



# CHINA'S ASAT PROGRAMME: SHOOTING BEYOND LEO

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China is reported to have tested its anti-satellite weapon once again and it is the 3<sup>rd</sup> test with the DN-3 launcher.<sup>1</sup> It last carried out a successful test in December 2016. In the recent test, the missile was launched from the Jiuquan Satellite Launch Centre and was reported to be a failure as the booster vehicle malfunctioned in the upper atmosphere.<sup>2</sup> Despite China's public position against militarising outer-space it continues to develop counter-space capabilities.

Like earlier times, the recent test was also reported by US sources and not by China. China has always been secretive about its ASAT projects and there is hardly any official statement on the tests. Most of the ASAT tests are either conducted in the name of BMD tests or high altitude scientific experiments. However, from time to time they have indirectly let the world know about their capability in this area.

As per reports the recent test involved the use of the Dong Neng-3 missile. The DN-3 direct ascent missile is a relatively new vehicle that is

being tested for the third time. The earlier ASAT test with the missile was carried out in 2015<sup>3</sup> and 2016 under the garb of anti-ballistic missile test. However, foreign observers, particularly the United States, identified it as ASAT going by the trajectory and other parameters.

China's asymmetric counter intervention strategy and their equipping trend are well known. Among many, ASAT weapons are seen as key systems in their asymmetric arsenal. The primary drive towards this is due to the overwhelming dependence of its potential adversaries on space based elements to conduct military operations. Degrading or destroying those space assets would mean weakening the enemy's war fighting potential to a significant extent. For instance the US operates 27 GPS satellites at present.<sup>4</sup> Even if China manages to destroy half a dozen or more of these satellites in the GPS constellation, it would degrade the performance of the GPS and would result in reduced accuracy. This would severely hamper US precision and stand-off strike capability since

most of its weapons and platforms depend on accurate real-time GPS updates. Hence, ASAT capability will act as a major deterrent against its potential adversaries.

At present, China has considerable capability to shoot down satellites in low earth orbit (LEO) where mostly earth observation satellites (weather and military surveillance) are placed. This capability has been proven several times since 2005 and in 2007 China demonstrated it to the world by destroying its own satellite (FY-1C) at an altitude of around 850km.<sup>5</sup> It is to be noted that all the LEO test firings were conducted using the SC-19 which is believed to have been derived from PLARF's DF-21 medium range ballistic missile (MRBM). This launcher might be the designated vehicle for LEO.

The significant aspect of the recent test is the use of the DN-3 ascent vehicle which, unlike other missiles is designed to target ballistic missiles and satellites orbiting beyond the LEO trajectories. The DN-3 is capable of knocking out Navigation (GPS) satellite in the MEO and early warning satellites.<sup>6</sup> China has been for some time actively pursuing the capability to target satellites in higher orbits. China's programme to develop these systems came to light in May 2013 when it tested the DN-2 for the first time under the cover of a scientific experiment.

The DN-3, in comparison to the DN-2, can reach even higher altitude and is believed to be

based on the new KZ-11 mobile space launch vehicle. The rocket, as claimed by China, is a commercial launch vehicle that will be used to launch satellites at short notice. In fact, the rocket has also been doubled up as a satellite killer boost vehicle. But unlike usual launch vehicles, the K-11 is a three stage – all solid fuel – mobile missile believed to be based on the DF-31 ICBM. The K-11 can put a one tonne satellite in a sun-synchronous LEO orbit.<sup>7</sup>

China, as per data available in the open source, appears to be the only country at present that has a secret and active program to develop systems to knock out satellites at higher orbits like MEO and beyond. There is also a speculation that China is developing another all solid fuelled, mobile rocket named KZ-21 which is even more powerful and that it is based on the DF-41 ICBM.<sup>8</sup> The K-21 booster, which is speculated to be under development might be the missile based on this mobile ICBM. With the DN-3 and possibly the future K-21 China will have the capability to shoot down satellites placed at all orbits. This would mean that, during times of conflict, China can cripple the adversary's C4ISR system, putting most of their weapon systems out of use or making it less effective.

It is very obvious that China has been consistently modifying its proven ballistic missiles to boost ASAT vehicles. The SC-19, DN-2 and DN-3 are an indication of China's strong link between the commercial and military programme. The achievements of China's civilian

space programme are benefitting their military projects and vice-versa. Moreover, their BMD and ASAT programmes are also closely linked.

There is only a slight difference between a missile defence and an ASAT system and that lies in the trajectory of the intercepting vehicle and the speed of the target. In fact, a satellite is a far easier target as unlike ballistic missile interception where tracking is difficult, a satellite is relatively easy to track and target owing to its large RCS, electromagnetic emissions and standard trajectory pattern. In addition, even present generation satellites have not been built to deal with this eventuality; i.e. they are not manoeuvrable, nor are they built with other active and passive counter measures.

Apart from direct ascent vehicles, China is also developing parasitic micro-satellites that could be used to disable or destroy satellites.<sup>9</sup> There are also passive systems like laser weapons that can be used to blind optical sensor equipped earth observation satellites in the LEO.<sup>10</sup> As discussed above China now possibly has the capability to target satellites in the Low Earth Orbit; it is also developing and testing booster vehicles to target satellites in the MEO and geo-synchronous orbit. However, targeting satellites in the MEO and higher would be comparatively difficult as it takes considerable time for the launch vehicles to reach such altitudes providing the enemy considerable reaction time to take defensive action; satellites

in the LEO do not enjoy such advantages and hence are more vulnerable.

Looking at the extensive development work for anti-satellite capability – which includes a variety of techniques – it is obvious that China gives very high priority for the development of such systems. China is also developing cyber capability to cripple the adversary's military data processing and relay infrastructure. It is to be noted that China in the recent past created the new Strategic Support Force that will coordinate space, electronic and cyber operations.

*(Disclaimer: The views and opinions expressed in this article are those of the author and do not necessarily reflect the position of the Centre for Air Power Studies [CAPS])*

### Notes

<sup>1</sup> “China Carries Out Flight Test Of Anti-Satellite Missile”, <http://freebeacon.com/national-security/china-carries-flight-test-anti-satellite-missile/>, 2 August 2017

<sup>2</sup>ibid

<sup>3</sup> “China Tests Anti-Satellite Missile”, <http://freebeacon.com/national-security/china-tests-anti-satellite-missile/>, 9 November 2015

<sup>4</sup> “Space Segment”, <http://www.gps.gov/systems/gps/space/>, accessed on 18 August 2017

<sup>5</sup> “China’s Anti-Satellite Test: Worrisome Debris Cloud Circles Earth”, <https://www.space.com/3415-china-anti-satellite-test-worrisome-debris-cloud-circles-earth.html>, 2<sup>nd</sup> February 2017

<sup>6</sup> “中国击落 GPS 卫星也没用美军 95 分钟内可找到备用装备”, <http://mil.news.sina.com.cn/jssd/2017-07-12/doc-ifyhwefp0619832.shtml>, 12 July 2017

<sup>7</sup> “Kuaizhou KZ-11”, [http://www.b14643.de/Spacerockets\\_1/China/Kuaizhou-11/Description/Text.htm](http://www.b14643.de/Spacerockets_1/China/Kuaizhou-11/Description/Text.htm), accessed on 19 August 2017

<sup>8</sup>ibid

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<sup>9</sup> Gregory Kulacki and David Wright , “A Military Intelligence Failure? The case of the Parasite satellite”, Union of Concerned Scientists, 16 August 2004 available at :  
[http://www.ucsusa.org/sites/default/files/legacy/assets/documents/nwgs/parasite\\_satellite\\_8-17-04.pdf](http://www.ucsusa.org/sites/default/files/legacy/assets/documents/nwgs/parasite_satellite_8-17-04.pdf)

<sup>10</sup> Chinese Anti-Satellite [ASAT] Capabilities, <http://www.globalsecurity.org/space/world/china/asat.htm> , accessed on 19th August 2017

