WiscNet
Connecting People and Strategies

WISCNET UPDATE

UW SYSTEM ENGINEERING 2017

Who and What:

The STRATEGIC TECHNOLOGIES Team at WiscNet

Brian Remer, Chris Liechty, Chris Wopat, Andy Koch, Josh Gorton, Danielle Tourdot

AGENDA

- WiscNet Organizational Update – Brian Remer
- WiscNet Network Update – Chris Wopat
- Open Discussion - All

WISCNET **ORGANIZATIONAL** UPDATE

- Now over 500 Members!
- Healthy budget, happy auditors
- Greater focus on healthcare

WISCNET **ORGANIZATIONAL** UPDATE

Community Area Networks (CAN)

- Municipalities are leading more CAN efforts
- CANs becoming more savvy, asking for more services like DDOS and Layer 2 links

WISCNET **SERVICES** UPDATE

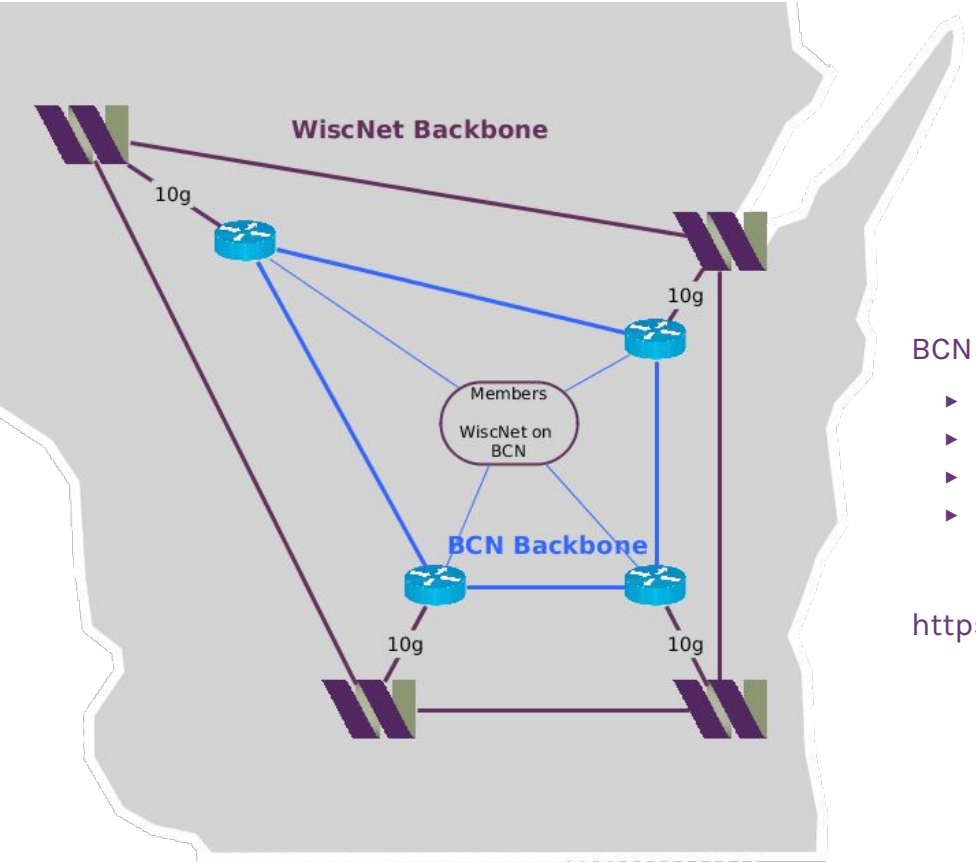
New or highlighted service offerings

- “Ethernet Networking Service” - Layer 2 MPLS across backbone
  - HPLL replacement for some
- PSC grant with Green Bay Schools
  - “Homework Gap” solutions
  - TV Whitespace, LTE
- VMWare contract - 18% off

WISCNET **NETWORK** UPDATE

- WiscNet on Badgernet 2017
- In state upgrades
- Out of state (Chicago)
- WRIPS Peering
- Transit

WISCNET BCN (EXISTING)

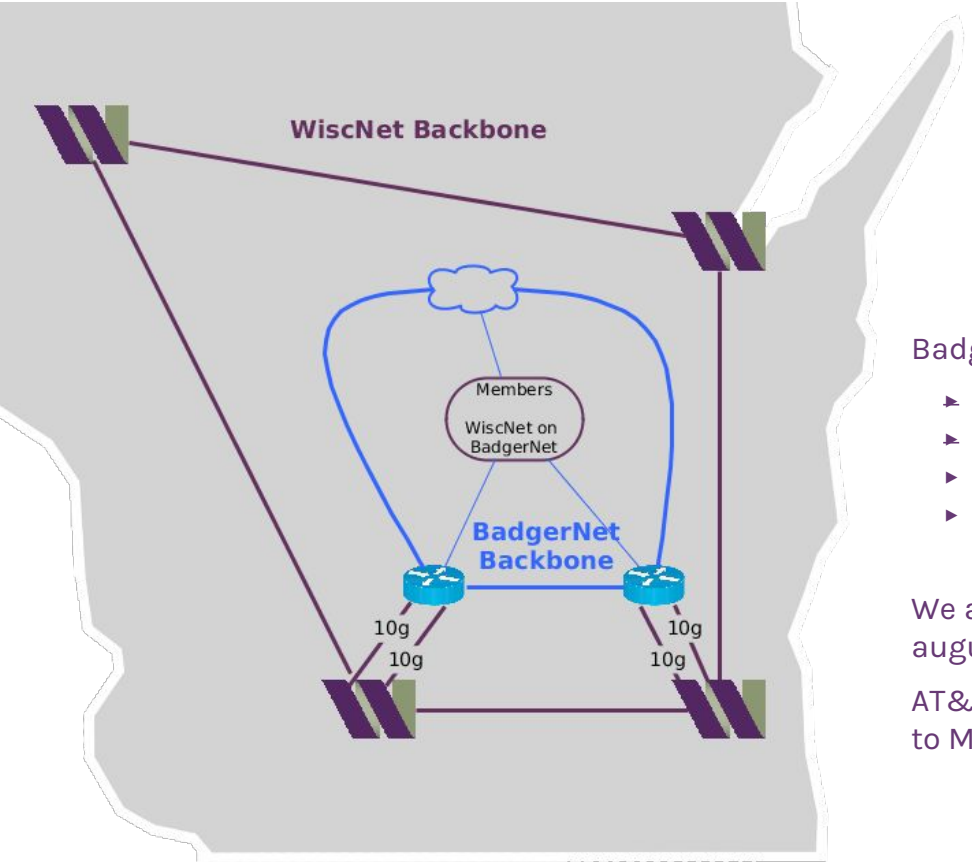


BCN Connections at 4 sites. 10gpbs each

- Eau Claire
- Green Bay
- Madison
- Milwaukee

https://www.wiscnet.net/wiscnetonbadgernet

WISCNET ON BADGERNET (~~SPRING -> SUMMER~~ -> FALL 2017)



BadgerNet Connections at 2 sites. 20gbps eac

- ~~Eau Claire~~
- ~~Green Bay~~
- Madison
- Milwaukee

We all agreed to have in place in May. It's now august, only 1 10g is up.

AT&T temporarily hauling Milwaukee customers to Madison. Have to undo it all later

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WISCNET MEMBER BANDWIDTH INTERFACE SPEEDS

LAST / THIS YEAR

2016

- < 10 Mbps 3
- 10 - 49 Mbps 29
- 50 - 100 Mbps 243
- 101 - 1000 Mbps 74
- >1Gbps - 10Gbps 6

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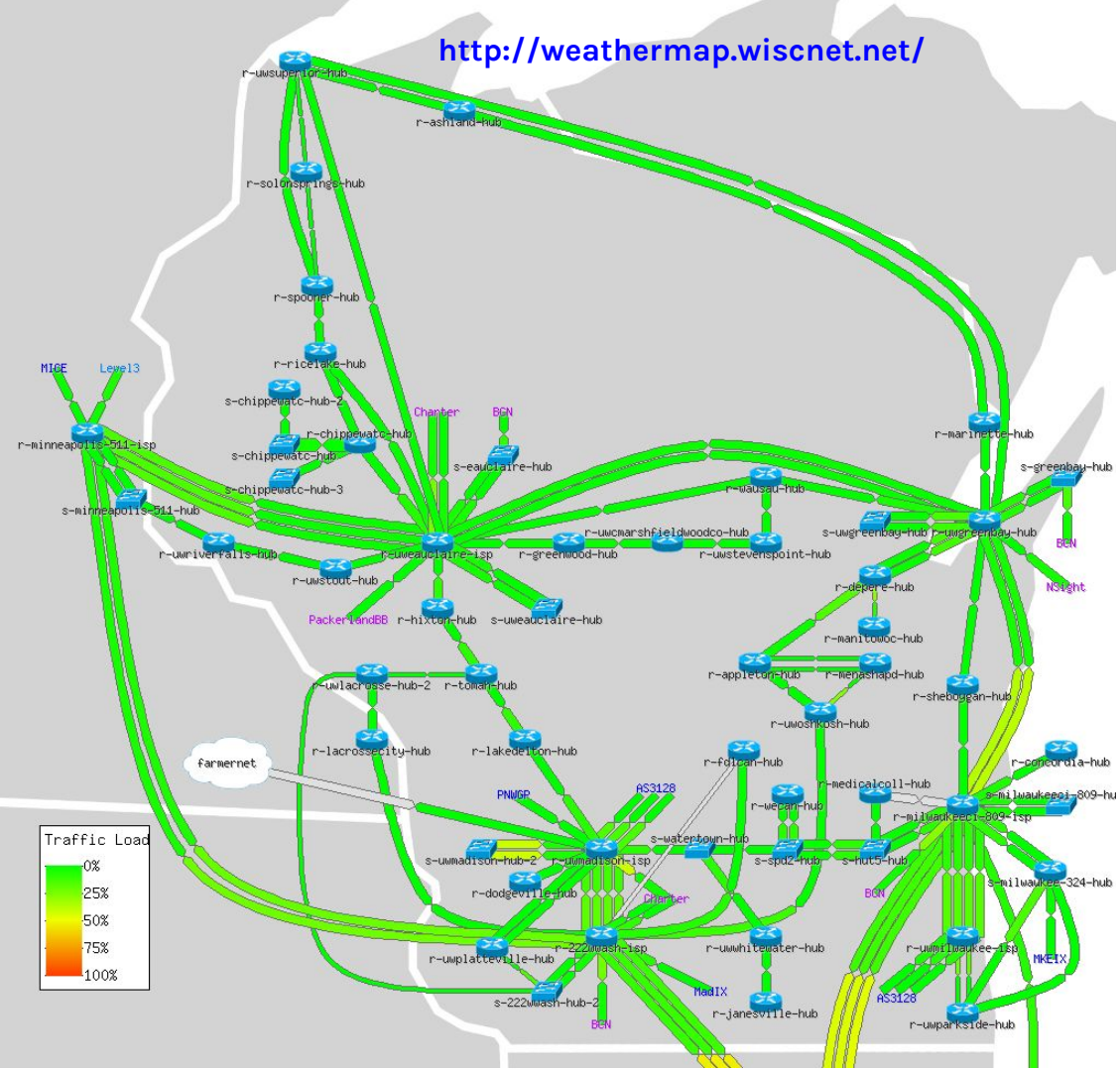
2017

- < 10 Mbps 2
- 10 - 49 Mbps 15
- 50 - 100 Mbps 145
- 101 - 1000 Mbps **132** ← **78%**
- >1Gbps - 10Gbps **41** ← **680%**

UPGRADES COMING SOON

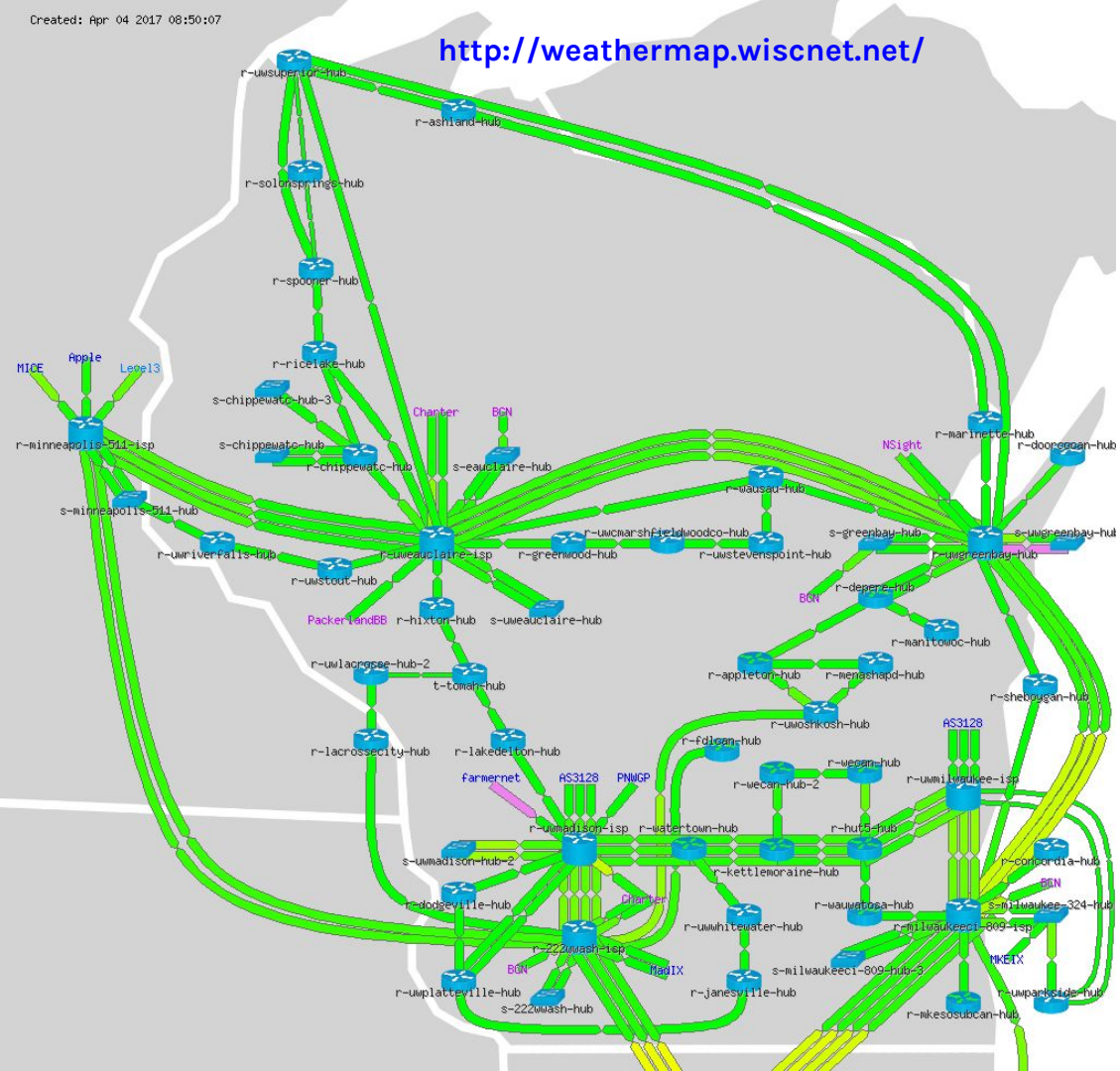
- POP Upgrades - 2x QFX5100’s on standby for deployment as needed Replaces EX4200’s. 10g ports + MPLS services
- 100g Backbone - Chicago, Milwaukee, Madison, Minneapolis. 2018?
- New Backbone path - Highway 41 Appleton - Oshkosh - Fond Du Lac- Milwaukee. Winter?

http://weathermap.wiscnet.net/



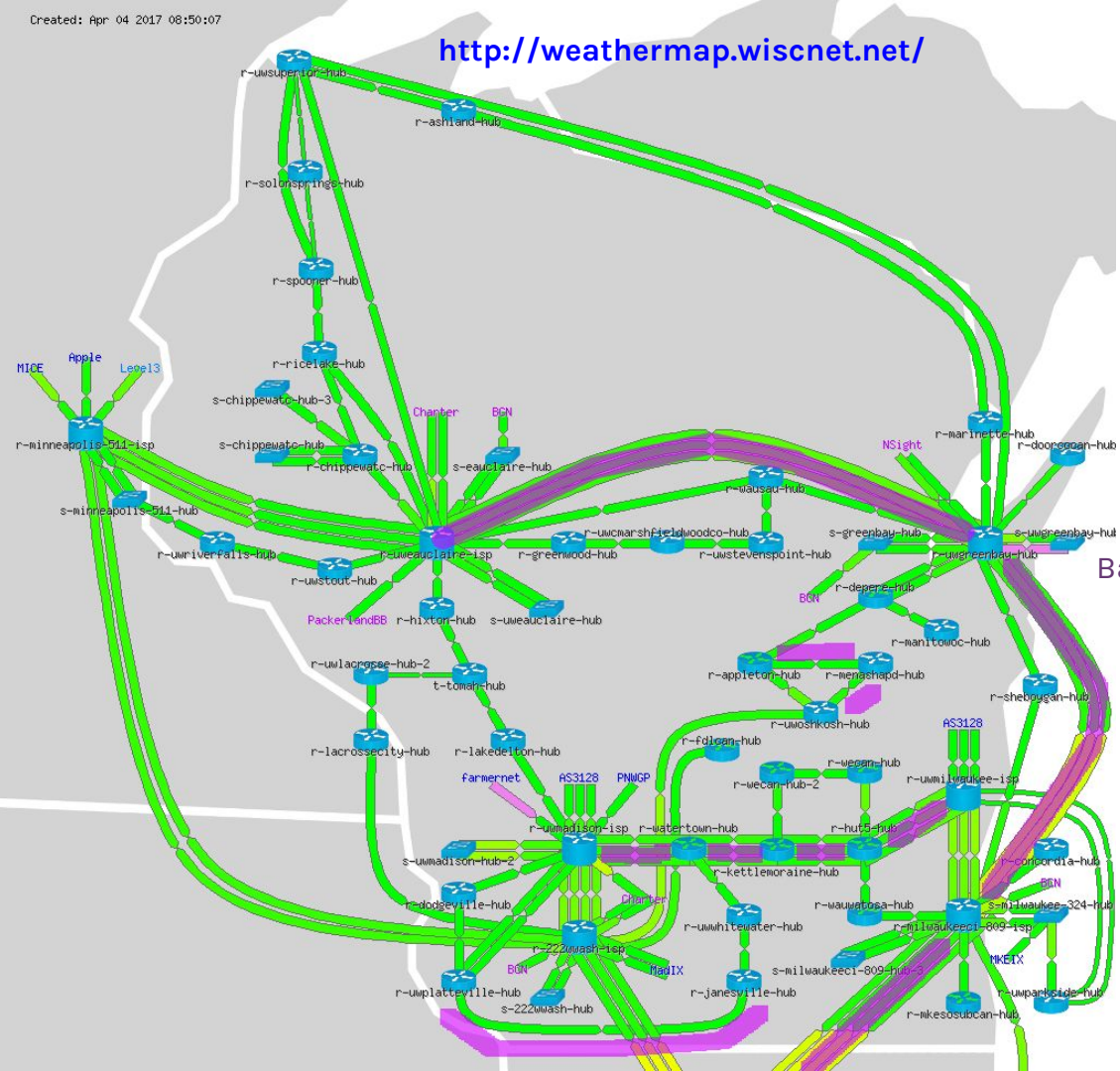
WISCNET BACKBONE

2016



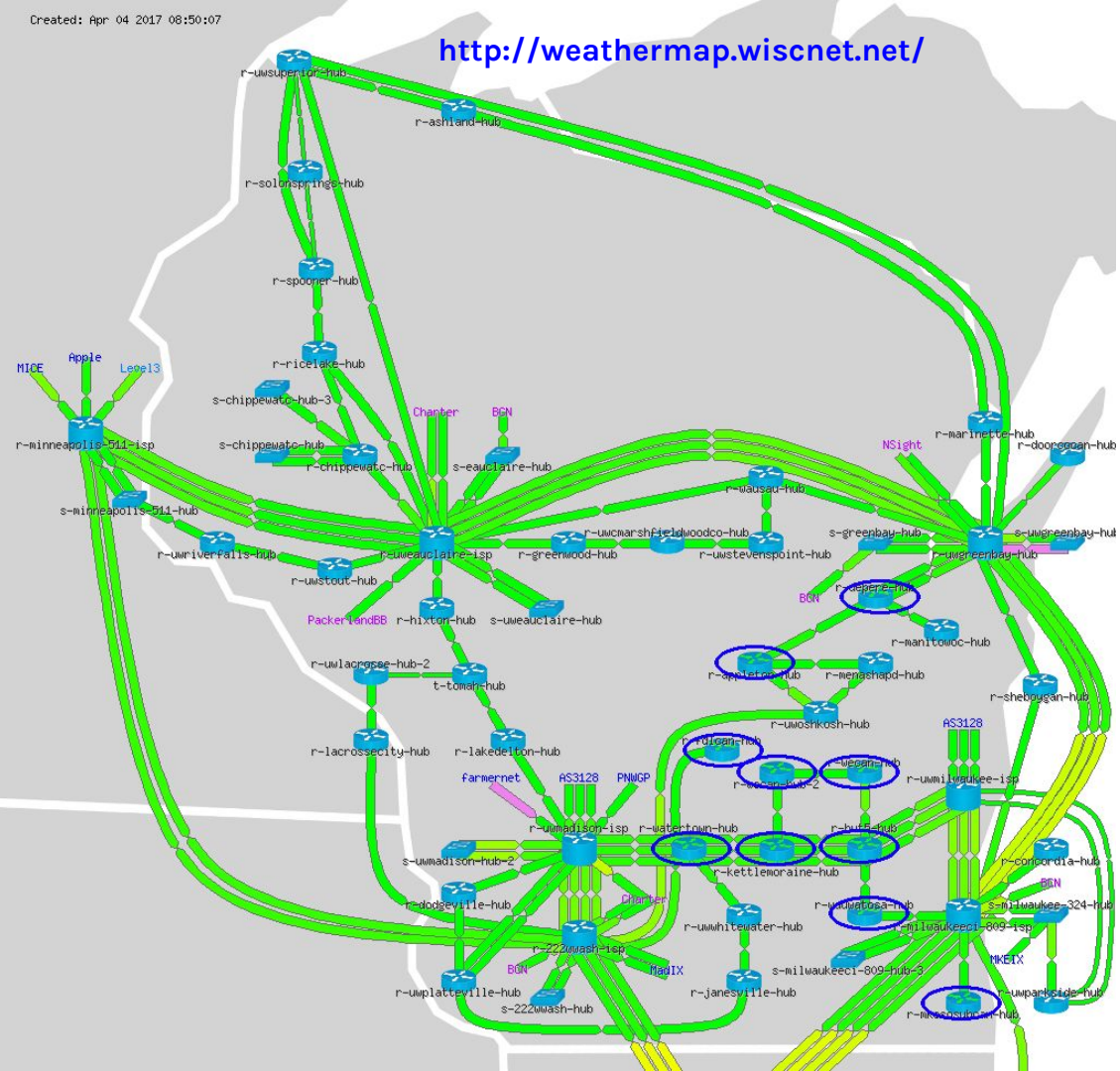
WISCNET BACKBONE

2016 -> 2017



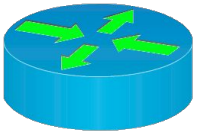
Backbone Upgrades:

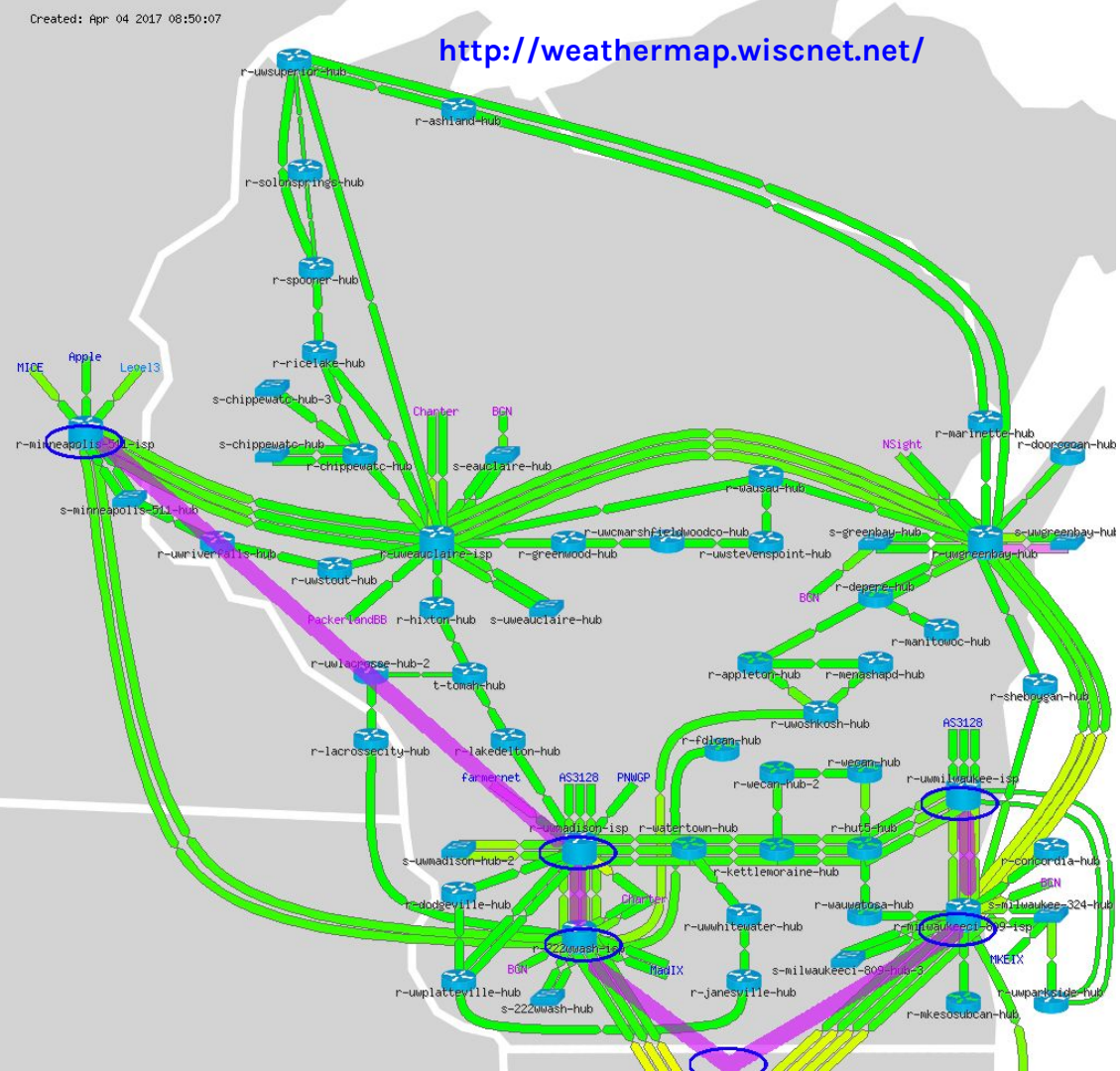
- Madison - Milwaukee
- Janesville - Platteville
- Eau Claire - Green Bay
- Chicago - Milwaukee - Green Bay
- Appleton - Menasha - Oshkosh



POPs Upgrades last summer (m
10G capacity)

- Appleton
- De Pere
- Fond Du Lac
- Kettle Moraine
- Milwaukee
- Watertown
- Waukesha
- Wauwatosa





2018?

100g backone links

Madison-Chicago

Milwaukee-Chicago

Madison-Minneapolis?

UPGRADES COMING SOON

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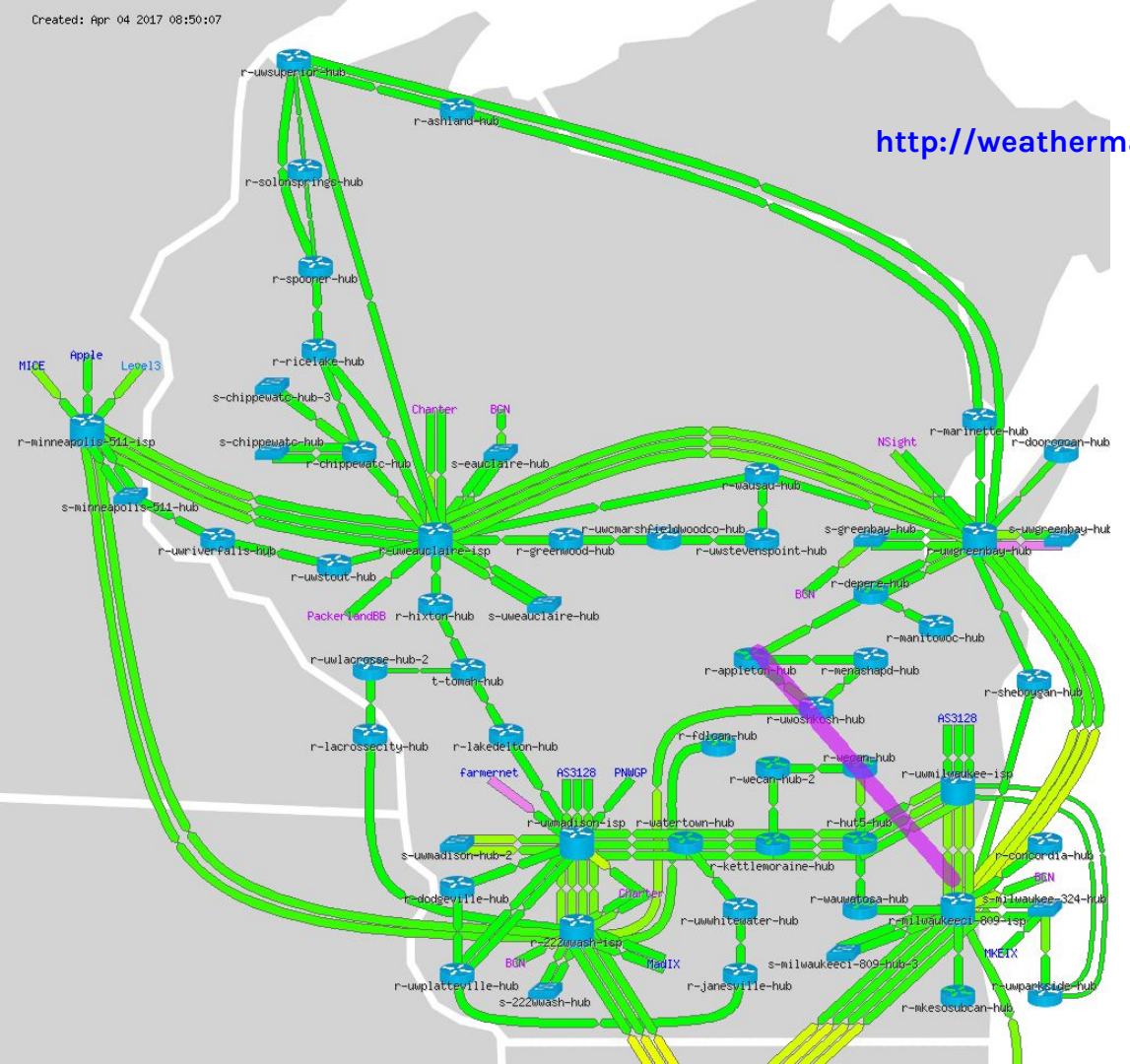

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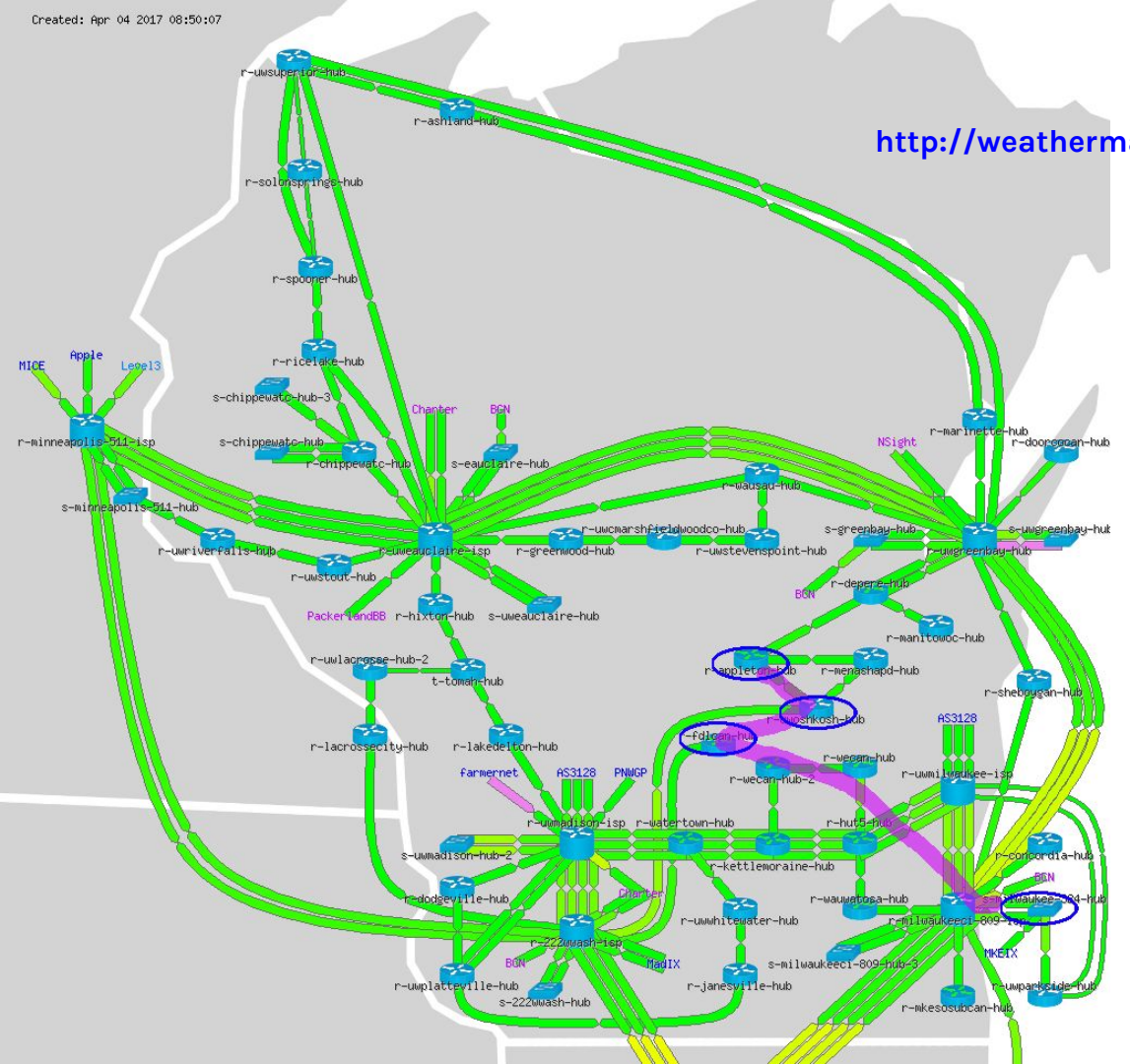
Highway 41

Geographically like this



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Highway 41

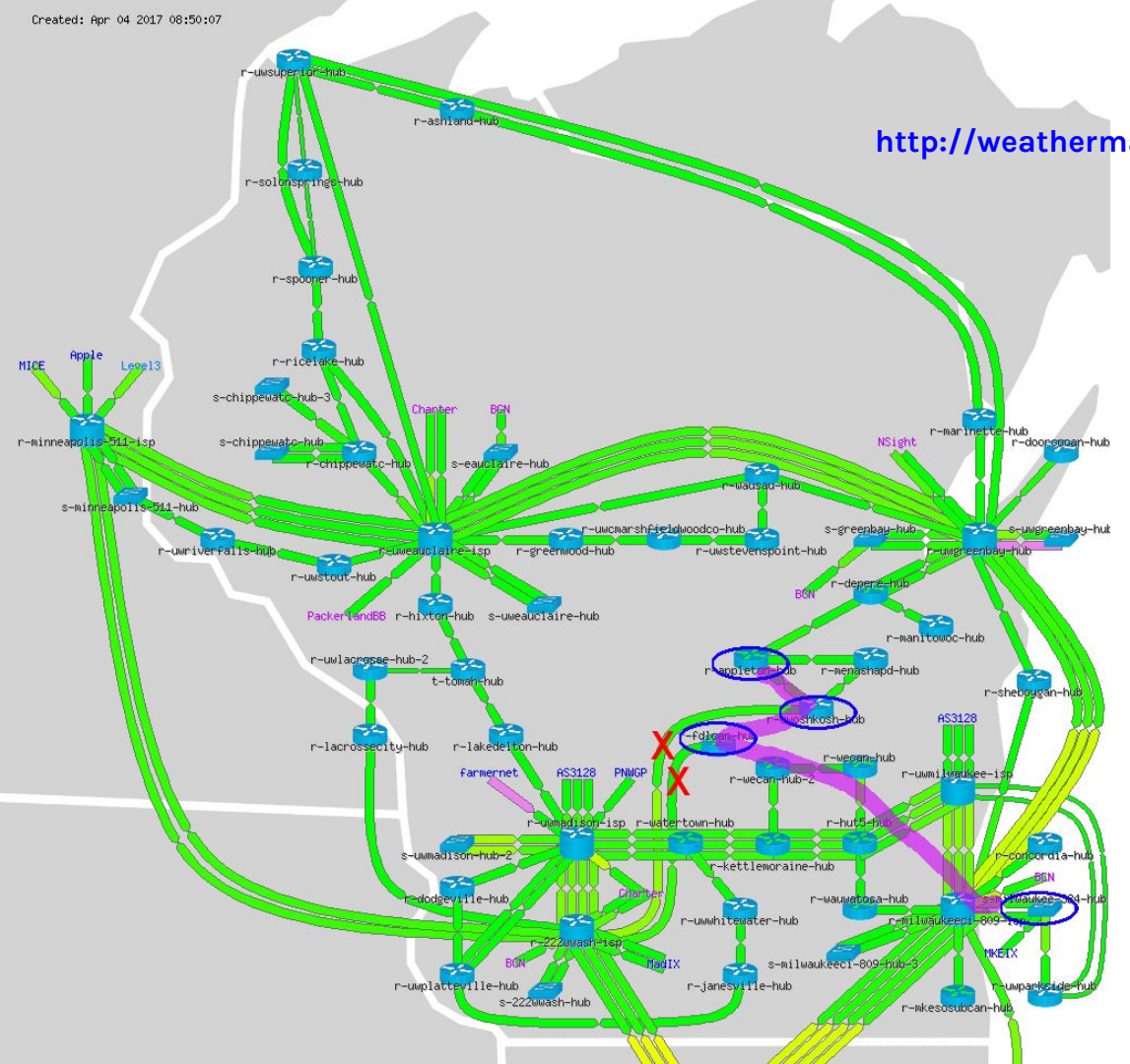
Appleton

Oshkosh

Fond Du Lac

[SOMETHING]

Milwaukee (324 / Wells building?)



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Highway 41

Cancel expensive

Telco circuits

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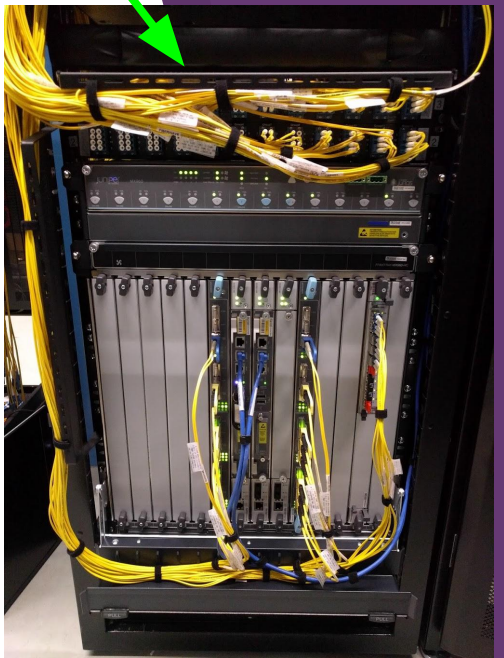
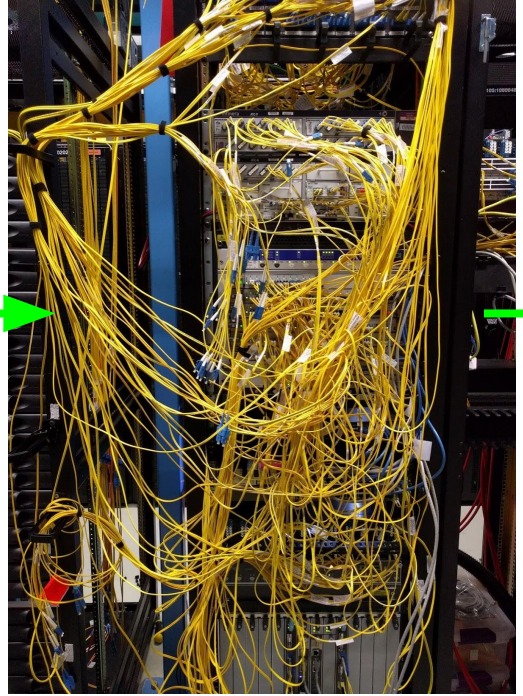


CHICAGO FORKFLIFT - ROUTER

- Old: MX480 2x MPC2, 4x MPC3 (6 line cards, 0 open)
- New: MX960 1x MPC3, 2x MPC7 (3 line cards, 8 open)
- MPC7-MRATE
  - 480gbps, QSFP only (4x qsfp28 / 12x qsfp+)
  - 10g via MPO breakout cables/boxes
  - SFP+ version exists, opted to use one model to ease sparing. Downside: no DWDM optics in MPC7
- MX480 ~2k watts (36a @ -53v), MX960 ~2.4k watts (46a @

CHICAGO - OPTICAL

- Infinera ATC
  - No 100g client ports, end of life
- Ciena Waveserver “DCI”
  - 200g line side on single DWDM channel
  - 2 line sides per box (400g per 1ru)
  - QSFP only (4x QSFP28 / 12 QSFP+), flexible
  - 2 @ 350 E Cermak, 1 @ 600w Chicago, 1 @ 710 NLSD
  - ~650 watts/ea (~12a @ -53v)

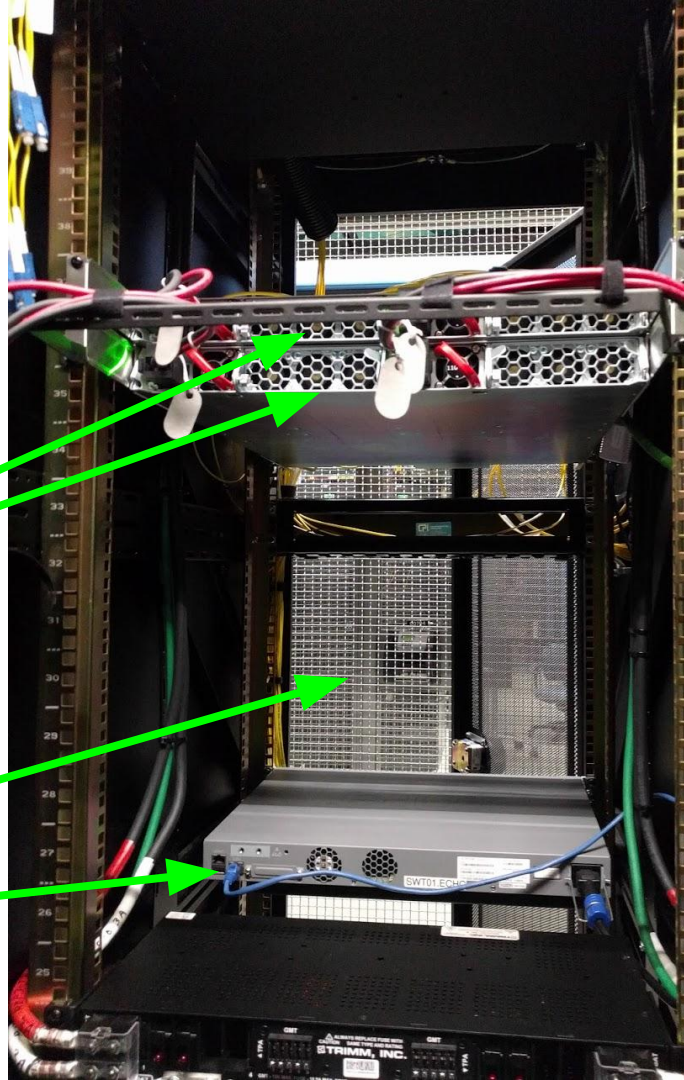


CHICAGO - RACK SPACE / POWER

- 2nd rack
  - Space was sufficient, needed more power

CHICAGO - RACK SPACE / POWER

- 2nd rack - “shared” equipment/space
- Ciena Waveservers (“shared resource”)
- Minnesota circuits to Chicago BOREAS Nodes
  - Amazon AWS (2x10g)
  - Equinix Cloud Exchange (2x10g)
  - Adding 2x Cisco 93180 soon?
- KINBER switch



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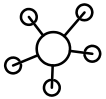


WRIPS Peering

- WRIPS - WiscNet Regional Peering Service
  Multiple R&E networks group together to have large aggregate traffic. Peers (Google, Netflix, Facebook, etc) will want to peer with you.

WRIPS PARTICIPANTS

BTAA Schools

- Illinois, Indiana, Iowa, Michigan, Minnesota, Northwestern, UW Sysnet, U of Chicago, Penn State

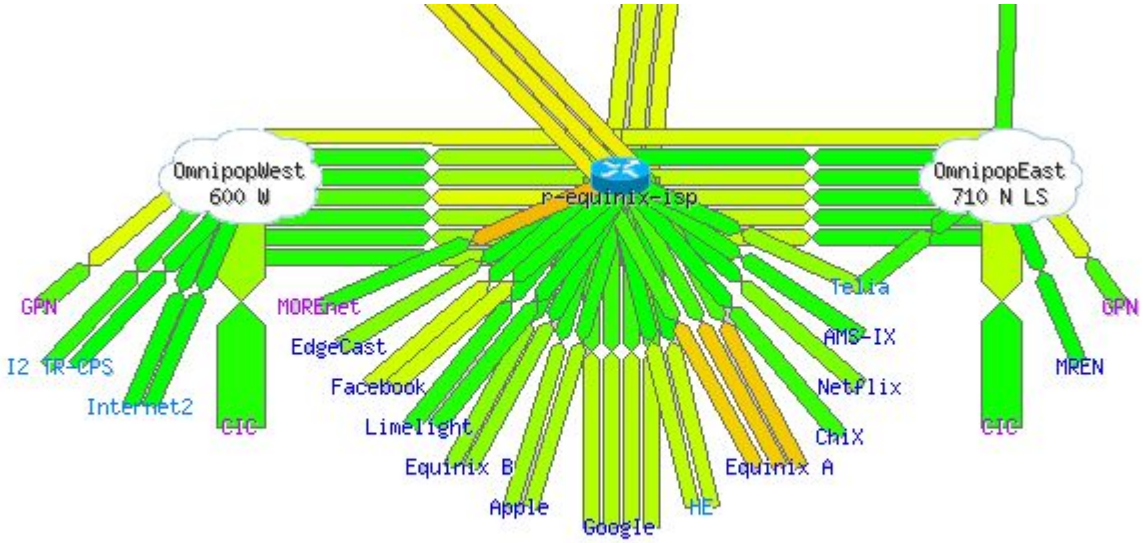
Other Networks

- WiscNet (WI), MOREnet (MO), KINBER (PA), Great Plains Network (IA State, OK/OneNet, NE)

https://weathermap.wiscnet.net/
https://weathermap.wiscnet.net/weathermap/wiscnet-wrips.html

Spring 2016

Last UW System meeting



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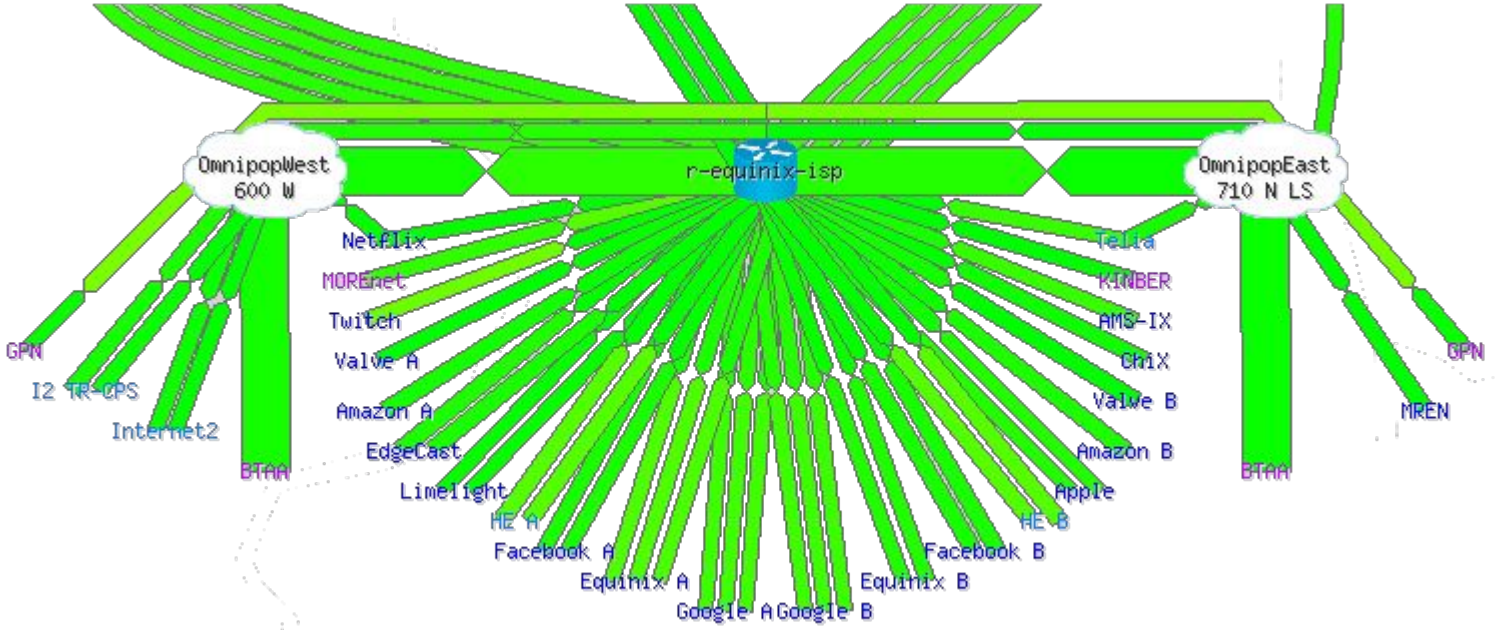
Summer 2017

Current



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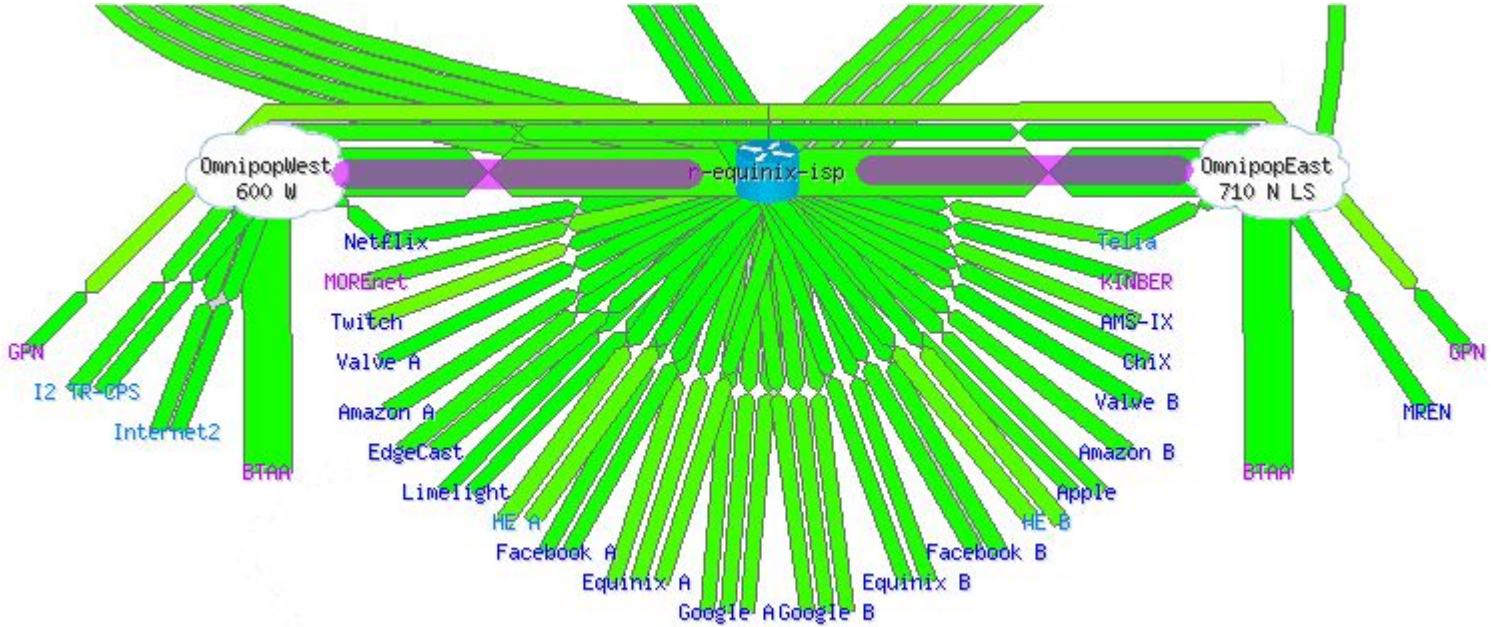
BTAA 100g

Added a few weeks ago



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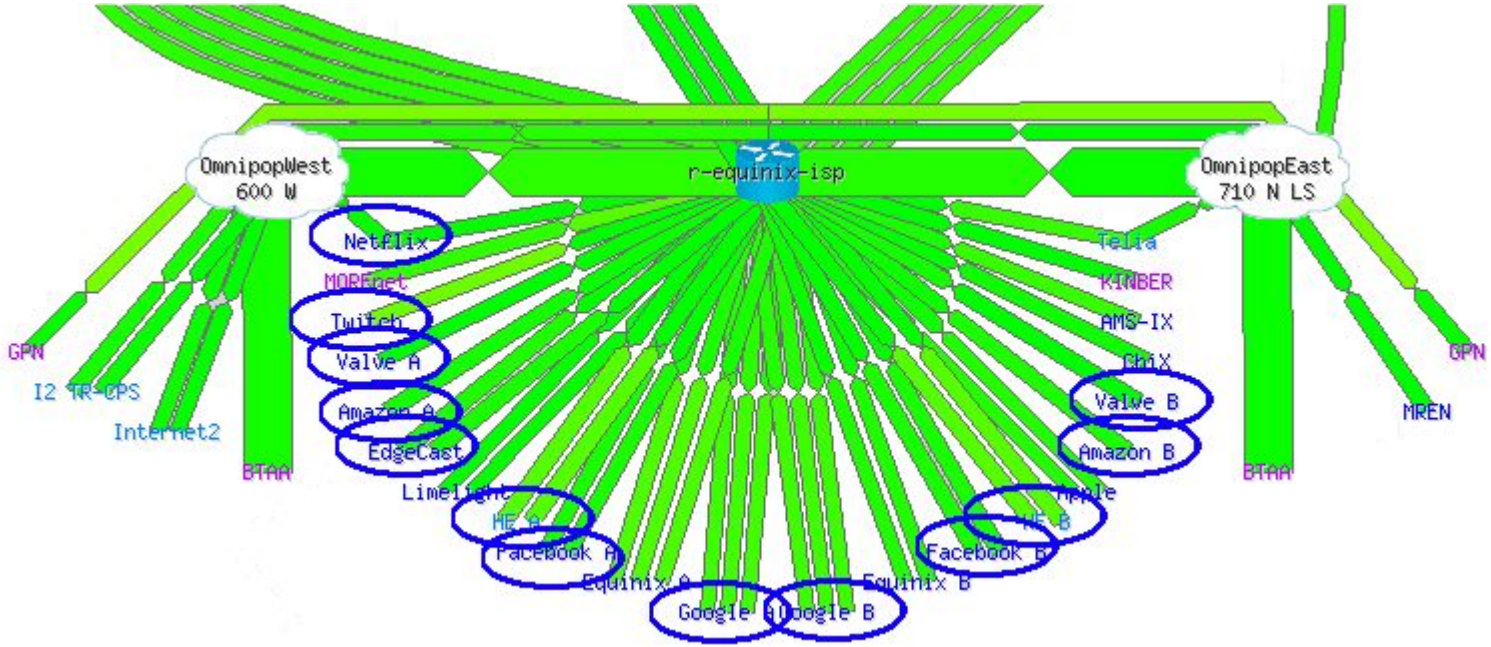
Peers Added last fall:

Twitch (new), Valve (new), Amazon (new), Edgecast (+10g), Facebook (+20g), Google (+20g), Hurricane Electric (+20g)



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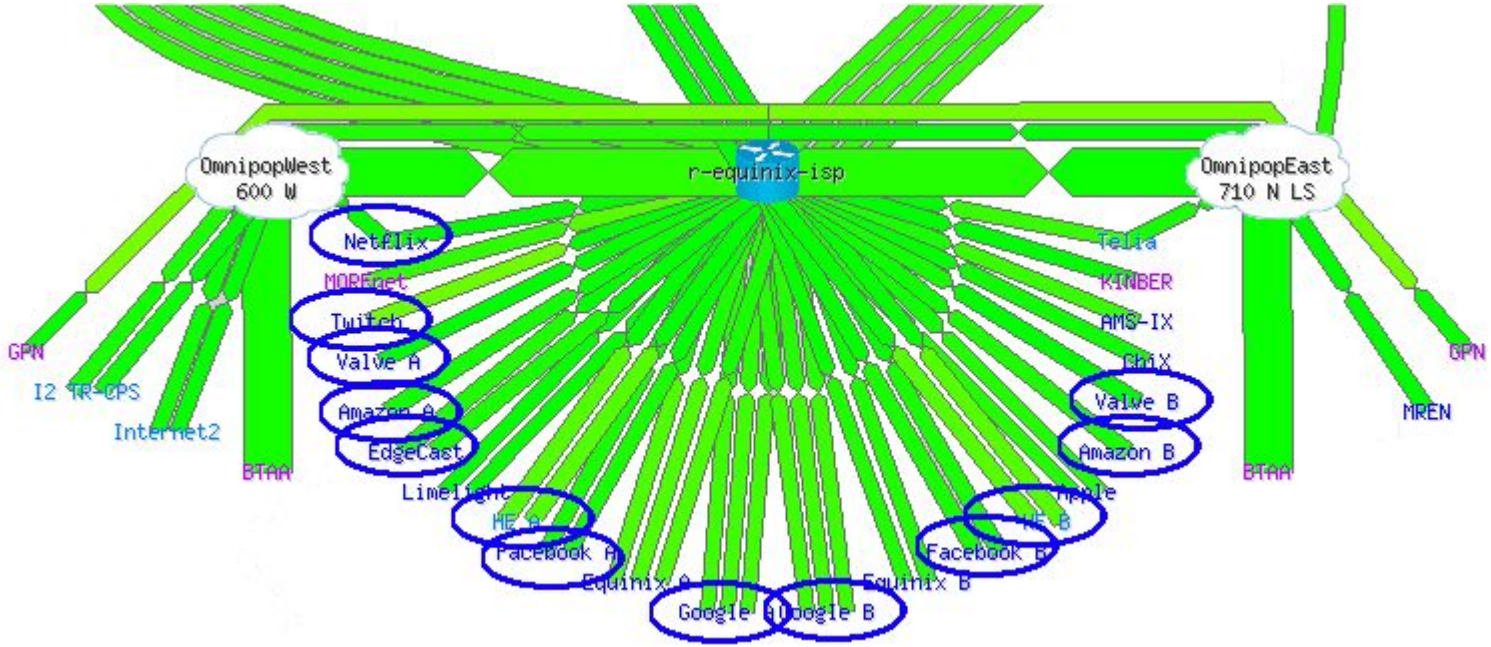
Peers Added last fall:

Twitch (new), Valve (new), Amazon (new), Edgecast (+10g), Facebook (+20g), Google (+20g), Hurricane Electric (+20g)

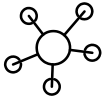
Peers Adding now: Twitch (+10g), Fastly (new 20g), Microsoft(?)



WRIPS FUTURE

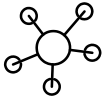
Diversification

- Logical Router inside BTAA router. WiscNet administers configuration of this VRF (Virtual Router)
- Diversify physical connectivity to peers by connecting directly to either BTAA or WiscNet routers



TRANSIT SHARE

- Transit Share
  Purchase a larger internet pipe (such as 100 Gbps) as a group to share costs.
- Each participant gets their own BGP connection to provider.
- Larger connection speeds = greater available capacity for failover (e.g. 25G committed of 100G link)



TRANSIT SHARE

Locations

- Chicago: TeliaSonera - 100Gbps
- Minneapolis: Level3 - 10Gbps, HE.net - 20Gbps

Participants

- Several Big10 schools (BTAA), Merit (MI) and KINBER (PA), Iowa State

TRANSIT SHARE

Possible Future Transit Links

- Chicago/Milwaukee/Madison/Minneapolis: AT&T
  - WiscNet may be required to purchase per BadgerNet agreement
  - AT&T Promised MIS service delivery on BadgerNet routers in MSN/MKE, but will not deliver on as7018 (private as only, their solution was to as-path rewrite)
    - AT&T DDoS?
- Minneapolis: HE 100G via UMN

OPEN DISCUSSION

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