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Issue Brief

Netra's Final Operational Clearance: Enhancing Mission Sudarshan Chakra

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Summary

The recent Final Operational Clearance (FOC) for the Netra MK I fleet of the Indian Air Force (IAF) marks a significant milestone for India's indigenous Airborne Early Warning and Control (AEW&C) capability, which has evolved from concept work and experimentation since the 1990s. The brief highlights the enduring organisational commitment and persistent efforts of the Defence Research and Development Organisation (DRDO) and IAF in indigenising complex airborne platforms, while underscoring Netra's contribution in strengthening Mission Sudarshan Chakra.

Introduction

On 25 June 2026, the Final Operational Clearance (FOC) certificate of India's indigenous 'Netra' Airborne Early Warning and Control (AEW&C) System was handed over to the Indian Air Force (IAF) by the officials of the Defence Research and Development Organisation (DRDO). The first of the three Netra MK1 aircraft that the IAF currently operates was inducted on 14 February 2017 following an Initial Operational Clearance (IOC) granted in 2015. Developed for Rs 2425 crores,¹ the remaining two Embraer ERJ-145-based aircraft were delivered in September 2019 and 2023, respectively.²

Netra's FOC signifies operational maturity gained through nine years of experience, including 'reliable utilisation during Operation Sindoor and Balakot strikes'.³ It also indicates that, following trials and refinements, the system is combat-proven across its envisaged full spectrum of roles: Early Warning, Surveillance, Electronic Support Measures, Signal Intelligence, Command and Control, and Air Battle Management. It is also pertinent to mention that it strengthens the sensor-shooter network required for Mission Sudarshan Chakra, India's national mission to enhance its indigenous Integrated Air and Missile Defence (IAMD) shield by 2035.⁴

Development Trajectory

While the terms AEW&C and Airborne Warning and Control System (AWACS) are often used interchangeably, their historical usage reflects a near-linear development trajectory. The ingenious amalgamation of radar and nascent aircraft technologies of the inter-war years led to early forms of Airborne Early Warning (AEW) systems, enabling both airborne and ground-controlled interceptions, such as the Vickers Wellington of the Royal Air Force (RAF) and the US Navy's TBM Avenger.⁵

¹ ["Airborne Warning and Control System"](#), Press Information Bureau, Ministry of Defence, Government of India, 17 March 2017.

² ["Year End Review – 2019 Ministry of Defence"](#), Press Information Bureau, Ministry of Defence, Government of India, 27 December 2019; Akhil Kadidal, ["India's Netra AEW&C Fleet Achieves Final Operational Clearance"](#), *Jane's Defence Weekly*, 25 June 2026.

³ ["IAF Gets Final Operational Clearance of Indigenous Airborne Early Warning & Control system 'Netra'"](#), Press Information Bureau, Ministry of Defence, Government of India, 25 June 2026.

⁴ "Control and Reporting: The Indian Way", in Sujan Chinoy and Sukhbir Kaur Minhas (eds), [Mission Sudarshan Chakra: India's Integrated Aerospace Command and Control System](#), Pentagon Press, New Delhi, 2026, p. 36.

⁵ S. Christopher, ["Indian AEW&C System in the Global Perspective"](#), *Journal of Aerospace Sciences and Technologies*, Vol. 61, No. 1, 2009, p. 131; Khalem Chapman, ["Airborne Early Warning and Control: Detecting the Battlespace"](#), Royal Aeronautical Society, 18 September 2018; Norman Polmar, ["The First Airborne Early Warning Aircraft"](#), U.S. Naval Institute, October 2000.

The first generation of purpose-built AEW&C aircraft included the Lockheed EC-121 Warning Star, Grumman E-1 Tracer, Tupolev Tu-126 and Grumman Hawkeye, enhancing airborne Command and Control (C2) capabilities.⁶ Besides being a radar picket, the Warning Star saw action in aid of US fighters during the Vietnam War against the Vietnamese People's Air Force (VPAF) fighters.⁷ Later Warning Star variants included communication monitoring stations and even jamming equipment, leading many historians to consider it an immediate predecessor to the modern-day AEW&C/AWACS.⁸

The term AEW&C gained widespread use in the 1970s and 1980s, especially during the Bekka Valley campaign, with the E-2C Hawkeye demonstrating its effectiveness in enhancing surveillance, integrating the radar picture with ground control posts, and providing battle management assistance to Israeli fighters against pop-up Syrian MiGs.⁹ The term AWACS has its genesis in the official designation of the US Boeing E-3 Sentry platform. Analysts also ascribe this to an evolution in the platform's mission from early warning/surveillance to that of executing offensive air power, especially when the USAF strategy is weighed against the NATO AEW&C construct.¹⁰

Though militaries still use the two terms for similar platforms, an AWACS may represent a larger aircraft platform, offering greater range and additional Operator Work Stations (OWS), Electronic Support Measures (ESM), and Communication Support Measures (CSM) compared to an AEW&C.¹¹ The IAF, for example, uses the former terminology for its older rotodome-based EL/W-2090 Phalcon system, which is incorporated onto Russian A-50EI/IL-76 variants and offers longer range and 360-degree coverage. The sleeker Embraer EMB-145I complements this system airframe-based Netra MK1, which is equipped exclusively with domestically developed systems. These include an active electronically scanned array (AESA) primary surveillance radar, alongside data links, software-defined radio (SDR) radios and electronic support (ES) capabilities.¹²

⁶ Peter McCarry, “[Airborne Early Warning and Control: A Piece of the Puzzle](#)”, Aerospace Centre, Australia, 2001.

⁷ Andy Cichon, “[High-End Fighters Need High-End AEW&C](#)”, *Wild Blue Yonder*, 16 May 2022.

⁸ Carl O. Schuster, “[Arsenal | EC-121 Warning Star](#)”, HistoryNet, 18 January 2012.

⁹ Rebecca Grant, “[The Bekaa Valley War](#)”, *Air and Space Forces Magazine*, 1 June 2002; Benjamin S. Lambeth, “[Moscow's Lessons from the 1982 Lebanon Air War](#)”, The Rand Corporation, September 1984.

¹⁰ Roland Van Deventer, “[Airborne Warning and Control System \(AWACS\) and Space: A Framework to Help Understand the Issues](#)”, School of Advanced Airpower Studies, Air University, Maxwell Air Force Base, Alabama, 1 June 2000.

¹¹ Swaim Prakash Singh, “[Prioritisation of AWACS for the IAF](#)”, Centre for Aerospace Power and Strategic Studies (CAPSS), 31 August 2022.

¹² Sreesha V.M, “[DRDO's 'Netra' System Gets Clearance](#)”, *Manorama Yearbook*, 27 June 2026; “[DRDO's AWACS 360 Rotodome Program Takes Backseat as Netra MKII's 300 Coverage Meets](#)”

Indigenisation, Netra, DRDO and the IAF

Netra's FOC certification is widely cited as a flagship success in indigenisation.¹³ This assertion is reinforced when contextualised within IAF's radar surveillance and Air Battle Management architecture, which comprises entirely homegrown systems, including its Surveillance and Fire Control radars, Ground-based AD Weapon Systems, the Integrated Air Command and Control System (IACCS), and the under-development Software-Defined Radio (SDR) framework.¹⁴

As the Netra programme moves ahead, it traces the DRDO and IAF's journey, beginning in 1985 under Project Guardian and later renamed 'Airawat' after the legendary flying elephant. The latter was a code name for an indigenous AWACS programme, shelved shortly thereafter due to a combination of factors. The programme was revived in the 1990s under the name Airborne Surveillance Platform (ASP), envisaging a domestically developed rotodome-based radar and mission system mounted on a Hawker Siddeley HS 748 turboprop.

The programme was rudely interrupted in 1999 after the testbed platform crashed during an experimental flight, killing all on board (four scientists and four IAF personnel).¹⁵ The FOC ceremony of 25 June 2026 was dedicated to these eight personnel. Shortly after the accident, in November 1999, a decision to lease Beriev A-50 Mainstays from Russia as a stop-gap arrangement was announced.¹⁶ The procurement deal for the Phalcon AWACS, under a tripartite agreement with Russia and Israel, was inked in 2003, with the first aircraft joining the IAF in 2009.¹⁷

In parallel, the ASP programme was revived in 2004. Eventually, it was renamed the Netra, this time with a compact, pod-mounted array and a side-looking design rather than a rotating dome.¹⁸ The caveat remained the imported airframe. Though this is

IAF Needs", Indian Defence Research Wing (IDRW), 16 September 2025; Akhil Kadidal, "[India's Netra AEW&C Fleet Achieves Final Operational Clearance](#)", no. 2.

¹³ "[FOC for Indigenous Netra](#)", Indian Defence Industries, 25 June 2026; "[IAF Gets Final Clearance for Indigenous Netra Surveillance Aircraft System](#)", *The Economic Times*, 25 June 2026; "[NETRA AEW&C Gets Final Operational Clearance: What It Means for India's Defence and Surveillance Capabilities](#)", *The Week*, 25 June 2026.

¹⁴ Oishee Majumdar, "Surveil and Defend", *Janes Defence and Intelligence Review*, July 2025; "[IAF Signs BEL Deal for Software Defined Radios: Rewiring India's Air Combat Network](#)", *IndoAsia Defense*, 8 April 2026; "Control and Reporting: The Indian Way", in Sujan Chinoy and Sukhbir Kaur Minhas (eds), *Mission Sudarshan Chakra: India's Integrated Aerospace Command and Control System*, Pentagon Press, New Delhi, 2026, p. 44.

¹⁵ Sanjib Kr Baruah, "[India's AWACS Story is as Thrilling and Mystifying as that of a Phoenix](#)", *The Week*, 20 March 2024; Stephen David, "[Airborne Radar: Surveillance System Project Suffers Another Jolt](#)", *India Today*, 25 January 1999.

¹⁶ Peter McCarry, "[Airborne Early Warning and Control: A Piece of The Puzzle](#)", no. 6, p. 43.

¹⁷ Nilofar Suhrawardy, "[India, Israel Sign AWACS Deal](#)", *Arab News*, 11 October 2003; "[After Long Wait, IAF to Get First Phalcon AWACS on May 20](#)", *The Times of India*, 8 May 2009.

¹⁸ K.S. Jayaraman, "[India's Eye in the Sky](#)", *Nature India*, 30 December 2019.

a familiar pattern observed in Indian defence indigenisation, it has arguably enabled the timely availability of critical capabilities, while ensuring that niche operational technologies remain domestic.¹⁹ Since the induction of the first Netra in 2017, the IAF has conducted two air campaigns against its western adversary in 2019 and 2025, the former with only one Netra in its inventory. Thus, the remaining two aircraft can be derived to have incorporated operational experience from the Balakot strikes.

Refinements after Operation Sindoor most likely included integration of domestically developed ESM and Radar Warning Receiver (RWR) systems as stated by officials at the FOC ceremony. The certification after nine years of operational service also indicates that each of the IAF's Air Staff Qualitative Requirements (ASQRs) on its core systems [Radar, ESM, CSM, Electronic Warfare (EW) suite], compatibility with the IACCS, data links, etc. were tested and cleared. This includes the aircraft's structurally fitted In-Flight Refuelling (IFR) probe, essential for enhanced endurance and on-station time.²⁰

Despite the delays, the programme reflects India's capability to conceptualise, design and field a complex airborne air battle management system, something that only six other countries have managed independently (US, Russia, China, Israel, Brazil and Sweden). The journey, which was on the drawing boards in 1985 and interrupted in 1999, culminated in a combat-validated AEW&C in 2026. Notwithstanding extended developmental timelines, this trajectory underscores not only technological resilience but also the enduring organisational commitment of the IAF and DRDO to indigenise complex airborne platforms—a facet largely overlooked in public perception.

Assessment

India's threat landscape necessitates an enhanced surveillance network at all altitudes. Additionally, Mission Sudarshan Chakra's framework demands rapid progress on Netra follow-ons. The near-future requirements are being met with six additional Netra MK1A systems on EMB-145 airframes, cleared by the Defence Acquisition Council (DAC) in March 2025. These upgraded variants will feature a Gallium Nitride (GaN)-based AESA radar transmitter module and software upgrades, while maintaining their existing coverage. As Embraer has stopped production of the ERJ-145 airframe, the airframes will be sourced from the global secondary market.

¹⁹ Sanjib Kr Baruah, “[India's AWACS story is as Thrilling and Mystifying as that of a Phoenix](#)”, no. 15.

²⁰ Akhil Kadidal, “[India's Netra AEW&C Fleet Achieves Final Operational Clearance](#)”, no. 2.

Following the March 2025 clearance, the Cabinet Committee on Security (CCS) approved six more AEW&Cs under the Netra MKII project in July 2025, combining DRDO-developed AESA radars on Airbus A321 airframes.²¹ In addition to a dorsal-mounted antenna, these systems feature an additional nose-mounted antenna for enhanced coverage. The A321 airframes are second-hand (Air India), thereby requiring military-grade modifications at Airbus’ facility in Spain and are expected to roll in from 2033 onwards.²² Costing roughly Rs 20,000 crores for six aircraft, they offer a larger platform than the Embraer with greater power generation, endurance, and payload margin, closer to what the imported Phalcons on IL-76 airframe were meant to deliver.²³

IAF’s Netra follow-on plans in 2015 included DRDO’s development of rotodome-based AWACS systems on an Airbus A330 platform to replace the Phalcon AWACS.²⁴ Eight years and a host of factors later (cost overruns, global trends, platform limitations), a decision was taken in favour of 12 Netras under the MK1A and MKII projects.²⁵ This gap in AWACS/AEW&C development has drawn sharp observations from analysts, who note the need for at least 18 such platforms to meet India’s land-boundary and maritime air surveillance requirements.²⁶

Hence, the shift from a rotodome AWACS to the Netra Mk1A and Netra MkII also signifies that the IAF is pursuing a complementary, layered architecture of AWACS and AEW&C aircraft, not just by design but out of necessity. The older three-aircraft fleet of Phalcon AWACS, currently complemented by Netra MK1, offers the advantages of battle-tested suites. The latter can also be adapted through software and hardware upgrades without depending on foreign OEMs or supply chains. Additionally, the Netra fulfils flexible and tactical roles, can be distributed across multiple threat axes, is economically viable, and can be surged in numbers. However, the problem of numbers remains.

²¹ Ethan M. Encarnacion, [“India Builds Its Own Eye in the Sky With Netra MKII AWACS”](#), *The Defense Post*, 23 July 2025; [“CCS Clears ₹19,000 Crore Project for Six A321-Based AEW&C Aircraft for IAF”](#), *Defense News*, 20 August 2025; D.K. Pandey, [“Netra — Eyes in the Sky Indian AEW&C Platforms to Bolster Network-Centric Air Operations”](#), *SP’s Aviation*, 2024.

²² [“India Clears Major AEW&C Expansion to Counter Pakistan’s Airborne Surveillance Edge”](#), *The Defense News*, 21 March 2025; [“Netra MkII AWACS Project: India to Develop Next-gen Airborne Warning Systems to Boost IAF’s Long-range Surveillance; Rs 20,000 crore Project Approved”](#), *The Times of India*, 17 July 2025.

²³ [“India Clears NETRA MK-2: A 500-km Range ‘Eye In The Sky’ To Reinforce Airborne Surveillance”](#), *Indian Defence News*, 24 October 2025.

²⁴ B.K. Pandey, [“DRDO to Develop Indigenous AWACS”](#), *SP’s Aviation*, 2015.

²⁵ [“A330 AWACS Plan Shelved, India to Go Narrow Body”](#), *Livefist Defence*, 20 July 2023.

²⁶ [“After PAF Takes AWACS Lead, IAF to Induct 3rd NETRA AEW&CS which was with DRDO as Testbed”](#), *Indian Defence News*; Rajat Pandit, [“Stalled AWACS Deals Hit Air Force”](#), *The Times of India*, 3 October 2017; Swaim Prakash Singh, [“Prioritisation of AWACS for the IAF”](#), Centre for Aerospace Power and Strategic Studies (CAPSS), 31 August 2022.

Hence, the InThe AWACS/AEW&C development trajectory needs to be assessed on multiple counts. Firstly, additional Mk1A on existing Embraer platforms are to be seen as a bridge-an emergency measure similar to the Phalcon procurement decision. Its GaN-transmitter-module-based radar upgrade is expected to improve performance and fill capability gaps as the MkII programme matures.²⁷ However, this still doesn't close the gap. Hence, it is expected that the SDR framework, reportedly also incorporated into Netra Mk1, will enable fusion of sensor data across ground radars and airborne fleets, enabling mature networking and better combat awareness through the IACCS.²⁸

Lastly, based on proven indigenous radar engineering spanning at least two decades, one expects both the DRDO and the IAF to aggressively protect the Netra MkII timeline from slippage. This is absolutely critical to ensure that vulnerabilities in procurement cadence do not overshadow indigenous technical and operational achievements, beyond operational imperatives. The programme's timely achievement strengthens the real-time sensor-shooter grid feeding into India's vision for an AI-enabled air defence shield. The Netra FOC grant goes beyond additional 'eyes in the sky'.²⁹ It is an integral and significant step towards Mission Sudarshan Chakra.³⁰

²⁷ Javaria Rana, [“After 20-year Wait, Netra AEW&C Finally Cleared for Full Combat Role”](#), *The New Indian Express*, 25 June 2026.

²⁸ Rajat Pandit, [“As Pakistan China Fly Ahead, India Guns for 12 More ‘Eyes in the Sky’”](#), *The Times of India*, 6 February 2024; [“Critical Analysis of Netra AEW&C Final Operational Clearance”](#), *ABC Live*, 26 June 2026.

²⁹ Saurabh Trivedi, [“Netra AEW&C: India's Indigenous ‘Eye in the Sky’ That Strengthens Air Power”](#), *The Hindu*, 27 June 2026.

³⁰ Sujan Chinoy and Sukhbir Kaur Minhas, [Mission Sudarshan Chakra: India's Integrated Aerospace Command and Control System](#), Pentagon Press, New Delhi, 2026, pp. 36, 234, 238.

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