

EMS CAPABILITY DEVELOPMENT STRATEGY FOR MILITARY DOMINANCE: INDIAN JOINT FORCES

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Abstract

*The two major technology disruptions which have impacted militaries all over the world are **convergence of compute and communications and high data rate communication capability from wired to wireless domain**. The erstwhile Combat Net radios, which were the only means of exercising Command and Control, are now getting replaced by Software Defined Radios, 4G/5G mobile communications, high bandwidth capable Satellite handsets with inbuilt information processing capability for Navigation, Decision Support and military utility applications. This has resulted in major enhancements in Mobility, precision, battlefield transparency, shared situational awareness and overall Shortening of OODA loop.*

If UAV/ drones have revolutionised warfare, then the backbone of this revolution is EMS domain. From a spectrum perspective, all flow of information takes place in the EM Spectrum, which has expanded, from HF/ VHF to the extremities of Light Waves. Therefore, denial of spectrum to adversary, control of vital Info flow, electromagnetic sovereignty and extraction of vital data and intelligence from spectrum have become synonymous with national power. In other words, spectrum has become a domain of warfare as is evident from organisation changes carried out

by leading armies of the world. The Electromagnetic Spectrum (EMS) aspects need to be understood from Indian defence forces context in conjunction with existing pillars of our information philosophy.

EM Spectrum: Key aspects

Spectrum Joint Force. Spectrum has emerged as a premium and expensive resource on which not only defence forces, but our National Critical Infrastructure is also relying. The high cost of spectrum is indicative of the information potential of this resource. Protection and management of this national resource for own use and denial of this resource to adversary therefore needs a consideration from a national perspective. While Army, Navy and Air Force were raised to protect our land, sea and air domains, EM Spectrum domain requires a force, which holistically looks at protection of National Information Infrastructure including defence. Therefore, there is an urgent need to create a separate specialist force for protection, management and denial of EM Spectrum domain. Creation of PLASSF is a step taken by China, which meets this emerging requirement.

Military Civil Fusion. The uniqueness of EMS domain is that there is a large relevance in not only military but also in civil domain. It cuts across the three services and has major implications in internal security also. The technical advancements carried out by India need to be synergised for creating EMS sovereignty. For achieving this capability, creation of an umbrella organisation which channelizes R&D, Academia, Industry and Military is imperative at National level.

Spectrum Evolution. The rapid expansion of use of spectrum has impacted counter capability requirements to be developed at a much faster pace. For full spectrum degradation capability, modern forces need capability against Communications, Radars, Mobiles, GNSS, Satellites, UAV/Drones and any other EM emission used by the adversary. In addition, development of Strategic Counter Space capability needs focus.

Space Domain. Leading powers have invested heavily in developing

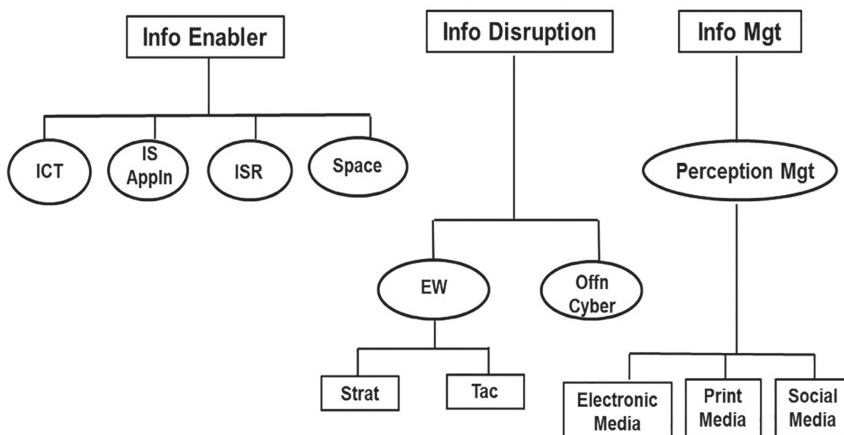
Space capability, which enhances C4ISR, IMINT, Navigation and Synchronisation signals for networks. Space provides a global reach besides overcoming terrain and weather challenges. Developing Space degradation capability through non-attributable EMS capability will be appropriate **asymmetric solution** particularly for our Northern adversary.

Cyber EMS Convergence. The convergence of computer and communication in Software Defined Radio, mobile and emerging technologies opens up new challenges and opportunities in EMS domain. Cyber vulnerabilities in wireless domain will require new skill sets and upgradation in EMS capabilities. Answer to counter unmanned systems also lies in building converged cyber and electronic warfare capabilities.

EMS Capability Development Strategy

Information Domain. In Indian context, akin to the trilogy where we have concept of Creator, Preserver and Destroyer, the logical grouping and categorisation of Information domain needs to be on **Info Enabler**, **Info Disruption** and **Info Management** capability. The relevant emerging

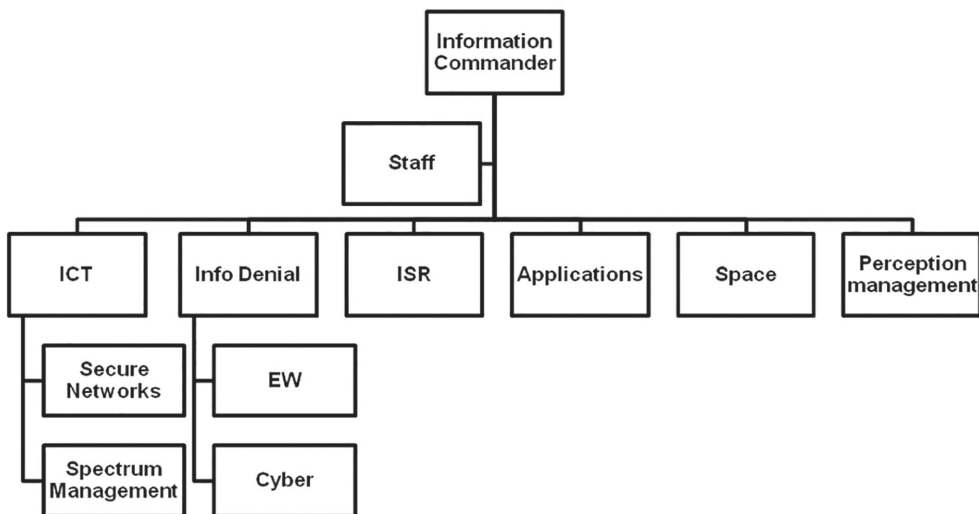
INFO DOMAIN



technologies can be grouped under these three verticals as under :-

EM Spectrum Framework. In order to build a national EMS capability, it is important that there is seamless exchange of spectrum intelligence exchange between national agencies and field formations. This capability is recommended on lines of Geo Intelligence framework. The huge spectrum intelligence gathering capability of field units can be utilised by multiple agencies through this framework. This will also facilitate in removing overlaps in multiple agencies undertaking similar spectrum related tasks but also overcome the technology challenges faced by field formations.

Information Command. In the backdrop of Info and EMS emerging as key domains of national importance, it will be prudent to consider creation of an Information Command as umbrella organisation for the defence forces addressing the emerging challenges and futuristic requirements of armed forces. This command under the CDS can be the bridge between National and Defence Information agencies. This will also address the requirement of umbrella organisation for Military Civil Fusion besides creating strategic counter capabilities. All Information enablers (ICT, ISR and Space), Information disabler (EW and Cyber) and Information Management (PM) to come under this organisation for synergistic development and application of National Info Warfare. This organisation can be a separate force on lines of PLASSF with leadership having exposure and understanding of Cyber and EW issue. The organisation and structures pertaining to Info domain in Operational Joint Theatre Commands can be modelled on similar lines. This will be imperative for ensuring seamless communications and protocols for inter and intra joint theatre commands as and when these are implemented on ground. Suggested structure of Information command is as under :-



Military Information Service. Information and EMS domain requires a specialisation oriented de novo look at HR management. Application of Kinetic warfare templates on this domain will be counterproductive. In view of the limited HR availability and major capability thrust required to create and sustain evolving defence information infrastructure, there will be a requirement to induct non-combatants for effective management of the backend infrastructure and processes. This will enable combatants to handle the EMS challenges in combat zone. Creation of a non-combat **Military Information Service** under the Information Command will be a step in right direction. This will assist in not only taking on backend Information domain tasks but also bring Military Civil Fusion to a logical conclusion.

Information Security. The high capacity data transfer capability shift from wired to wireless has brought to fore the requirements of over the air security protocols. Security development and testing agencies need to find de novo solutions for this evolving dimension, else defence forces will be left behind in exploitation of wireless capacities which have huge

potential and applications in military domain. Moreover, in a joint force concept, interoperability will hinge on seamless information security.

Spectrum Management. One of the key areas which will gain importance will be smart spectrum sharing and management technologies. The demand for this premium resource from multiple agencies is going to increase by the day. Evolved solutions will facilitate a collaborative and deconflicted spectrum usage philosophy. R&D in this domain will pay rich dividends in future. EMI/EMC aspects will also gain prominence with enhanced density of emitters and intense dependence on EM radiations by multiple stake holders in combat zone. Expertise in combat zone spectrum management is a requirement which is on the anvil.

Software Defined Radio. Indigenous SDR waveforms and security solution is imperative for command, control and ISR of our joint force. Success of future information predominant conflicts will hinge on these critical technologies. It is important that jointness is achieved at development stage for smooth interoperability in joint operational scenario.

Mobile Technologies. The form factor, processing capability, data capacity and multi utility applications of mobile segment has direct relevance in military domain. Somehow, in absence of a military grade mobile technology with inbuilt Electronic Protection features, this high utility,relatively low cost technology has not been exploited for military purposes. It is time this challenge is thrown open to industry to make this technology available to military for C4ISR in a contested EM space in the form required. This will be a good alternative to SDR technology since, infrastructure for creating military mobile in Indian context with non-expansionist ideology is relatively easy to implement.

Decoupling Dependence on China. It is important that industries in ESM domain decouple their dependency on China. Recent efforts towards indigenisation and creation of fab manufacturing facilities are steps in right direction. However, our hardware manufacturing has to

quickly match up to the emerging large scale EMS requirements, which are increasing by the day. .

Training Transformation. In order to leap frog in EMS domain, there will be requirement of training transformation. While the leadership has to adapt to hybrid approach of handling kinetic and non-kinetic domain, the execution has to adopt a specialisation approach. Multinational collaboration and cooperation will be key for a faster transition. Collaboration based on core strength, infrastructure sharing, common training protocols need consideration.

Conclusion

The evolving global conflict scenario indicates a clear shift from pure kinetic to hybrid warfare where info and EMS has gained importance. Since this domain is common to not only the three services, but affects National Information Infrastructure it is important that EMS domain be viewed from that perspective. Nation states with ability to synergise all stakeholders of this domain have better probability of success in dominating EMS space.

The solution space for EMS dominant conflict lies in finding indigenous, simple workable solutions. The ever evolving technology poses challenges of fast obsolescence and high cost. Tendency to run after every new technology needs to be curbed. It is proven that only robust and tested EMS solutions withstand the rigours of combat communications. Therefore, development of smart indigenous EMS eco system which meets interoperability and jointness requirements is need of the hour. Organisation, structures and training need to be put in place for facilitating the same.

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