

NEXRAD Strategic Plan

Radar Operations Center

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This document describes the Radar Operations Center (ROC)'s strategy for operating, maintaining and sustaining the NEXRAD fleet through at least 2030.

Mission Statement

Sustain the tri-agency NEXRAD network ability to reliably observe and detect hazardous weather in support of forecast and warning programs, the National Airspace System, and the national economy through timely infusion of technology transition and new capabilities.

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 – Help communities and businesses prepare for and prosper in a changing environment

Strategic Objective – Build a Weather-Ready Nation

Key strategies include:

1. Evolve NOAA's NWS to be an agile agency supporting emergency managers, first responders, government officials, businesses, and the public
2. Improve the accuracy and usefulness of forecasts
3. Enhance decision support services for emergency managers

- National Oceanic and Atmospheric Administration (NOAA):

Strategic Objective – NOAA's Science and Technology Enterprise: Accurate and reliable data from sustained and integrated earth observing systems

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

- National Weather Service (NWS)

Strategic Plan – Building a Weather-Ready Nation

NWS Strategic Plan Goals include:

1. Improve weather decision services for events that threaten lives and livelihoods
2. Deliver a broad suite of improved water forecasting services to support management of the nation's water supply
3. Enhance climate services to help communities, businesses, and governments understand and adapt to climate-related risks
4. Improve sector-relevant information in support of economic productivity
5. Enable integrated environmental forecast services supporting healthy communities and ecosystems
6. Sustain a highly skilled, professional workforce equipped with the training, tools, and infrastructure to accomplish our mission

A core foundation of the current 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.

Stakeholders

The NEXRAD Program is comprised of tri-agency (DOC, DoD, DOT) strategic partners that oversee the program management of the operational radar network. The groups and organizations affected or perceive themselves to be 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. Academic institutions pursuing weather radar capability and technology enhancement
5. Commercial and business enterprises
6. General public

Background

NEXRAD is a tri-agency system that has been instrumental in assisting the NWS, DoD, and FAA in meeting mission objectives. The system's performance has met or exceeded the 96% operational availability requirement to reliably observe and detect hazardous weather, support forecast/warning programs, protect lives and property, 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 aim of continual modifications was to avoid obsolescence, prevent wholesale replacement, improve data quality, meet new mission requirements, improve system maintainability and reliability, and control NEXRAD operations and maintenance (O&M) costs. As a result of these sustaining engineering and technology refresh investments, NEXRAD continues to be upgradable, reliable, and maintainable through at least 2030 given the current funding levels in the NEXRAD O&M program.

In the NEXRAD network, there are 12 FAA, 26 DoD, and 122 NWS operational radars. The NWS also operates 9 support systems for training, parts refurbishment and testing of hardware and software modifications. The O&M, ROC operations, and depot-level radar maintenance and modification costs are 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 Radar Operations Center 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 and organizationally reporting to the OBS Director. The OBS Director serves as the DOC representative for the NPMC.

The NPMC established the following priorities for the ROC:

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

Major responsibilities of the ROC to sustain operational life cycle operations for all tri-agency WSR-88D systems are in the areas of:

1. Centralized software/algorithm development 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 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.

Strategy for NEXRAD Program Vitality

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 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 stocks, and shared support infrastructure, including the ROC.
 - b. Use a robust program support infrastructure at 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 Lincoln Laboratory to improve dual pol data quality through algorithm tuning and calibration enhancements that leverage dual pol capabilities.
 - b. Implement signal processing advancements into the WSR-88D by leveraging NSSL's Multi-function Phased Array Radar (MPAR) risk reduction research.
3. Maintain NEXRAD reliability, availability (96%), and maintainability through a continuous program of technology refresh modifications (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 Software Recommendation & Evaluation Committee (SREC) to define NEXRAD software release contents and schedules.
- c. Continue to use the NEXRAD Technical Advisory Committee (TAC) to prioritize technical needs and evaluate the science of R&D technical proposals.
- d. Operate a 24/7 NEXRAD Hotline that assists radar sites with technical support.
- e. Maintain a cadre of specially trained radar technicians that provide on-site depot-level maintenance.
- f. Maintain active task order contracts for providing on-site depot-level maintenance of radar towers and radomes; use these contracts for continuous preventive and restorative maintenance.
- g. 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 earthquakes, floods, wild fires, or severe storms.

Future State:

1. Extend the useful life of the NEXRAD fleet to at least 2030 through the Service Life Extension Program (SLEP). Without the SLEP investment, NEXRAD service availability would likely decrease to less than the required 96% after 2020. SLEP consists of 4 independent projects: (1) Signal Processor Technology Refresh, (2) Transmitter Refurbishment, (3) Pedestal Refurbishment, and (4) Shelter Refurbishment. SLEP deployment will occur from 2016-2022.
2. Leverage inter-agency radar data streams, e.g., FAA Terminal Doppler Weather Radar (TDWR) to provide backup coverage in event of a WSR-88D outage, and to fill coverage gaps with boundary layer coverage at major metropolitan areas.
3. Share NEXRAD data—both real time and archive data—widely throughout the America’s Weather Enterprise (federal government, public, academia and commercial sectors) using evolving tri-agency communications architectures.

Gap Analysis

1. Technology Refresh: Cost varies from year to year depending on component obsolescence and sustaining engineering analyses, resulting in variances to the estimates contained within the NEXRAD 8-year Modification Plan.
2. Radar Asset Recover and/or Relocations: Costs incurred to relocate a NEXRAD system to meet new coverage requirements or respond to new development near the site. Partner

agency requirements may also change, such as OCONUS DoD assets, resulting in the excessing of valuable NEXRAD components.

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

References

The following documents and changes thereto are applicable:

MEMORANDUM OF AGREEMENT among Department of Commerce (DOC), Department of Transportation (DOT) and Department of Defense (DoD) for Allocation of Program Costs of Next Generation Weather Radar (NEXRAD) Program, October 1, 2011

MEMORANDUM OF AGREEMENT (MOA) among the Department of Commerce, Department of Defense, and Department of Transportation for Interagency Operation of the Weather Surveillance Radar-1998, Doppler (WSR-88D), March 24, 2008

NEXRAD Integrated Logistics Support Plan (ILSP), March 7, 2007, revised August 15, 2010

DOC Strategic Plan:

https://www.commerce.gov/sites/commerce.gov/files/media/files/2014/doc_fy2014-2018_strategic_plan.pdf

NOAA Strategic Plan: <http://www.ppi.noaa.gov/ngsp/>

NWS Strategic Plan: http://www.nws.noaa.gov/com/weatherreadynation/files/strategic_plan.pdf