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N-WaveNews

this issue

From the N-Wave Operations Manager P.1
N-Wave Network and Performance Metrics P.2
N-Wave NOC Tickets Report P.4
N-Wave's Evolving Efforts to Aid in NOAA's TIC Compliance Mandate P.5
N-Wave Updates P.6

NOAA N-Wave

N-Wave is NOAA's science network. Built on partnerships and relationships among NOAA and the Academic and State research network communities, N-Wave connects researchers to the data and resources needed to advance environmental science.

Mission

N-Wave is committed to provide innovative networking capabilities with integrity, excellence, value, and flexibility, to enable NOAA's science and research through reliable high-performance networking.

Our Vision

A consolidated, agency-wide network resource that meets NOAA's research connectivity requirements and where appropriate, supplements NOAA's operational connectivity requirements.

From the N-Wave Operations Manager

In the last issue, you got the perspective of the N-Wave Network Manager providing support for NOAA's scientific and programmatic missions through new customer connectivity, supporting continued customer connectivity, enhanced network capabilities, and internal management responsibilities. As the N-Wave network continues to grow, so does the organization that supports it. After coming on in the spring of 2010 and assisting in the very first equipment installs, I have moved into the new position of N-Wave Operations Manager. My goal for this new role is to ensure the continued operational success we have been able to achieve despite the rapid growth we have experienced.

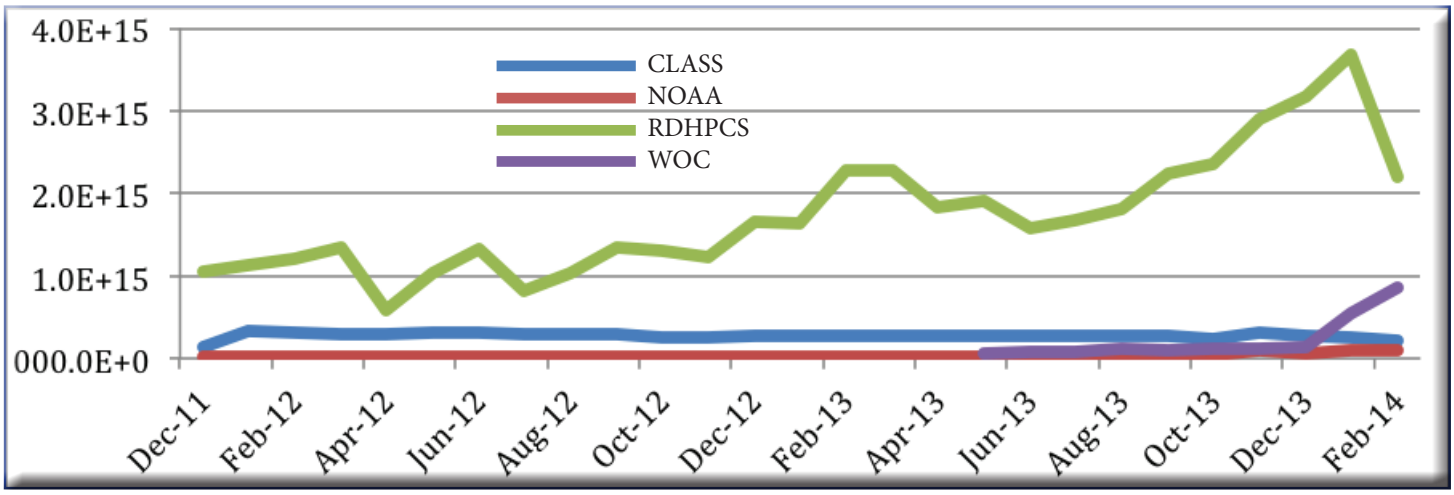
As more and more organizations within NOAA look to N-Wave to solve their data challenges, I want to ensure that our existing customers receive the high level of support they expect from us; all the while, making our new customer's migration as smooth and painless as possible.

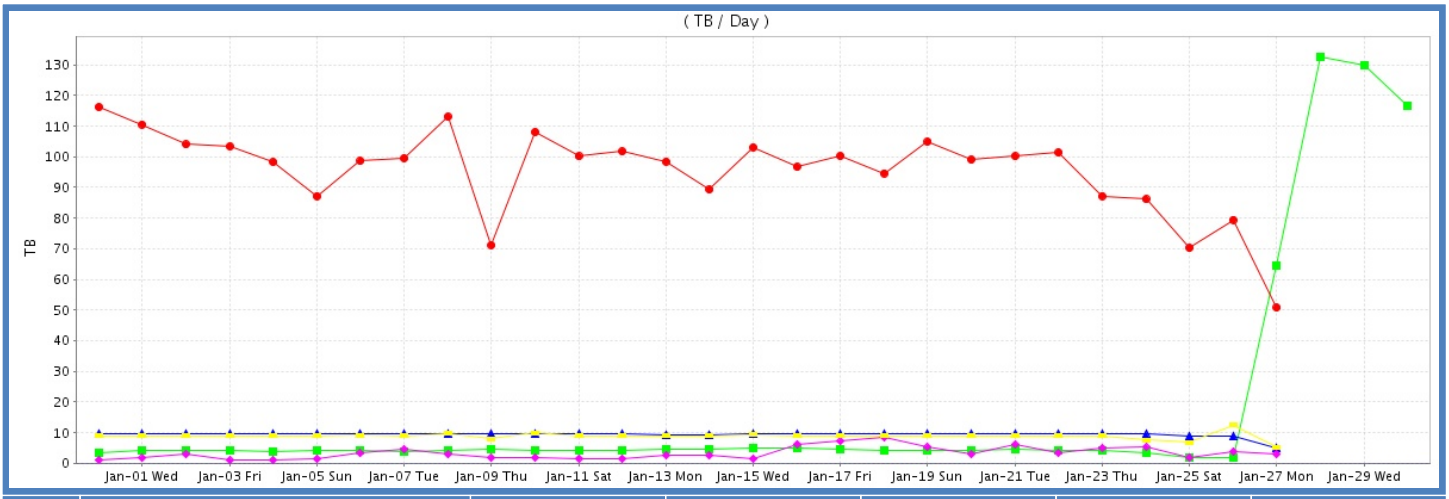
Many long hours have been spent creating N-Wave, and I am extremely proud of what the team has been able to accomplish. Working with our partners at the GlobalNOC has been a great experience, and I am looking forward to what we will be able to achieve together in the future.

Mark Mutz
Operations Manager

N-Wave Network and Performance Metrics

N-Wave Data Transfer Monthly Totals in Petabytes





No.	Source Account	TB sum	TB avg	TB max	G.Pkts sum	K.Flows sum
1	RDHPCS	2,673.549	86.244	116.223	490.289	5,665.775
2	Undefined	552.129	17.811	132.728	247.494	5,189.016
3	NWAVE	260.303	8.397	9.603	254.334	523.485
4	CLASS	246.956	7.966	12.450	211.194	1,980.050
5	NOAA	90.314	2.913	8.396	66.856	2,084.002
	Total (5)	3,823.251	123.331	139.319	1,270.167	15,442.328

Note: TB = 1000^4 Bytes, G.Pkts = 1000^3 Packets, K.Flows = 1000^1 Flows

N-Wave Utilization Daily Averages Between 120 and 130 TB per Day.

As seen in this January 2014 report, the N-Wave utilization trends continue with daily averages between 120 and 130 TB per day. RDHPCS continues to transfer well over 100 TB per day, with CLASS coming in second, near 20 to 30 TB per day.

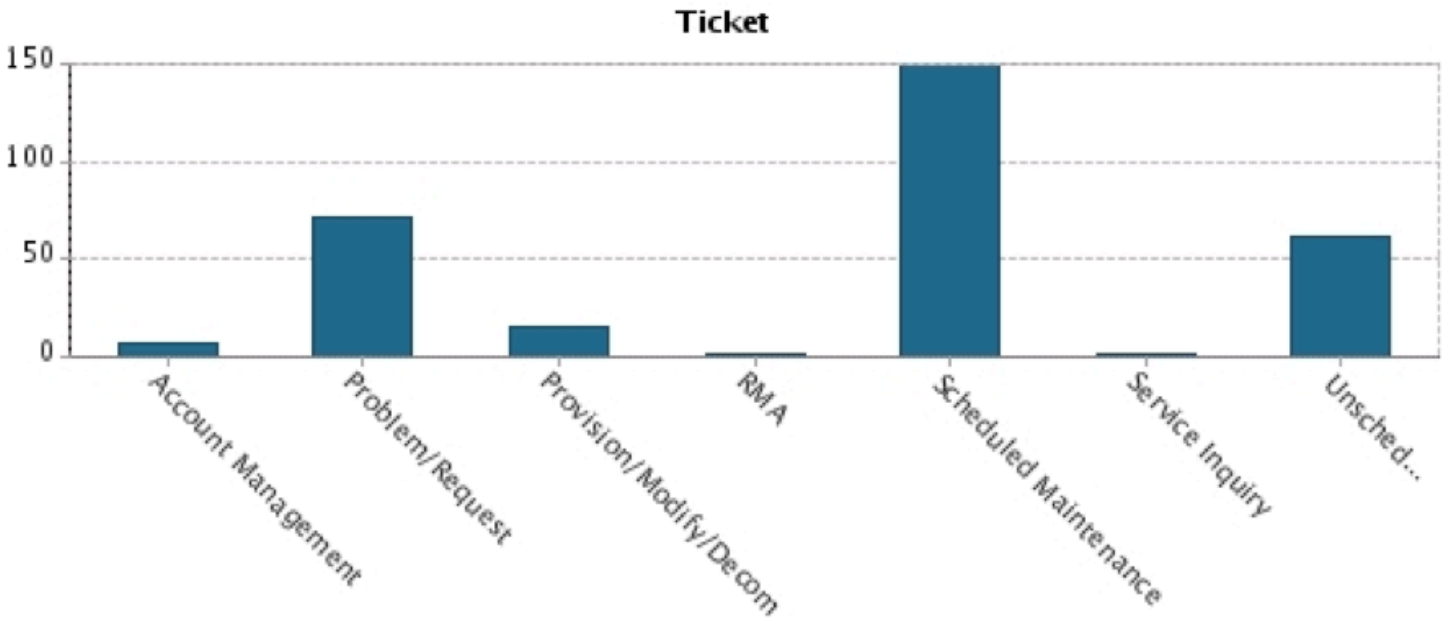
January 2014's report illustrates a software error, where the classification of traffic did not occur for the last few days of the month, as illustrated by the green "Undefined" line in the chart. A software update forced N-Wave engineers to re-define IP address ranges for the various programs using N-Wave. Nonetheless, the daily totals remain correct.

N-Wave engineers continue to refine and enhance the N-Wave traffic reporting capabilities, and will soon have additional sources of traffic information as Netflow and IPFIX protocols are enabled on the N-Wave Juniper aggregation routers.

If you would like to subscribe to the outbound traffic information, please go to: noc.nwave.noaa.gov

N-Wave NOC Tickets Report October 2013 through January 2014

This report contains data from 307 tickets



This N-Wave tickets report tracks various ticket types that are used to support the N-Wave Network. In this issue, we will feature and discuss another one of these ticket types and its associated workflows; the Service Inquiry ticket type

The Service Inquiry ticket type is used to track all customer inquiries for connecting to N-Wave or getting new services through N-Wave. Whether it is basic N-Wave Connectivity through one of the VRFs, TICAP, Assessment, or any other needs, N-Wave participants or potential customers can submit a simple Web form on the N-Wave NOC site (http://noc.nwave.noaa.gov/) that assures that their request or inquiry is fully addressed by the N-Wave Network Management Office, engineering and project management staff.

Submit Service Inquiry

Service inquiries are carefully reviewed and once they become requests, they follow the standard N-Wave Change Management, and Turn-Up process depending on the type of service. Customers submitting the requests will receive a notification of ticket creation and can submit their follow-up questions by either directly replying to the ticketing systems or contacting the N-Wave NOC and requesting to update a ticket by referencing the ticket number.

Prior to submitting a Service Inquiry form, customers can review the "N-Wave Networking Services Catalog" by visiting the link located directly on the web form. The catalog will provide a general overview of N-Wave services, N-Wave Operations, contacts, and technical details to help with Turn-up services.

N-Wave was envisioned and engineered to be a robust and high-availability network tracking outages and maintenances for each network event whether it affects service or not. Most unscheduled outages occur due to lower- level problems that are normally out of control of N-Wave Change Management, Operations, or architectural design of the network. Fire at a nearby facility, wildlife caused damage, various fiber cuts or brief fiber disturbances in the PoP co-location facilities are just some of the events that cause unscheduled outages which are tracked by the N-Wave NOC. The N-Wave Backbone is completely redundant and no single event affects traffic in the Backbone, however each event is tracked and reported on. Most NOAA sites (N-Wave participants) are multi-homed and are normally not affected by single outages/maintenances that are reflected in ticket numbers in this report. For instance, out of 198 Unscheduled Outage and Scheduled Maintenance tickets on this report, only six events were service-impacting, and in each case, service interruptions were due to the N-Wave participant having a single connection into the N-Wave Backbone. We encourage participants to work closely with the N-Wave NOC or the N-Wave Project Management to ensure best-possible architectural design on their services that run across the N-Wave Network and to meet all particular needs and expectations.

N-Wave's Evolving Efforts to Aid in NOAA's TIC Compliance Mandate

As mentioned in the previous newsletter, N-Wave staff is helping with NOAA's effort to fulfill the Trusted Internet Connections (TIC) mandate. Progress has been made on a variety of fronts in support of this effort including: consolidating network operations at the NOAA TIC Access Point (TICAP) locations; migration of campus offices to N-Wave TIC services; coordination of TIC architecture; and providing TIC services to remote NOAA field offices that are not collocated with a NOAA TICAP.

Taking advantage of failover between the various NOAA TICAP locations requires consolidated management of the infrastructure surrounding the TIC security. This will ensure that traffic flowing through the TIC stack fulfills the data symmetry requirements imposed by the stateful firewalls within the TIC stacks. N-Wave is in the process of establishing coordinated and consolidated management of the equipment at the NOAA TICAP locations; currently managing the equipment in Boulder and Seattle and soon deploying equipment in both Honolulu and Dallas to support NOAA facilities locally in Hawaii and to support NOAA's Central TICAP location.

As equipment comes under N-Wave management, the various offices that are collocated with that particular NOAA TICAP location are migrating under the new architecture. This will provide them with TIC v2.0-compliant Internet connectivity. An added benefit of migration to the new architecture lends the capability for the offices to connect to the NOAA-Wide Virtual Routing and Forwarding (VRF) instance, allowing NOAA-to-NOAA intercommunications to traverse N-Wave instead of going through the TIC stack and out to the Internet.

N-Wave and the Boulder Network Operations Center (BNOC) have also been providing network-engineering support to the NOAA security office for the design of the TIC stack. N-Wave engineers have met with NOAA security personnel and Fortinet engineers to intelligently structure the TIC stack to reduce points of failure and performance impacts. N-Wave staff will continue to aid in the network design and testing of the TIC stack to provide the best chance of a successful TIC deployment for NOAA.

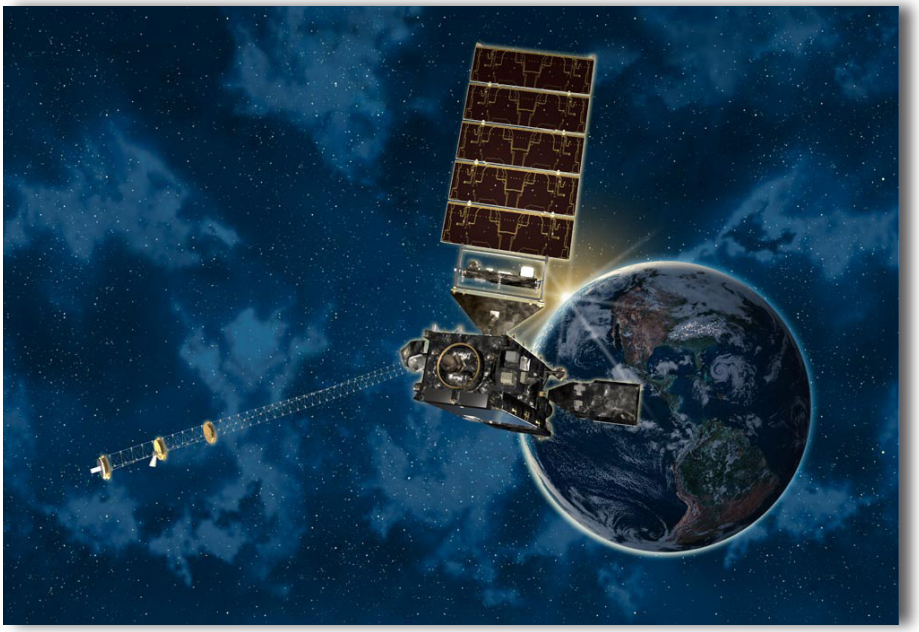
Finally, N-Wave has been busy providing backhaul services and testing of TIC access for a variety of remote NOAA field offices. The first remote NOAA location to get TIC services was the Geophysical Fluid Dynamics Laboratory (GFDL). N-Wave provided the transport piece for GFDL to receive TIC services from the Silver Springs Metro Complex (SSMC) Network Operations Center (NOC).

N-Wave Updates

N-Wave Continuing its Partnership with NESDIS

N-Wave Deploying Routers and Wide-area Network Circuits to Support GOES-R Ground System Program

The N-Wave partnership with NOAA's Satellite and Information Service (NESDIS) will provide enterprise-wide options for networking support and services. At the forefront of this effort is the ground system network for the Geosynchronous Environmental Satellite in the "R" series (GOES-R). GOES-R is the next generation of satellites that will provide atmospheric and surface measurements of Earth's Western Hemisphere for meteorological research and space weather monitoring.



Rendering of GOES-R satellite. *Credit: NOAA*

In the first quarter of 2014, N-Wave has been deploying routers and wide-area network circuits to support the GOES-R ground system program. N-Wave engineers have been working with engineers from GOES-R, NWS, and Harris Corporation, the ground system contractor. New routers were installed at the NOAA Satellite Operations Facility (NSOF, Suitland MD) and Wallops Island, VA. Circuits are in the final phase of delivery and testing. Connections to NWS Operations Network (OPSnet) are also being made, for data delivery from the GOES-R ground system to the NWS Advanced Weather Information Processing System (AWIPS).

In addition to GOES-R, N-Wave is working with the Joint Polar Satellite System (JPSS) to provide connectivity at the Fairmont, WV Consolidated Back-Up (CBU) site. N-Wave will be interfacing with the new NESDIS Product Distribution and Access (PDA) system, and Comprehensive Large Array-Data Stewardship System (CLASS) ingest. Through a partnership with NESDIS, N-Wave will be installing a100-megabit/s connectivity to the Alaska Gilmore Creek Satellite Acquisition Facility.

N-Wave is also starting the acquisition phase of a Dense Wavelength Division Multiplexing (DWDM) network ring in the DC area. This ring will circle NSOF, SSMC, College Park (MAX co-location facility at the U of MD), and McLean, VA (Level-3 co-location facility). Through a partnership with NESDIS, the ring will help all of NOAA maximize the existing dark fiber assets, to provide additional bandwidth as well as resiliency through ring-network operations. Current plans for the ring include dedicated Ethernet bandwidth services available to users on 1-gigabit/s and 10-gigabit/s increments. Initial ring capacity will be on the order of 100 gigabit/s, with future capabilities on the order of 400 or 800 gigabit/s as needed, using a pay-as-needed model.

N-Wave's First Non-NOAA Customer

NIST Investigates Using N-Wave to Connect to Its Headquarters

The National Institute of Standards and Technology (NIST) is investigating the use of N-Wave to provide wide-area transport between their headquarters site in Gaithersburg, Maryland and the field office in Boulder, Colorado. NIST has traditionally used costly DS3's (Digital Signal 3–a point-to-point circuit of approximately 45Mbit/s) to interconnect their campuses. This new connection allows NIST to leverage existing connectivity to potentially save money and further enable research and projects that depend on high-bandwidth connectivity between the two campuses.

Since NIST and NOAA share the same campus in Boulder, their respective connection to N-Wave was a simple patch cable to internonnect their fiber resources.

NIST-Gaithersburg already has a Gigabit Ethernet connection to the Mid-Atlantic Crossroads (MAX) in College Park, MD for internet service so they were able to leverage that to interconnect with N-Wave equipment already collocated at the MAX. Since NIST and NOAA share the same campus in Boulder, their respective connection to N-Wave was a simple patch cable to interconnect their fiber resources. NIST is in the process of testing out this new Gigabit Ethernet transport on N-Wave and is enlisting the support of N-Wave engineers to help with the traditional problems encountered with high-bandwidth, high-latency transfers.

NIST also plans to use the NOAA Trusted Internet Connection Access Provider (TICAP) services in Boulder and the DC area to provide them with Internet access that is compliant with the Federal Government TIC mandate.

Top Right: NOAA site entrance in Boulder, CO
Credit: Will von Dauster
Bottom Left: NIST site entrance in Gaithersburg, MD
Bottom Right: NIST building in Boulder, CO

Focused Technical Workshop

High-Performance Networking for International Climate Science Hosted by NOAA Boulder

In July 2014, a Focused Technical Workshop (FTW), sponsored by ESnet and Internet2; co-sponsored by Indiana University, National Center for Atmospheric Research (NCAR) and National Oceanic & Atmospheric Administration (NOAA); and hosted by NOAA, brings together network experts with scientists in the domain of international climate sciences to discuss their most pressing network-related issues and requirements. The workshop includes a slate of invited speakers and panelists in a format designed to encourage lively, interactive discussions with the goal of developing a set of tangible next steps for supporting this data-intensive science community.

NOAA SCIENCE NETWORK

For more information contact:
NOAA N-Wave Science Network
http://noc.nwave.noaa.gov/
Earth System Research Laboratory, Office of the Director
http://www.esrl.noaa.gov/
Robert Sears, Network Manager
Jerry Janssen, System Owner
Rhonda Lange, Outreach & Communications
Rhonda.K.Lange@noaa.gov

U. S. Department of Commere, NOAA
325 Broadway, R/ESRL
DSRC-3B107
Boulder, CO 80305-3328