



National Weather Service
NEXRAD Strategic Plan
2021 – 2025



NEXRAD is the Premier System for Hazardous Weather Detection

NEXRAD is a tri-agency system instrumental in assisting the National Weather Service (NWS), Department of Defense (DoD), and Federal Aviation Administration (FAA) in meeting mission objectives. The system's performance meets or exceeds the 96% operational availability requirement to reliably observe and detect hazardous weather; support forecast/warning programs; protect lives, property, and military assets; promote a safe and efficient National Airspace System, and enhance the nation's economy. Since deployment began in 1992, the NEXRAD program has executed a continuous program of modifications, retrofits, technology refreshments, and pre-planned product improvement upgrades. The goal of this effort has been to extend system life, upgrade functionality and capabilities, improve data quality, meet new mission requirements, improve system maintainability and reliability, and control NEXRAD operations and maintenance (O&M) costs. The Service Life Extension Program (SLEP) began in 2015 and will continue into 2024. SLEP consists of five projects to replace and refurbish major components of the radar: signal processor, transmitter, equipment shelters, pedestal, and backup generator. As a result of these sustaining engineering, hardware, and technology refresh investments, NEXRAD continues to be upgradable, reliable, and maintainable beyond 2035 or until a suitable replacement for the WSR-88D is deployed.

In the NEXRAD network, there are 12 FAA, 25 DoD, and 122 NWS operational radars. The NWS also operates 10 support systems for training, parts refurbishment, and testing of hardware and software modifications. The Radar Operations Center (ROC) budget supports daily ROC operations, depot-level radar maintenance, and system modification costs that are equitably shared in accordance with the tri-agency signed Cost Share Allocation Memorandum of Agreement (MOA).

By tri-agency agreement, the NWS Office of Observations (OBS) is responsible for overall NEXRAD program management, the ROC in Norman, Oklahoma, is responsible for support management, and both perform these functions under the authority of the tri-agency NEXRAD Program Management Committee (NPMC). The NPMC oversees the NEXRAD program budget, policy, and resource commitment, and provides management guidance throughout the life cycle of the NEXRAD program to ensure that both common and unique agency requirements are addressed and resolved. The day-to-day operations and management of the NEXRAD Program are directed from the tri-agency ROC with the ROC Director serving the NPMC as the Integration Program Manager while organizationally reporting to the OBS Director. The OBS Director serves as the DOC representative for the NPMC.



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Mission, Stakeholders & Priorities

The mission of the program is to sustain the capability of the tri-agency NEXRAD network to reliably observe and detect hazardous weather in support of forecast and warning programs, protection of military assets, the National Airspace System, and the national economy through timely infusion of technology transition and new capabilities.

The NEXRAD Program is a tri-agency strategic partnership that oversees the program management of the operational radar network. The groups and organizations affected by program decisions, activities, or outcomes include:

1. Regional offices of the NWS, Air Force, and FAA
2. Field offices of the NWS, Air Force, and FAA
3. Line offices of the tri-agency partners
4. Weather, Water, and Climate Enterprise
5. Media
6. General public



Priorities for the NEXRAD Program:

1. Keep operational radar systems running
2. Sustain baseline operational radar system capabilities
3. Improve radar system reliability
4. Integrate new capabilities into the radar system
5. Support product improvement programs

Radar Operations Center sustains life-cycle operations for all WSR-88D systems in the areas of:

1. Centralized software/algorithm development, testing, and maintenance
2. Field support
3. Engineering management
4. Configuration management
5. Modification development and deployment
6. Technical documentation
7. On-site depot maintenance

Supply support management and centralized depot parts repair are the responsibility of the NWS Logistics Management Branch. The NWS Office of the Chief Learning Officer provides NEXRAD operator and maintenance training via the Warning Decision Training Division (WDTD) and NWS Training Center (NWSTC), respectively.

Strategic Alignment

NEXRAD provides essential data needed to achieve DOC/NOAA/NWS strategic objectives and goals. No other observation system is capable of providing these unique remote sensing data.

Department of Commerce (DOC):

Strategic Goal – Strengthen U.S. Economic and National Security

Strategic Objective – Reduce Extreme Weather Impacts

Key strategies include:

1. Evolve the National Weather Service to deliver better forecasts, earlier warnings, and clearer communication of high-impact weather and water events.
2. Strengthen partnerships with America’s weather industry and other members of the weather, water, and climate enterprise.
3. Deploy the next generation of satellites, aircraft, ocean-going ships, and observation and data gathering systems.
4. Develop and deploy next-generation environmental observation and modeling systems to make informed planning, resources management, and investment decisions.

National Oceanic and Atmospheric Administration (NOAA):

Future Vision – Healthy ecosystems, communities, and economies that are resilient in the face of change

Long-term Goal – Weather-Ready Nation

Objectives to achieve this goal include:

1. Reduced loss of life, property, and disruption from high-impact events
2. Improved freshwater resource management
3. Improved transportation efficiency and safety
4. Healthy people and communities due to improved air and water quality services
5. A more productive and efficient economy through environmental information relevant to key sectors of the U.S. economy



Strategic Alignment

National Weather Service (NWS):

Strategic Plan – A Weather-Ready Nation: Society is prepared for and responds to weather, water, and climate-dependent events.

Strategic Plan Goals include:

1. Reduce the impacts of weather, water, and climate events by transforming the way people receive, understand, and act on information.
2. Harness cutting-edge science, technology, and engineering to provide the best observations, forecasts, and warnings.
3. Evolve the NWS to excel in the face of change through investment in our people, partnerships, and organizational performance.

A core foundation of the NWS infrastructure is its observational systems. NWS relies on an integrated suite of observations and nationwide observational systems, including NEXRAD, to accurately detect, analyze, and forecast weather events. Data from these observational systems are used 24/7 in support of NWS' core weather, water, and climate mission.

DOC Strategic Plan: https://www.commerce.gov/sites/default/files/2020-08/us_department_of_commerce_2018-2022_strategic_plan.pdf

NOAA Strategic Plan: <https://www.performance.noaa.gov/ngsp/>

NWS Strategic Plan: https://www.weather.gov/media/wrn/NWS_Weather-Ready-Nation_Strategic_Plan_2019-2022.pdf



NEXRAD Strategy: Current State

The NEXRAD program will continue to be well served by the following high-level strategy that has sustained the network's operational availability at or above 96%:

1. Maintain the strategic alliance with tri-agency partners to control NEXRAD costs, as codified in MOAs and the Integrated Logistics Support Plan (ILSP) (see References).
 - a. Use a cost-effective model for supporting operations and maintenance through use of common operator and maintenance manuals, shared spares stock, and shared support infrastructure, including the ROC.
 - b. Use a robust program support infrastructure at the ROC to provide depot-level maintenance and on-going sustaining engineering, operator and maintainer training, and common management of logistics, facilities, spectrum, safety, and IT security.
2. Continuously improve the NEXRAD system by infusing new and improved radar science and communications/computer technology to address evolving operational requirements by maintaining synergy with key partners.
 - a. Collaborate with source scientists at the National Severe Storms Laboratory (NSSL), National Center for Atmospheric Research (NCAR), and MIT Lincoln Laboratory to improve dual polarization data quality through algorithm tuning and calibration enhancements.
 - b. Implement signal processing advancements in the WSR-88D by leveraging NSSL's Phased Array Radar (PAR) risk reduction research.
3. Maintain NEXRAD reliability, availability (96%), and maintainability through a continuous program of technology refresh modification (hardware and software), and a robust depot-level maintenance capability.
 - a. Continue to use the NEXRAD 8-Year Modification Plan, updated annually in coordination with tri-agency stakeholders, to plan and budget for ongoing hardware technology refresh modifications needed to sustain reliable operations.
 - b. Continue to use the tri-agency NEXRAD governance process to define software release contents and schedules, and prioritize technical needs and evaluate the science of R&D proposals.
 - c. Operate a 24/7 NEXRAD Hotline assisting radar sites with technical support.
 - d. Maintain a cadre of specially trained radar technicians providing on-site depot-level maintenance.
 - e. Maintain active task order contracts for on-site depot-level maintenance of radar towers and radomes for continuous preventative and restorative maintenance.
 - f. Maintain a NEXRAD Reconstitution Plan, along with strategic spares stock of long-lead time components, for restoring radar operations lost to natural events such as hurricanes, floods, wildfires, or severe storms.



NEXRAD Strategy: Future State



- Extend the useful life of the NEXRAD fleet beyond 2035 through completion of the Service Life Extension Program (SLEP) and sustaining engineering.
- Work with government partners to leverage supplemental radar data, where applicable, and ingest those data into NOAA's Multi-Radar Multi-Sensor (MRMS) System.
- Support the tri-agencies in determining a practical and feasible solution for weather radar coverage from 2035 and beyond, exploring all options including phased array technology, a new rotating dish radar system, and the continuation of NEXRAD.
- Continue efforts to address interference and beam blockage. This includes interference from crowding of the frequency spectrum and wind turbines, as well as natural and man-made blockages from trees and structures.

Program Gap Analysis

These issues can result in deviations from planned NEXRAD program activities with little to no advanced notice:

Technology Refresh:

Costs vary from year to year depending on component obsolescence and sustaining engineering analyses, resulting in variances to the estimates contained within the 8-Year Modification Plan.

Radar Asset Recovery and/or Relocations:

Costs incurred to relocate a NEXRAD system to meet new coverage requirements, address coverage factors such as blockages, or recover and restore a system which has sustained significant damage. Partner agency requirements may also change, resulting in the excessing of valuable NEXRAD components.

Interference and Blockages:

Costs incurred while addressing issues associated with packing of the frequency spectrum, interference (e.g. wind farms, wireless emitters, other radars), and blockages from natural and man-made structures (e.g. trees, buildings, water towers).

Unfunded Mandates:

Downward directed policy decisions that result in unplanned capital expenditures for items such as IT security, IT system monitoring, etc.

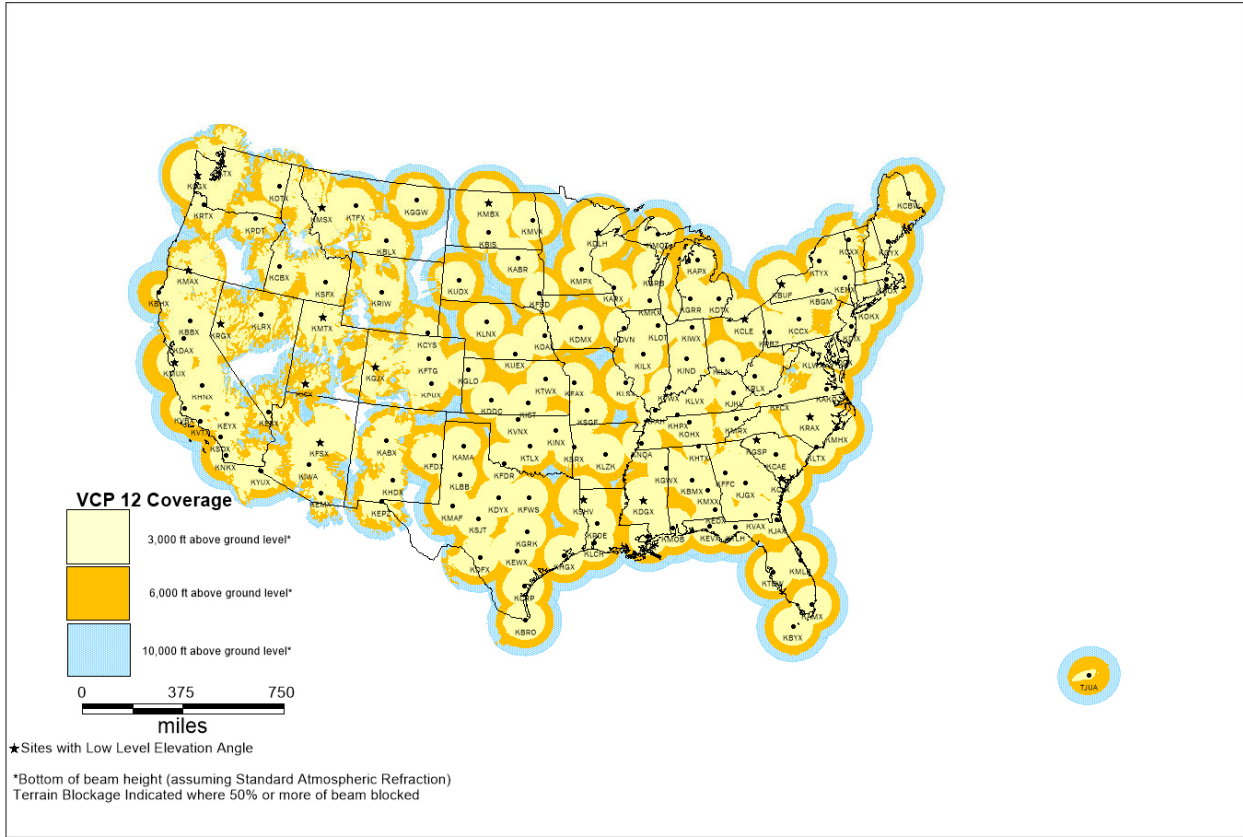
References

- Memorandum of Agreement (MOA) among the Department of Commerce (DOC), Department of Transportation (DOT), and Department of Defense (DoD) for Allocation of Program Costs of the Next Generation Weather Radar (NEXRAD) Program, October 2019.
- Memorandum of Agreement (MOA) among the Department of Commerce (DOC), Department of Transportation (DOT), and Department of Defense (DoD) for Interagency Operation of the Weather Surveillance Radar-1998 Doppler (WSR-88D), March 2021.
- NEXRAD Integrated Logistics Support Plan (ILSP), May 2020.



NEXRAD Coverage

NEXRAD COVERAGE BELOW 10,000 FEET AGL



NEXRAD COVERAGE BELOW 10,000 FEET AGL

