

Deep-Space Advanced Radar Capability [DARC]

Recommended Citation

Richard Tanter, "Deep-Space Advanced Radar Capability [DARC]", Australian Defence Facilities, August 16, 2025, <https://nautilus.org/briefing-books/australian-defence-facilities/deep-space-advanced-radar-capability-darc/>

Updated: 8 May 2026

See also

- [Deep-Space Advanced Radar Capability, Site 1, Exmouth, Western Australia](#)
- [Deep-Space Advanced Radar Capability, Site 2, Cawdor Barracks, Wales](#)
-

The Deep-Space Advanced Radar Capability [DARC] is a United States Space Force-auspiced ground-based space surveillance radar system, planned to be built on three sites – on the Exmouth Peninsula in Western Australia, St. Davids, Pembrokeshire in Wales, and at a location to be announced in the United States. Intended to complement the existing elements of the U.S. Space Domain Awareness architecture and overcome their limitations, the DARC system will provide surveillance of foreign satellites in geosynchronous orbit (approximately 36,000 kms above the earth's surface), in all weathers and continuously, all day and night. Between the three sites, DARC will potentially provide surveillance of all satellites in the 360 degrees of longitude above the equator, with the objective of detecting, tracking, and maintaining custody of deep space objects.



A Transmit Antenna at Site 1 (photo credit: Doug Humphries, BAE Systems)

Source: [United States Space Force, photo by: X0813, VIRIN: 250219-X-FC312-1003](#)

The DARC system was incorporated by the United States into Pillar 2 of the AUKUS treaty structure under a Memorandum of Understanding signed on 2 December 2023 by the United States, United Kingdom and Australia. The system was developed by the U.S. Space Systems Command

The United States, United Kingdom and Australia announced 02 December 2023 a trilateral initiative called the Deep Space Advanced Radar Capability following the signing of a Memorandum of Understanding in September 2023.

[According to US Space Force](#), 'DARC was approved for Early Use capability for U.S. Space Command in Sept. 2025, enabling the streamlining of test and evaluation processes while proving readiness of the capability in support of joint and combined force objectives.'

Space Force [announced in May 2026](#) that 'Early Use activities are being conducted from the 20th Space Surveillance Squadron's Integrated Radar Operations Center (IROC) at [Eglin Air Force Base](#), Florida.'

According to [GlobalSecurity.org](#), drawing on extensive uncited official sources,

'The highly-advanced Deep Space Advanced Radar Capability (DARC) transmit and receive arrays are capable of a multitude of missions crucial to monitoring, tracking, and reporting objects of interest in space, capability that will fill critical gaps in the ground-based element of the Space Domain Awareness architecture enterprise. Site surveys performed in the U.S., U.K. and Australia confirmed that these locations are optimally positioned to provide full coverages of the GEO. All three sites are expected to be operational by the end of the decade.

'With all of the space debris and objects now populating Earth orbit, the DARC tracking radar will use existing technologies to detect small space objects or satellites quickly and with highly precise orbital information. If a collision threatens a satellite system, the operator will be alerted and have time to maneuver away from oncoming debris. DARC will also identify adversarial threats that have the potential to disrupt/deny civil and military space services.

'DARC offers higher sensitivity, better accuracy, increased capacity and more agile tracking than current radars capable of tracking objects in Geosynchronous Earth Orbit. Its ability to provide global monitoring extends beyond inclement weather and daylight, which are limitations of current ground-based optical systems. The capability will also be used to protect the essential services that rely on satellites and communication.'

The DARC system was designed by the Johns Hopkins University Applied Physics Laboratory (APL) in Laurel, Maryland, with a [Technology Demonstrator \[DARC-TD\]](#) version of the system built at White Sands Missile Field in New Mexico [declared successful](#) by Space Systems Command in December 2021.

'The WSMR demonstration involved a small-scale version of the envisioned system, complete with similar hardware, and was used to broadcast a signal at specific test objects in space.'

DARC-TD demonstrated the feasibility of ground based radar surveillance of objects in geosynchronous orbit using multiple transmit and receive arrays of large parabolic antennas on a single site, coordinated to act like a single-dish radar system.

[The total cost of the DARC Rapid Prototype Development](#) and initial development of Site 1 was US\$844.6 million.

DARC represents a heightened level of U.S.-led integration of allied military space assets and command structures. When operational, data from all three sites will be supplied to the Combined Force Space Component Command (CFSCC) through the [Combined Space Operations Center \(CSpOC\)](#) at Vandenberg Space Force Base, CA.

‘The CSpOC is CFSCC’s lead integrating space operations center and along with Joint Overhead Persistent Infrared (OPIR) Planning Center (JOPC), Missile Warning Center (MWC), and Joint Navigation Warfare Center (JNWC), provides a synergistic and multi-layered network of defense operations centers supporting U.S. Space Command (USSPACECOM) and CFSCC operations.

‘The CSpOC also works closely with the National Space Defense Center (NSDC), National Reconnaissance Office Operations Center (NOC) and the national space operations centers or headquarters of Australia, Canada, France, Germany, New Zealand and the United Kingdom.

‘Under the direction of CFSCC, the CSpOC uses this multi-layered network to coordinate, command and control space effects for geographic theater commanders and allied partners across the globe — ensuring the right effect or capability is available to theater components at the right place and right time to achieve the theater mission.’

Space Delta 5 (DEL 5) staffs Combined Space Operations Center for United States Space Command.

‘[USSPACECOM augments](#) DEL 5 with U.S. Air Force, Army, Navy, and Marine space personnel and along with exchange officers from Australia, Canada, and the United Kingdom they form the CSpOC.’



‘[Deep Space Advanced Radar Capability – DARC](#)’, *GlobalSecurity.org*, [n.d.]

While government descriptions emphasize the ability of the DARC system to detect and follow very small objects in geosynchronous orbit, particularly space debris, the system is designed to assist the United States to achieve space dominance, focussing on capabilities to detect, characterize and monitor foreign satellites in GEO, amplifying the possibilities of United States counterspace operations.

Coordinator: Richard Tanter (rtanter@nautilus.org)

Updated: 8 May 2026

View this online at: <https://nautilus.org/briefing-books/australian-defence-facilities/deep-space-advanced-radar-capability-darc/>

Nautilus Institute

608 San Miguel Ave., Berkeley, CA 94707-1535 | Phone: (510) 423-0372 | Email:

nautilus@nautilus.org