

The background of the slide is a grayscale image of server racks with various cables and power outlets. At the top, the letters 'SFMMR' are displayed in a stylized, blocky font. Each letter is filled with a different color and has a grid-like pattern overlaid on it. The colors are: 'S' is purple, 'F' is blue, the first 'M' is green, the second 'M' is yellow-green, 'R' is orange, and the final 'R' is red.

SFMMR

Members Meeting

April 16th, 2024

Agenda

- Introductions
- Elections
 - Need New Board Members
- We should have an Executive Director
- Volunteering
- 2023 & 2024 Accomplishments, new members/upgrades
- DevOps and Automation Update
- Backbone Snapshot, 2024 Plans
- What should we build next?
- Past Financials
- New Opex and Capex needs, possible 2024 expenses

Introductions All Around

- Board members
 - Matt, Tim, Justin, Peter
- Volunteers
 - jof
- Participants

Thanks to Rudy for today's venue!



Board Members

Current:

- Justin Seabrook-Rocha (*Dialpad*)
- Peter Helmenstine - Secretary (*DRT*)
- Matt Peterson - President (*to term out in 2024*)
- Tim Pozar - Treasurer (*to term out in 2024*)
- [Empty Seat]

We need more board member candidates

<https://forms.gle/QGwKAZV5bKzQMrdE8>

SFMIX Is Growing Up

We need more engagement

The Need for more engagement

- Board Members
 - Traditionally a bit of a token/figurehead position
 - We need more regular engagement and work contributions: ***secretary & treasurer***
 - Please see “[Board Member Responsibilities](#)” in the “[Documentation](#)” section on the website
- Members / Volunteers
 - Creating automation software
 - Deploying software, provisioning ports
 - Responding to requests for support
 - Physical “spring cleaning” days (*see pics*)

Maybe *you*?

An Executive Director for SFMIX

The new board would drive this.

- Executive Director
 - SFMIX has outstripped its “hobbyist” early years, and could really use more dedicated, strategic support
 - Income has moved SFMIX to file a complete IRS Form 990 now
 - The need to manage multiple concurrent, long-term projects as well as the operations and future strategy of SFMIX
 - We have an internal document we have been using for discussion that can be cleaned up for distribution to members

2023

- Added new participants / *Upgrades*
 - Kerfuffle
 - Akamai Connected Cloud/Linode (100G)
 - Sail Internet
 - Ryamer
 - Unwired Broadband
 - Volt Broadband
 - Starry
 - Dbolical
 - DAOport
 - Synergy
 - Edgio (100G)
 - Netskope (2x100G)
 - Cachefly (100G)

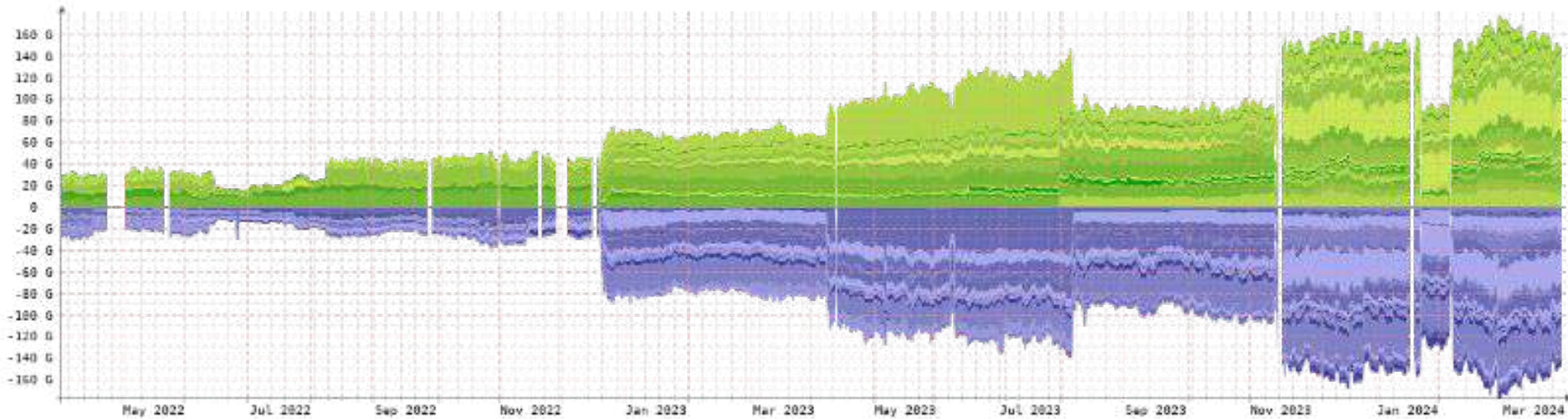
2024

- EGI Hosting
- Webpass (100G)
- Wirecat
- NetActuate
- Macarne
- Eons Data
- Sea Ranch Connect
- Etheric Networks
- Subconscious

Under provisioning & consideration:

- SpaceX/Starlink
 - *Link up, awaiting BGP turn-up*
- Qwilt (*new CDN*)
 - *Cross-x install, need to patch*
- Nominet UK
 - *Contract approval process*
- Quad9 DNS cache
 - *Pending hardware shipment, behind PCH*
- *Expansion into 1380 Kifer (Sunnyvale)*
 - *Cruzio & Surfnet (Interested)*
 - *CENIC (Curious, non committal)*

Bandwidth for the Last Two Years



Currently peaking at 200 Gbit/s

Gaps and lower bandwidth due to management / monitoring network downtime

2023 Accomplishments

- Deployed initial two 400G capable Arista 7280CR3-36S switches (*SJC01* & *SFO02*)



- Upgraded EOS to 4.27.7.1M
- Significant cable re-shuffling: *FMT01* & *SFO02*
 - 40G PLR4 breakouts for 4x10G



2023 Accomplishments

- Deployed two additional 400G capable Arista 7280CR3-36S switches (*FMT01* & *SCL03*)
- Added unknown-unicast port security setting
- Upgraded EOS to 4.29.5M
- Significant cable re-shuffling: *FMT01* & *SJC01*
- Migrate to VyOS mgmt routers



mgmt-gw.scl04
(*PC Engines APU6 / VyOS*)

mgmt-sw.scl04
(*Juniper EX*)

4 port RJ45 serial console

2023 Accomplishments

- Upgraded SSD's on Fremont Proxmox cluster
- Begin standardization of PDUs & mgmt-switches
- Renting storage space
- Use of Jira ticketing



ServerTech C1W08HC-0ABA2BAC

Juniper EX4300-48P



2023 Accomplishments

The screenshot displays the SFMIX Ops Kanban board with three columns: BACKLOG (27 items), PRIORITIZED (3 items), and IN PROGRESS (4 items). Each item includes a task description, a status indicator (checkbox), an ID (e.g., OPS-13), and an assignee icon. The board also features a search bar, navigation tabs (Summary, Board, List, Calendar, Timeline, Approvals, Forms, Pages, Attachments, Iss), and a user profile section with avatars for MP, TP, JS, and a plus sign.

SFMIX Ops

Summary Board List Calendar Timeline Approvals **NEW** Forms **NEW** Pages Attachments **NEW** Iss

Search board

BACKLOG 27

- Set up NLNOG Ring for SFMIX
✓ OPS-13
- Setup sfmix.org v6 proxy web site
✓ OPS-16
- Setup bgp.tools VM for route collector
✓ OPS-17
- fmt01: Remove Wholesale cross-x
✓ OPS-29
- Update ACLs to filter and log broadcast protocols

PRIORITIZED 3

- Apply for a RIPE Atlas Anchor
✓ OPS-21
- Migrate SFMIX admin BGP from VM's to baremetal
✓ OPS-7
- sjc01: swing cross-x for Starlink's 2nd 100G port
sjc01
✓ OPS-122
- + Create

IN PROGRESS 4

- Set up a free-tier JIRA Service Management account
✓ OPS-24
- Add tested example of traffic shaping into Ansible EOS template
ansible
✓ OPS-68
- 400G upgrade between SJC01 and FMT01
fmt01 sjc01
✓ OPS-87
- New Participant: Etheric Networks

2024 Accomplishments

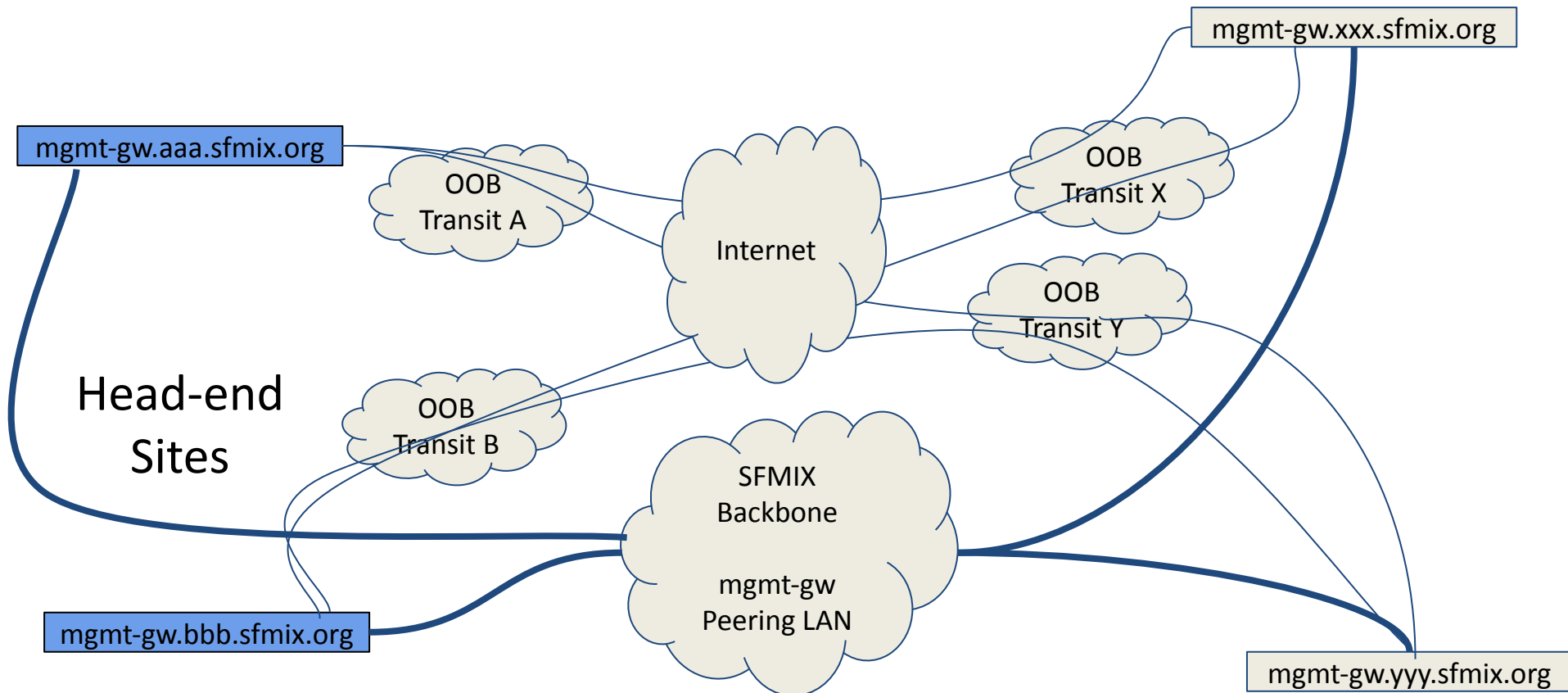
- OpenColo “SCL04”: 5 new participants!
- Rewrote automation w/ Ansible/NetBox
 - [IX modeling in Netbox](#)
 - ARouteServer, DNS fwd/rev, Alice, IRR AS-Set
- [Euro-IX JSON](#) participants list, automated
- Route servers: upgraded software/OS, [MANRS](#) compliant, & enhanced [BGP communities](#)
- Launched [Route Browser](#), *aggregate looking glass of route servers & route collector*
- Prometheus/Grafana dashboards
- Open Source management code: [sfmix/sfmix](#)

Management Routers Update

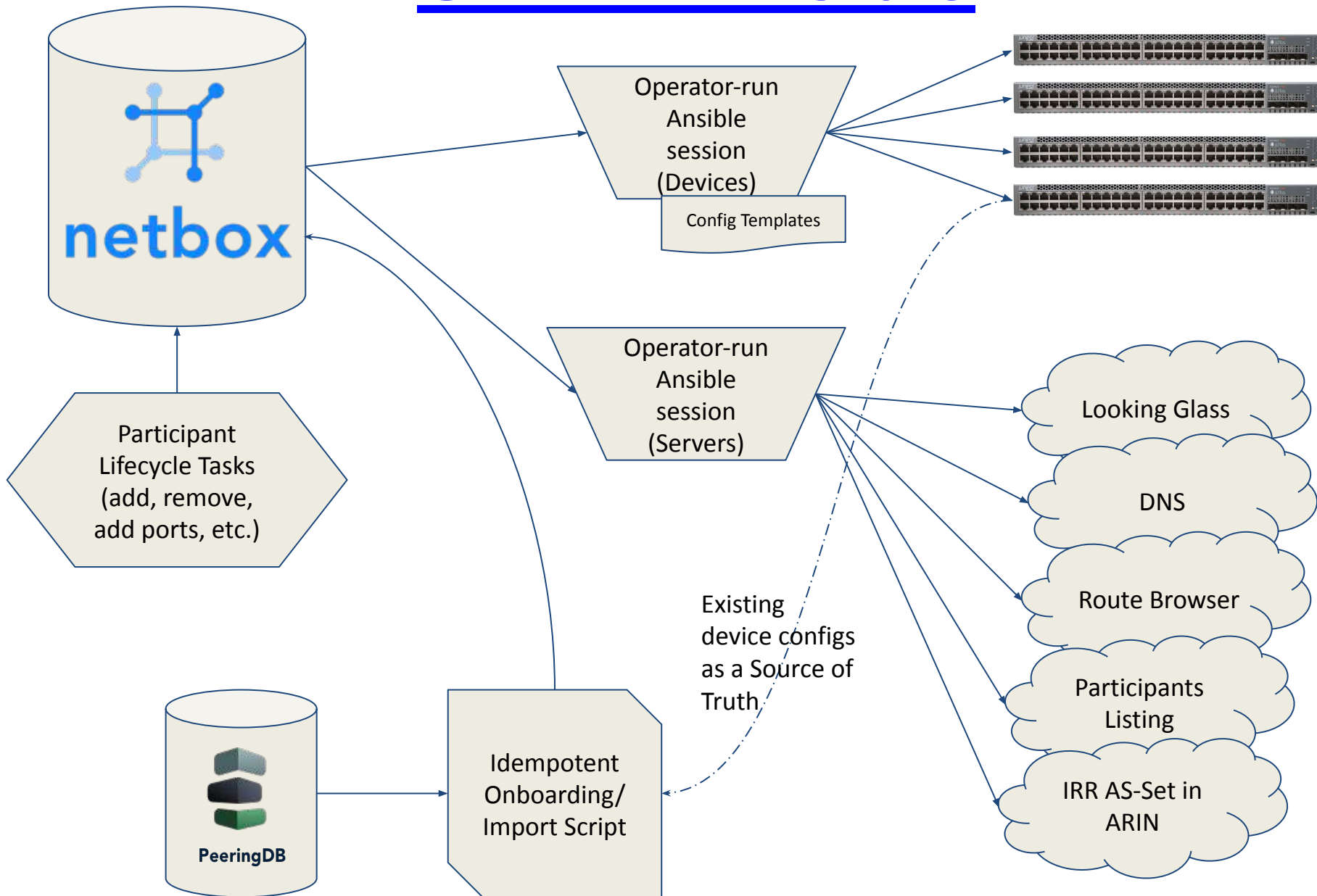
No more gappy graphs! 🙌



- High-bandwidth (1G) in-band
- Backup Wireguard Tunnels over the Internet to two head-end sites
- OSPF link costs to prefer high-speed backbone, falling back to tunnels if unavailable



SFMIX Ansible



SFMIX Ansible

```
jof@shell:~/sfmix/scripts$ pipenv run ./new_participant.py
```

```
New participant ASN?: 30640
```

```
New interface speed? (in Gbit/s; e.g. "10"): 10
```

```
Existing peering sites are:
```

```
    fmt01, scl01, scl02, scl04, sfo01, sfo02, sjc01
```

```
Which site is the participant joining in? sfo02
```

```
New Netbox Tenant Created: https://netbox.sfmix.org/api/tenancy/tenants/214/
```

```
Found 5 patched and unassigned ports:
```

```
[1] - switch01.sfo02/Ethernet25 - AVAILABLE: Pre-Patched: 10G-LR
```

```
[2] - switch02.sfo02/Ethernet18/1 - AVAILABLE: Pre-Patched: 10G-LR (Breakout)
```

```
[3] - switch02.sfo02/Ethernet18/2 - AVAILABLE: Pre-Patched: 10G-LR (Breakout)
```

```
Your port selection? 2
```

```
Created LAG Port-Channel102 - https://netbox.sfmix.org/api/dcim/interfaces/2719
```

```
Added physical port to Port-Channel102:
```

```
https://netbox.sfmix.org/api/dcim/interfaces/1971/
```

```
Allocated IPv4 Address: 206.197.187.61/24 -
```

```
https://netbox.sfmix.org/api/ipam/ip-addresses/780/
```

```
Allocated IPv6 Address: 2001:504:30::ba03:640:1/64 -
```

```
https://netbox.sfmix.org/api/ipam/ip-addresses/781/
```

```
Tracing patching for LOA Landing information...
```

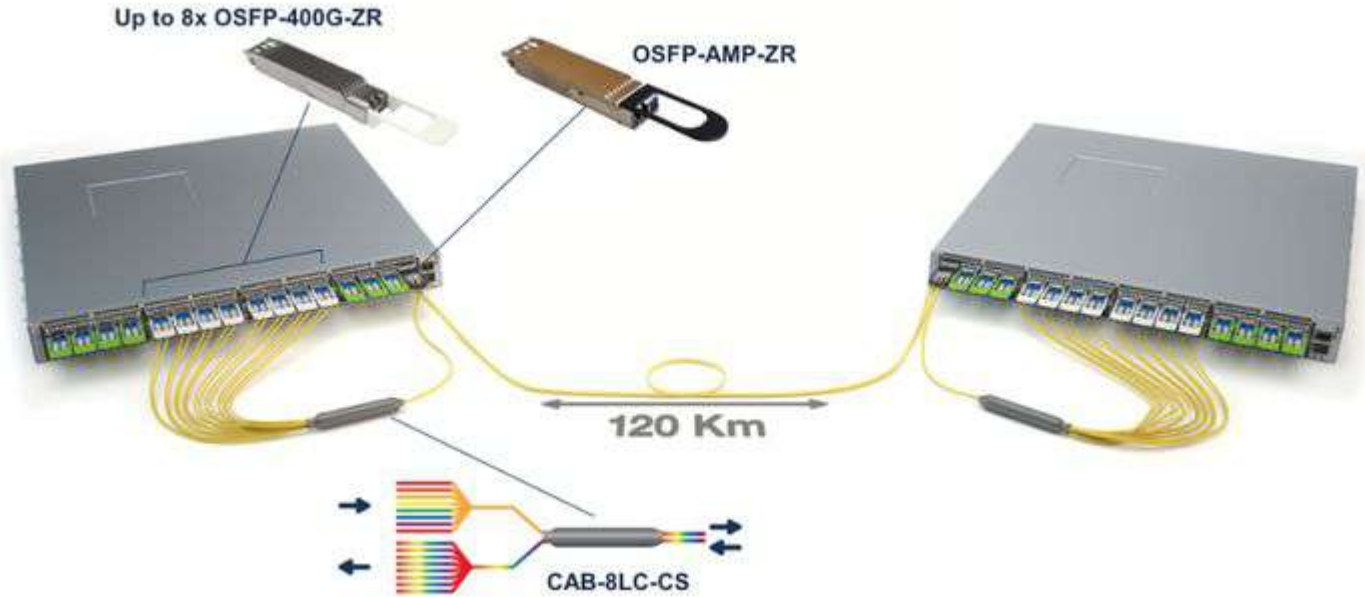
```
Most distal patch panel location to land at:
```

```
    Patch Panel: pp_003.305.037.038.sfo02
```

```
    Rack: Cabinet 537 (03.305.37), Unit 38.0
```

```
    Ports: 5 & 6
```

Arista DCI-over-dark 400G



400G QSFP-DD

EDFA Amp

```
hardware port-group 2 select 1x-qsfp-dd(Et35)
```

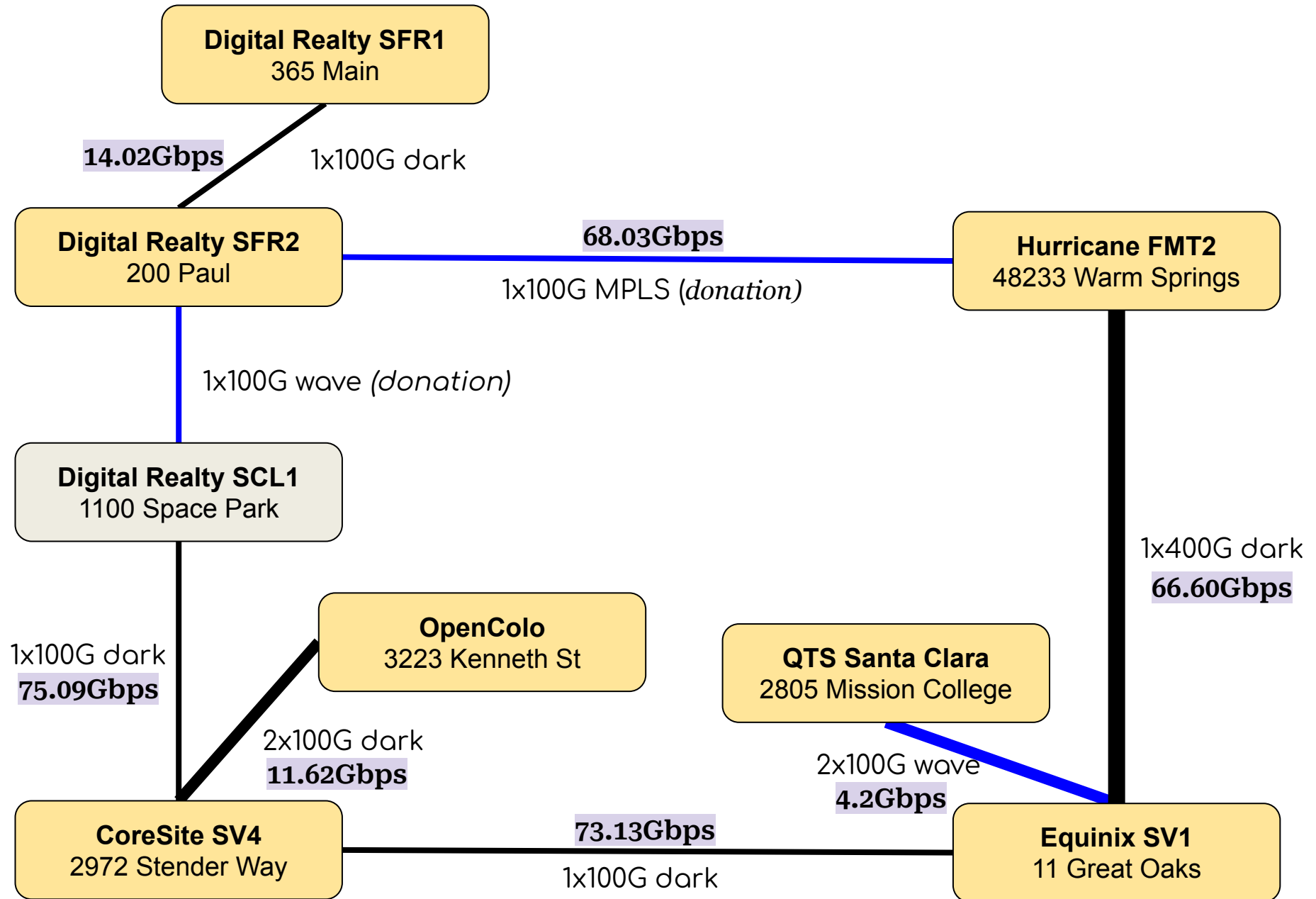
```
interface Ethernet35/1  
  transceiver frequency 192100.000
```

2024 Plans

- 700% Ansible/NetBox based switch configs
- EOS 4.30.5M; expose dropped packets via sFlow
- 400Gbps: *SJC01 (Eqx) ↔ SCL02 (CoreSite) & FMT01 (Hurricane) ↔ SFO02 (200 Paul)*
- 2nd 400G capable switch @ SJC01
- Proxmox server upgrades (*moar cores, storage, RAM, & redundant PSU's*)
 - Long term data warehouse (*sFlow, etc.*)
- Continue management network standardization
- Significant cabling / server clean-up day for SJC01 (*Equinix*), FMT01 (*Hurricane*), and SFO02 (*200 Paul*)

95th over 30 days

Backbone - Current



Backbone - 2024 Plans

Digital Realty SFR1
365 Main

1x100G dark

Digital Realty SFR2
200 Paul

1x100G MPLS (*donation*)

Hurricane FMT2
48233 Warm Springs

1x400G dark (*eta late 2024*)
New bay submarine crossing

1x100G wave (*donation*)
400G dark in mid 2025

Digital Realty SCL1
1100 Space Park

1x400G dark

1x100G dark

OpenColo
3223 Kenneth St

QTS Santa Clara
2805 Mission College

2x100G dark

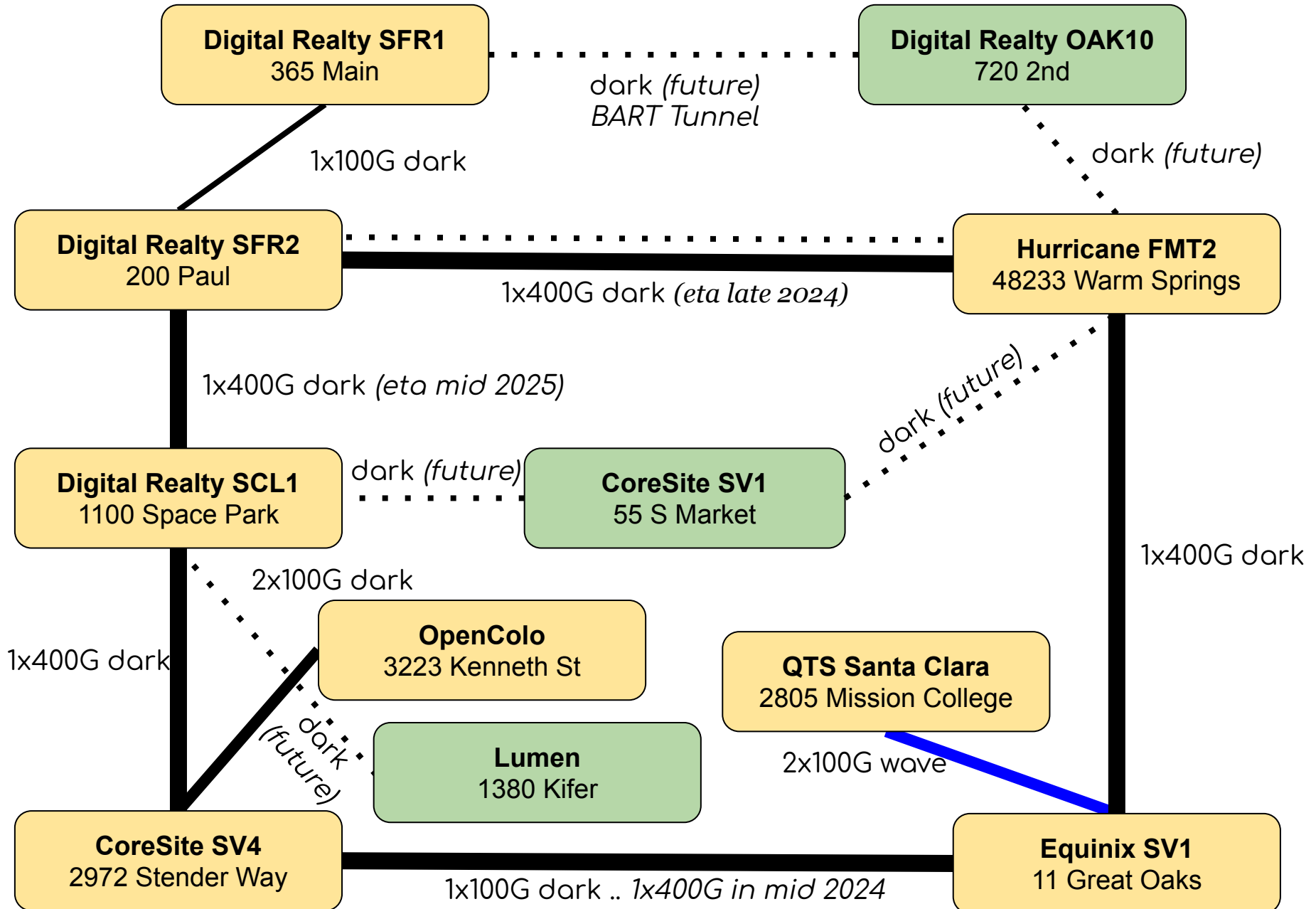
2x100G wave

CoreSite SV4
2972 Stender Way

1x100G dark .. 1x400G in mid 2024

Equinix SV1
11 Great Oaks

Backbone - tbd



Discussion Topics: What should we Build Next?

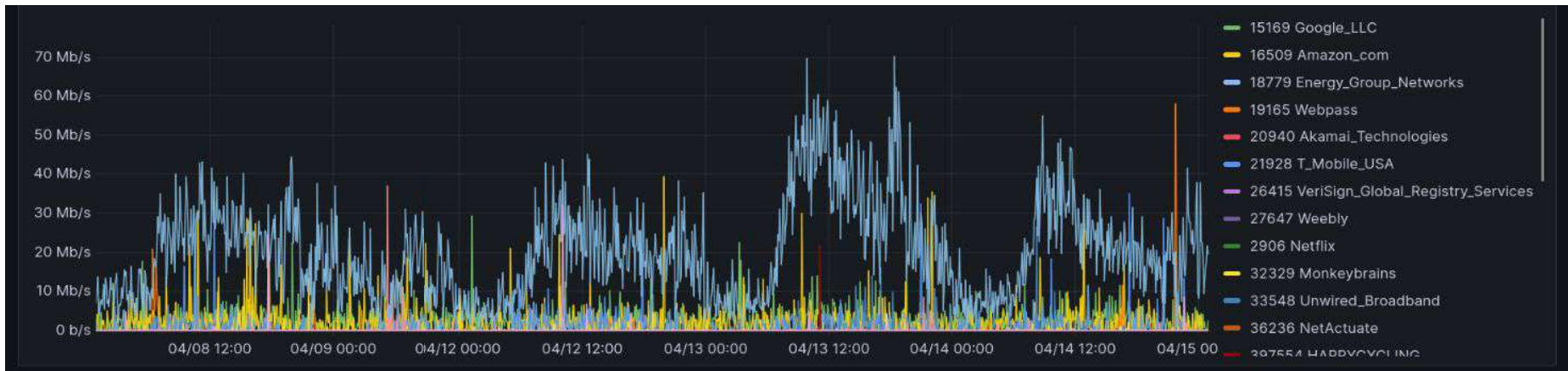
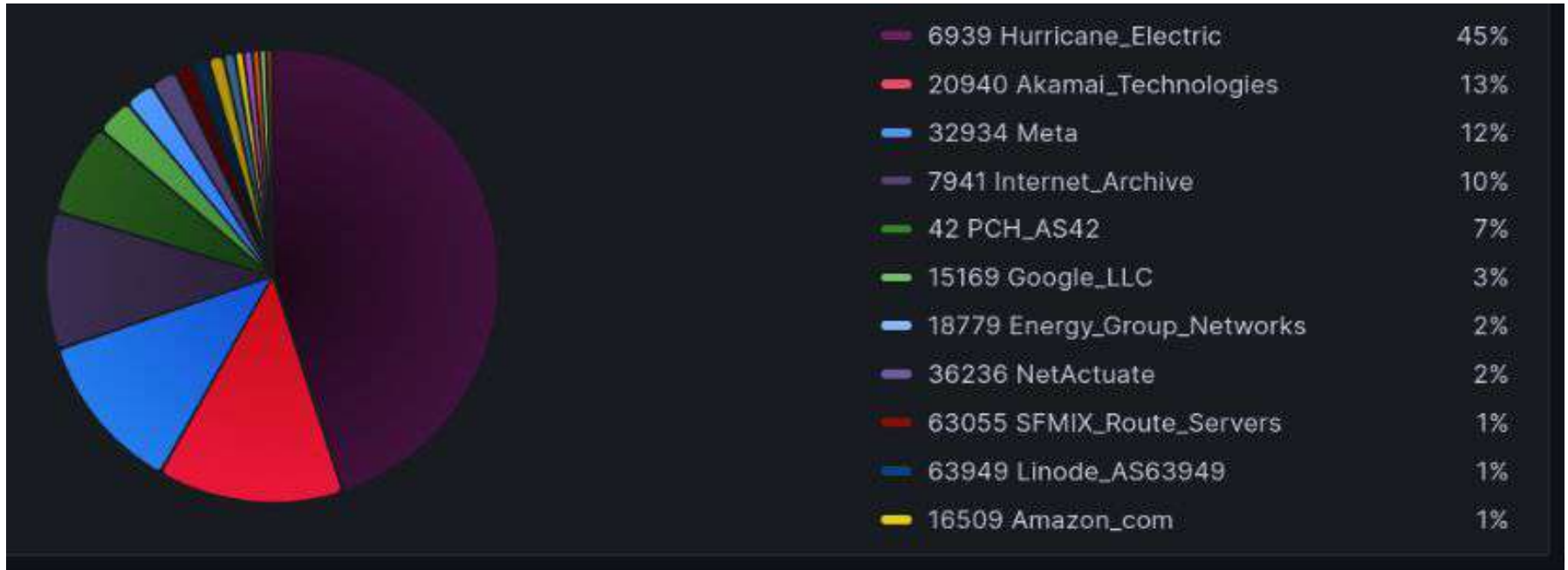
- We can't take on everything.
- What is most useful and important to you, our members?

Discussion Topics: What should we Build Next?

- A participant portal
- Improved Routing Hygiene Stats
- Detect Routing Abuse, Promote Defense
- Deprecate 1G Physical Ports
 - 1G customers would connect on 10G ports
- Cache Hosting
- Private VLAN Service
- Physical Expansion
 - 55 S. Market, San Jose
 - 1380 Kifer Street, Sunnyvale
 - Sacramento

Concept: A Participant Portal

- A way for SFMIX to reflect data we have back to participants (e.g. received optical power), and for participants to self-manage their data (e.g. billing contacts)
- Pros
 - An open-source alternative IXP Manager, compatible with modern ops tools
 - Automate onboarding further
- Cons
 - Ongoing software maintenance burden



Home / Participant Name

SFMIX Health Check

415 days since last outage

New SFMIX Participants

[Fufuhead](#) Fufuhead, Fubar, Foo Bar

PeeringDB SSO

SFMIX Participant: TWO P

AS #6140 www.twop.co

Member Since 2008

Paying Member

Exchange IP Addresses:

- 1.1.2.1

Billing information

Current Invoice [000123](#) Outstanding

Prior Invoice [000120](#) PAID

Download PDF's

LAG as a logical unit

Link Agregation Group [#23443](#)

Port(s): [80](#), [8800](#), [3321](#)

Description: Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua.

Location: Hurricane Electric

Services: Link (no cloud)

Status

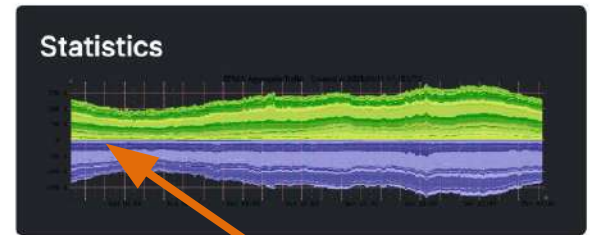


Everything is hurray

Port #80 is down

Overall health

Statistics



Sparklines graph

Link Agregation Group #23443

Port(s): [80](#), [8800](#), [3321](#)

Description: Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua.

Location: Hurricane Electric

Services: Link (no cloud)

Status

- ✔ Configuration set
- ⚠ Reduced throughput
- ✖ Port #80 is down

Mac Addresses

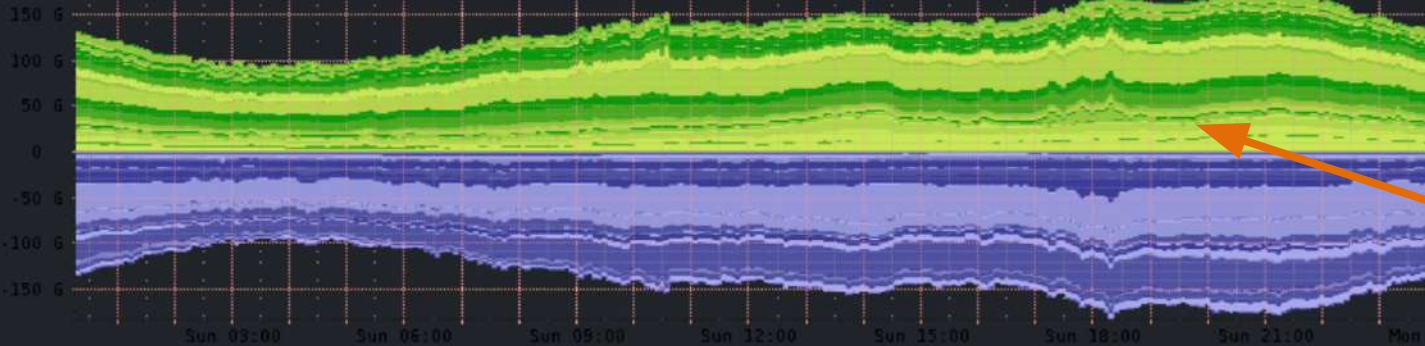
- ✔ 00:25:96:FF:FE:12:34:56
- ⚠ 0025:96FF:FE12:3456
- ⚠ f8:4d:89:69:fe:9b

Learned MAC's

Healthcheck

Traffic in and out

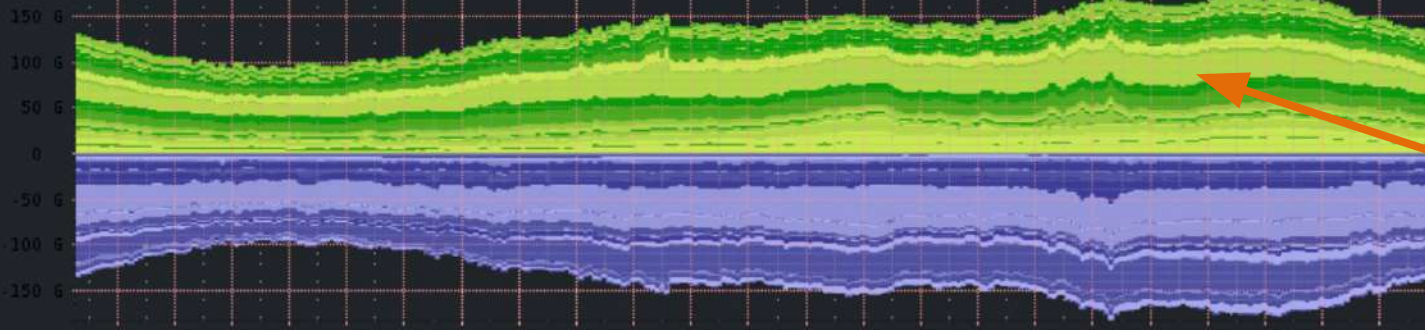
SFMIX Aggregate Traffic - Created at 2023/08/21 07:15 UTC



LAG In/Out

Participant to Participant

SFMIX Aggregate Traffic - Created at 2023/08/21 07:15 UTC



sFlow

Port #80

Devicerack B12

Patching information: Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua.

Location: Hurricane Electric

Media Type: Fiber/distance/speed

Letter of Authorization (LOA): [\[filename.pdf\]](#)

Status ✕

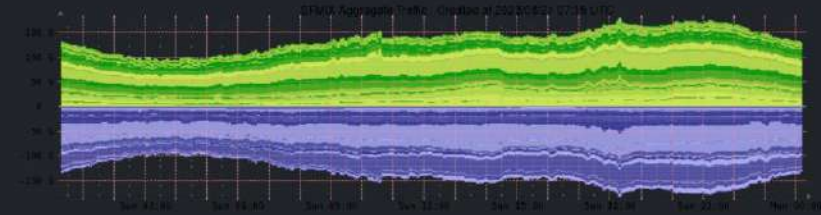
Down since 2023-06-01 14:21:12

other message...

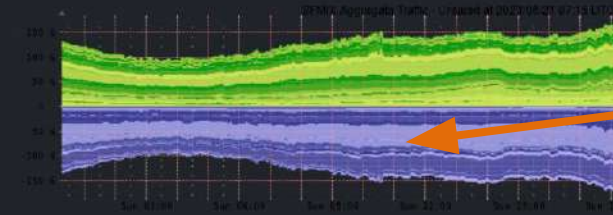
Phy Port Health

LOA PDF & cross-x ID's

Capacity



Optics



Optical dBm

Traffic in and out



Concept: Improve Routing Hygiene Stats

- Reflect back operational metrics about participants' operational practices on the peering LAN to other participants.

Namely: leaks of bogon source IPs or cases of routing abuse

- **Pros**

- Gives participants a way to gauge the professionalism and routing hygiene of potential bilateral peers

- **Cons**

- Could be embarrassing or leak semi-private information to other participants

Concept: {Detect, Defend Against} Routing Abuse

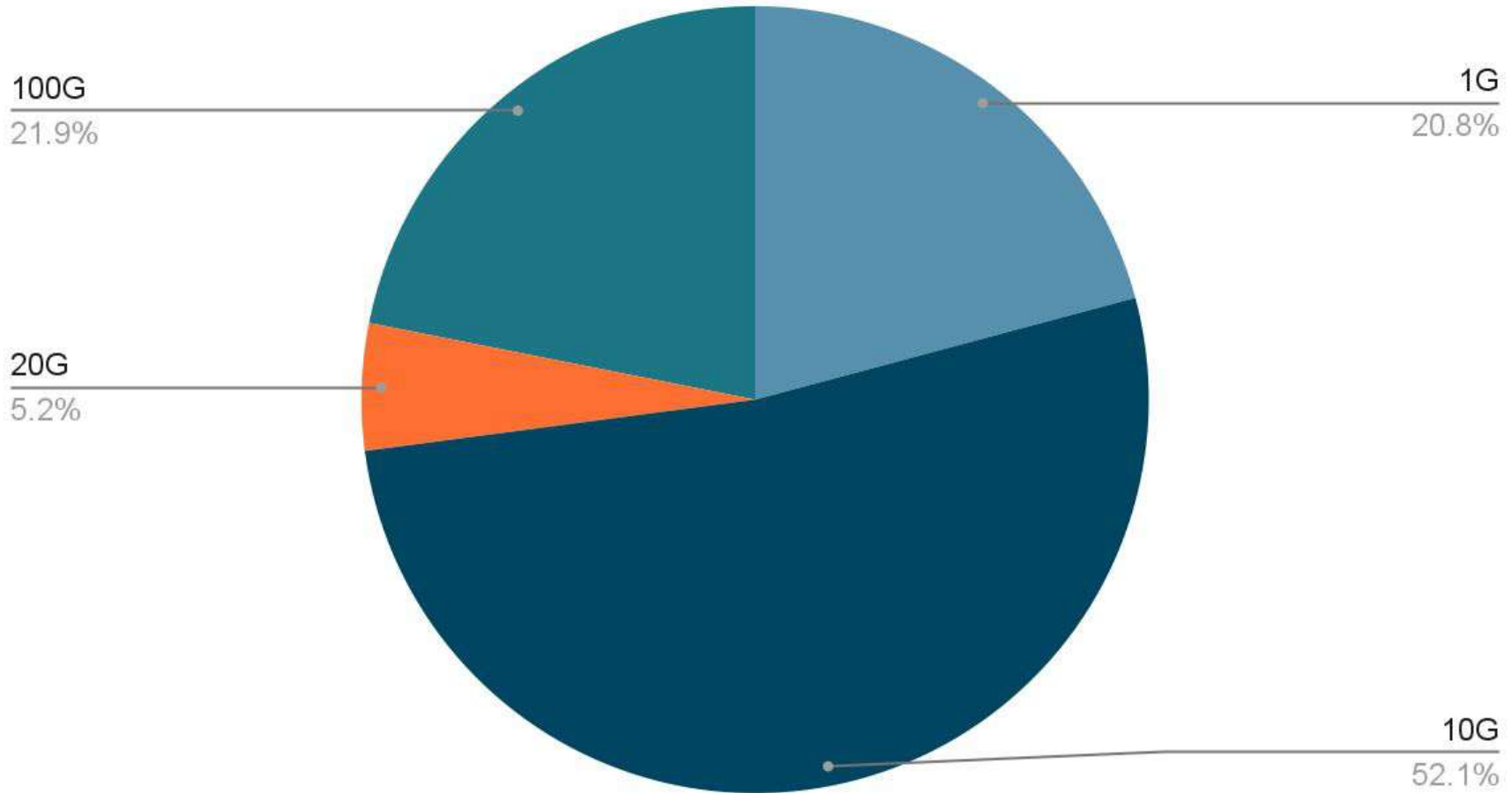
- Routing Abuse: sending IP traffic with destination IP addresses that don't correspond to IP prefixes announced
- With sFlow data and routing information (e.g. route server peers), it could be possible to detect cases or routing abnormalities.
- Ideally: participants defend themselves

Concept: Deprecate Physical 1G Ports

- Move 1Gig participants to 10Gig ports with a 1Gbit/s rate limit. This enables us to better utilize higher-density QSFP-only routing platforms more efficiently (using 4x10G breakouts); **no price change**
- Pros
 - Frees up SFMIX to move to progressively higher bandwidth platforms, without maintaining older hardware for lower-margin participants
- Cons
 - Forces smaller participants onto 10Gig media

Concept: Deprecate Physical 1G

Port Speed Breakdown



Concept: Deprecate Physical 1G Ports

- 1G Ports by site:
 - “SFO01” 365 Main 1 Port
 - “SFO02” 200 Paul 2 Ports
 - “FMT01” HE FMT2 16 ports, *40% of ports*
 - “SCL04” OpenColo 1 port

Concept: Commercial Cache Hosting

- Utilizing SFMIX-operated colocation space, power, and IP transit to host commercial content caches. (*e.g. Microsoft, Apple, Valve*)
 - These networks have denied traditional invites in favor of a one-cache-per-region policy.
- Pros
 - Additional transit offloading and cost savings for eyeball-type SFMIX participants
- Cons
 - Could cost some amount of money in terms of IP transit for cache-fills and internal backhaul
 - CapEx: servers ... OpEx: storage, power, transit
 - SFMIX Support

Concept: Private VLAN Service

- Providing a private Ethernet transport-like service using the SFMIX backbone. No SLA.
- Pros
 - Very low-cost transport within the region, enabling participants to reach themselves or other providers in distant off-net buildings
- Cons
 - SFMIX can't provide an SLA
 - Not a great replacement for high quality NNI services, but as a way to pick up non-mission-critical providers in local buildings you aren't in
 - Could be viewed as a competitive move by providers that offer special deals to SFMIX

Concept: Physical Expansion into 1380 Kifer Street, Sunnyvale

- Extend into the Lumen building in Sunnyvale.
- Pros
 - Access to some additional unique eyeball participants like Cruzio, Surfnet, and CENIC
 - Potential intertie with the California State Middle-Mile Broadband Initiative
- Cons
 - Not a carrier-neutral building; somewhat against the core charter of SFMIX

Concept: Physical Expansion to 55 S. Market, San Jose

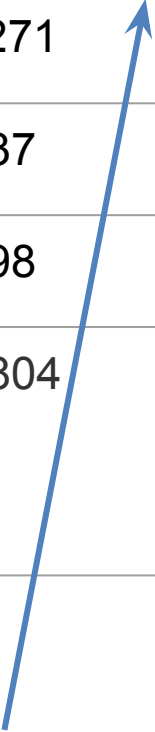
- Extend SFMIX into “CoreSite SV1”
- Pros
 - Enables access to different set of unique peers
 - An “express” fiber path between Fremont and Santa Clara, which doesn’t touch Equinix
- Cons
 - ~\$25k/annual additional OpEx (*dark to FMT01 & SJC04, cab/power/cross-x’s*); ~\$20k CapEx (*400G switch, optics, PDU’s, etc*)

Concept: Physical Expansion into Sacramento


- Open question: create a new island IXP *and/or* extend SFMIX outside of the Bay?
 - Existing space already allocated in QTS
 - NTT (*fka RagingWire*) is in discussions
- Pros
 - Extends access to even more diverse peers in the region, all eyeballs (*Cal.net, DigitalPath, Vast/CVIN, Zeta Broadband, etc*)
- Cons
 - On-site support becomes more challenging; *it's a long drive*
 - Lit vs dark fiber backhaul

Financial

Year	2021	2022	2023	2024
Income	\$110,774	\$115,271	\$116,350	\$274,386
OpEx	\$33,028	\$44,937	\$46,977	\$69,712
CapEx	\$13,665	\$59,298	\$82,415	\$49,609
Bank Balance	\$98,886	\$101,804	\$140,795	\$265,696 <i>(April 15, 2024)</i>

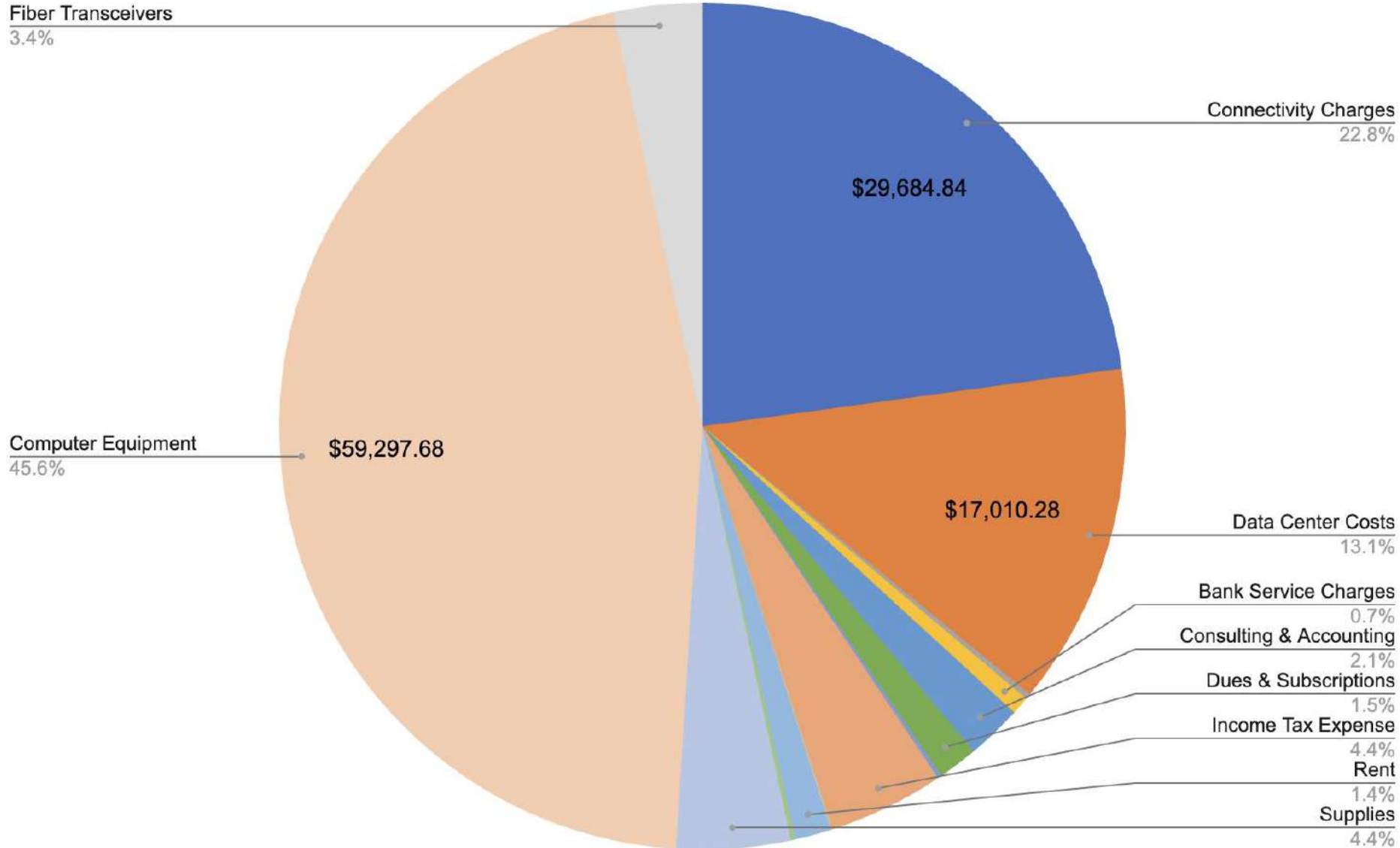


400G switches, amps, & optics
Website redesign
Spare 100G switches
Management/transit SBC's

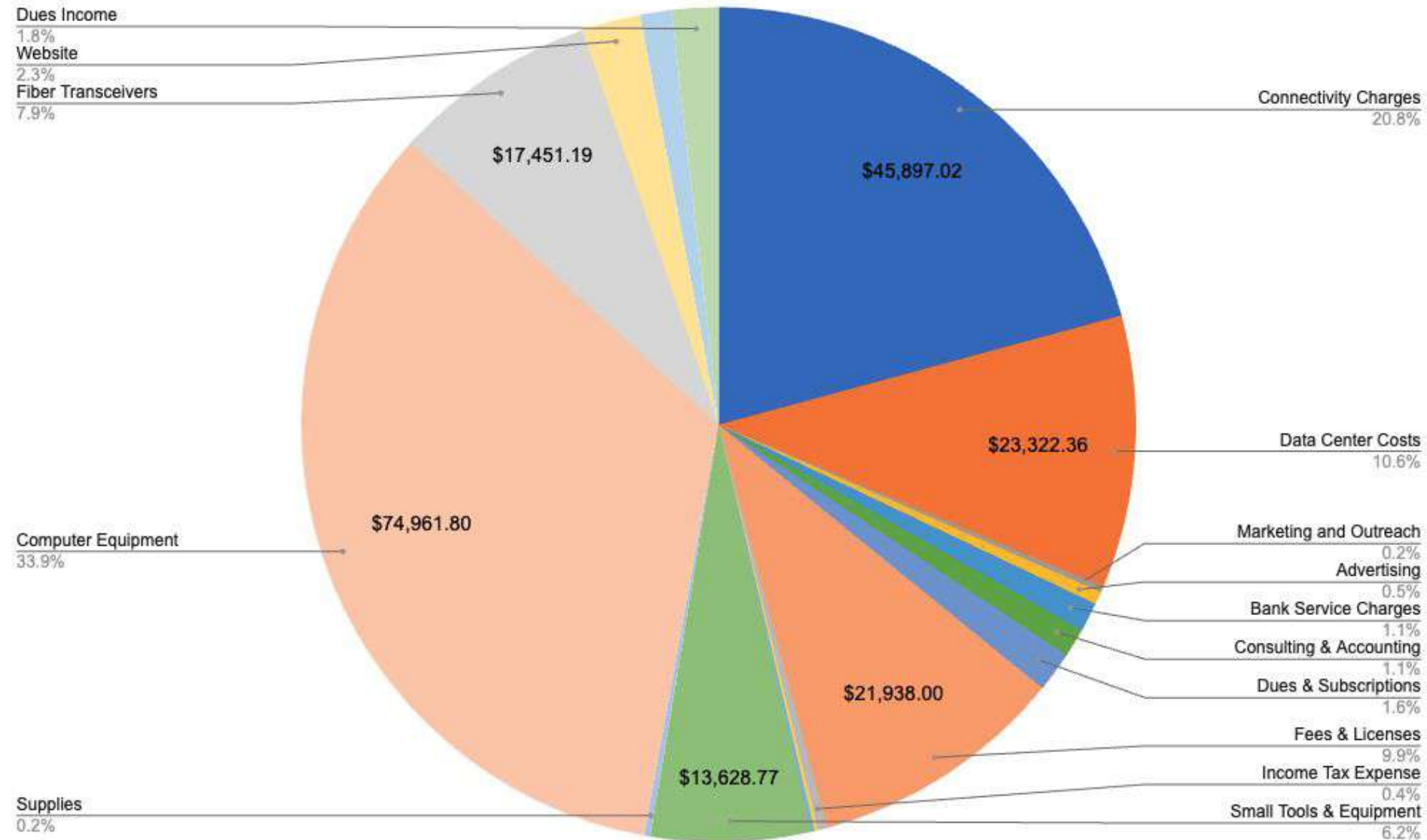


Est 2024 taxes, t-shirts, DevOps
consulting, new PDU's, 12VDC
redundant PSUs

2022 Cap/OpEx Expenditures



2023 Cap/OpEx Expenditures



Typical Monthly OpEx

Expenses	Avg. Month
Bookkeeping	\$70.00
CPA	\$125.00
ARIN	\$41.66
Google Apps	\$64.64
1Password	\$16.00
PO Box	\$18.00
Xero	\$42.00
Domain names	\$3.00
Website hosting	\$25.00
Insurance	\$225.00
Optics, patch cables	\$850.00
Income Tax	\$500.00
Bank/Stripe Fees	\$150.00
Data Centers	\$1,060.00
Dark Fiber	\$4,473.00
Total Expenses	\$7,663

Current balance = \$265,696
(as of April 15, 2024)

Several annual payments shown
as per-month *(ARIN, PO Box, etc)*

Dark fiber will rise in late
summer *(SFO02 to FMT01)*,
Peninsula in 2025

Does not assume any contractual
eng/dev support projects, new
deployment sites, etc

Possible 2024 Budget Items

Expenses	One Time
2nd switch @ SJC01 (7280CR3-32D4)	\$15,000
Spare 400G switch (<i>might use at Kifer</i>)	\$15,000
Renew Arista support contracts (<i>exp 10/2024</i>) for all 8 switches, annual	\$14,400
400G optics (SJC01-SCL02 & SFO02-FMT01)	\$22,000
DevOps consulting (<i>mgmt & edge routers, Ansible/NetBox remaining tasks</i>)	\$7,500
Software consulting (<i>portal, NetBox plugins, "lint" health, Xero integration, etc</i>)	\$15,000
Proxmox servers (<i>3x per two sites, for correct cluster size + more I/O & cores</i>)	\$30,000
Complete PDU standardization at remaining sites (<i>2RU 30A metered units</i>)	\$5,000
General mgmt/executive director (<i>remainder of the year, 6 months</i>)	\$30,000
Taxes (<i>state & feds, estimated</i>)	\$5,000
Total	\$128,900

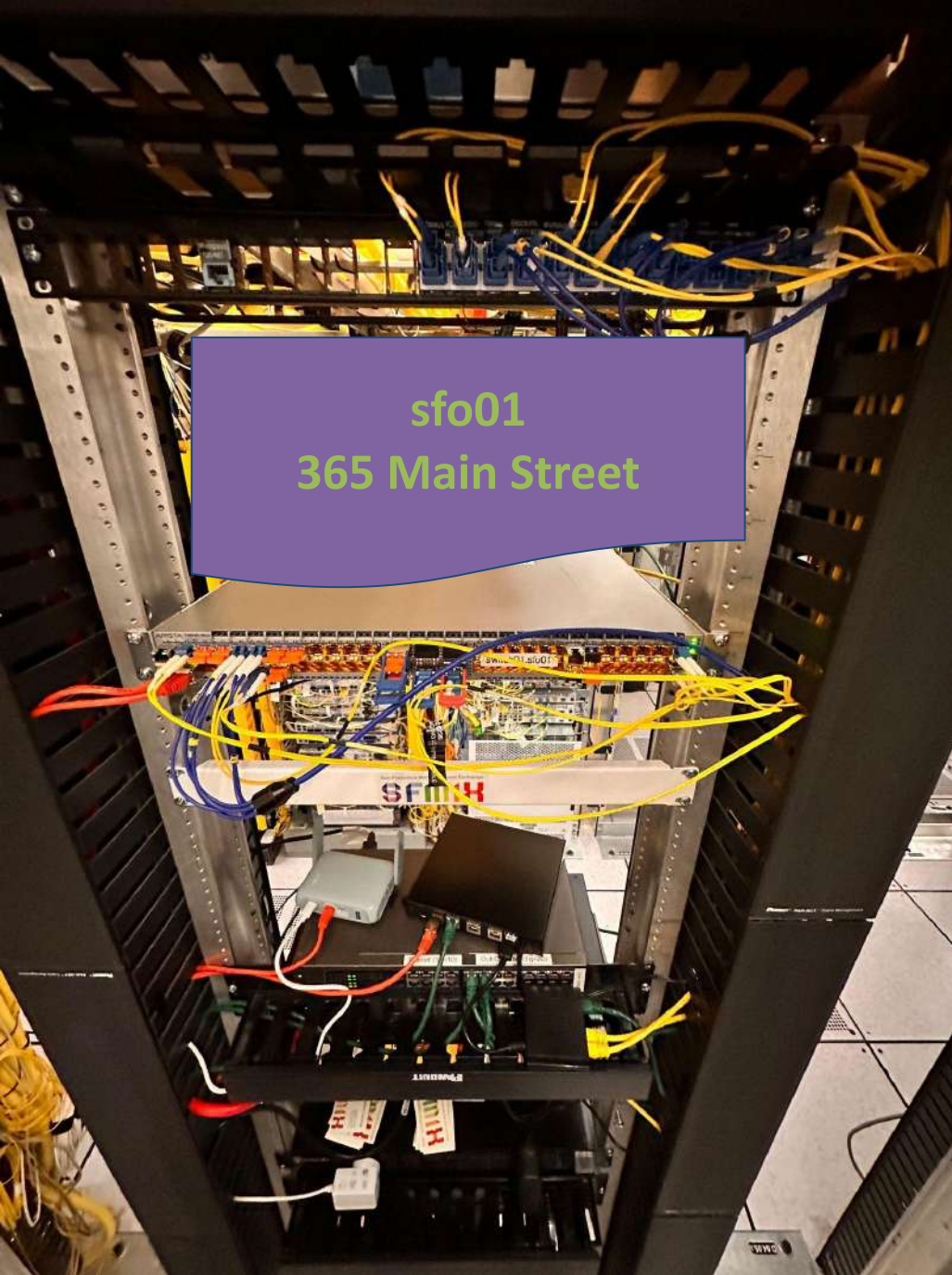
Current balance = \$265,696
(as of April 15, 2024)

Two pairs of 400G EDFA amps & breakout cables already purchased

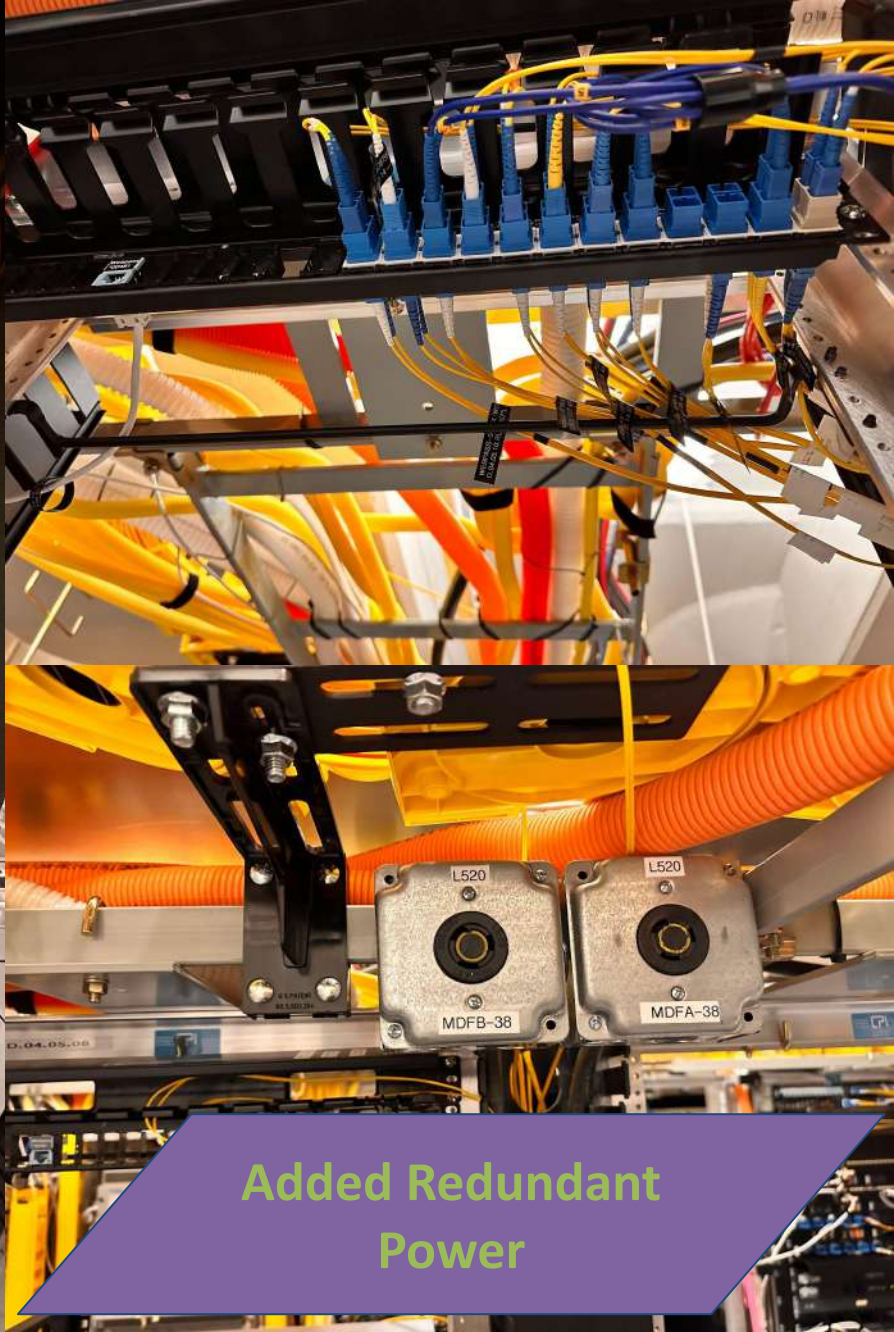
10TB storage per server (*cur 1*), 16 cores, 10G SFP+, 128G RAM (*32 cur*), redundant PSU

Several 5yr depreciation items (*switches, servers, 400G*)

Snapshot Tour



sfo01
365 Main Street

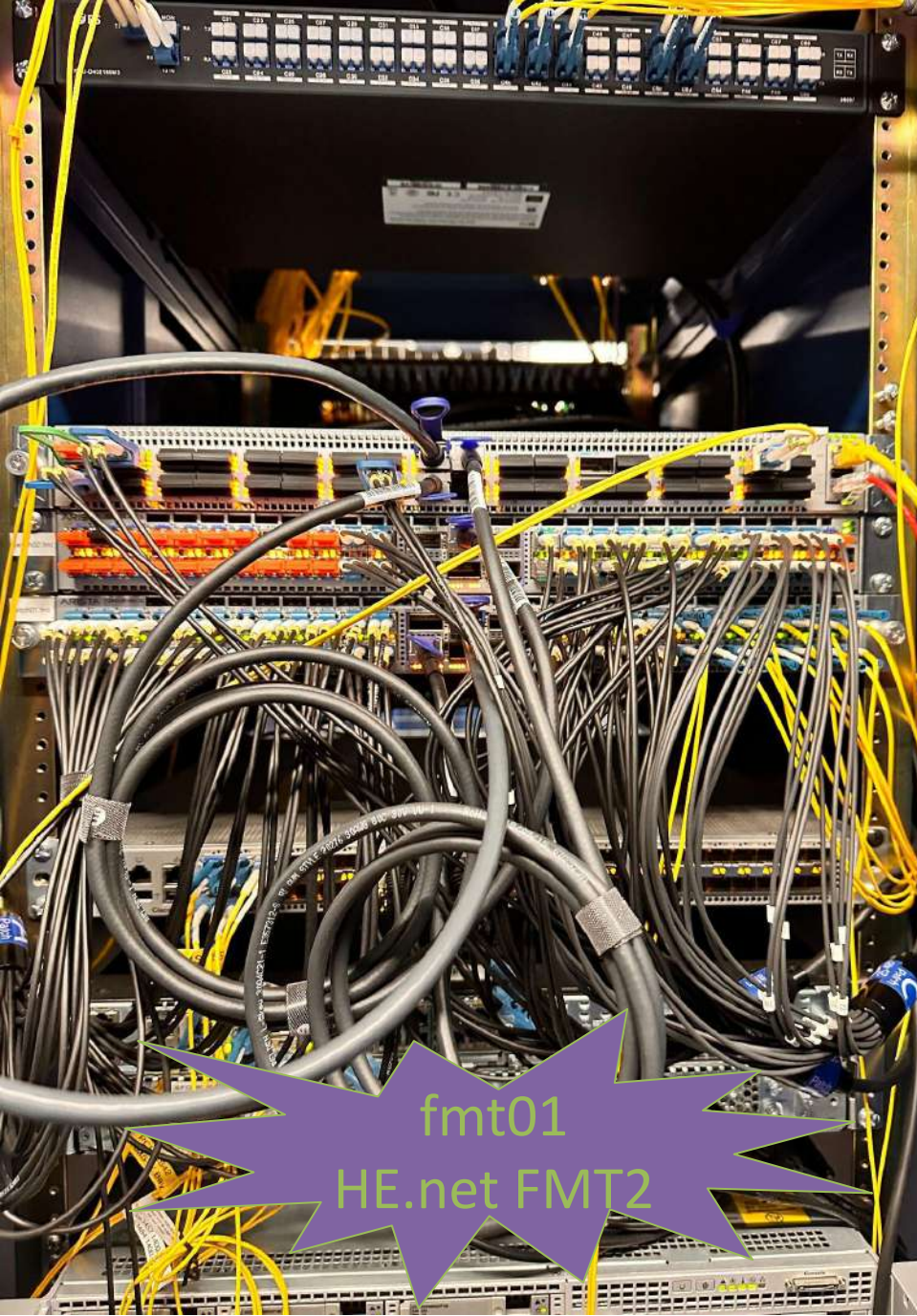


Added Redundant
Power



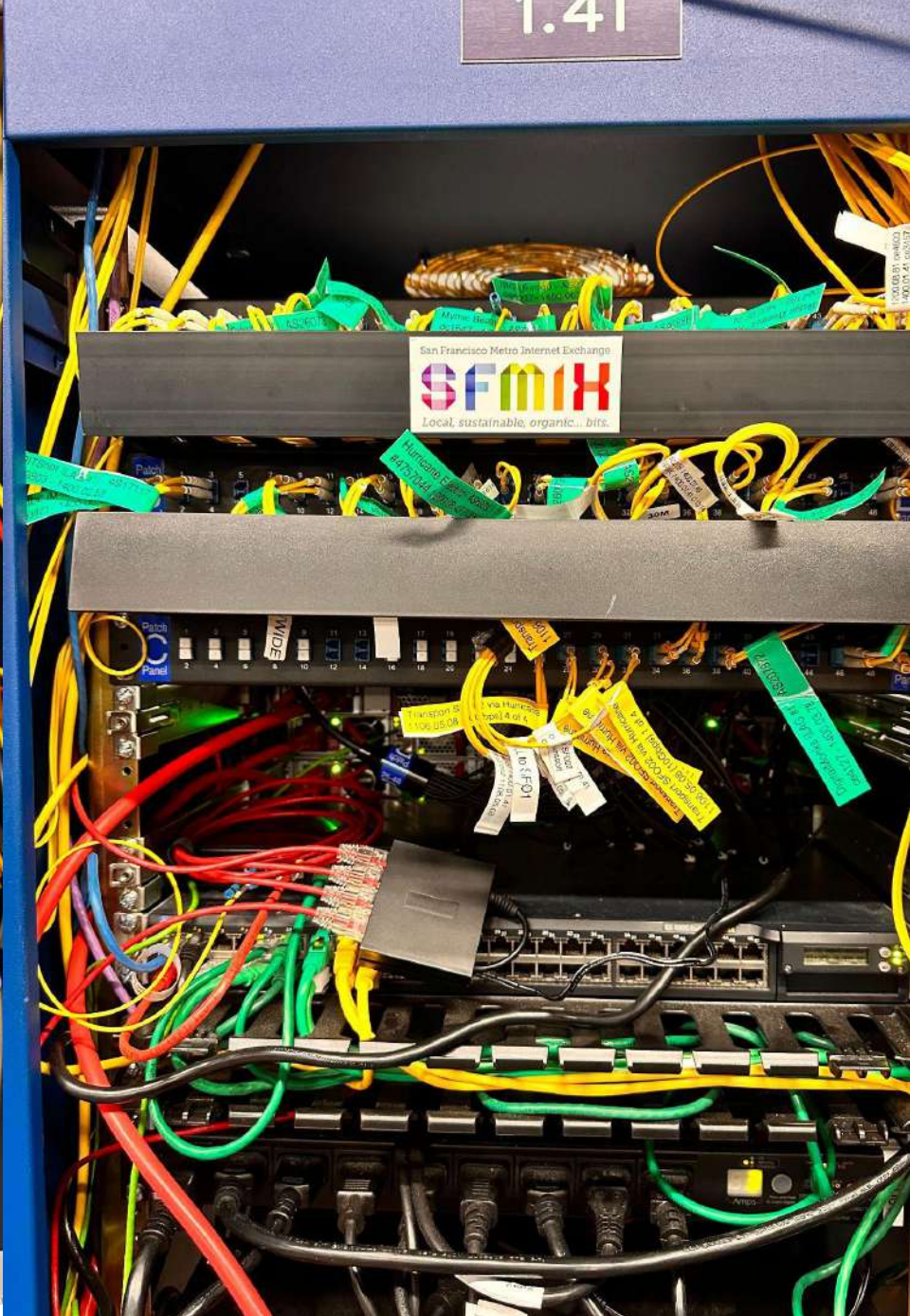
Added redundant DC power supplies for core routers

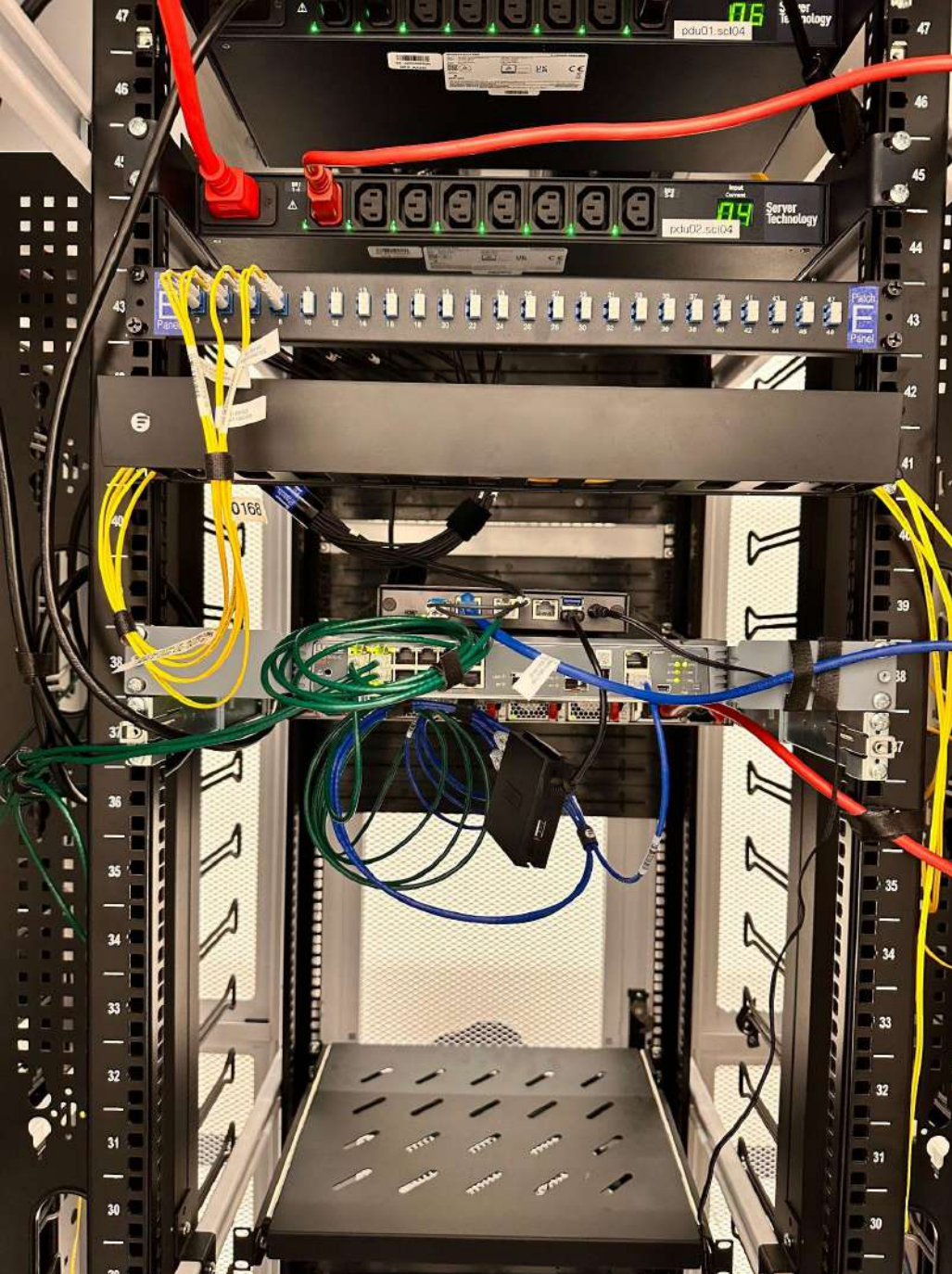
sfo02
200 Paul Ave



fmt01

HE.net FMT2







sjc01
Equinix San Jose



*Added switched PDUs,
room for 3rd patch panel
& 2nd 400G switch*

EOF

