Agenda

• Introductions
• Review (2017 & 2018)
  – Participants
  – POP deployments
• Architecture
  – Discards event
• Financial update
• Future opportunities
Introductions

• Board members
  – Justin, Leslie, Matt, Tim, Navin, Bronwyn

• Participants

Thanks Weebly for today’s venue!
Participants (2017 to current)
2017

• Added new participants:
  – Linode
  – Sail Internet
  – SkyFiber Internet
  – Multex Systems
  – Southern NJ Internet Providers
  – Cloudflare (*production CDN*)
  – High Desert Internet Services
  – WIDE (*M-root DNS*)
2018

• Added new participants:
  – Amaysim/6Net
  – Telekomunikasi Indonesia
  – Weebly (2nd 10G upgrade)
  – SRDF Labs

• Provisioning:
  – Amazon (3x 10G LAG up & IP plumbed)
  – Necto (port up)
  – Packet (LOA issued)
  – UnWired Broadband (LOA issued)
  – PCH/WoodyNet (10G upgr. - Quad9, DNS root)
# DNS roots & recursive

<table>
<thead>
<tr>
<th>Root</th>
<th>Organization</th>
<th>Originator</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>University of Maryland</td>
<td>PCH</td>
<td>v4 v6</td>
</tr>
<tr>
<td>E</td>
<td>NASA Ames</td>
<td>PCH</td>
<td>v4 v6</td>
</tr>
<tr>
<td>F</td>
<td>Internet Systems Consortium</td>
<td>Internet Systems Consortium</td>
<td>v4 v6</td>
</tr>
<tr>
<td>J</td>
<td>Verisign</td>
<td>Verisign</td>
<td>v4 v6</td>
</tr>
<tr>
<td>M</td>
<td>WIDE / JPRS</td>
<td>WIDE / JPRS</td>
<td>v4 v6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Anycast</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.8.8.8</td>
<td>Google</td>
</tr>
<tr>
<td>9.9.9.9</td>
<td>PCH (IBM)</td>
</tr>
<tr>
<td>74.82.42.42</td>
<td>Hurricane</td>
</tr>
</tbody>
</table>
“SFO01” – 365 Main

- Pre-wired cross-x patching
- switch01.sfo01 (EX3300-24T)
- cold spare EX3300 (future OOB SW)
- future (Dell S4048-ON) switch
“SFO02” – 200 Paul

- Pre-wired cross-x patching
- MUX to Wave/Spectrum
- switch01.sfo02 (Dell S4048-ON)
“FMT01” – 48233 Warm Springs Blvd.

- Pre-wired cross-x patching
- switch01.fmt01 (Dell S4048-ON)
- Packet Clearing House (router)
- Packet Clearing House (DNS cache)
- ISC F-root “in a box” (DNS cache)
“FMT01” – 48233 Warm Springs Blvd.
“SJC01” – 11 Great Oaks Blvd.

Ubnt EdgeRouter - OOB

switch01.sjc01
(Dell S4048-ON)
Hackathons

- Average of 4 participants
- Happens every few months
- Work includes:
  - Writing code (Ansible, Python, etc)
  - Onboarding volunteers
  - Administrative
  - Debugging
  - Upgrades
  - Planning
Hackathons

• Many services driven by **Ansible** (route server, switch configs, web site, etc.)
• Goal to deprecate YAML to SQL backend
• Very beginning early stages of portal development

• *Really could use more volunteers here, most of us are network / systems engineers - not programmers*
Hackathons

• Participants (*outside of the board*)
  – Pier Carlo Chiodi, James Ouyang, Saima Hashimi, Joe Gross, Ryan Anderson …

Thank You!
Architecture

Active POP’s
- SFO01 (est. 2006) 365 Main
- SFO02 (11/2013) 200 Paul
- FMT01 (04/2015) 48233 Warm Springs
- SJC01 (11/2017) 11 Great Oaks

Inactive POP’s
- Vantage - 2820 Northwestern (Santa Clara)
- Evocative - 534 Stockton (San Jose)
- Evocative - 1400 65th (Emeryville)
Switching

• 75% of switches Cumulus Linux on Dell

• Completed migrating from cheap no-name optics to flexOptix
  – 2 participants using BiDi 10G optics for cross-x (pricing) efficiency *wink*

• Would like to depreciate copper by end of 2018
  – lots of troubleshooting, bad cross-x wiring, distance issues
Packet Loss on the FMT Switch on Feb 5th 2018
## DWDM (Fremont - San Jose)

<table>
<thead>
<tr>
<th>Switch</th>
<th>Description</th>
<th>Bandwidths</th>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>swp37</td>
<td>Transport (SJC01 via Paxio LAG #1 Ch 37 DWDM)</td>
<td>240.220/30.340/0.000/4.080Mbps</td>
<td>10.000Gbps fullDuplex</td>
</tr>
<tr>
<td>swp38</td>
<td>Transport (SJC01 via Paxio LAG #2 Ch 38 DWDM)</td>
<td>247.860/30.960/0.000/4.960Mbps</td>
<td>10.000Gbps fullDuplex</td>
</tr>
<tr>
<td>swp39</td>
<td>Transport (SJC01 via Paxio LAG #3 Ch 30 DWDM)</td>
<td>266.330/30.500/0.000/4.750Mbps</td>
<td>10.000Gbps fullDuplex</td>
</tr>
<tr>
<td>swp40</td>
<td>Transport (SJC01 via Paxio LAG #4 Ch 40 DWDM)</td>
<td>252.460/29.880/0.000/4.740Mbps</td>
<td>10.000Gbps fullDuplex</td>
</tr>
<tr>
<td>swp41</td>
<td>Transport (SJC01 via Paxio LAG #5 Ch 41 DWDM)</td>
<td>246.860/33.660/0.000/5.320Mbps</td>
<td>10.000Gbps fullDuplex</td>
</tr>
<tr>
<td>swp42</td>
<td>Transport (SJC01 via Paxio LAG #6 Ch 42 DWDM)</td>
<td>250.510/29.570/0.000/4.720Mbps</td>
<td>10.000Gbps fullDuplex</td>
</tr>
</tbody>
</table>
### swp37
Laser output power : 1.3022 mW / 1.15 dBm  
Receiver signal average optical power : 0.0032 mW / -24.95 dBm  

### swp38
Laser output power : 1.6600 mW / 2.20 dBm  
Receiver signal average optical power : 0.0033 mW / -24.81 dBm  

### swp39
Laser output power : 1.6630 mW / 2.21 dBm  
Receiver signal average optical power : 0.0035 mW / -24.56 dBm  

### swp40
Laser output power : 1.2671 mW / 1.03 dBm  
Receiver signal average optical power : 0.0023 mW / -26.38 dBm  

### swp41
Laser output power : 1.5080 mW / 1.78 dBm  
Receiver signal average optical power : 0.0032 mW / -24.95 dBm  

### swp42
Laser output power : 1.5787 mW / 1.98 dBm  
Receiver signal average optical power : 0.0030 mW / -25.23 dBm
**DWDM (Fremont - San Jose)**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form Factor</td>
<td>SFP+</td>
</tr>
<tr>
<td>Connector</td>
<td>LC</td>
</tr>
<tr>
<td>Interface</td>
<td>DWDM</td>
</tr>
<tr>
<td>Wavelength TX</td>
<td>C15 - 1565.5 nm</td>
</tr>
<tr>
<td>Wavelength RX</td>
<td>1565.5 nm</td>
</tr>
<tr>
<td>Distance</td>
<td>80 km</td>
</tr>
<tr>
<td>Power Budget (DB)</td>
<td>23 dB</td>
</tr>
<tr>
<td>Transmit Min.</td>
<td>0 dBm</td>
</tr>
<tr>
<td>Receive Min.</td>
<td>-23 dBm</td>
</tr>
<tr>
<td>Transmit Max.</td>
<td>5 dBm</td>
</tr>
<tr>
<td>Receive Max. (Receiver Overload)</td>
<td>-6 dBm</td>
</tr>
</tbody>
</table>

Thankfully flexOptix specs are conservative.
Financial

• Start charging in mid 2015
  – Halfway paid off previous loan to Matt and paid off Tim
  – Covering hardware, SaS, ARIN, bookkeeper and CPA
• Stay true to our mission
  – regional, affordable, focused
  – $995/yr <=1G, $1995/yr more than >1G
  – registered non-profit’s may request comp
Financial

• January 01, 2017 balance: $16,538.86
• January 01, 2018 balance: $23,325.41
• Outstanding debt: $11,008
  – Pay back start-up loan (>⅔ paid off)
• Current balance (as of May 8, 2018): $60,620.28
• Estimated balance (as of mid July): $72,404.28
  – Confirmed outstanding member dues
2017 Expenditures

- Loan Payment: 41.4%
- Switch Equipment: 26.9%
- Optics: 10.3%
- Rack Space: 5.2%
- Service Subscription: 7.8%
- Fiber Patch and Cable MGNT: 5.7%
- Government Fees: 0.2%
- Hackathon: 2.1%

2017: $17,153.45
2016: $17,615.56
# 2017 P&L

## Revenue
- Dues Income: $19,940
- Support Income: $4,000
- **Total Revenue**: $23,940

## Gross Profit
- **Gross Profit**: $23,940

## Operating Income / (Loss)
- **Operating Income / (Loss)**: $23,940

## Other Income and Expense
- Bank Service Charges: ($10)
- Dues & Subscriptions: ($260)
- Fees & Licenses: ($20)
- General Expenses: ($480)
- Insurance: ($317)
- Office Expenses: ($799)
- Telephone & Internet: ($1,227)
- **Total Other Income and Expense**: ($3,112)

## Net Income / (Loss) before Tax
- **Net Income / (Loss) before Tax**: $20,828

## Net Income
- **Net Income**: $20,828

## Total Comprehensive Income
- **Total Comprehensive Income**: $20,828
2018 YTD Expenditures

- **Rack Space**: 51.2%
- **Optics**: 24.1%
- **Service Subscription**: 18.7%
- **Hackathon**: 2.6%
- **Bank Fee**: 3.4%

2018 YTD $1,756
Catching up on Paperwork...

SFMIX is a bit behind on our bookkeeping and paperwork with the Government.

• The books
  – Invoicing
  – Taxes
  – Budgets

• Government Paperwork
  – IRS
  – The State of CA Attorney General
  – Franchise Tax Board
  – Secretary of State
Planned 2018 CapEx

• ~$5k DWDM 120km (25dB) optics, qty 12

• ~$2k restock 1 & 10G optics, patch cables

• Large buffer switch(es)
  – Possibly $8K a unit.
  – How to get the price down?
Membership payment status

• Paid up members as of 5/7/2018:
  Amazon.com, Digital Ocean, Fire2Wire, Google, Hurricane Electric, IX Reach, Linode, Pubmatic, Two P, RocketSpace, Unwired Ltd, Weebly, Necto, Softcom

• Exempt (DNS and/or operational insight):
  PCH/WoodyNet (D), ISC (F), WIDE (M), RouteViews
Membership payment status
Total 24 awaiting payment ($64,800)

Committed ($13,955)

Altiora, CNE Media, Cloudflare, Digital Realty / Telx, DNS-OARC, Ether Web Network, Fastmetrics, Limelight, Monkeybrains, Oath (formerly Yahoo!), Out of Wall, Paxio, Race Telecommunications, StackPath (formerly ReliableHosting), T-Mobile, Tekify Broadband, UnitedLayer, Verisign, Wave Broadband, Webpass, Yelp
2018 planned activities

• Deprecate remaining copper switch
  – SFO01 (365 Main): Cumulus S4048-ON in place, schedule window to perform migration

• Route Servers
  – Enforce IRR, OriginAS, RPKI, filters, etc.
  – OpenBGPD (Q1) & Upgrade BIRD (Q2)

• Continue to troubleshoot discards

• Cleanup of financials and tax filings
Discussion

• Discards
  – Switch to large buffers switches?
    • BCM Jericho: Dell S4248FB-ON, Arista 7280SR-48C6

• Redundancy
  – Dual power (365 Main)
  – Switch to VXLAN (away from STP)
    • Would facilitate alternative providers between POP’s
    • LoNAP, INEX, etc other IXP’s already switched

• Expansion
  – 55 S Market (Coresite) .. $5k/yr in power