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Jul. 5, 2023
Defense Intelligence Headquarters
Ministry of Defense, Japan
Reference: C23-0529

China's National Low Earth Orbit Communication Megaconstellation Project "Guowang(GW)"

- On June 9, China launched "Longjiang-3", experimental flat-panel and stackable communication satellites, to help construct a large-scale satellite constellation*1
  -The method to stack the flat-panel small satellites to allow the launch of multiple satellites at once was used by Space X when it constructed a satellite communication network called "Starlink" Note 1
- On March 3, China Academy of Launch Vehicle Technology announced that they were going to use a modified version of Long March 5B to launch the low orbit satellite network *2
  -Long March 5B is a large-scale rocket used to launch the China Space Station's structural component and it has been launched 4 times in total
  -Other prospective candidates include Long March 8 (launched twice in the past) which has the capability of launching multiple satellites. Private company's rockets has also been under development and operational Note 2
- China plans Project "GW," a low orbit broadband communication satellite constellation with a maximum of about 13,000 units*3
  -Satellite internet of "GW" mainly provides the access to the Internet for areas with inadequate terrestrial telecommunications infrastructure. However, competitions such as "Starlink" is present in the areas of prospective clients (domestic, friendly, regions of One Belt One Road) Note 3

⇒ The satellites used in "GW" is likely to be close to "Starlink" in terms of weight and shape given vast amounts of satellites required and the China's domestic development trend of large-scale communication constellation satellites. Also, to construct "GW", it can be assumed that multi-satellite launch at a high frequency using a medium to large-scale rocket will be necessary. However, the prospective rocket does not have the sufficient number of launches in the past*4 and we have to keep an eye on the future launches if they will be successfully done consecutively.

⇒ Although the acquisition of clients and revenues are necessary to retrieve the costs of construction and maintain "GW," the demand from individuals without domestic Internet access, friendly countries, and the One Belt, One Road regions, who are all potential clients, is low. In addition, there is also a possibility that costs will not be recovered sufficiently after completion. Therefore, to maintain "GW," a large amount of capital may be constantly required.

*1 HITSAT (哈尔滨工大卫星技术有限公司), June 9, 2023 *2 China News (中国新闻网), March 3, 2023 *3 "Starlink" planned to deploy about 12,000 satellites by 2027, yet researchers at People's Liberation Army have said that "GW" will be highly likely to finish deploying before "Starlink". Also, the researchers of People's Liberation Army have written in their papers that the "GW" satellites may carry payloads to perform missions such as short-range and long-term monitoring of the US firm SpaceX's Starlink satellite. ("China aims to launch nearly 13,000 satellites to 'suppress' Elon Musk's Starlink, researchers say", South China Morning Post, 2023.2.24) If that is the case, the weight of the satellite can be further increased. *4 The Long March series have rockets that can be used for the launch of SSO (Sun-synchronous orbit) such as Long March 2D, Long March 4C and Long March 6A but is inferior compared to Long March 8 in terms of transportable weight. Another prospective, based on Long March 5B case, is a rocket for space station-related missions or a rocket with a large transportation ability for medium and geostationary orbit. It can be assumed that these rockets will be used to launch "GW."

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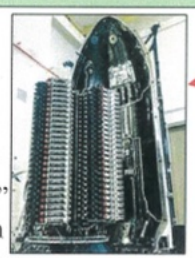
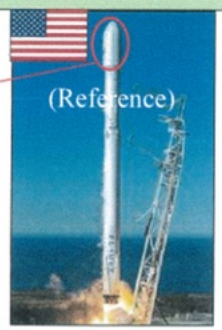
Note 1, Note 2 Comparison of Rocket Launch (Reference)

"Starlink (V.1.5)" satellite loaded in a **stacked** state (Weight 310 kg)





Rocket Name	Falcon 9 (Space X)	Long March 5B	Long March 8
Payload	22,800kg(LEO)	25,000kg(LEO)	5,000kg(SSO)
Number of Satellites for Launch *5	Around 50 satellites	Maximum of 80 satellites	Maximum of 16 satellites
Launch Track Record	About 230 times *6	4 times	Twice
Remarks	"Starlink" is also planned to be launched with the next generation rocket "Starship"	In a previous launch, there was a problem where the core stage fell uncontrollably	Whether it will be used in "GW" or not is unknown. It is able to launch multiple rockets simultaneously. Planned to be launched 50 times yearly in the future

*5 The value of Chinese rockets is estimated assuming the "GW" satellites are the same weight as Starlink (V.1.5)
*6 Numbers of successful launch(Falcon Heavy excluded.)

Source material: Space X website, China National Space Administration website, China Academy of Launch Vehicle Technology website and others

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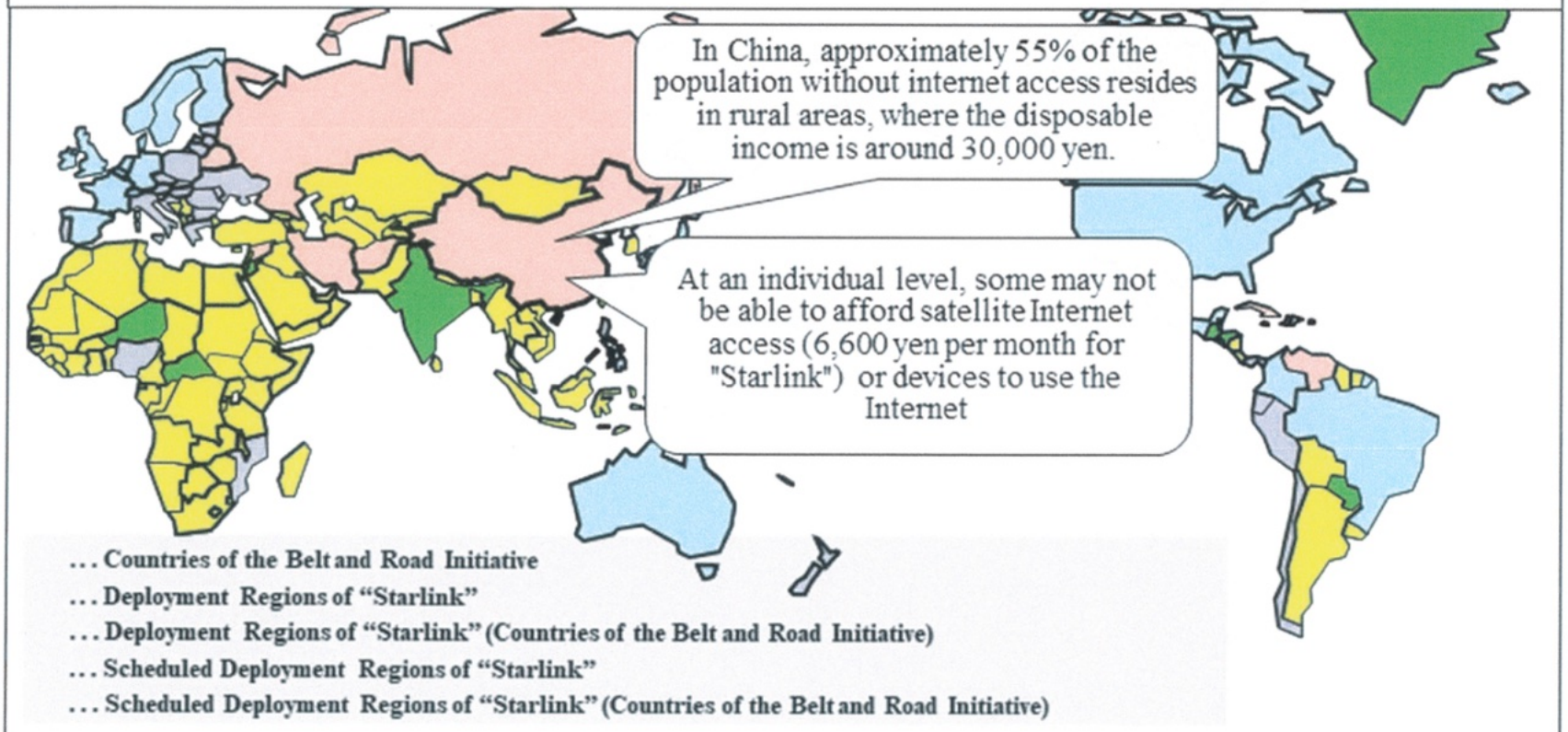
ote 3 Prospective Clients of "GW" Domestically and Internationally (The Possibility of Competition with "Starlink")

- Countries in **light red** indicate "GW" and "Starlink" would not compete. Countries in yellow and purple indicate "GW" and "Starlink" might compete. However, among the **light red** countries, Russia and Iran have their own satellite internet plans



Source material: Starlink website (checked on June 29 2023), the 51st Statistical Report on Internet Development (March 2023), National Bureau of Statistics of China (checked on June 27th 2023) and others

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North Korea Launched Solid Fuel Missile Hwasong-18
- Possibly Demonstrating Progress in Nuclear Deterrence against the U.S. by Achievement of Solid-Fuel ICBM's Provisional Flight Range of 15,000 km -

- On 13 July, Rodong Sinmun reported that Kim Jong-un guided the test launch of the new-type ICBM "Hwasong-18" (solid-fuel) on the 12[Note 1, 2]
  - The test was aimed at reaffirming the technical creditability and operational reliability (Warning for adversaries (the U.S. and South Korea) of the risk and recklessness of military options)
  - January 2021, Kim Jong-un mentioned development promotion of ground-launched solid-fuel ICBM at the Eighth Party Congress [Note 3]

⇒ From the flight range and altitude of said launch, both liquid-fueled and solid-fueled achieved a provisional range of 15,000 km (likely)[Note 4]

⇒While the U.S. and South Korea have intensified pressure, North Korea test launched "Hwasong-18" reaffirming the technical and operational reliability of its missiles and demonstrating the progress of its nuclear war deterrence with strategic nuclear weapons. By portraying the launch as a success at the military parade (27 July), North Korea intended to restore the prestige that had been lost due to the failure of their satellite launch, and to curb pressure from the U.S. and South Korea (possible)

⇒ As this year marks the third year of the five-year plan for the development of the defense science and the weapon system as well as the year of 70th commemoration of Korean War victory and 75th for national foundation, North Korea will continue to speed up the process to realize the plan with (1) development, production and deployment of arms such as ballistic missiles loading nuclear warheads and (2) promoting launches of arms such as ballistic missiles for feature testing (likely)

Note 1 North Korea's report regarding said launch (summary) (Korean Central News Agency July 13, 2023)
- Kim Jong-un guided the test launch of ICBM "Hwasong-18" - A part of the efforts to bolster the just right of self-defense to thoroughly deter the dangerous military moves of hostile forces - The current situation, in which the U.S. and south Korea's frantic confrontational attempts are nearing an intolerable critical point, requires the DPRK to put spurs to bolstering the capability for strengthening the nuclear war deterrence for self-defense - The test launch was aimed at reaffirming the technical creditability and operational reliability of the new ICBM weapon system (It serves as a strong practical warning to clearly show the adversaries the unwavering will to overwhelmingly counter them and the entity of physical strength, and to make the enemies clearly realize how risky and reckless their anti-DPRK military options.) - The test launch had no negative effect on the security of neighboring countries - The missile travelled up to a maximum altitude of 6648 km, flew a distance of 1001.2 km for 1 hour 14 minutes 51 seconds before accurately landing on the preset area in the open waters off the Sea of Japan - Expressing great satisfaction over the test results, Kim Jong-un requires more intense efforts to implement the line of bolstering nuclear war deterrent set forth by the Eighth Party Congress - Kim Jong-un extended warm congratulations and thanks to all the scientists and technicians in the national defense scientific research field who made a history of eternal victory for the times and future through the great success in the test of new strategic weapon system ahead of the 70th anniversary of the significant day of war victory

Note 2 Announcement regarding said launch by Ministry of Defense and ROK's Joint Chiefs of Staff (Main points)
- According to Ministry of Defense, 1 ICBM-class ballistic missile was launched from outskirts of Pyongyang in the East direction at around 09:59 on the 12. Flight distance was approximately 1,000 km, maximum altitude is estimated to surpass approximately 6,000 km (Ministry of Defense website July 12, 2023) - ROK's Joint Chief of Staff announced that at around 10:00 on the 12, they picked up a long-range ballistic missile that was launched from the Pyongyang area to the Sea of Japan. They also announced that the ballistic missile was launched at a high angle and after flying for about 1,000 km, and landed in the Sea of Japan (Yonhap News Agency July 12, 2023)

Note 3 The weapons Kim Jong-un mentioned regarding the weapons development policy at the Eighth Congress Party ("Five-year plan for the development of the defense science and the weapon system")	
Solid-fuel ICBM	Moving forward with the plan of solid-fuel ICBM development for both in water and on land
ICBM	Enhancing nuclear first strike and retaliatory strike capabilities by further improving the accuracy to strike and wipe out any strategic target within a 15,000 km range

Note 4 Launch case of over 15,000 km provisional flight distance (After 2022)			
Date	Flight range	Altitude	Type of projectile
March 24, 2022	1090 km	6248.5 km	Hwasong-17 (Liquid-fuel) (Possible that ballistic missile launched on March 24, 2022 was Hwasong-15)
November 18	999.2 km	6040.9 km	
March 16, 2023	1000.2 km	6045 km	
July 12	1001.2 km	6648.4 km	Hwasong-18 (Solid-fuel)

*All flight distance/altitude cited from announcement of North Korea.