

118TH CONGRESS }
1st Session

SENATE

{ REPORT
118-141

NOAA WEATHER RADIO MODERNIZATION
ACT OF 2023

R E P O R T

OF THE

COMMITTEE ON COMMERCE, SCIENCE, AND
TRANSPORTATION

ON

S. 1416



DECEMBER 19, 2023.—Ordered to be printed

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SENATE COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION

ONE HUNDRED EIGHTEENTH CONGRESS

FIRST SESSION

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NOAA WEATHER RADIO MODERNIZATION ACT OF 2023

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Ms. CANTWELL, from the Committee on Commerce, Science, and Transportation, submitted the following

R E P O R T

[To accompany S. 1416]

[Including cost estimate of the Congressional Budget Office]

The Committee on Commerce, Science, and Transportation, to which was referred the bill (S. 1416) to provide guidance for and investment in the upgrade and modernization of the National Oceanic and Atmospheric Administration Weather Radio All Hazards Network, and for other purposes, having considered the same, reports favorably thereon without amendment and recommends that the bill do pass.

PURPOSE OF THE BILL

The purpose of S. 1416, National Oceanic and Atmospheric Administration Weather Radio Modernization Act of 2023, is to require the National Oceanic and Atmospheric Administration (NOAA) to modernize the outdated technology currently in use throughout the NOAA Weather Radio (NWR) system to improve reliability and expand coverage. The bill would also expand the delivery of weather hazard warnings to rural and Tribal communities by enhancing the NWR transmission system with modern technologies, such as satellite communications, and transition to media other than copper.

BACKGROUND AND NEEDS

NWR is a nationwide network of radio stations operated by NOAA within the United States. The purpose of NWR is to provide weather, water, and climate forecasts and warnings 24 hours a day, 7 days a week, to the public and emergency responders. NWR broadcasts continuous weather information directly from nearby National Weather Service (NWS) offices. This information includes current weather conditions, forecasts, and any severe weather

warnings or other emergency alerts.¹ NWR also provides non-weather emergency messages, such as AMBER alerts, local and State emergency messages, and earthquake information.²

NWR transmissions can be received using special weather radios, which are designed to automatically activate and sound an alarm when severe weather or other emergency alerts are issued. To receive a weather alert broadcast, the radio must be in range of an NWR transmitter. Currently, of the 750 weather radio transmitters,³ approximately half the transmitters in current operations are, or will be, over 25 years in service and cannot continue to be sustained and repaired efficiently in the future. NWR also currently broadcasts only in the VHF public service band (between 162.400 and 162.550 megahertz (MHz)), and therefore one would need a special radio receiver or scanner in order to pick up the signal.⁴ All NWR stations broadcast on one of seven frequencies in the VHF public service band, but some older weather radio receivers only have three frequencies.⁵

The normal broadcast range of a full-power transmitter (1000 watts) over level terrain is approximately 40 miles.⁶ The effective range depends on terrain, height and power of the transmitting antenna, quality of the receiver, and whether an indoor or outdoor antenna is in use.⁷ With these limitations, only about 95 percent of the U.S. population is reached. Improvements to NWR would enable these radio transmissions to reach up to 99 percent of the U.S. population, which would expand service to up to 13.3 million additional Americans.

Advanced Weather Interactive Processing System

The bill requires NOAA to accelerate software upgrades to the Advanced Weather Interactive Processing System (AWIPS), thereby replacing the Automation of Field Operations and Services System that has been in place in the NWS since the 1980s.⁸ AWIPS is a type of computer system that is currently being introduced into the NWS to analyze and forecast weather.⁹ This system provides meteorologists with a range of tools and resources to help them make accurate and timely weather forecasts and warnings, and is a vital component to the NWS plans for modernization and restructuring.¹⁰ AWIPS is also used by NWS forecasters to intake, process, and display data from a variety of sources, including satellite and radar imagery, surface observations, upper air soundings, and numerical weather prediction models.¹¹ The system allows forecasters to view and manipulate weather data in real-time, and to

¹NOAA, National Weather Service, "NOAA Weather Radio Frequently Asked Questions" (<https://www.weather.gov/phi/nwrfaq#:text=K%20nawn%20as%20the%20%22Voice%20of%20the%20U.S.%20Pacific%20Territories>).

²Ibid.

³Ibid.

⁴Ibid.

⁵Ibid.

⁶Ibid.

⁷Ibid.

⁸NOAA, "AWIPS Advanced Weather Interactive Processing System" (https://www.weather.gov/okx/Tour_AWIPS).

⁹Ibid.

¹⁰Ibid.

¹¹Ibid.

quickly analyze and disseminate weather information to other NWS offices and to emergency managers.¹²

Copper Reliance

Currently, NWR infrastructure is reliant on copper media. Copper is a good conductor of electricity and is commonly used in electrical wiring, but it is not an ideal material for radio transmitter antennas or other radio frequency (RF) components.¹³ This is because the electrical properties of copper wire create resistance and interference, leading to weaker communication signals the further the transmission goes.¹⁴ Copper is also prone to oxidation and corrosion over time, which can degrade its performance as an RF conductor. This can lead to signal loss and reduced range for radio transmissions. The cost of copper is rising due to increased demand. It is also becoming more expensive to fix and replace.¹⁵ Lastly, copper cables are more susceptible to attenuation¹⁶ due to several factors, such as impurities in the copper, physical use, long term exposure to water, temperature, or other nearby signals.¹⁷

SUMMARY OF PROVISIONS

If enacted, S. 1416 would do the following:

- Direct NOAA to update, expand, and improve the reliability of NWR.
- Establish requirements for upgrading and modernizing NWR, including transitioning current infrastructure away from copper transmissions, ensuring consistent maintenance and operations monitoring, and acquiring additional transmitters to expand coverage to rural communities.
- Require the acceleration of software upgrades to NWS's Advanced Weather Interactive Processing System, and enhance the accessibility of data and NWR broadcasts.
- Require the development and implementation of alternate back-up capabilities in the event of an outage in the NWS forecast offices and the research and development of an alternative transmitting option for transmitting signals from NWR to transmitters that are remote or do not have internet protocol capability.
- Require the Under Secretary of Commerce for Oceans and Atmosphere to assess NWR within 1 year of enactment.

LEGISLATIVE HISTORY

S. 1416, NOAA Weather Radio Modernization Act of 2023, was introduced on May 3, 2023, by Senator Cantwell (for herself and Senator Cruz) and was referred to the Committee on Commerce, Science, and Transportation of the Senate. On May 10, 2023, the

¹² Ibid.

¹³ Department of Transportation, Federal Highway Administration, "Chapter 2. Fundamentals of Telecommunications" (https://ops.fhwa.dot.gov/publications/telecomm_handbook/chapter2_01.htm).

¹⁴ Ibid.

¹⁵ Ibid.

¹⁶ Eland Cables, "What is Attenuation in an Electrical System?" (<https://www.elandcables.com/the-cable-lab/faqs/faq-what-is-attenuation-in-an-electrical-system#:text=As%20the%20signal%20travels%20through,lengths%20and%20higher%20frequency%20signals>).

¹⁷ Horace Pops, "The Metallurgy of Copper Wire," Copper Development Association Inc. (<https://www.copper.org/publications/newsletters/innovations/1997/12/wiremetallurgy.html>).

Committee met in open Executive Session and, by voice vote, ordered S. 1416 reported favorably without amendment.

H.R. 1482, the House companion to S. 1416, was introduced by Representative Stephanie Bice on March 9, 2023, and was referred to the Committee on Science, Space, and Technology of the House of Representatives. On March 29, 2023, that Committee voted 36–0 in favor of H.R. 1482.

In the 117th Congress, H.R. 5324, the NWR Modernization Act of 2021, was introduced by Representative Stephanie Bice on September 22, 2021, and was referred to the Committee on Science, Space, and Technology of the House of Representatives. It was passed out of the House on May 11, 2022.

ESTIMATED COSTS

In accordance with paragraph 11(a) of rule XXVI of the Standing Rules of the Senate and section 403 of the Congressional Budget Act of 1974, the Committee provides the following cost estimate, prepared by the Congressional Budget Office:

S. 1416, NWR Modernization Act of 2023			
As ordered reported by the Senate Committee on Commerce, Science, and Transportation on May 10, 2023			
By Fiscal Year, Millions of Dollars	2023	2023-2028	2023-2033
Direct Spending (Outlays)	0	0	0
Revenues	0	0	0
Increase or Decrease (-) in the Deficit	0	0	0
Spending Subject to Appropriation (Outlays)	0	45	not estimated
Increases <i>net direct spending</i> in any of the four consecutive 10-year periods beginning in 2034?	No	Statutory pay-as-you-go procedures apply?	No
		Mandate Effects	
Increases <i>on-budget deficits</i> in any of the four consecutive 10-year periods beginning in 2034?	No	Contains intergovernmental mandate?	No
		Contains private-sector mandate?	No

S. 1416 would direct the National Oceanic and Atmospheric Administration (NOAA) to expand and modernize NOAA Weather Radio (NWR), a nationwide radio network that continuously broadcasts weather forecasts as well as warnings and post-event information for all types of hazards, including earthquakes and 911 outages. The bill would have NOAA expand NWR coverage to rural and underserved areas, national parks, and recreation areas. S. 1416 also would direct the agency to modernize the NWR by using the Internet, accelerating software upgrades, and assessing and enhancing access to the NWR broadcasts.

For this estimate, CBO assumes that S. 1416 will be enacted near the end of fiscal year 2023. In 2023, NOAA allocated \$10 million for NWR activities. Using information from the agency and based on historical spending patterns for similar activities, CBO estimates that implementing S. 1416 would cost \$45 million over the 2024–2028 period, assuming appropriation of the estimated amounts.

That amount consists of \$15 million to acquire and install new transmitters, and \$30 million to modernize the system, as described above. Those estimated costs incorporate the fact that some of those activities are happening under current law.

The costs of the legislation, detailed in Table 1, fall within budget function 300 (natural resources and environment).

TABLE 1.—ESTIMATED INCREASES IN SPENDING SUBJECT TO APPROPRIATION UNDER S. 1416

	By fiscal year, millions of dollars—						
	2023	2024	2025	2026	2027	2028	2023–2028
Expand NWR Coverage:							
Estimated Authorization	0	4	4	4	4	4	20
Estimated Outlays	0	1	3	3	4	4	15
Modernize NWR Infrastructure:							
Estimated Authorization	0	8	8	8	8	8	40
Estimated Outlays	0	2	5	7	8	8	30
Total Changes:							
Estimated Authorization	0	12	12	12	12	12	60
Estimated Outlays	0	3	8	10	12	12	45

NWR = National Oceanic and Atmospheric Administration Weather Radio.

On June 9, 2023, CBO transmitted a cost estimate for H.R. 1482, the NWR Modernization Act of 2023, as reported by the House Committee on Science, Space, and Technology on May 16, 2023. The two bills are similar, and CBO’s estimates of their budgetary effects are the same.

The CBO staff contacts for this estimate are Kelly Durand and Aurora Swanson. The estimate was reviewed by H. Samuel Papenfuss, Deputy Director of Budget Analysis.

PHILLIP L. SWAGEL,
Director, Congressional Budget Office.

REGULATORY IMPACT STATEMENT

Because S. 1416 does not create any new programs, the legislation will have no additional regulatory impact, and will result in no additional reporting requirements. The legislation will have no further effect on the number or types of individuals and businesses regulated, the economic impact of such regulation, the personal privacy of affected individuals, or the paperwork required from such individuals and businesses.

CONGRESSIONALLY DIRECTED SPENDING

In compliance with paragraph 4(b) of rule XLIV of the Standing Rules of the Senate, the Committee provides that no provisions contained in the bill, as reported, meet the definition of congressionally directed spending items under the rule.

SECTION-BY-SECTION ANALYSIS

Section 1. Short title

This section would provide that the bill may be cited as the “NOAA Weather Radio Modernization Act of 2023” or the “NWR Modernization Act of 2023”.

Section 2. Definitions

This section would define the terms “NOAA Weather Radio” and “Under Secretary”.

Section 3. Upgrading existing systems

This section would create a requirement for the Under Secretary of Commerce for Oceans and Atmosphere to upgrade the systems of NWR in order to expand coverage and ensure reliability. This section also establishes specific requirements for upgrading NWR, including maintaining support for areas that are not covered or have poor cellular service, ensuring consistent maintenance and operations for timely repairs, enhancing the ability to amplify non-weather emergency messages, and acquiring additional transmitters to expand coverage.

Section 4. Modernization initiative

This section would create a requirement for the Under Secretary to modernize NWR. This section also establishes specific requirements for modernization, including transitioning current infrastructure away from copper transmissions, requiring the acceleration of software upgrades to NWS’s Advanced Weather Interactive Processing System and enhancing the accessibility of data and feeds of NWR. This section would also require the development and implementation of alternate back-up capabilities in the event of an outage in the NWS forecast offices and the research and development of an alternative transmitting option for transmitting signals from NWR to transmitters that are remote or do not have internet protocol capability. This section would also require the transition of critical application to the Integrated Dissemination Program.

This section would also require the Under Secretary to create an assessment of NWR that must be submitted within 1 year of enactment to Congress. This assessment should provide recommendations on the need for continuous and real-time broadcasts from NWR, the compatibility of NWR with third-party platforms that provide online services, and existing or new management systems that promote efficiency. This section also requires that the assessment must evaluate NOAA’s ability to aggregate real-time broadcast feeds at multiple locations, the effectiveness of coordination between agencies, the potential effects of an electromagnetic pulse or geomagnetic disturbance, and any improvements of hazardous weather and water event communications.

CHANGES IN EXISTING LAW

In compliance with paragraph 12 of rule XXVI of the Standing Rules of the Senate, the Committee states that the bill as reported would make no change to existing law.