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Augmenting India's Indigenous Ballistic Missile Defence: An Analysis

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On July 24, 2024, India's Defence Research and Developmental Organisation (DRDO) successfully tested the second phase of the Ballistic Missile Defence (BMD) System. The press release from DRDO stated that "the target missile was launched from LC-IV Dhamra… mimicking adversary Ballistic Missile, which was detected by weapon system radars deployed on land and sea and activated the AD Interceptor system."[1]

The successful test of the Phase-II Air Defence (AD) endo-atmospheric missile is a testament to India's growing Indigenous BMD capabilities. The milestone demonstrates India's progression in BMD.

The Test

The press release specified that the test was conducted through the Phase-II AD endo-atmospheric missile, which intercepts ballistic missiles of the 5,000 km class. This two-stage, solid-propelled, ground-launched missile system intercepts and destroys threats in the endo- to low exo-atmospheric regions.[2] This was the second test of Phase-II AD, the first of which was conducted on November 2, 2022.[3] Phase-II AD instrumentalises AD-1 interceptor missile. While the first test of the AD-1 missile in 2022 was undertaken to cross-check the indigenously developed advanced control systems, navigation and guidance algorithm, the July 2024 test essentially validated the land and sea AD interceptor system. The test is also an important milestone as it passed the need for a "complete network centric warfare weapon system"[4] primarily consisting of long-range Sensors, a low-latency communication system and Missile Control Centre (MCC), and an Advanced Interceptor missile. Long-range sensors are essential for both the detection and tracking of threats. Phase-II AD uses the indigenously developed Swordfish Long Range Tracking Radar (LRTR), which has a reported detection range of 1,500 km.[5] The test has referred to a low-latency communication system, primarily hinting at the use of Low Earth Orbit (LEO) for guidance.

A Step in the Right Direction: From Phase I to II

India conducted its first BMD system test in November 2006, deploying the Prithvi Air Defence (PAD) missile against the Prithvi-I missile.[6] Since then, under the Phase-I programme, India has developed PAD missiles that can intercept incoming missiles at a range of about 80 km. The Phase-I programme also has an Advanced Air Defence (AAD) missile for 15-25 km altitudes. India's BMD

programme is based on two levels: endo-atmospheric and exo-atmospheric. Phase I of India's BMD is developed while keeping the interception of missiles at the endo-atmospheric level. In 2017, the DRDO tested the Prithvi Defence Vehicle (PDV) interceptor missile to augment its BMD capabilities.[7] To further enhance endo-atmospheric capabilities, the DRDO in 2018 conducted the test of the indigenously developed and built Advanced Air Defence (AAD)/Ashvin Advanced Defence interceptor missile.[8] The AAD missiles are terminal phase interceptors meant to intercept missiles once they re-enter the earth's atmosphere. The 2018 test was a significant milestone, as it was conducted against the multiple electronically simulated dummy warheads designed as decoys by employing a new indigenous imaging infrared (IIR) seeker. The Phase-II BMD deals with the exo-atmospheric level. The development of PAD and PDV is done from the point of view of mid-course interception. The AAD essentially helps in developing the Phase-II BMD.

Countering a Two-Front Threat

The Phase-II BMD test is a significant step in countering the two-front missile threat from Pakistan and China. The Phase-I BMD can intercept missiles with a range of less than 2,000 km, such as Pakistan's Ghauri and Shaheen and China's Dongfeng-21 (DF-21). The Phase-II BMD has the capability to defend against missiles with ranges up to 5,000 km. Once deployed, the Phase-II BMD will enable India to counter missiles such as China's DF-26. This development, coupled with the deployment of the S-400 Triumf, significantly enhances India's air defence capabilities against its adversaries. More importantly, the ability to deal with projectiles at the exo-atmospheric level demonstrates India's stand-off power projection and helps in damage limitation.

Conclusion

India's BMD programme is on the right course of action, though additional tests are required to augment its defensive capabilities. The Phase II BMD programme helps augment India's defence for two reasons. One is related to a prospective collusive two-front missile threat that India faces from Pakistan and China. The second is to reduce the vulnerability of reliance on foreign assistance. On October 3, 2023, the Chief of Air Staff Air Chief Marshal V R Chaudhari mentioned the challenges in the timely delivery of Russia's S-400.[9] The delay in the delivery of the S-400 air-defence missile system due to the ongoing Russia-Ukraine war essentially points to the problem of relying on foreign countries for paramount security needs. More importantly, as India seeks to enhance its indigenously developed long-range air defence system under 'Project Kusha,'[10] which was first

approved by the Cabinet Committee for Security in May 2022 and later accorded Acceptance of Necessity (AoN) status, it will certainly benefit from the lessons learned from Phases I and II and will help India further its defence.

NOTES:

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[9] Smruti Deshpande, "IAF's Rs 3 lakh crore Made-in-India shopping list— 97 fighter jets, 156 LCHs, Sukhoi upgrades," *The Print,* October 3, 2023, https://theprint.in/defence/iafs-rs-3-lakh-crore-made-in-india-shopping-list-97-fighter-jets-156-lchs-sukhoi-upgrades/1788440/. Accessed on July 28, 2024.

[10] Smruti Deshpande, "'Desi' S-400: All about Project Kusha, India's very own long-range air defence system," *The Print,* October 31, 2023, https://theprint.in/defence/desi-s-400-all-about-project-kusha-indias-very-own-long-range-air-defence-system/1826664/. Accessed on July 28, 2024.