

Introduction and/or Research Question

STRATEGY:

FIND SOLUTION TO PROTECT U.S. SATELLITES FROM ATTACKS FROM SPACE-BORNE ATTACKS

The People's Republic of China is one of the main national security threats to the United States of America. China developed anti-satellite weapons that threaten the security of U.S. Satellites. The Department of Defense 2021 Report on China estimates Beijing's attainment of all three main foreign policy objectives (Taiwan, Hong Kong, South China Sea) by 2049 (Department of Defense, 2021). This means the possibility for the U.S. and China to go to war is a long-term guaranteed probability. Beijing could launch space attacks against U.S. Satellites. With America unable to adequately respond, China could seize the opportunity to invade Taiwan, Hong Kong, expand across the South China Sea, or initiate all three (Brian G. Chow, 2021).

Abstract and/or Background

WORLD WAR II TO MODERN HISTORY

During World War II, Nazi Germany's blitzkrieg through Europe required an advancement in weapons (ordered by Adolf Hitler and Nazi High Command). At the Peenemunde Research Base, notable German scientists experimented on advanced weapons that were eventually incorporated into modern rocketry (Williamson, 2016). In October 1942, the V-2 was successfully launched. In the final stages of World War II (1944-1945), Germany developed additional advanced weapons such as jets and stealth aircraft (Britannica, 2022).

During the Cold War, tensions between the United States and Soviet Union peaked during the 1950s and 1960s. From 1946, the U.S. Government launched Operation Paperclip: extradition of Nazi Scientists to America (Magazine, 2016). In 1957, the Soviet Union launched *Sputnik*, first satellite in space (NASA, 2022). In 1960, the U.S. launched the first GPS satellite. By 1974, the atomic clock was integrated within the GPS Satellite. In 1978, the GPS satellite system became orbital with 24 satellites. Through the 1980s and through the 2000s, the GPS satellite became more integrated within American society (i.e., aircraft navigation, U.S. military targeting, etc.) [Aerospace Corporation, 2021]. In 2019, the *Block III* GPS Satellite was launched (Steigenberger et al., 2020). In December 2019, the United States Space Force was officially established (U.S. Space Force, 2022).

U.S. ECONOMIC AND MILITARY DEPENDENCE ON SATELLITES

The Bureau of Economic Analysis projects the U.S. Digital Economy to have expanded to 9% of the total economy from 2005-2018 (Nicholson, 2020). Technology has become more common amongst Americans (especially within the last decade). This is most evident with the record ownership of smartphones (i.e., iPhones, etc.). Worldwide, the number of owners drastically increased since 2016. By 2027, owners are expected to reach more than 7.6 billion (S. O'Dea & 23, 2022). Americans are also increasingly becoming integrated within digital banking. Note that GPS satellites use atomic clocks; they are integrated (timewise) toward financial transactions, and infrastructure such as oil, etc. (Fernholz, 2022). As for digital banking, 75% of Americans were users in 2021. By 2025, it is projected that 80.4% of Americans will be users of digital banking (Business Insider, 2021). The U.S. Military uses satellites not only for communications, but missile defense as well (The Heritage Foundation, 2021).

CHINA'S BEGINNING TO SPACE ADVANCEMENT

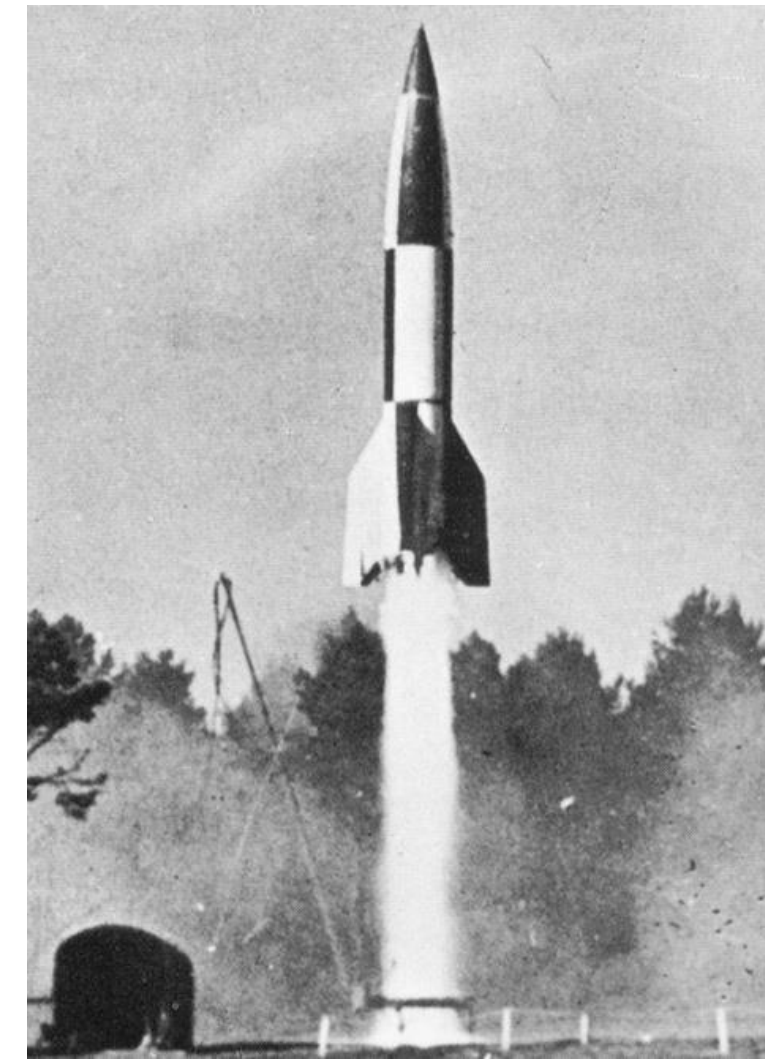
China's launch of a ballistic missile against a satellite on January 11, 2007, was concerning for U.S. national security (can indicate Beijing's ability to eventually destroy U.S. satellites) [Broad & Sanger, 2007]. In 2019, China successfully launched on the dark side of the moon (Pruitt, 2016). In October 2021, the world was shocked by Beijing's successful test of the hypersonic missile (note, U.S. is continuing development to acquire) [The Guardian, 2021]. China's Tiangong Space Station is set for completion by the end of 2022 (Jones, 2022). Current Chinese anti-Satellite weapons include the Shijian-17 and Shijian 21. Both are disguised as observation satellites, contain a robotic arm that can compromise or destroy a U.S. satellite (Robitzski, 2021).

Methods

OPERATION FORTIFIED SHIELD

- KINETIC WEAPONRY:** The missile fired from the U.S. anti-satellite weapon will engage/destroy another satellite. This is a physical collision of one object into another. Major modifications need to be adhered since there is no gravity in space and navigation is not the same as a traditional strike against targets (Preston et al., 2002).
- LASER TARGETING/TRAJECTORY:** The strike needs accuracy. The missile fired from the U.S. anti-satellite weapon needs a trajectory to not collide with another satellite or create any unnecessary collateral damage (Gleason & Hayes, 2020).

NAZI GERMANY TO THE FIRST SATELLITES IN SPACE



LAUNCH OF THE GERMAN V-2 ROCKET DURING WORLD WAR II

(Traces of War, 2022)



GERMAN SCIENTIST WERNHER VON BRAUN SITTING IN HIS OFFICE. HE SURRENDERED TO AMERICAN FORCES IN MAY 1945. HE SOON WORKED FOR AMERICA FOR ROCKET AND BALLISTIC MISSILE DEVELOPMENT.

(Garza, 2019)



SOVIET SCIENTIST PREPARES SPUTNIK FOR LAUNCH. THIS WAS THE FIRST SATELLITE IN SPACE (1957).

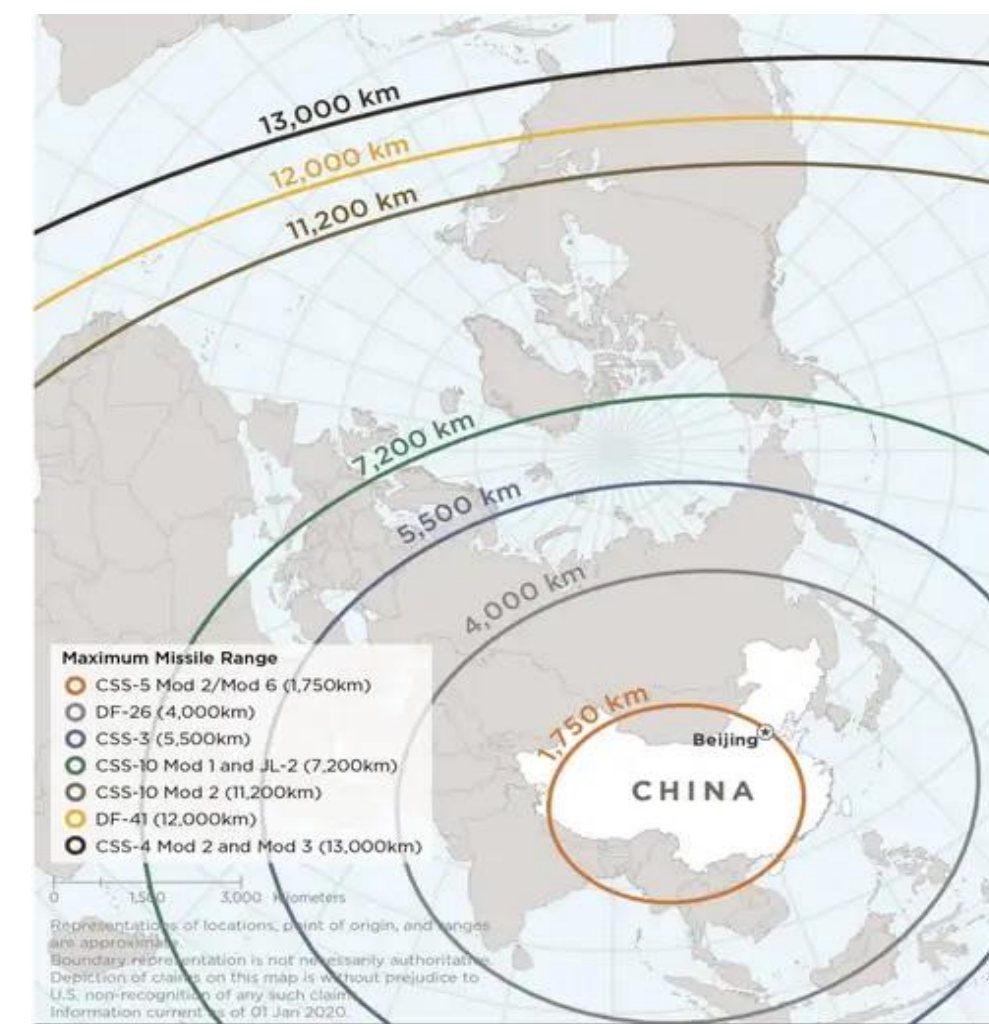
(History, 2009)



U.S. PREPARATION TO LAUNCH TRANSIT, THE FIRST GPS SATELLITE IN SPACE

(GPS World, 2020)

ULTIMATE OBJECTIVES OF THE SILENT DRAGON



MAP OF CHINA WITH INTERCONTINENTAL BALLISTIC MISSILE RANGES

(Brimelow, 2020)



MAP OF TAIWAN

(Taiwan: Issues for Congress 2017)



MAP OF SOUTH CHINA SEA

(Research Gate, 2013)



MAP OF CHINA WITH ROCKET LAUNCH SITES

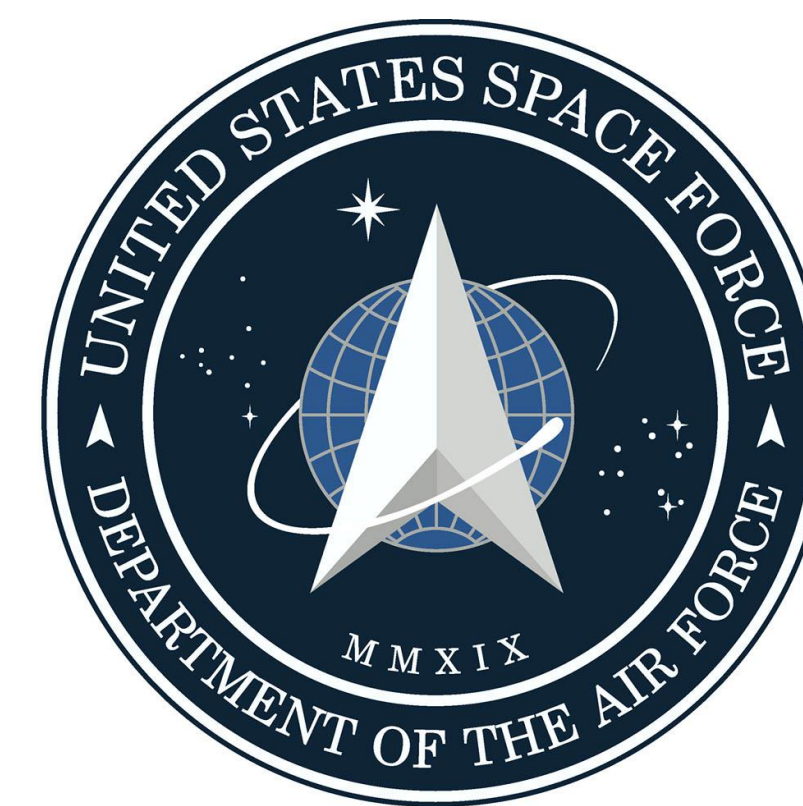
(The Economist, 2015)

UNITED STATES MODERN ADVANCEMENT FOR SPACE WARFARE



PRESIDENT DONALD TRUMP ANNOUNCING THE ESTABLISHMENT FOR THE U.S. SPACE FORCE

(Sky, 2018)



OFFICIAL SEAL OF THE UNITED STATES SPACE FORCE

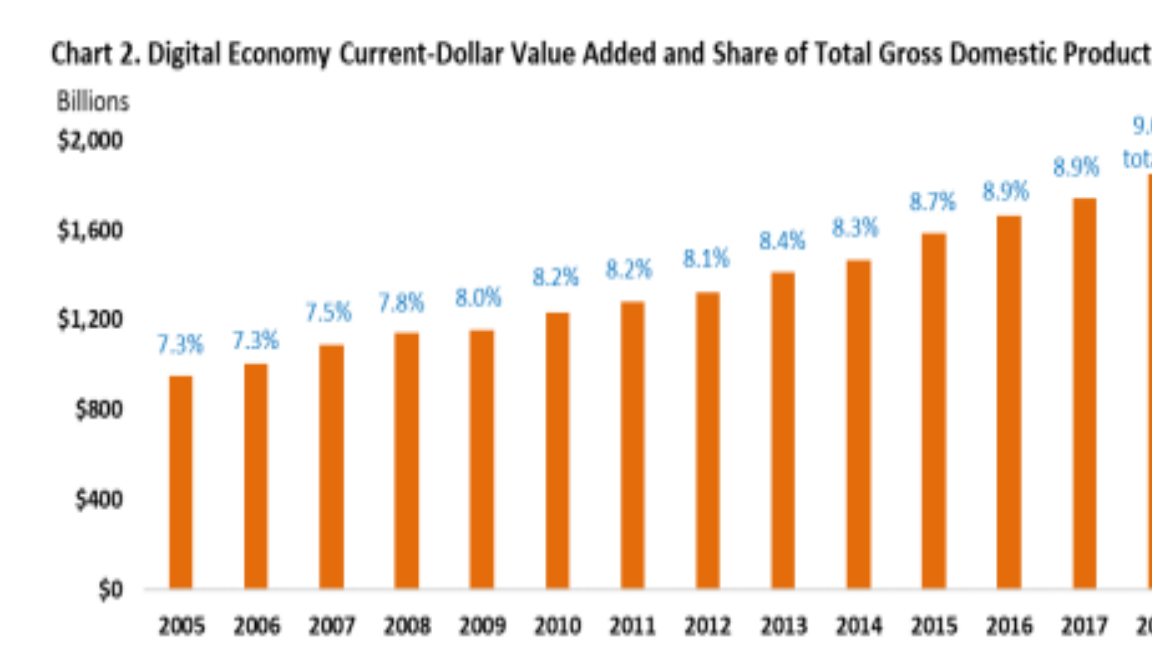
(Malik, 2020)



U.S. SPACE FORCE LAUNCH OF FALCON 9 IN 2020.

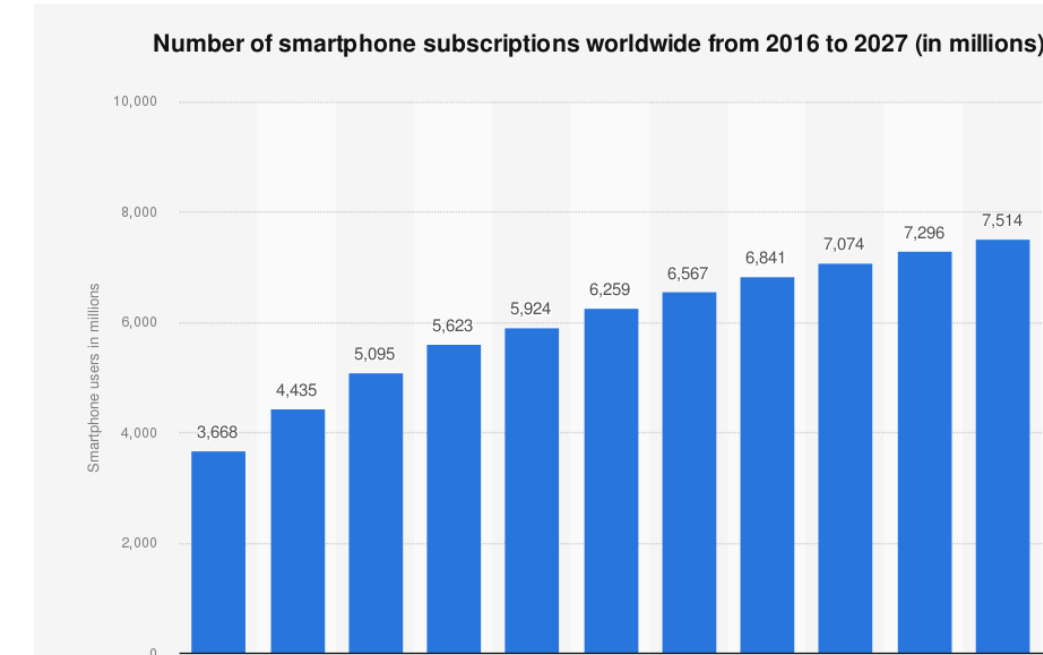
(U.S. Space Force, 2022)

DATA DISPLAYING THE IMPACT OF U.S. RELIANCE ON SATELLITES



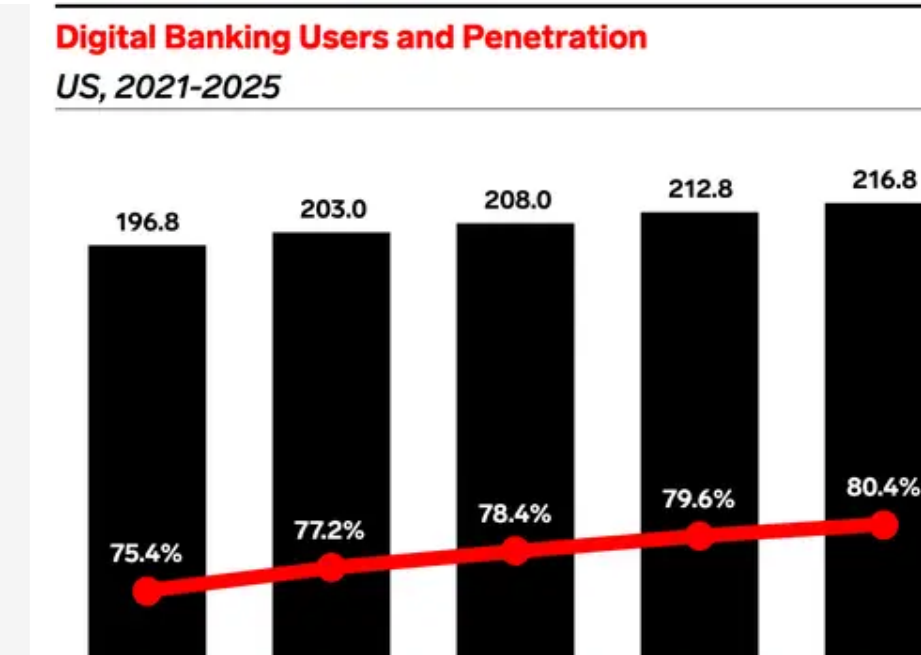
GROWTH OF U.S. DIGITAL ECONOMY FROM 2005-2018

(Nicholson, 2020)



PROJECTED AMOUNT OF SMARTPHONE OWNERS THROUGH 2027

(S. O'Dea & 23, 2022)



PROJECTION OF AMERICANS USING DIGITAL BAKING THROUGH 2025

(Business Insider, 2021)

U.S. Satellites in Orbit

System	Function	Satellites
GPS	Positioning, Navigation, and Timing	31
SBIRS	Missile Warning	9
DSP	Missile Warning	5
SBSS	Space Surveillance	1
STSS-ATR	Missile Defense	1
GSSAP	Space Tracking	4
DNSP	Weather	4
Milstar	Communications	5
AEHF	Communications	6
DCSC	Communications	7
WGS	Communications	10
Total		90

TYPES OF CURRENT ORBITING U.S. SATELLITES AND PURPOSES

(The Heritage Foundation, 2021)

Results and/or Conclusion

RESULTS

As China continues to pose a major national security threat to the United States, the newly developed U.S. anti-satellite weapon system is a gamechanger. As reiterated, the United States is heavily dependent on satellites (particularly the GPS satellite) for economic, communication, and military operations. The new anti-satellite weapon will fire a kinetic weapon to destroy a hostile satellite such as China's Shijian-17 or 21. By achieving this capability, the United States will better protect its satellites, deter China and other hostile nations, but most of all prevent any space borne attacks that would result in major damage to the U.S. economy, military, or overall readiness/stability. The new anti-satellite weapon system will deploy (Operation Fortified Shield) as a perimeter around the main constellation of U.S. satellites.

CONCLUSION

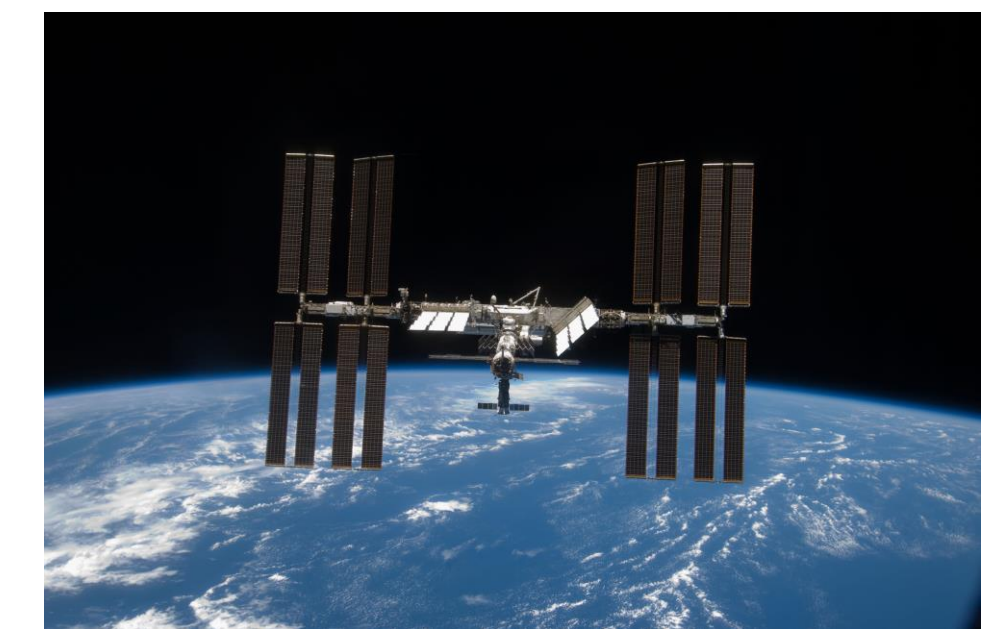
In Conclusion, space is the last untouched theatre of warfare. U.S. Military readiness is not to standard for war in space. China is one of the main national security threats to the U.S. Within a decade, they have developed anti-satellite weapons with the capability to destroy U.S. satellites. As Beijing's military and weapons capabilities, it is inevitable they seek their long-term objectives (such as Taiwan) by any means possible. This means a potential attack on a U.S. satellite. Since the United States is heavily dependent on satellites for daily function, Operation Fortified Shield is a major necessity for the U.S. Space Force. Deploying this system to perimeter the main orbit of U.S. satellites will deter China, but most of all, reduce the risk of a crashed U.S. economy, communications blackout, or undermined U.S. military response capabilities.

OPERATION FORTIFIED SHIELD: DEFENDING U.S. SATELLITES



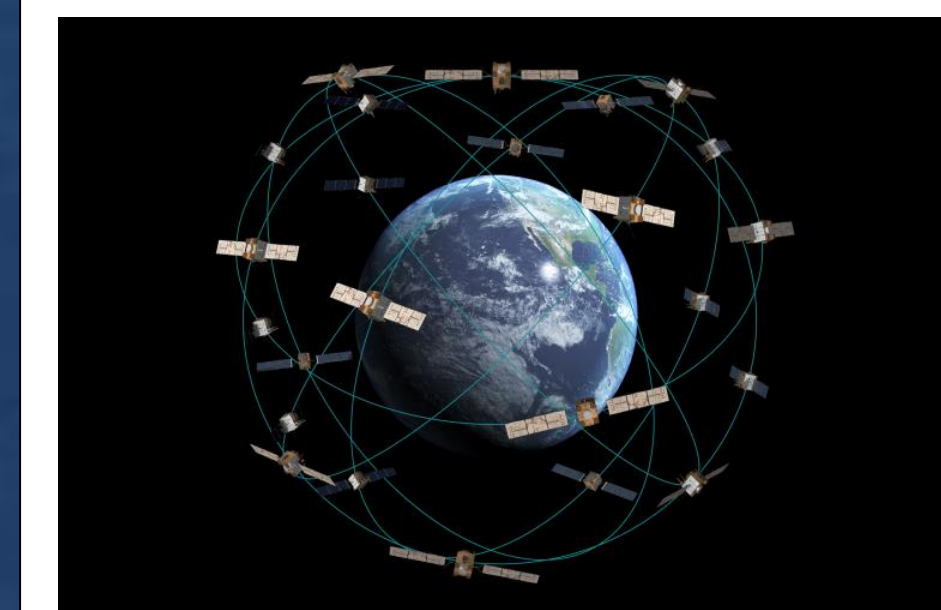
ROBOTIC ARM ON CHINESE SPACE STATION. EQUIVALENT TO ROBOTIC ARMS OF SHIJIAN-17 OR SHIJIAN-21.

(South China Morning Post, 2021)



DESIGN FOR THE U.S. ANTI-SATELLITE WEAPON SYSTEM. MODELLED AFTER ISS (INTERNATIONAL SPACE STATION). FORTIFIED SHIELD WILL BE SMALLER, BUT EQUIPPED WITH MISSILES AND A LASER FOR TARGETING.

(Wall, 2017)



(LEFT) U.S. GPS SATELLITE SYSTEM IN ORBIT. FORTIFIED SHIELD WILL FORM A PERIMETER AROUND, ESTABLISH SECTORS OF FIRE, AND ENGAGE/DESTROY ENEMY SATELLITES, IF NECESSARY.

(Aerospace, 2019)

Future Work

SPACE WARFARE: THE LAST DOMAIN OF COMBAT

- United States Space Force develops a base in space to conduct operations against enemy satellites and/or weapons.
- Further expand upon capabilities to shoot down Intercontinental Ballistic Missiles.
- Study GPS and other satellites on whether they can have weapons installed for defense.
- Develop a permanent "Iron Dome" style defense to protect U.S. satellites from any space-borne attack from hostile nations.

References and/or Acknowledgments

2022. Home. Accessed March 17. <https://www.spaceforce.mil/Multimedia/Photos/igphoto/2002859814/>.
 Brian G. Chow, Brandon Kelley. 2021. "China's Anti-Satellite Weapons Could Conquer Taiwan-or Start a War." The National Interest. The Center for the National Interest, August 21. <https://nationalinterest.org/feature/china%E2%80%99s-anti-satellite-weapons-could-conquer-taiwan%E2%80%99s-start-war-192135>.

ADDITIONAL SOURCES

**BELOW IS THE WORD DOCUMENT WITH THE REST
OF THE BIBLIOGRAPHY**

[Research Week 2022 Bibliography.docx](#)