

GlobalNOC

at Indiana University

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Vera C. Rubin Observatory Virtual Network Operations (and some PerfSONAR)

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The GlobalNOC

A World class 24x7x365 Network Operations Center that has been focused servicing the Research and Higher Education community for the past 25 years.

As a part of Indiana University, not only do we help the community, we are part of it.



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What is the Vera Rubin Observatory?

You could do worse than starting with Wikipedia:

https://en.wikipedia.org/wiki/Vera_C._Rubin_Observatory

It's a **synoptic survey observatory**

- Looking at lots of things, frequently
- vs. looking at a few things, infrequently

Houses the Simonyi Survey telescope

- 3.5 degree FOV
- 3.2 **Gigapixel** camera

Also, read about Vera C. Rubin:

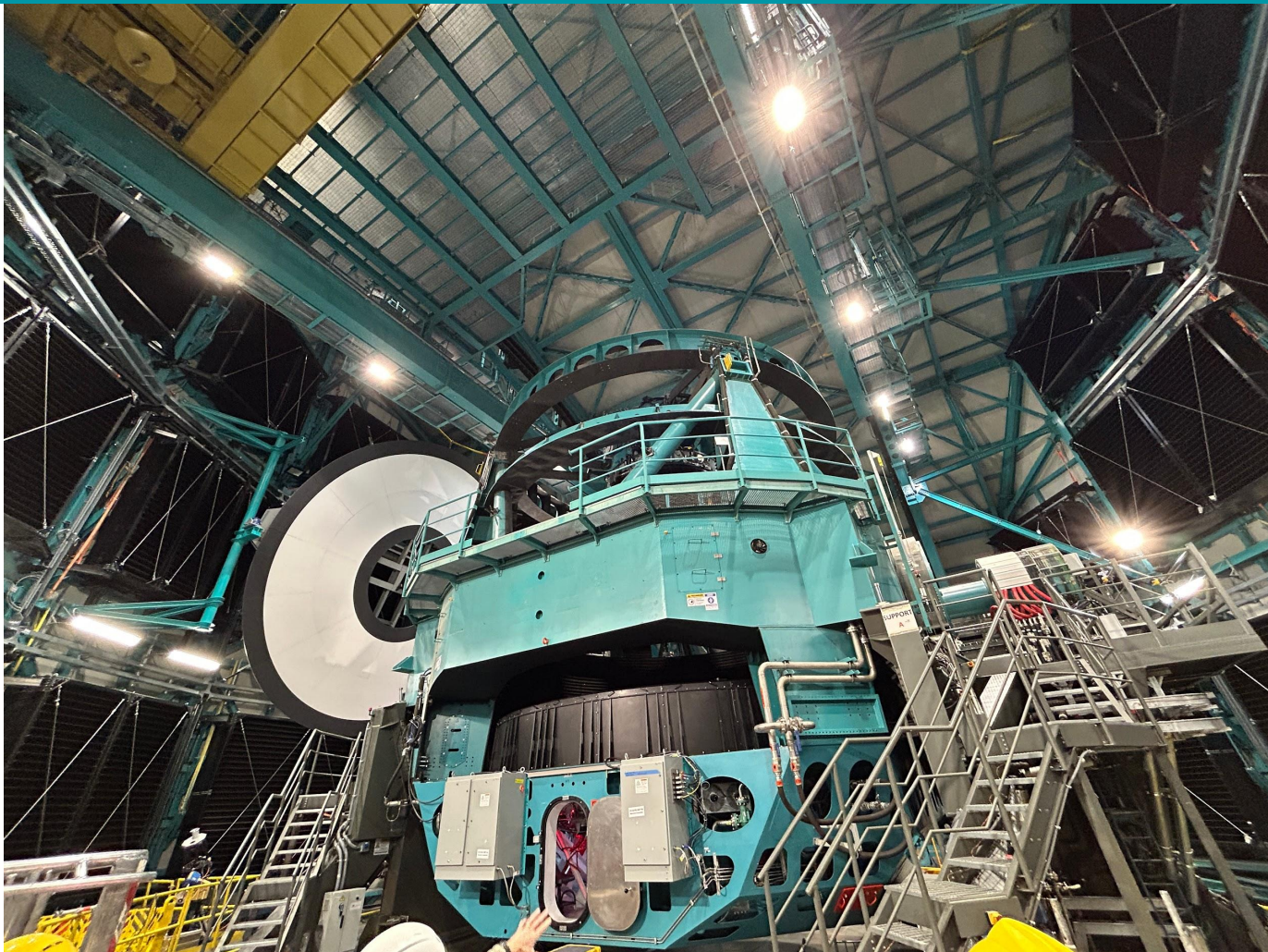
- https://en.wikipedia.org/wiki/Vera_Rubin





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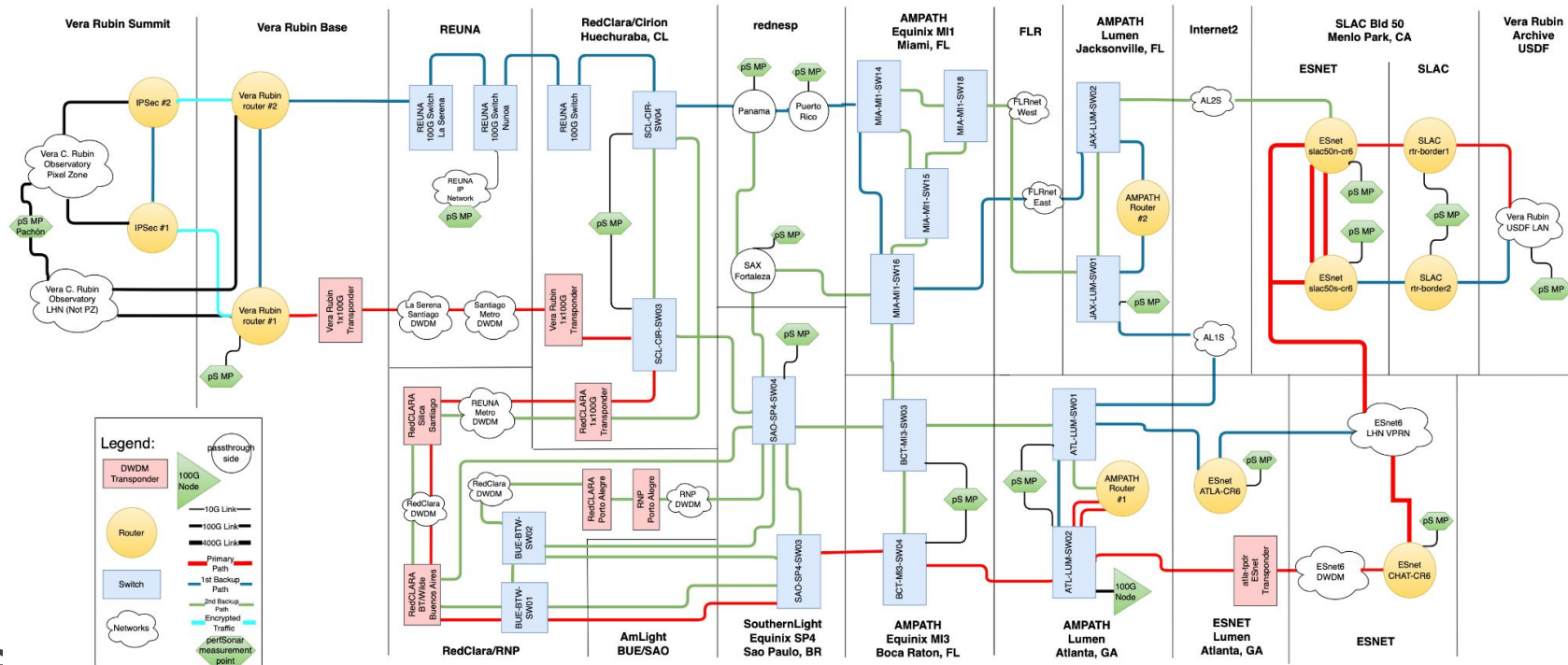
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What does this have to do with networks?

Versioning

Author: NET team
Last update: April 2026

Vera Rubin Observatory LHN



Long Haul Network

- The Long Haul Network (LHN) is a dedicated network to support transfer of data from the observatory.
 - Source - Vera Rubin Observatory, La Serena, Chile.
 - Destination - US Data Facility (USDF) at SLAC National Laboratory
 - Approximately 14,000 miles.
 - Redundant paths
 - 100Gb/s dedicated primary
 - 40Gbs/ guaranteed, shared infrastructure as secondary



Complications

- The LHN as a whole is provided by multiple network operators:
 - Vera Rubin Observatory - Source LAN
 - REUNA - Transit
 - AmLight - Transit
 - ESNet - Transit
 - USDF at SLAC - Destination LAN
- *Stringent* performance requirements
- Image data is encrypted in an IPSEC tunnel



Where does GlobalNOC fit in?

- GlobalNOC is the “Virtual NOC” (VNOC) for the observatory’s long haul network (LHN).
- We accept alerts (via Alertmon API) from the LHN network operators
 - AMPATH, ESNet, REUNA, SLAC, Observatory itself
- NOC processes those alerts, changes, maintenances, outages.
- Looking ahead to providing an overview of the LHN status for stakeholders.
 - Map(s), traffic data, etc.



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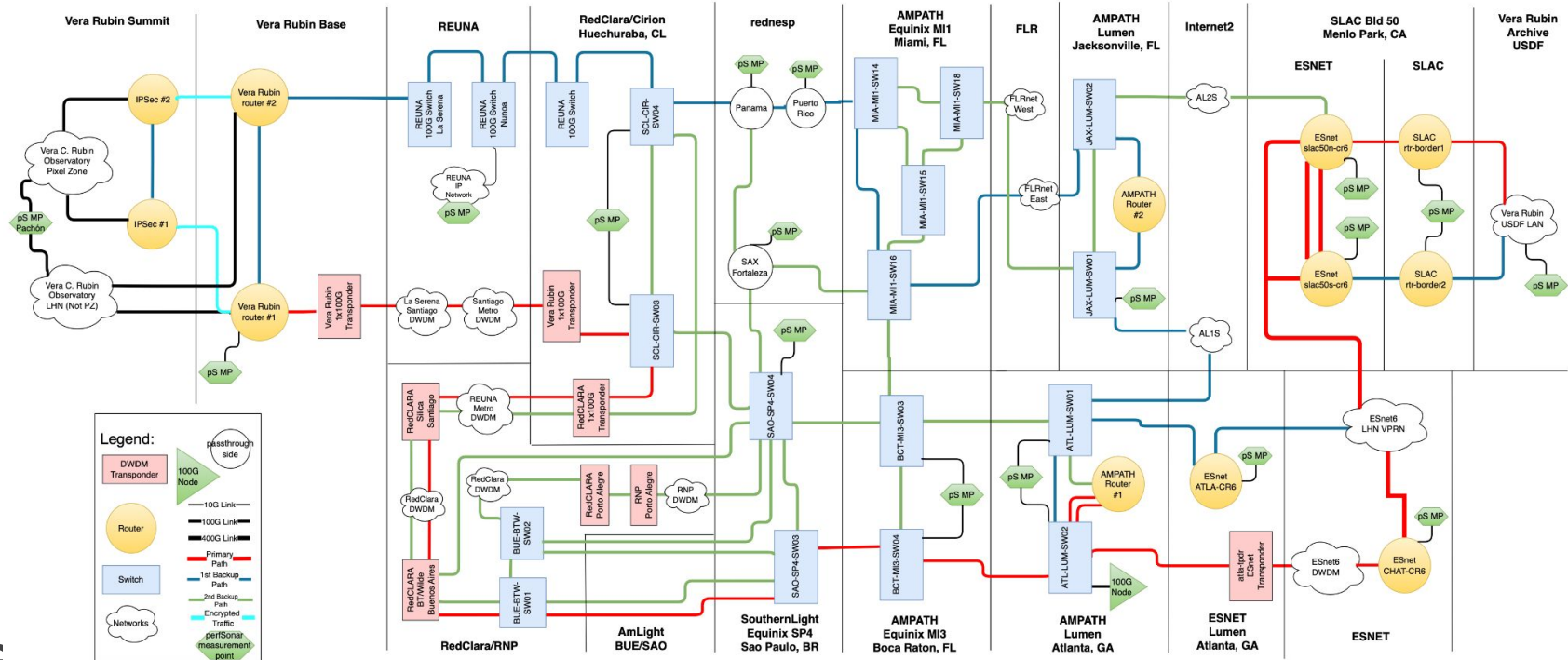
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Let's go back to that network diagram...

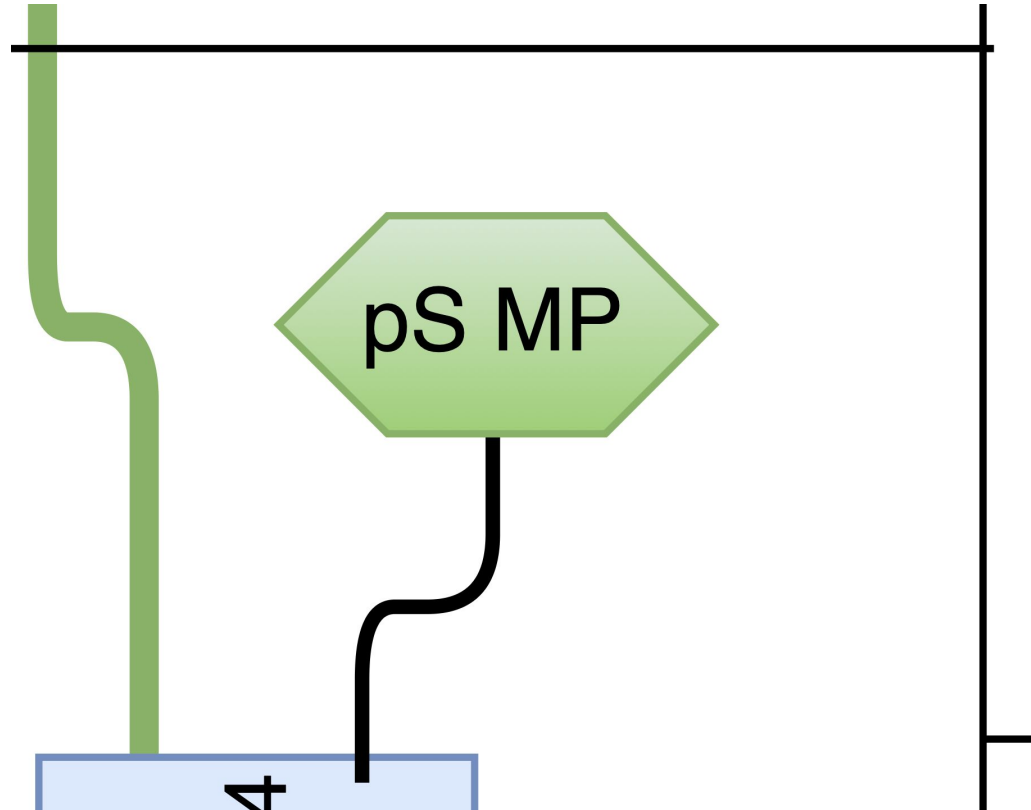
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Vera Rubin Observatory LHN



Zoom in...



PerfSONAR Measurement Points

- Measurement points deployed throughout the network
- Currently a mix of 5.1 and 5.2, 10Gb/s and 100Gb/s
- Measuring throughput, one-way latency, packet loss, round-trip time, traceroute
- Measurement archive/front end provided by RNP on behalf of AmLight:

<https://ps-cma.amlight.net/grafana/d/aaatqaA0QfVk/vera-rubin-observatory-perfsonar-matrix?orgId=1>



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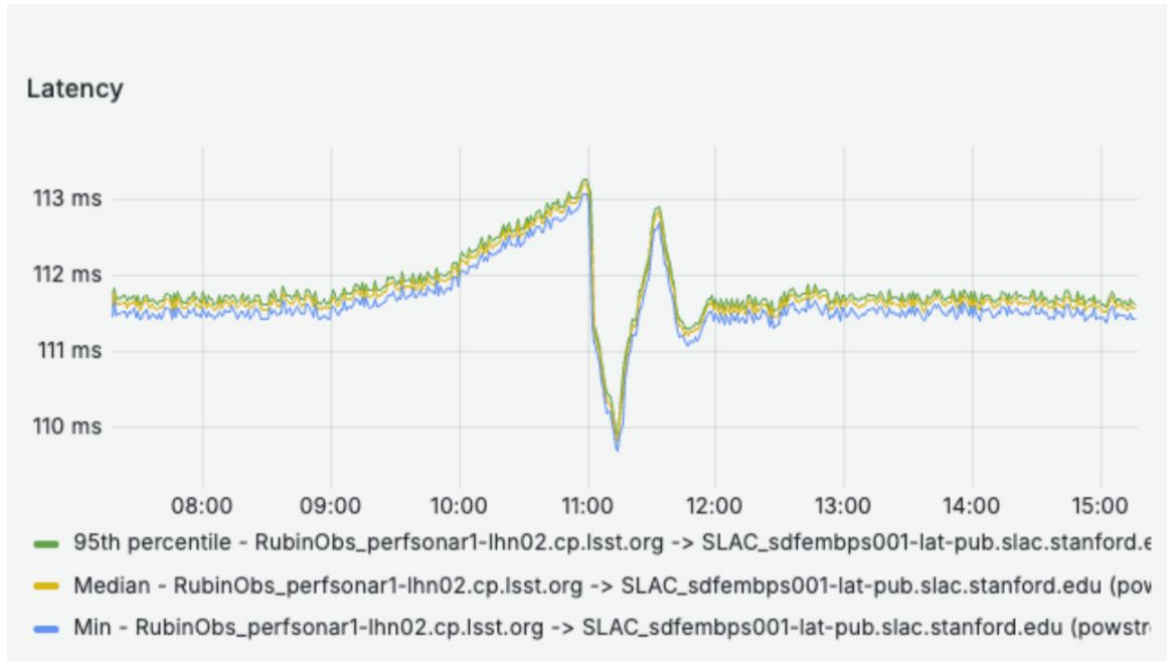
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End-to-end, Intra LHN, and Tunnels, oh my.

- Measurements are made end-to-end
 - Inside and outside the IPSEC Tunnel
- Intra-LHN measurements used by the providers
 - Troubleshooting, isolation of network issues
- Measurements are reviewed regularly for indications of path changes, performance degradation etc.



Example Anomaly



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Future Directions

- Active alerting based on performance anomalies
- Integration into VNOG systems for alerting/notifications etc.
- Better visibility into network state for public, stakeholders.
- Monitoring of secondary path



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May I see?

<https://ps-cma.amlight.net/grafana/d/aaatqaA0QfVk/vera-rubin-observatory-perfsonar-matrix?orgId=1>



Closing Thoughts

- It can be easy for the work we do as developers, network engineers, etc. to seem like it exists for its own sake, divorced from real applications, real science, real people.
- The Vera C. Rubin Observatory and the network that supports it is contributing to our knowledge of the universe.
- We're helping!!



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