Global Research Map

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GÉANT 2nd Telemetry and Data Workshop

Agenda

- Who is GlobalNOC
- Telemetry Collection
- Maps
- Broader Community Telemetry Collection
- Bigger Maps
- Lessons learned along the way.

GlobalNOC

- First - I promise this isn't a sales pitch.
  - Background for Community Metrics and Global Research Map
- We're a network operations center headquartered in Indiana, United States serving the R&E community around the country, including some international ones like AMPATH, for the last 20+ years.
  - https://globalnoc.iu.edu/ if you care to know more.
- My chief role in all of this relates to data telemetry and visualization.
  - Hence why I am here.

Telemetry

- Like many of you, we collect troves of data from all of our customers.
  - SNMP, TL1, SSH, Streaming Telemetry, REST APIs, you name it.
  - Mix of off the shelf components like telegraf combined with a lot of inhouse components and automation / orchestration
- We use this data for a wide array of purposes.
  - Up/down monitoring and thresholding alarming
  - Billing
  - Capacity planning
  - Fault detection
  - General visualization

Maps

- A picture is worth a thousand words, right?
- Everyone has network diagrams.
  - Network engineers maintain these by hand
  - Frequently out of date due to being static
  - Don't integrate with monitoring status or current traffic levels
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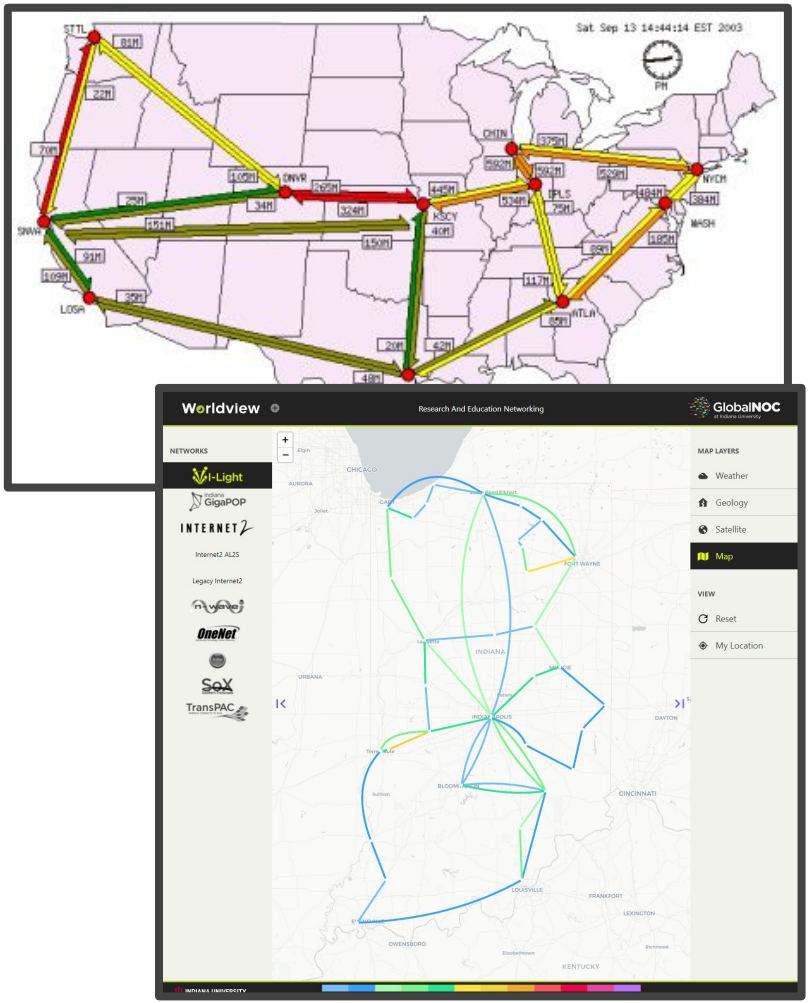
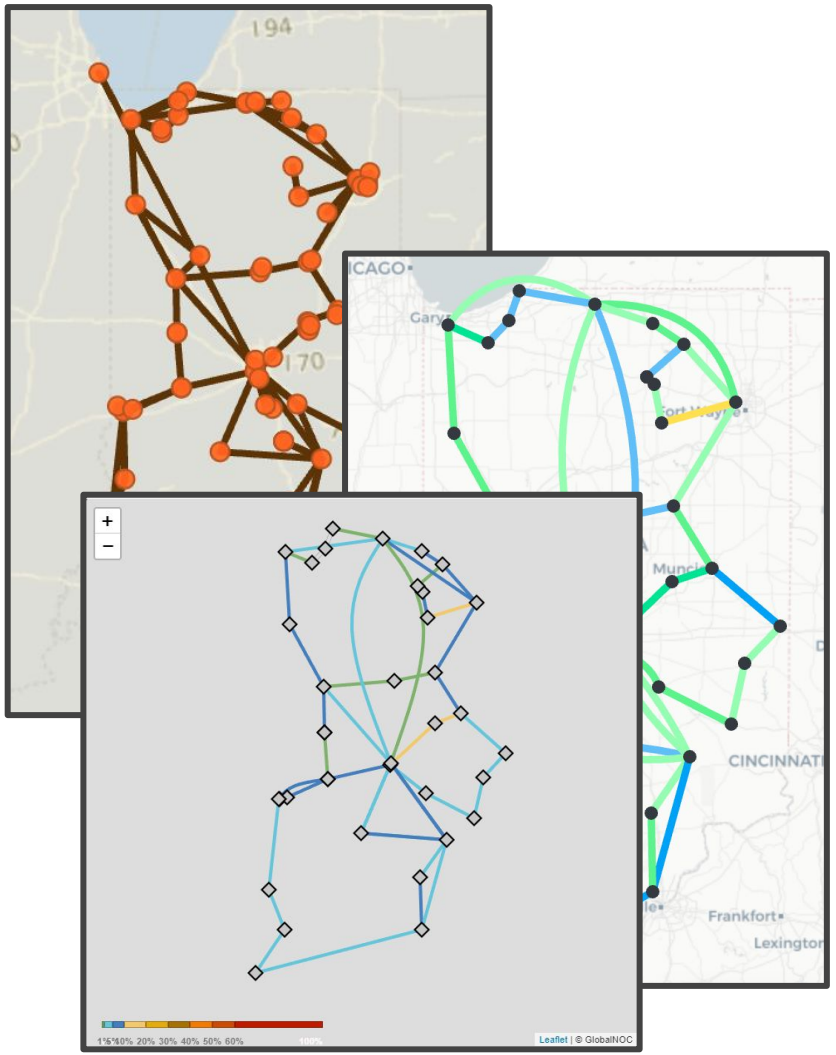
Maps

- Many years ago we started off making individual network maps for customers.
  - Merging the idea of a network diagram with live traffic levels.
- Over time this has evolved, gotten prettier, more interactive, and more automated.
  - Automated is key. Networks change quite a bit.
  - Based on network topology database with automated documentation of circuits.



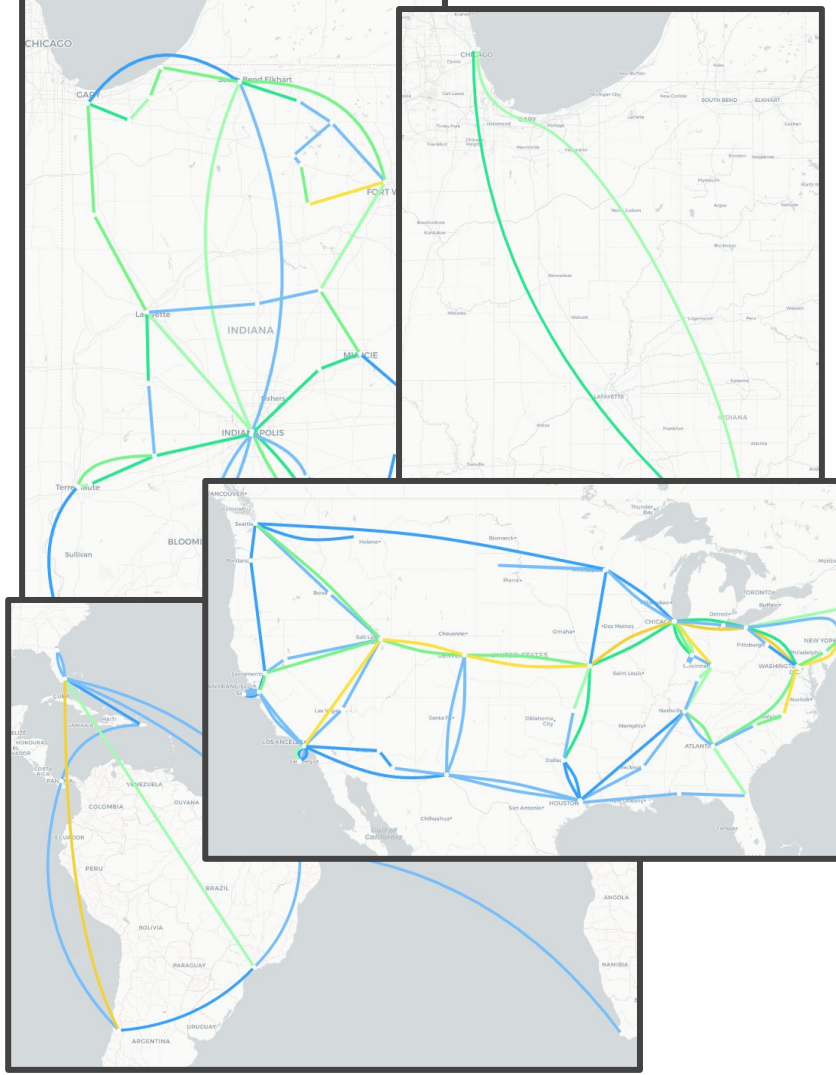
Maps

- As map tech evolved, so have the needs and usage of them.
  - A layer3 map of your network showing bits/sec is different than a layer1 map of the same network showing dBm loss levels at the physical layer.
  - Who is your audience? The CEO's use case for looking at a map is probably different than the network engineers.
  - What about other data like alarm information, maintenances, cpu usage, weather?
  - Do you collect this data today?
- This is all still focused on showing one network. What about other networks?



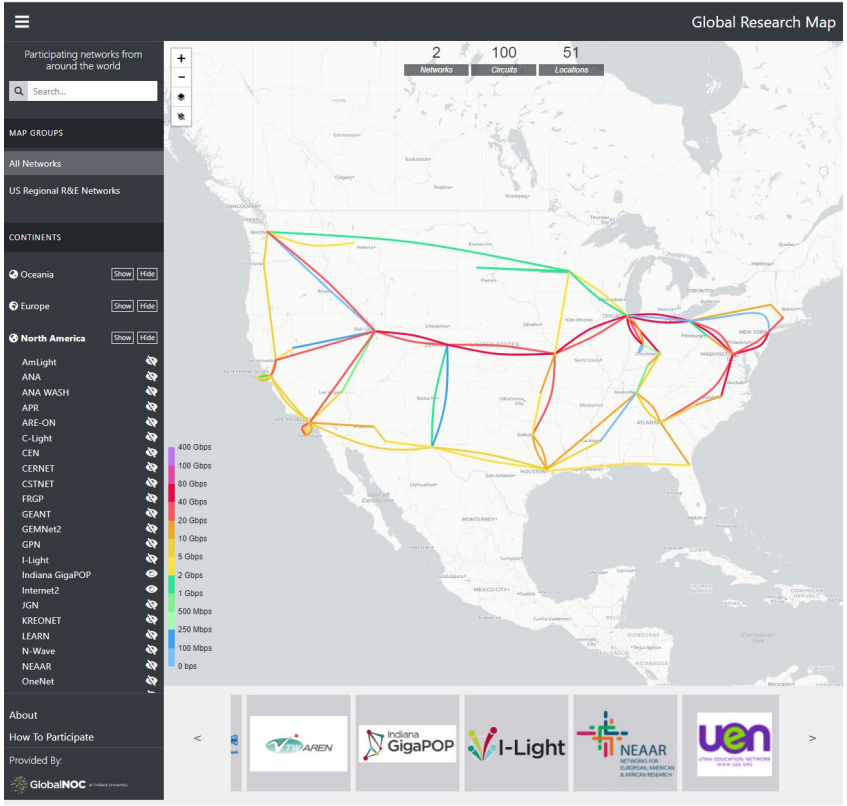
Shared Telemetry / Maps

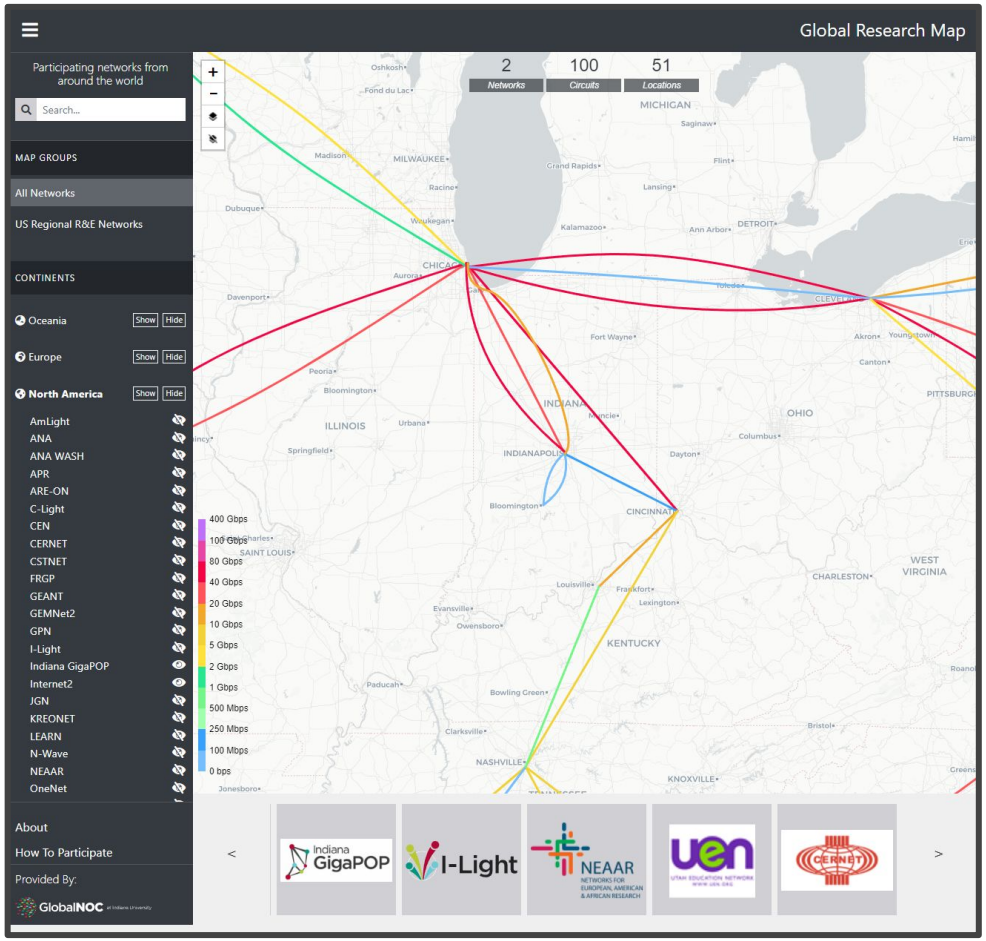
- Networks don’t exist in a vacuum. By definition they interconnect with other networks.
  - That’s how the cat videos flow.
- Showing the maps one by one per network is useful for highlighting or focusing on that one network, but you can miss the bigger picture.
  - Where do networks interconnect? How fast and how much capacity is in use on these networks where my traffic is flowing?
  - What trans-atlantic links are down right now that might be impacting some of my users?
- How do we showcase more of this information?
- We already have a lot of maps. Hmm...



Shared Telemetry / Maps

- We created Global Research Map as an extension of this already existing map work. This lets us show any number of maps and help build the “big picture” for R&E networking.
  - With approval from networks, of course.
- https://globalresearchmap.org/
- One stop shop for seeing all the networks, either in groups or one by one.
  - Branding, snippets, links to homepages, etc all to raise awareness of our great community.



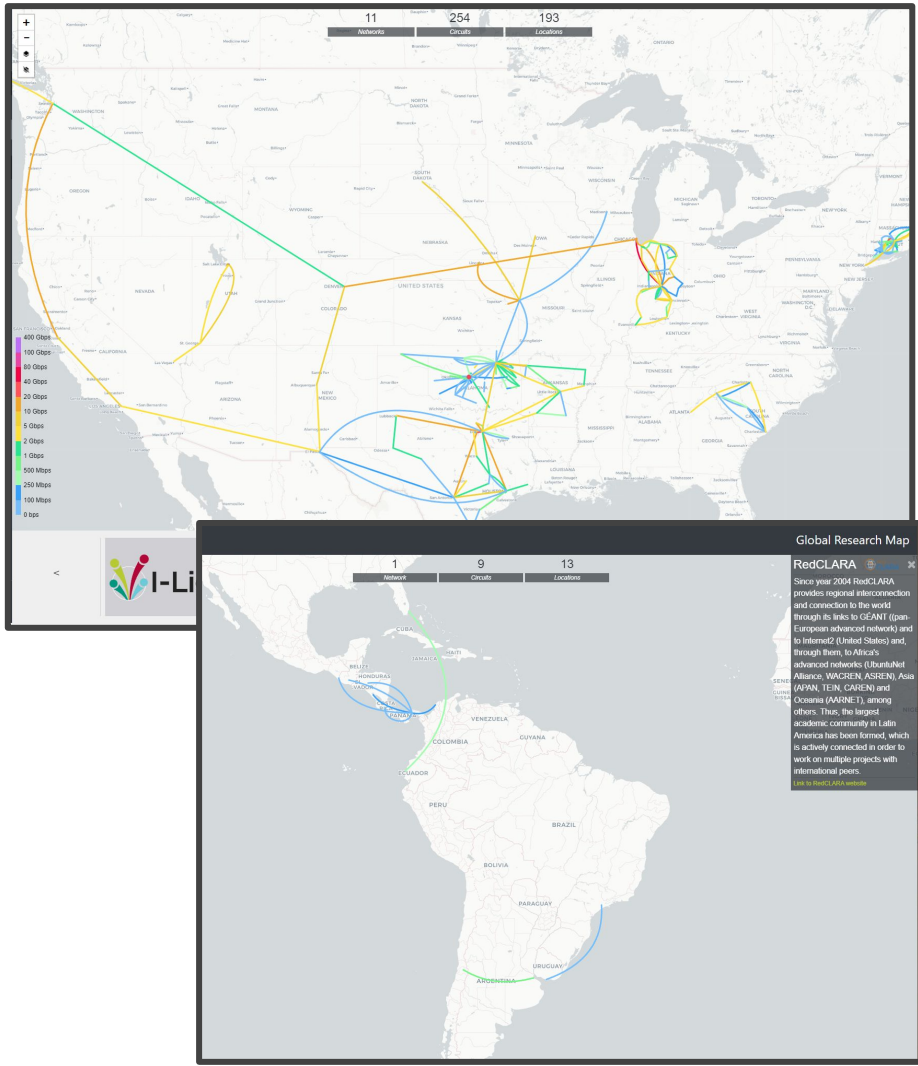


Indiana GigaPOP connecting to Internet2 in Chicago.

A few Trans-Atlantic links along with their realtime traffic stats.

Community Metrics

- Starting in 2019, collaboration between GlobalNOC, Internet2, and University of Utah to do a “community metrics” project.
  - Focus is on reaching out to networks in the community to see if willing to share SNMP interface metrics for the sake of transparency, collaboration, and awareness.
- Storage in central GlobalNOC managed data repository hosted by I2.
  - Goal is to make this as lightweight as possible for participating people. GlobalNOC collects data directly, or provides a docker container that collects and sends back.
- Data available via APIs, integrated into some applications such as Global Research Map and Augmented Traceroute.
  - Generally available to interested parties.



Community Metrics

- Still going on, by the way. Reach out if you're interested!
  - https://spaces.at.internet2.edu/display/PerformanceWG/Internet2+Community+Measurement%2C+Metrics+and+Telemetry+Project

Parting Thoughts

- Topology sharing is hard.
  - Do you have an accurate network diagram today? How is this being maintained?
  - Networks evolve over time. Your once beautiful map bitrots. Do you have automation / monitoring for this?
- Data collection is hard.
  - Privacy concerns, data ownership concerns.
  - How to collect the data is hard. Some people want you to poll their devices, some people want to collect data themselves, some people want you to pull it from their existing infrastructure with their own API.
- Build in automation from the start.
  - Nobody is updating documentation by hand at 3am during a disaster.

Parting Thoughts

- Overall positive, some mixed results.
  - Some people are very happy to participate, particularly if they don't really have to do anything.
  - Some people less so. Maybe their agreements don't allow for data sharing / transparency, or are particularly onerous.
- There are other efforts within this space.
  - The GREN working group is a great example of this. GlobalNOC's solution was built on top of existing tech over the years organically.
- Finally - maps are really useful.
  - Bridge the gap between engineers and non-engineers.
  - They can synthesize a wide array of data sources into an easy to digest picture.

Thank you.

- Questions? Rotten tomatoes?
- daldoyle@globalnoc.iu.edu for any questions, followups, etc.