfrogging
- **Next major conflict likely to begin with “shooting ones & zeroes”**
 - Kinetic threats endanger all
 - Reversible actions first; irreversible as last resort

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Questions?



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