REPORT

ROUND TABLE DISCUSSION

ON

EVOLVING DRONE THREATS AND THE FUTURE OF INTEGRATED AIR & MISSILE DEFENCE SYSTEMS

17 SEP 2025 AT CHANAKYA HALL, CLAWS

Rapporteurs

Anjali, Research Assistant, CLAWS

Executive Summary

Evolving Drone Threats and the Future of Integrated Air & Missile Defence Systems

1. The battlefield landscape is rapidly transforming with the proliferation of drones and swarm drone technologies, posing increasingly complex challenges to traditional air defence frameworks. These unmanned aerial systems, especially in altitudes below 3000 meters, are disrupting land, air, and naval operations in contested environments, including critical littoral zones. In response, Integrated Air and Missile Defence (IAMD) systems must evolve to maintain air superiority, protect vital assets, and adapt to emergent warfare dynamics. This report summarizes the findings from a Round Table Discussion (RTD) held on 17 September 2025 at Chanakya Hall, CLAWS, which brought together subject-matter experts to deliberate on strategic, technological, and operational responses to these evolving threats. The **themes and topics includes :**

a. Evolving Threat Matrix from Drones and Swarm Drones

This theme focused on the revolutionary impact of drones on ground warfare and the associated challenges they pose. Modern drones enhance battlefield awareness, facilitate precision targeting, and support logistical operations, significantly altering operational tempo and threat environments for ground formations. The deployment of autonomous and remotely piloted systems intensifies the need for advanced sensor networks, robust counter-UAS tactics, and integrated electronic warfare capabilities. Critical challenges discussed include the detection and engagement of low radar cross-section (RCS) targets, minimizing collateral damage, and integrating unmanned aerial system defence protocols within tactical battle spaces—especially at altitudes under 3,000 meters. The discussion further explored the emerging menace of swarm drones in contested airspace, highlighting the sophisticated AI-driven coordination, saturation attack capabilities, and survivability mechanisms that complicate their countering within existing air defence architectures. Additionally, challenges posed by unmanned underwater and surface vehicles were examined, emphasizing their

role as both threats and tools for maritime intelligence, surveillance, and reconnaissance (ISR) in littoral waters.

b. <u>Integrated Air and Missile Defence (IAMD): Challenges and Future Architectures</u>

The second theme dealt with revitalizing ground-based air defence to counteract the increasingly diverse aerial threat spectrum encompassing drones, missiles, and multi-domain adversaries. Emerging strategies advocate for multi-layered defence frameworks that synergize short-, medium-, and long-range interceptors integrated with sensor grids enhanced by AI-driven threat identification. The discussion highlighted the growing importance of tri-service integration across the Army, Navy, and Air Force to realize unified airspace coverage and dynamic real-time threat interception, particularly in littoral and tactical battle zones. Advancements in sensor fusion, command and control system modernization, and resilience against saturation attacks from drone swarms were core points. The session underscored that India's air defence architecture must continue evolving to incorporate next-generation technologies, seamless interoperability, and intelligent automation aligned to future threat projections.

2. <u>Additional Insights and Recommendations :</u>

The RTD recognized significant gaps in indigenous drone and counter-drone technology ecosystems and emphasized the need for standardization of drone platforms, development of dedicated drone warfare doctrines, and expansion of drone platoons at tactical levels with specialized training. Effective command and control restructuring was urged to integrate real-time drone data while preventing decision-making bottlenecks or overload. Counter-drone responsibilities should be centralized under specialized air and missile defence units to enhance operational focus and efficiency.

For counter-UAV technological advancement, the importance of investing in robust detection technologies (such as next-generation radars operating in K-band and Doppler frequencies), autonomous interceptor drones, and directed energy weapons (including high-power lasers with adaptive optics) was stressed, alongside the creation

of dedicated test ranges for validating emerging systems. Cybersecurity and quantum-safe communication infrastructures were identified as critical components for future resilience.

In the maritime domain, the emergence of unmanned underwater vehicles (UUVs) introduces new strategic and operational complexities. The report highlights the necessity of integrated UUV defensive and offensive doctrines, rapid domestic technology ecosystem development, secure underwater communication protocols, and robust resilience planning for subsea infrastructure protection.

Multi-layered ground-based air defence modernization calls for layered protection around manoeuvre units, data-centric battlefield management systems leveraging AI/ML models, and enhanced multi-service command and control frameworks. Civil-military coordination and incorporation of hybrid and asymmetric threats, including low-signature drone attacks on logistic hubs and civilian infrastructure, remain imperative.

Annexure 1: Programme Schedule

PROGRAMME

Time (h)	Topic	Speaker
1000 - 1010	Opening Remarks	Lt Gen Dushyant Singh, PVSM, AVSM (Retd), DG CLAWS
1010 - 1100	**Theme 1 – Evolving Threat Matrix from Drones and Swarm Drones**	**Moderator – DG CLAWS**
	Drones a Ground Warfare Perspective	Maj Gen Pankaj Saxena, VSM
	Countering Swarm Drones in Contested Airspace	Air Marshal Gurcharan Singh Bedi, AVSM, VM, VSM
	Unmanned Underwater Systems as Threat and Counter-Measure	Rear Admiral Mohit Gupta VSM (Retd)
1100 - 1140	**Theme 2 – Integrated Air and Missile Defence (IAMD): Challenges and Future Architectures**	**Moderator – ADG CLAWS**
	Revitalizing Ground Base Air Defence	**Lt Gen (Dr) V K Saxena, PVSM, AVSM, VSM (Retd)** (Former DG, Air Defence, Indian Army, Higher Defence Analyst)
	Evolving Integrated Air and Missile Defence (IAMD): Multi-Layered Strategies, Sensor Fusion, and Tri-Service Coordination Against Modern Aerial and Missile Threats	**Lt Gen AP Singh, AVSM (Retd)** (Ph.D.) (Director General and Colonel Commandant Army Air Defence)
1140 - 1150	Q&A	
1150 - 1200	Concluding Remarks	DG CLAWS