ISSUE
13
May
2019

N-Wave News

NOAA N-Wave

The N-Wave Enterprise Network Services Branch, under the NOAA Office of the Chief Information Officer, Service Delivery Division, supports both operations and research, enabling NOAA's mission of science, service and stewardship through highly available, secure, high-speed network transport and services.

Mission

N-Wave is committed to providing innovative networking capabilities with integrity, transparency and flexibility, to enable NOAA's missions through the implementation of:

- Quality, advanced high-speed connectivity both internally and externally to NOAA
- Portfolio of secure, flexible, available, high-bandwidth network services
- Retention and recruitment of exceptional operations and engineering staff.

Our Vision

To provide reliable, secure and sustainable enterprise network services for NOAA, which enables NOAA's mission of science, service and stewardship.

NOAA ENTERPRISE NETWORK

in this edition:

From the N-Wave Program Manager

Robert Sears

A decade has passed since the 2009 American Recovery and Reinvestment Act provided the one-time funding needed to build a network capable of serving all of NOAA—N-Wave. What started as a research network built for NOAA HPC has matured and expanded in capacity, reach and scope—all changes driven by the needs of NOAA science and critical operations.

N-Wave's initial service offerings were delivered through private wide area network transport. The first bits to traverse the network's national backbone originated among NOAA researchers in Boulder, CO, and Princeton, NJ, to high performance computing resources in Fairmont, WV, and Oak Ridge, TN, along with the satellite data archive spread among Suitland, MD, Asheville, NC, and Boulder. Expansion began with the partnership between N-Wave and the NESDIS GOES-R program, which increased N-Wave's national footprint and established its D.C. Metro dense wavelength division multiplexing ring. With the onset of the federal Trusted Internet Connection Initiative, more NOAA sites began to connect to N-Wave for internet access, further building out the N-Wave transport portfolio.

While N-Wave has continued to migrate NOAA sites to its transport services, the fastest growing service area during the past two years has been *within* our customer sites. The N-Wave campus and enterprise network services portfolio offers wireless (see p. 6), virtual private networking and managed local area network (LAN) services (see p. 2). This means N-Wave has extended its operational service offerings past the wide area provider transport edge and into campus and site local area networks.

This yields a large number of assets under N-Wave operation and management, from over 500 wireless access points nationwide to dozens and dozens of LAN closet switches and core campus network devices. As these services grow, so does the N-Wave FISMA system boundary of responsibility. Services such as wireless and managed LAN fall under a Moderate enclave within N-Wave's greater High criticality FISMA system. What this requires is even more diligence for operations and management of nationally distributed assets, including more robust logging, scanning and asset security posture review.

The N-Wave security program has a new manager to lead efforts to ensure our growing service portfolio remains highly available and secure, in conjunction with compliance and continuous monitoring and management. It is by no means a trivial task, and coordination among the N-Wave security program manager, engineering and network operations is critical. Eric Estes, the new N-Wave security program manager, is well up to the task. He joins our team from the Physical Sciences Division within the Office of Oceanic and Atmospheric Research's Earth System Research Laboratory, bringing many years of experience in cybersecurity and systems engineering.

I welcome Eric to the N-Wave team, along with other new staff members – Tran Nguyen and Emad Said – who support N-Wave customers from Hawaii to Alaska and across the contininetal United States.

New N-Wave Managed LAN Services

N-Wave has added campus and site Managed LAN services to its portfolio, building on the success of recent Managed LAN deployments. With the ability to securely converge multiple users and services onto a single network infrastructure, N-Wave can reduce labor, cabling, maintenance and equipment costs while improving service for all.

N-Wave uses a modular approach in building LANs. The modules can be thought of as the building blocks of any N-Wave LAN deployment, regardless of its size or complexity. This approach delivers a scalable solution that allows for new building blocks to be added as the network grows, without significantly increasing the network's complexity.

Using technology like link aggregation groups (LAGs), redundant multi-chassis LAGs and virtual switches allows N-Wave engineers to build reliable, scalable and fast-converging switching networks without compromising network simplicity and ease of management.

Understanding that NOAA offices have different mission requirements and local network needs, N-Wave has designed a Managed LAN service that is not one-size-fits-all. The service includes multiple LAN designs that vary in size, complexity and cost.

As part of the service, N-Wave assumes responsibility for all tasks related to the active LAN components – including procurement, configuration, management, software and hardware maintenance, monitoring and securing the LAN devices.

The Managed LAN service is fully deployed at the Western Regional Center in Seattle, WA, and it is in various deployment stages at the NOAA Boulder Campus in Colorado and Silver Spring Metro Center in Maryland. A form of the service also is deployed across multiple NOAA sites in support of the N-Wave Enterprise Wireless service. This makes for an easier turn-up of the full Managed LAN service if a site chooses to opt into that service in the future.

No site is too big or too small

N-Wave offers different LAN designs for large, medium, small and micro site sizes. The micro size deployment can be used for sites that usually consist of one building or floor, and it provides connectivity to a limited number of users and/or services. On the other hand, the large site design is used for locations with multiple buildings and large numbers of users and access switches. Using the building blocks modular approach allows N-Wave to achieve cost efficiency even for a site that has multiple buildings with different sizes and with users who are not evenly distributed within those buildings.

Three-tier model

The N-Wave managed LAN service uses a three-tier hierarchical network model that consists of core, distribution and access layers. This model allows us to build reliable, scalable and high-performance local area networks.

In some deployments, those three tiers/layers can be collapsed into a two-tier deployment or even a one-tier deployment of core/distribution/access. The three-tier model is used for large sites with multiple buildings, while the one-tier is usually seen in micro sites where one device can perform the role of the core, distribution and access layers. This collapsed model helps simplify operations and reduce the cost for smaller sites. Multiple factors are considered in determining which model is best for the environment. Those factors vary from site to site and must be carefully assessed during each deployment to not compromise the system availability.

Standardization

N-Wave uses standard hardware, software and network design models when deploying LANs. This standardization reduces complexity and ensures compatibility between the different solution components, which allows engineers to easily troubleshoot any campus LAN issue regardless of its geographical location.

Security is another key reason to standardize. Using standard deployments allows N-Wave to better control the environment and respond to security incidents and events in a timely manner. System patches, upgrades and vulnerability mitigations are more easily managed when standard hardware and software is used across all deployments.

Future direction

Using Network Access Control (NAC) protocols to help control network access and improve network security posture is one of the areas N-Wave engineers are currently exploring and testing for future service improvement. They are looking at different NAC solutions that can be integrated with the Managed LAN service and used to control devices and user access to local networks. Using NAC will not only provide user authentication capabilities, it will also enhance the network's security posture and help with risk management.

Credit: NOAA/PIFSC/HMSR

Aggregation Model Deployed to Serve NOAA Tidewater Sites

Three years after N-Wave deployed its first customer aggregation site in Sunnyvale, CA, the next iteration of this model is now serving customers in the Tidewater area of Virginia. A new aggregation site in Norfolk, VA, allows N-Wave to deliver cost-efficient networking services to customers in an area that encompasses Norfolk, Newport News, Chesapeake and Woodford.

Similar to Sunnyvale, the Tidewater project involved multiple stages of development: engaging customers in the area, identifying and collaborating with new partners, developing an aggregation design and deploying collector circuits to customer sites. Ultimately that process is leading to enhanced services for NOAA line offices.

Identifying and engaging with Tidewater stakeholders

In the earliest stage of the project, N-Wave identified through customer engagement several NOAA offices at various locations across the Tidewater region that wanted to take part in this opportunity:

- National Ocean Service (NOS)
  - Center for Operational Oceanographic Products and Services – Field Operations Division / Atlantic Region - Chesapeake, VA
  - Monitor National Marine Sanctuary – Newport News, VA
  - National Geodetic Survey Field Operations – Norfolk, VA
  - National Geodetic Survey Testing and Training Center – Woodford, VA
  - Office of Coast Survey - Atlantic Hydrographic Branch – Norfolk, VA
- Office of Marine and Aviation Operations (OMAO)
  - Marine Operations Center-Atlantic – Norfolk, VA
- Office of the Chief Information Officer (OCIO) Corporate Services
  - NOAA Norfolk Regional IT Support Office – Norfolk, VA

These NOAA line office sites vary in size and function of their work. For example, the NOS office in Newport News focuses on maintaining the Monitor National Marine Sanctuary, which protects the shipwreck of the Civil War era USS *Monitor*. The OMAO Marine Operations Center-Atlantic in Norfolk serves as a homeport for one NOAA survey ship and provides administrative, engineering, maintenance and logistical support to NOAA's Atlantic fleet. By engaging with customers at each site, N-Wave was able to develop a better understanding of each unique mission and, subsequently, each site's specific network and service requirements.

Partnering with Old Dominion University

To facilitate the customer aggregation model, N-Wave needed to find a partner who could help with last-mile customer connectivity, provider-to-N-Wave connectivity and colocation requirements. In California, N-Wave worked with CENIC and AT&T. For the Tidewater project, Old Dominion University (ODU) emerged as a partner who could help solve these challenges.

ODU's Information Technology Services team leveraged their relationships with Cox Communications, E-LITE, and the Mid-Atlantic Research Infrastructure Alliance (MARIA) to deliver these services to N-Wave. ODU also provided the two colocation sites for N-Wave: the ODU Engineering and Computational Sciences Data Center in Norfolk, VA, and the ODU Virginia Modeling, Analysis and Simulation Center (VMASC) in Suffolk, VA. These sites have the capacity to aggregate wide-area and customer connections, as well as the ability to meet NOAA colocation requirements for redundancy, power, access, space and cooling. The VMASC location also provided connectivity to the secondary E-LITE router located at the ODU Tri-Cities Center in Portsmouth, VA.

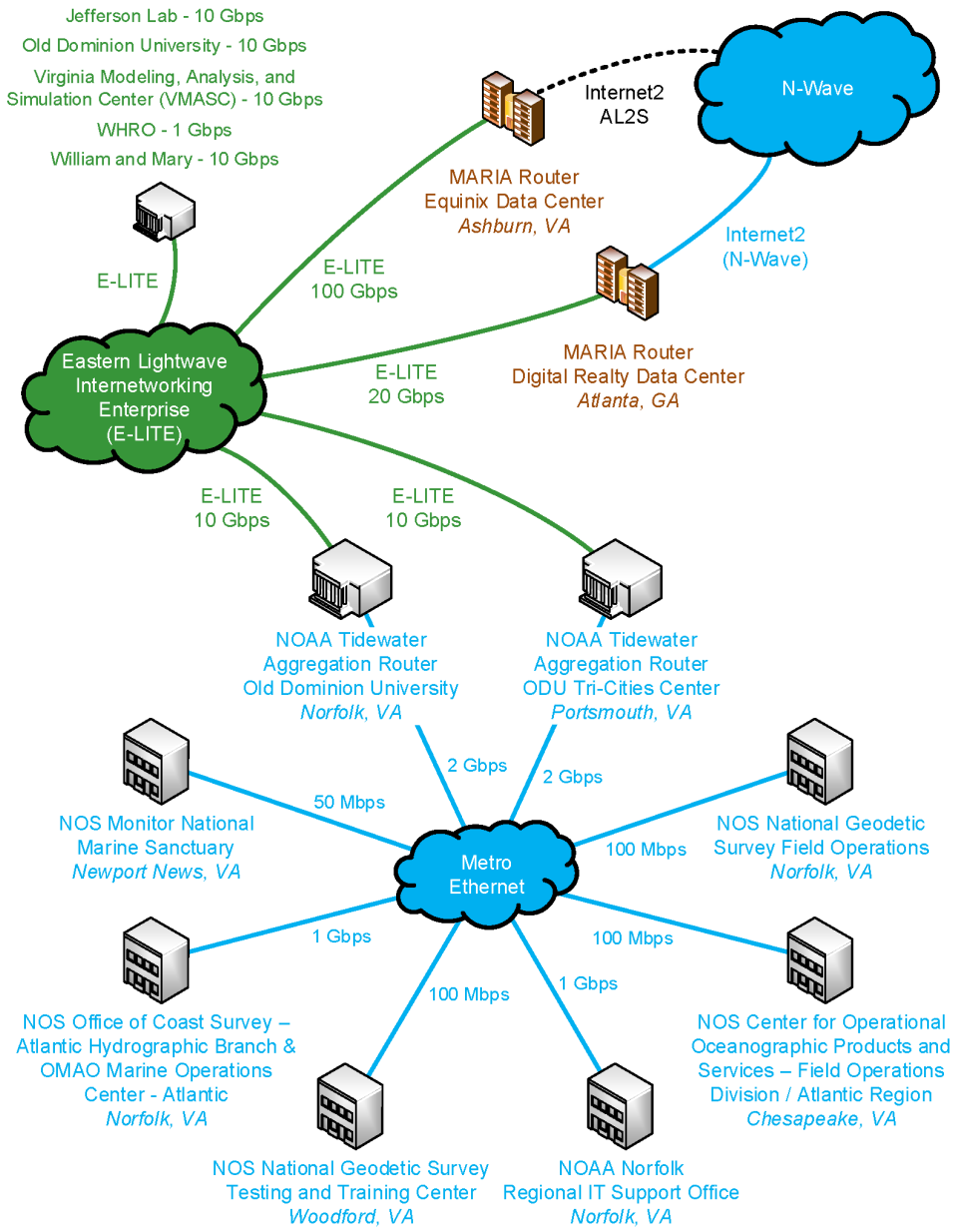
A Cox Communications Metro-Ethernet connection provided last-mile connectivity to N-Wave customer sites. N-Wave then procured two-gigabit Cox collector

circuits, one to Suffolk and the other to Norfolk, to aggregate all customer connections onto a single connection to the N-Wave router in each colocation facility. If one of the two collector circuits fails, N-Wave customer traffic would then roll over to the other circuit and continue to flow to N-Wave.

To provide diverse wide-area connectivity for N-Wave customers in this region, N-Wave and ODU utilized the E-LITE and MARIA routers to reach N-Wave core nodes in McLean, VA, and Atlanta, GA. The E-LITE network includes participants such as the DOE's Jefferson Lab, ODU, VMASC and the College of William and Mary, providing connectivity among all locations. MARIA is a network run by various universities in Virginia to facilitate access to advanced information, instruction and research infrastructure technology.

The first wide area network path is from Norfolk to McLean. The Norfolk E-LITE router has transport to the Equinix Data Center complex in Ashburn, VA, via an optically protected and diverse path 100-gigabit circuit. It then interconnects to the MARIA router at the Equinix facility. NOAA traffic is passed via Internet2's Advanced Layer 2 Service from the MARIA router to the N-Wave router at McLean.

The second path is from Portsmouth to Atlanta. The Portsmouth E-LITE router transports over two 10-gigabit Cox Communications circuits to the MARIA router in the Digital Realty Data Center in Atlanta. The traffic is then passed over an Internet2 10-gigabit circuit to the N-Wave core router in the CenturyLink Data Center in Atlanta. In summary, through its partnership with ODU, N-Wave is able to deliver high-speed, high-availability and scalable networking to multiple NOAA sites in the Tidewater area.



Credit: Scott Daffron, Network Architect, Old Dominion University Information Technology Services

Next steps in the Tidewater project

N-Wave engineers recently finished installing hardware at each customer site in the Tidewater area. The circuits have been tested and are performing as expected. The customer site migrations have occurred for the NOS offices and others are scheduled to occur this spring. At that point, all seven new customers at six new sites will join N-Wave. While the architecture, implementation and support model for the project was designed to meet the current needs of N-Wave customers, the model is also able to scale as new customers opt in and existing customer needs evolve.

From Coast to Coast, N-Wave's Enterprise Wireless Delivers Mobility to More Sites

Following the first deployment in September 2018, N-Wave's Enterprise Wireless is now available at more than a dozen NOAA sites across the U.S. The service has seen significant adoption among the line offices, particularly in locations that did not previously offer wireless services.

In addition, NOAA sites that were using the Boulder Network Operation Center's (BNOC) wireless infrastructure recently migrated to the N-Wave service, resulting in a notable influx of new users. Following that migration, N-Wave engineers were able to upgrade the existing infrastructure and implement network design changes to improve supportability and the user experience.

More sites, more mobility

The N-Wave services team has made significant progress deploying the enterprise wireless service to new sites, thereby increasing the number of customers and areas serviced. This growth makes the service better for everyone who uses it. As the service becomes available at more sites, wireless users gain mobility to seamlessly connect to wireless at these new locations. At the time of this publication, the service is available at more than a dozen sites. Six additional sites have approved funding and will be added to the service locations list soon.

Current service locations:

- Aircraft Operations Center – Lakeland, FL
- David Skaggs Research Center and Building 22 – Boulder, CO
- Fairbanks Command and Data Acquisition Station – Fairbanks, AK
- NOAA Finance Office – Germantown, MD
- Information Technology Center – Largo, MD
- Oxford Cooperative Laboratory – Oxford, MD
- Hollings Marine Lab – Charleston, SC
- NOAA Beaufort Laboratory – Beaufort, NC
- NOAA Environmental Security Computing Center – Fairmont, WV
- Wallops Command and Data Acquisition Station – Wallops Island, VA
- Office for Coastal Management – Charleston, SC
- Office for Coastal Management – Oakland, CA
- Silver Spring Metro Center Buildings 1, 3 and 4 – Silver Spring, MD
- Western Regional Center – Seattle, WA

Coming soon:

- NOAA Satellite Operations Facility – Suitland, MD
- Monterey Bay National Marine Sanctuary Exploration Center – Santa Cruz, CA
- Thunder Bay National Marine Sanctuary – Alpena, MI
- National Geodetic Survey Testing and Training Center – Woodford, VA
- OMAO Marine and Aviation Operations-Atlantic – Norfolk, VA
- OMAO Marine and Aviation Operations-Pacific – Newport, OR

WRC and Boulder wireless transition

In March, the N-Wave services team coordinated a mass transition of the remaining BNOC wireless customers to N-Wave's enterprise-level service. This transition included NOAA customers at the WRC in Seattle, WA, and NOAA and NTIA customers at the Department of Commerce Boulder Labs facility in Boulder, CO. Once the migration was complete, the

BNOC was able to turn down their wireless service offering and pass wireless equipment to N-Wave for continued use.

Infrastructure upgrades and architecture changes improve user experience

With the addition of BNOC-provided wireless equipment, N-Wave upgraded the existing enterprise infrastructure to improve supportability and the overall user experience. Initially N-Wave was using an Aruba 7030 as the master wireless LAN controller (WLC). N-Wave engineers since then replaced that equipment with the BNOC wireless LAN controllers, two Aruba 7210s, to improve capacity and capabilities. The change also adds device redundancy, in case one WLC device would fail. These infrastructure improvements will reduce downtime and improve operational supportability of the service through built-in redundancy.

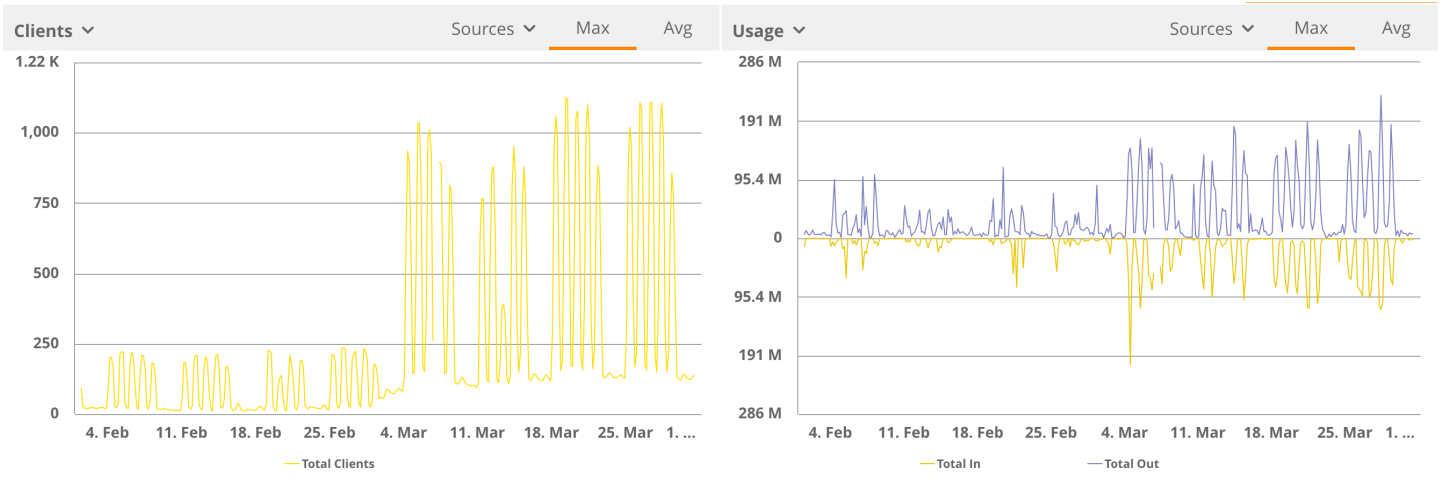
To improve the overall user experience, additional equipment from the BNOC will be leveraged to develop a wireless service testing lab. The purpose of this lab will be to ensure the N-Wave services team is aware of current operating conditions of the wireless network, can test without breaking the production network, and can test and validate configuration changes before implementing those on the production network. This will include the ability to test code upgrades, configuration changes and user issues.

As the wireless service extends to new sites and an increasing number of users, customer feedback becomes invaluable in uncovering issues and improving the service across the enterprise. For example, when the service was turned up at the Information Technology Center in Largo, MD, users initially reported connection drops and what appeared to be poor coverage. From this information, the N-Wave services team investigated and found an issue in the master controller settings used to provide wireless redundancy. Further research led to an improved strategy, which since then has been implemented successfully at the enterprise level.

Next up: Wireless streaming

N-Wave is working to add a new feature to allow streaming from wireless devices to Apple TVs and other wireless display technologies. N-Wave customers from the Office of Oceanic and Atmospheric Research and the National Ocean Service have expressed interest in this functionality, which will give users the ability to walk into a conference hall or meeting room with a WiFi-connected mobile device and share content directly to a media streaming device in the space.

Enterprise wireless customers can submit additional requests for new features by emailing nwave-noc@noaa.gov.



The number of devices concurrently connected to N-Wave's Enterprise Wireless service surged by more than 750 devices, following the WRC and Boulder Labs wireless transitions in early March. User traffic followed a similar trend, with spikes at or above 191 mbps.

Alaska Updates: Partnering to Boost Connectivity in the Region

The National Weather Service Alaska Region will host an "Alaska Federal Agencies Networking Meeting" May 7-9 for NOAA and federal partners in the state. Partners from the Department of Defense's (DOD) Defense Research and Engineering Network (DREN), Federal Aviation Administration (FAA), the Department of Interior's (DOI) U.S. Geological Survey (USGS) and the U.S. Coast Guard (USCG) will gather with representatives from N-Wave and NOAA's line offices in the Alaska region at the Anchorage Federal Building.

One of the main topics for discussion will be the possibility of fostering a networking cooperative among government agencies in Alaska, following the successful model of the Hawaii Intranet Consortium (HIC). The HIC was established through the leadership efforts of DREN with the goal of saving money for its members by sharing expensive resources within Hawaii and between Hawaii and CONUS. It now serves multiple organizations in Hawaii, including the DOD, DOI, NOAA, the University of Hawaii and Internet2.

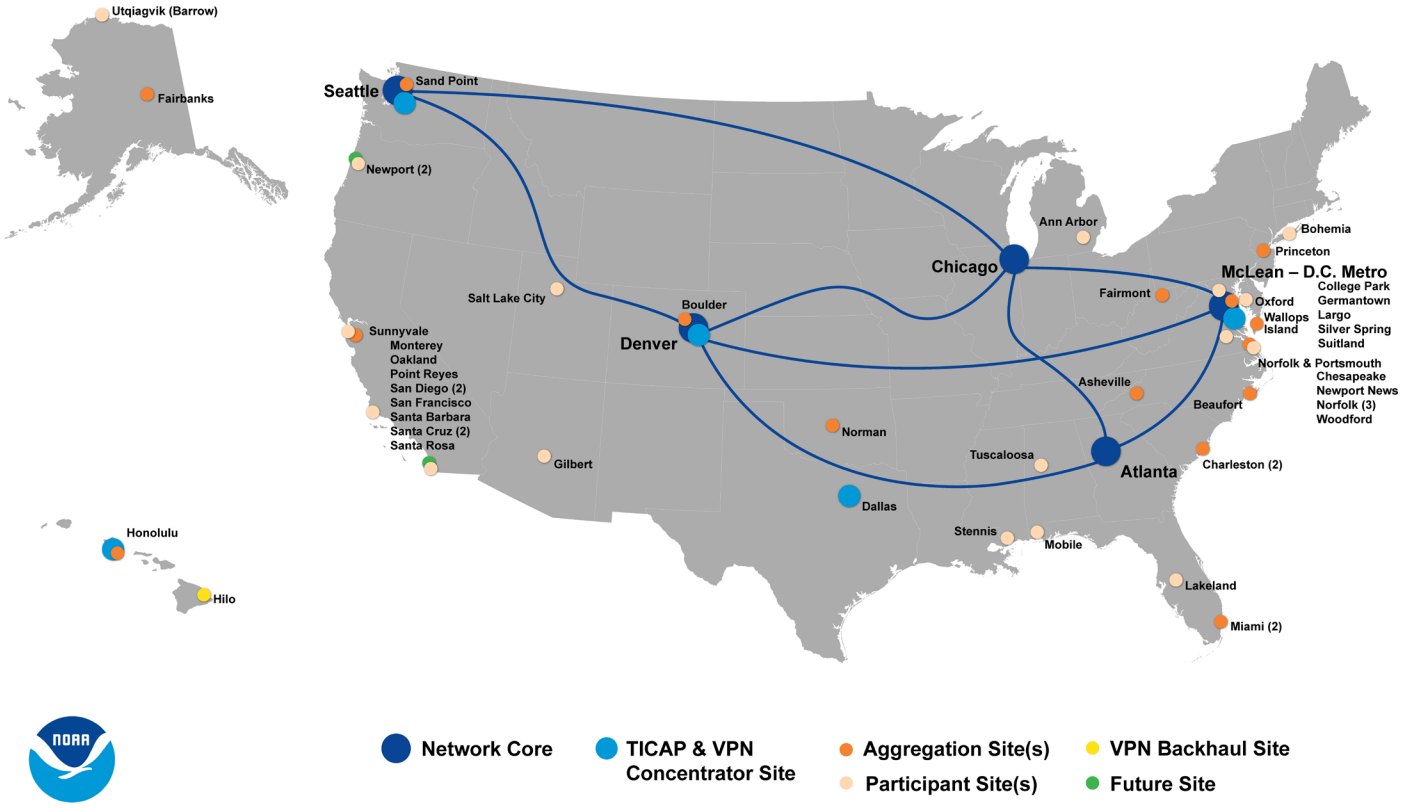
While the sheer size of Alaska stands in stark contrast, the challenges of delivering connectivity to remote sites – whether surrounded by water or vast wilderness areas – are similar. In the case of Alaska, NOAA and its enterprise network, N-Wave, may be well positioned to facilitate a networking cooperative that will benefit multiple government agencies in the state. During the interagency meeting, N-Wave staff will report on recent progress in ongoing and upcoming projects in Alaska.

NOAA Ship Reuben Lasker *off the Alaskan coast. Credit: NOAA/OMAO*

Last fall, N-Wave established connectivity in Utqiagvik (Barrow), AK, the northernmost U.S. city, in support of the National Weather Service, the Office of Oceanic and Atmospheric Research (OAR), and the National Environmental Satellite, Data, and Information Service (NESDIS). The connection leverages a new Quintillion subsea cable that runs from Nome to Prudhoe Bay and then south more than 400 miles to Fairbanks. N-Wave continues to explore multiple options for fiber connectivity between the Quintillion infrastructure and a new NOAA facility in Utqiagvik that will be built during the next two years. That facility will replace the existing Earth Systems Research Laboratory Global Monitoring Division's Barrow Observatory.

N-Wave is also working with various partners on initial network designs to support new N-Wave points of presence in Anchorage and Juneau. The designs will provide highly available aggregation for local NOAA offices and diverse high-capacity links to CONUS for access to the N-Wave backbone and TICAP services.

Finally, N-Wave and NESDIS continue to increase capacity and availability of the current Fairbanks to Seattle circuit from 100 mbps to 1 gbps. The European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) and other NOAA partners are taking advantage of this more robust network infrastructure for command and control, as well as to receive data from their current MetOp satellites using the Fairbanks Command and Data Acquisition Station at Gilmore Creek. EUMETSAT and other NOAA partners are also looking to utilize this upgraded network infrastructure for their future joint satellite missions, including JASON-CS.



Credit: NOAA West Coast Fisheries

Network Changes and New Participants (October 2018 - March 2019)

Tidewater Aggregation Site: At the end of March, N-Wave completed a major expansion project in the Norfolk/Tidewater area of Virginia. Partnering with Old Dominion University (ODU), E-LITE and the Mid-Atlantic Research Infrastructure Alliance (MARIA), N-Wave engineers spent a week installing equipment at two ODU compute facilities and six remote NOAA sites. Seven NOAA offices will be served at those sites when the move to N-Wave is complete this spring:

- NOS Center for Operational Oceanographic Products and Services – Field Operations Division / Atlantic Region - Chesapeake, VA
- NOS Monitor National Marine Sanctuary – Newport News, VA
- NOS National Geodetic Survey Field Operations – Norfolk, VA
- NOS National Geodetic Survey Testing and Training Center – Woodford, VA
- NOS Office of Coast Survey - Atlantic Hydrographic Branch – Norfolk, VA
- OMAO Marine Operations Center-Atlantic – Norfolk, VA
- NOAA Norfolk Regional IT Support Office – Norfolk, VA

Read more about the Tidewater aggregation project on p. 4.

Newport, OR: Working with Oregon State University (OSU) and the Network for Education and Research in Oregon (NERO), N-Wave engineers connected the Office of Marine and Aviation Operations (OMAO), Marine Operations Center-Pacific (MOC-P) facility to the N-Wave network via a 1 gbps Ethernet circuit. Plans are underway to also connect to N-Wave the NOAA offices located across the street at OSU's Hatfield Marine Science Center.

Washington, D.C., Metro: N-Wave continues to expand in the D.C. Metro area. Two NOAA offices in the area recently migrated to the N-Wave network: the NOAA Financial System Division office in Germantown, MD, and the NOAA Information Technology Center in Largo, MD. In addition, N-Wave supports the Commerce Business Systems (CBS), the Web Operations Center (WOC) and the Messaging Operations Center (MOC).

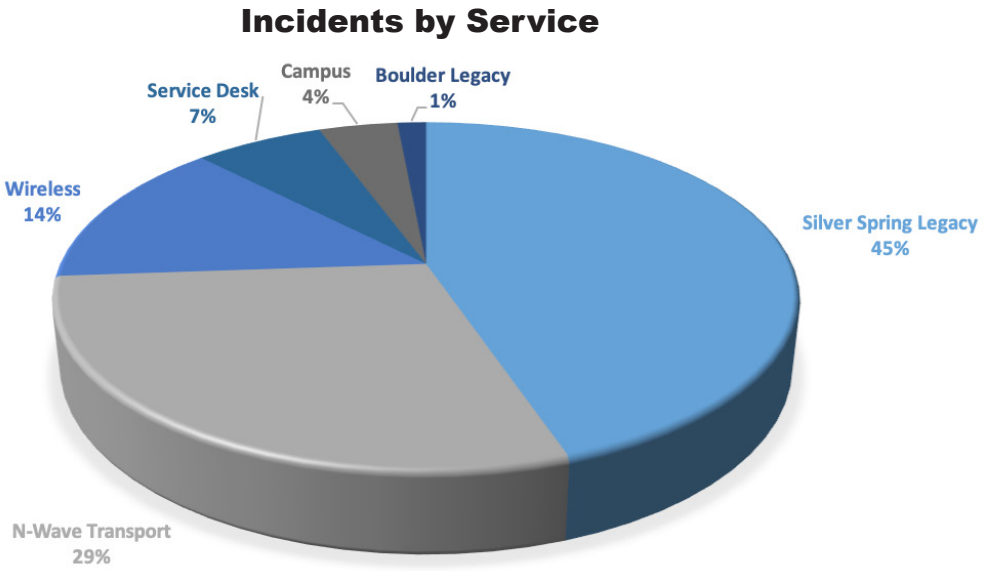
Fairbanks to Seattle Circuit Upgrade: N-Wave successfully upgraded the Fairbanks to Seattle aggregation backbone circuit from 100 mbps to 1 gbps on November 19, 2018. Along with the bandwidth upgrade, the vendor, Alaska Communications, also implemented full path protection across their MPLS backbone and a dedicated bandwidth/committed rate of 1 gbps. The new capacity and added resiliency is paving the way for EUMETSAT and the NESDIS Office of Satellite and Product Operations (OSPO) to use the circuit to both receive data and command the new generation JASON-CS polar-orbiting spacecraft.

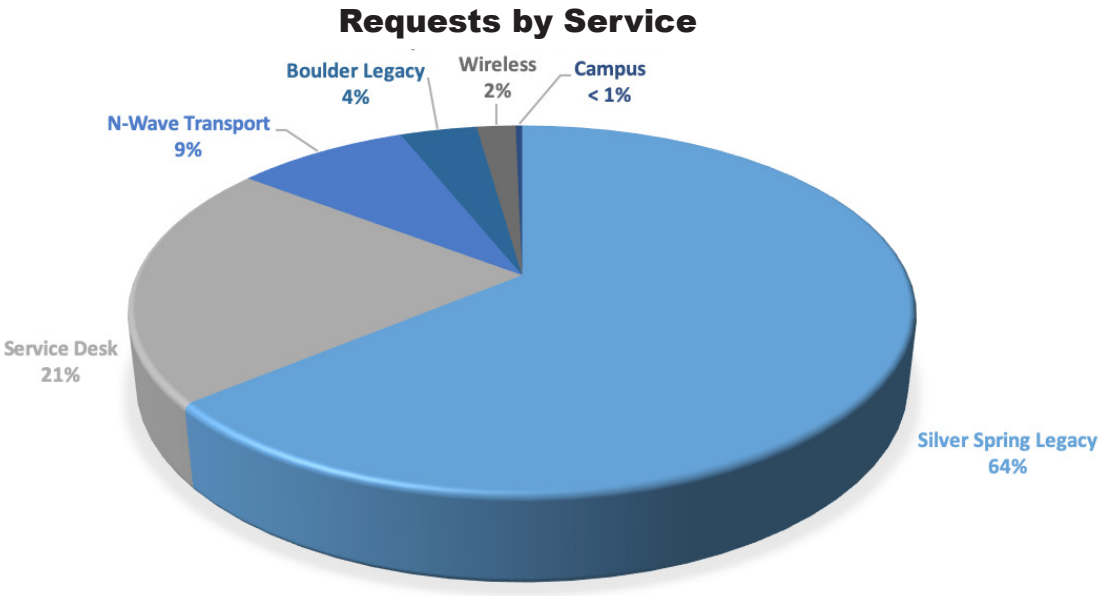
NESDIS/OSPO/ESPC CIP Migration from Commercial Provider to N-Wave: NESDIS OSPO migrated their Critical Infrastructure Protection (CIP) network off a commercial telecommunication provider's MPLS OC-3 and OC-12 circuits onto N-Wave as of January 30, 2019. This migration not only saves the program considerable annual costs, but also increases their capacity by moving to the N-Wave gigabit network infrastructure. In addition, the move provides resiliency with redundancy at each site.

Network Operations Center Metrics and Updates

The N-Wave Network Operations Center (NOC) provides support 24 hours a day, 365 days a year. Support metrics gathered from September 2018 through March 2019 indicate that the N-Wave NOC opened more than 17,700 tickets. That number encompasses all N-Wave projects, incidents, service requests and customer communication records, such as individual phone calls and incoming and outgoing email correspondence of the NOC.

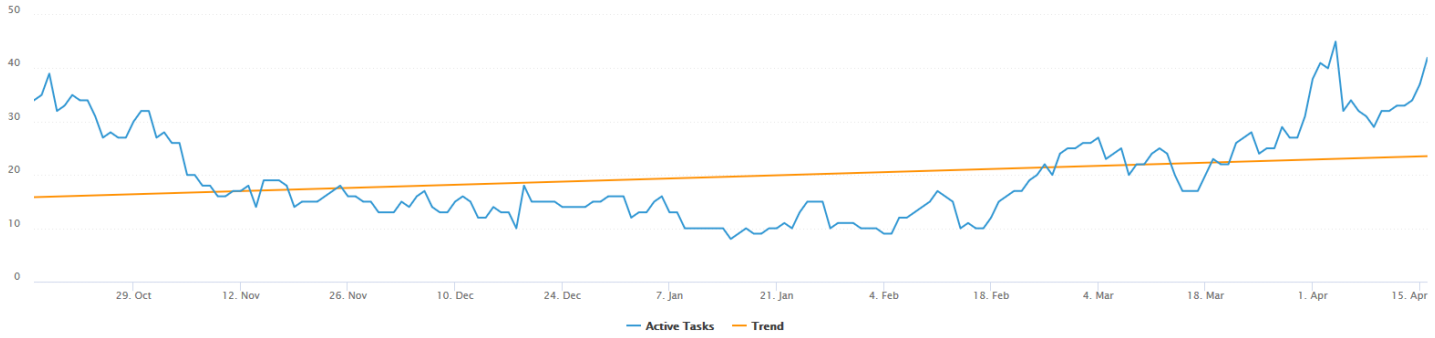
Out of the more than 17,700 tickets, only 268 were related to incidents, or active alerts, outages, impacts or issues reported by a customer. The two pie charts below regarding incidents and requests by N-Wave service category reflect N-Wave's expanding scope, from transport services to new service offerings such as Enterprise Wireless and Managed Local Area Networks. The charts also show the integration of the Silver Spring NOC and Boulder NOC, along with each NOC's legacy services.



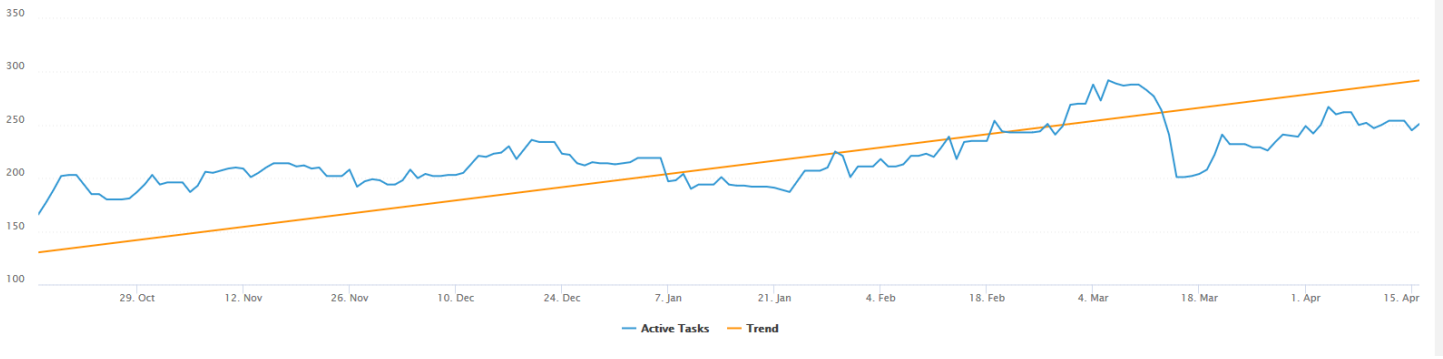


The N-Wave NOC continues to use ServiceNow to track more granular incident and task data, allowing for more in-depth analysis to improve N-Wave processes and services. The first graph below represents the active incidents logged on a given day. The orange trend line indicates a relatively stable balance of new and resolved incidents processed during the past six months. The second graph shows all active tasks needed to complete a service request (referred to as catalog tasks) on a given day during the past six months. The orange trend line indicates the overall rate of growth in those tasks, as N-Wave expands its service catalog and delivers services to new sites and customers.

Active Incidents



Active Catalog Tasks



N-Wave's Network Operations Center continues with GlobalNOC

Since 2010 when the N-Wave network was switched on, the GlobalNOC's network engineers, software developers and service desk technicians have provided expert, round-the-clock support.

Read more about the latest 10-year agreement between Indiana University and NOAA for GlobalNOC to continue to support N-Wave: https://news.iu.edu/stories/2019/05/iu/releases/01-noaa-contract-n-wave-network.html

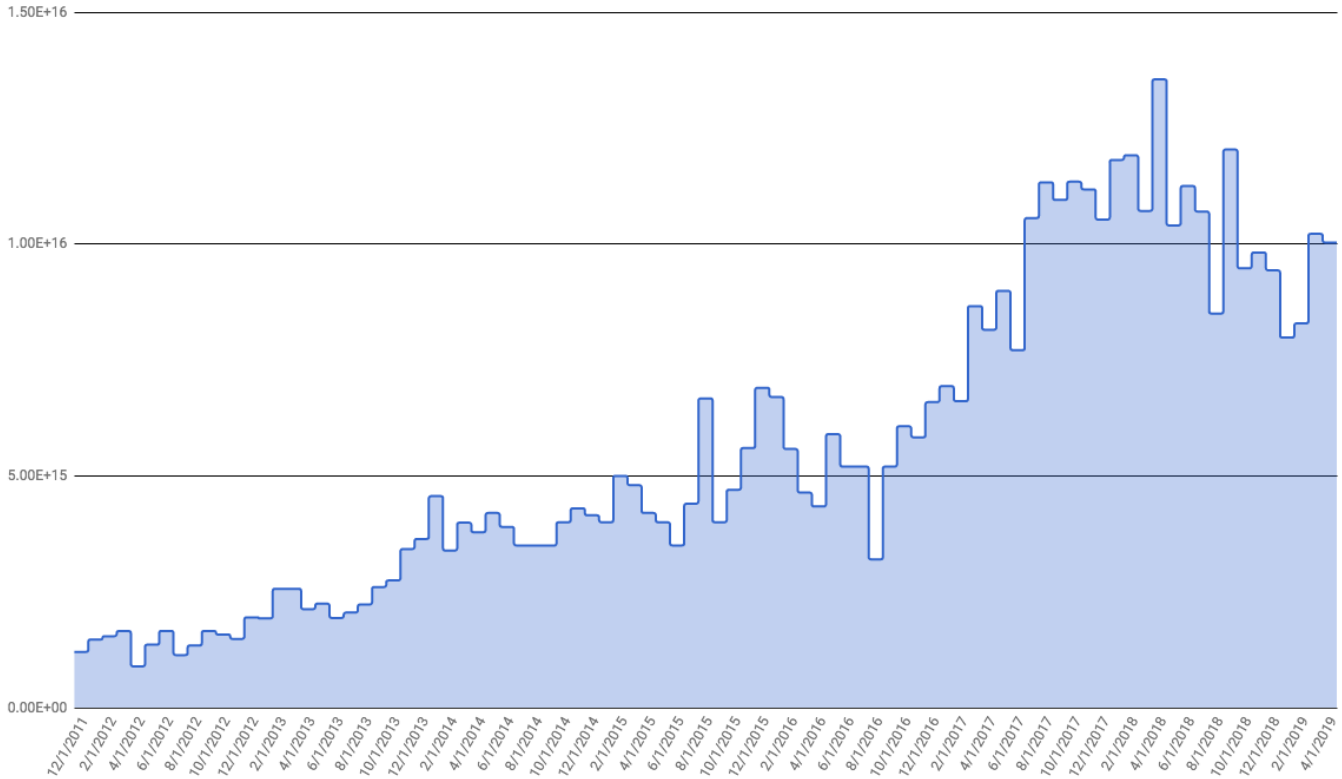
N-Wave Network Performance Metrics

N-Wave network traffic has largely leveled off following a substantial upward trend in 2017 through early 2018. That growth period in large part reflected the migration of all NOAA traffic to N-Wave's Trusted Internet Connection Access Point, or TICAP, infrastructure.

Since then traffic has reached a temporary plateau, which coincides with the saturation of several N-Wave backbone links and customer uplinks. N-Wave engineers are in the process of completing multiple 100+ gbps upgrades across the D.C. Metro ring, to the Fairmont data center and across the network backbone. Following those upgrades, and subsequent upgrades to increase capacity from big data generating sites to the network core, N-Wave anticipates a return to the growth trend seen in the past.

The low point in traffic during the past six months correlates with the partial federal government shutdown, which lasted from December 22, 2018, through January 25, 2019. N-Wave maintained operations throughout the 35-day shutdown, but effects on NOAA line office missions and operations are reflected in the network traffic decrease.

Network Traffic (December 2011 - March 2019)



N-Wave Welcomes New IT Security and Engineering Staff

N-Wave's expanding team includes three new staff members: Eric Estes, Tran Nguyen and Emad Said.

Eric Estes is N-Wave's IT security program manager and information system security officer (ISSO), providing oversight for N-Wave's IT security posture. Eric joined N-Wave in March 2019 and is based in Boulder, CO. Before that, he was the ISSO for the NOAA Earth System Research Laboratory's Physical Sciences Division from 2007-2019. He has a bachelor's degree in biological science from Colorado State University and a master's in computer science from the University of Colorado Boulder.

Tran Nguyen joins the N-Wave team under a unique partnership between N-Wave and the Office of Oceanic and Atmospheric Research's Pacific Marine Environmental Laboratory (PMEL). N-Wave and PMEL have a long-standing engineering history at the NOAA Western Regional Center (WRC) in Seattle, WA, where PMEL engineers like Tran have always been considered an extension of the N-Wave team. Tran works as an IT specialist for PMEL, and he has a bachelor's degree in electrical engineering from the University of Washington.

Emad Said joined as a network engineer with the N-Wave network services team. He started in March 2019 and is based in Seattle. Emad directly supports the WRC, along with enterprise-level services that are available at the WRC and other NOAA campuses. He has more than 10 years of experience as a senior network engineer and a bachelor's degree in engineering.

Credit:Officers and Crew of NOAA Ship PISCES; Collection of Commander Jeremy Adams, NOAA Corps

N-Wave will host its first annual "N-Wave Stakeholders and Science Engagement Summit" July 9 - 11, 2019, at the David Skaggs Research Center in Boulder, CO.

The theme of the 2019 event, "From the Campus to the Cloud," will provide visibility into the many layers – campus, metro and wide area networks and associated data transfer methods – that provide NOAA and its collaborators in the research and education community the means for sharing data and advancing science.

Those attending will have opportunities to gain insight into the multiple NOAA and partner network infrastructures that enable data exchange among NOAA, the scientific community and the world; share about line office and program initiatives that present new challenges and opportunities in leveraging shared network resources; and explore topics ranging from data transfer optimization and process flow to N-Wave's latest capabilities and services.

Attendees can also look forward to opportunities for networking and informal breakout discussions that may produce new insights and cross line office "ah-ha" moments.

Program topics will include NOAA line office and program briefs regarding activities that are driving science and network requirements; scientific community partner projects, including the University Center for Atmospheric Research's Unidata Program; cloud connectivity, NOAA TICAP 3.0, and N-Wave infrastructure upgrades; and technical talks on automated capacity planning techniques, data transfer and data flow optimization, and network virtualization. For more information about the event, please visit https://noc.nwave.noaa.gov/nwave/public/events.html.

For more information:
NOAA N-Wave Program
http://noc.nwave.noaa.gov
Office of the Chief Information Officer
http://cio.noaa.gov
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U. S. Department of Commerce
National Oceanic and Atmospheric Administration
N-Wave
325 Broadway
Boulder, CO 80305-3337