

Bootstrapping IX-Denver

A Cooperative IX Case-Study

NANOG 70
Bellevue, WA
5 June 2017

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On behalf of the IX-Denver board
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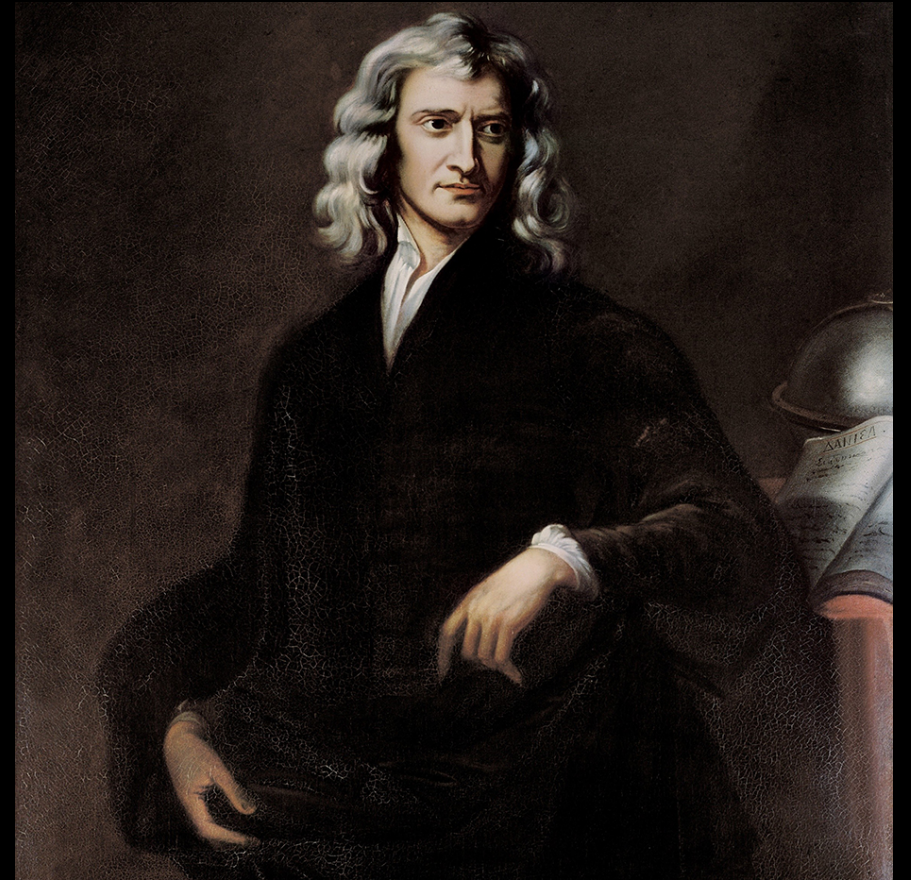
What are we talking about?

1. Motivation
2. Getting started
3. Finding a home
4. Hardware
5. Software
6. Paperwork
7. Chickens and eggs
8. Surprises
9. Motivating good behavior
10. Where we stand
11. Future plans
12. Applying these lessons

Why this presentation?

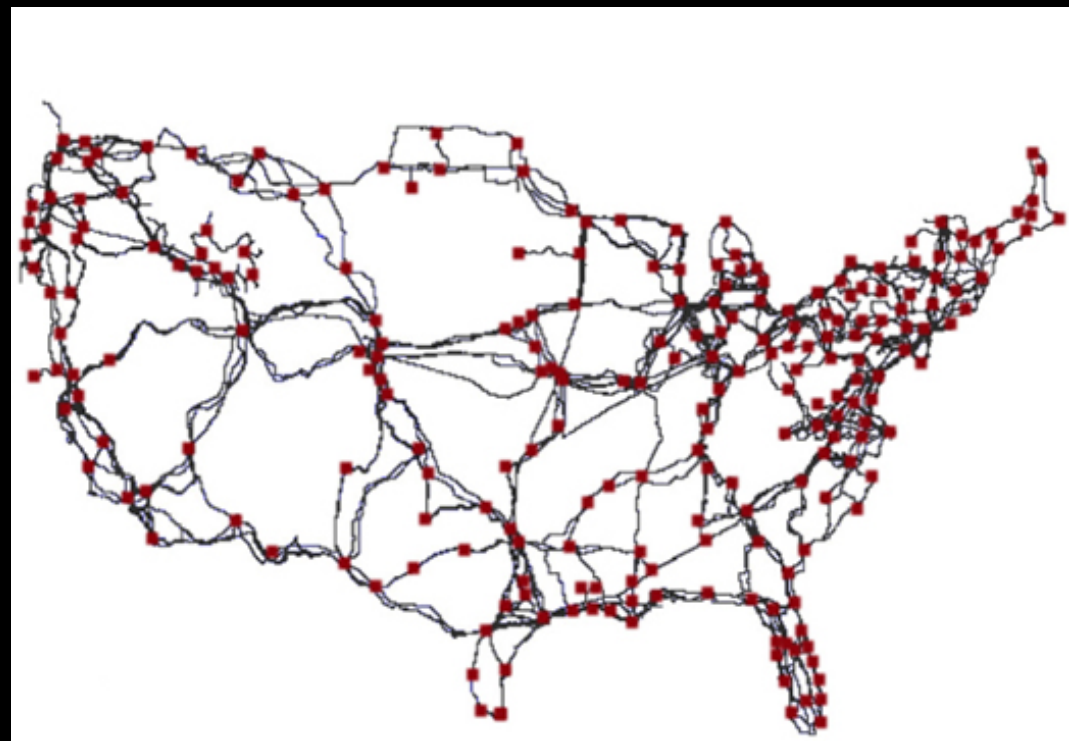
"If I have seen further, it is by standing on the shoulders of giants."

- A case study
- Provide a template
- Hopefully inspiration as well



Why start IX-Denver?

- IXPs are where networks become internetworks
 - Adding robustness to the Internet
 - Having more IX' in more places is a good thing
- Denver should be a hub
 - Geography
 - Fiber interconnection
 - Universities, Tech Offices, Start-ups...
 - 19th largest metro in US and growing



Really though, why?

- Make a difference
- Give back
- Dream big
- Educate ourselves
- Be remembered

...Passion



What are we trying to do?

Mission

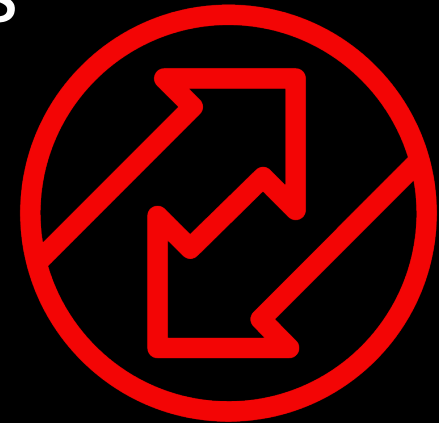
Provide open, neutral, community oriented, and membership based Interconnection eXchange Points.

Vision

Constantly improve inter-connectivity across the Internet community.

How are we doing it?

- Non-profit, community oriented (Open-IX/Euro-IX)
- Low, flat-rate membership fees and port costs
- Always non-blocked switching fabric
- Re-evaluation of port costs on an annual basis
- Expert level, well connected operators



What about Any2Den?

- Everybody deserves options
 - There is such a thing as too many IXPs
 - Two is not too many
- Adding resiliency
 - Backing each other up
 - Different facilities (future)
- A different approach
 - Neutral / Transparent / Open
 - Community focused & Member driven

Coopetition

~~Zero Sum~~

Where to start?

- First step was forming a team

- Inspire others to join you
- Board of Directors
 - zero interest loan

- Friendly help

- PCH and Other IX'
- Donations from Patrons

- One step at a time

- Lofty goals, measured action



Who helped?

- Mark Calkins
- Chris Grundemann
- Jay Hanke
- Ogi Mitev
- Ryan Privette
- 910 Telecom
- GDT
- Juniper Networks
- Myriad Supply
- NWAX
- PCH

<http://ix-denver.org/?q=board>

<http://ix-denver.org/?q=patrons>

Where to build?

- 910 Telecom made sense
 - Location, location, location
 - Connectivity in & out of building
 - Cross-connect fees
- Introducing IX to DC
 - Making contact
 - Educating the stakeholders
 - Providing value
- Donated space and power
 - In the MMR!

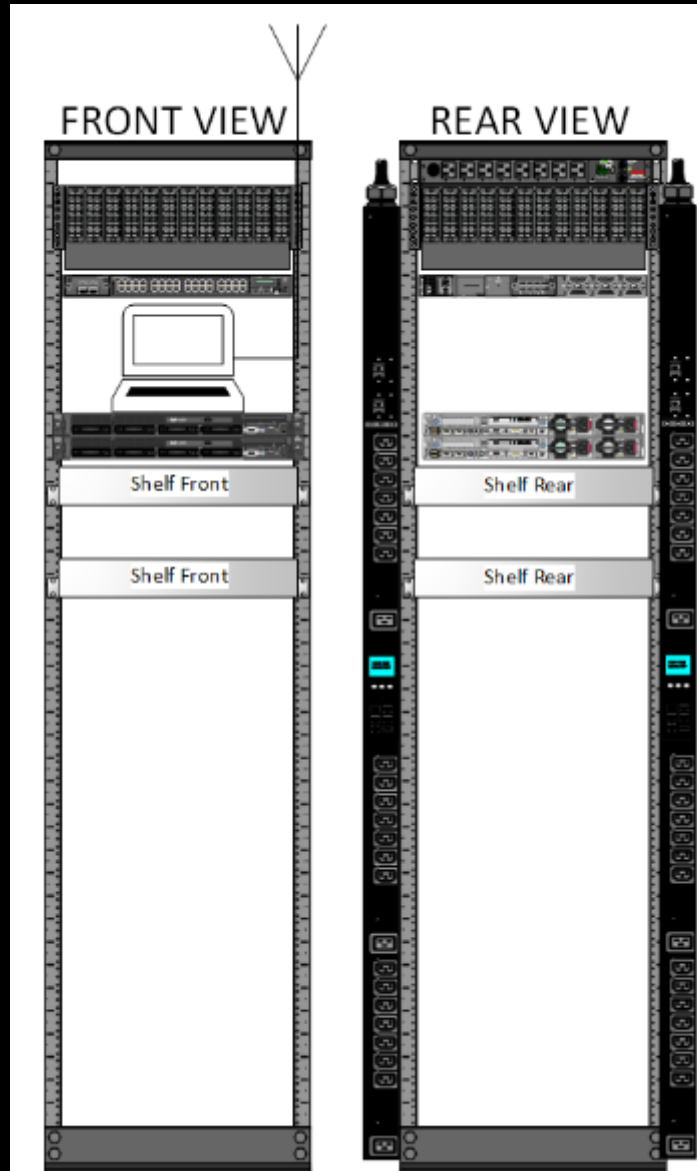


7619 GAS AND ELECTRIC BUILDING AT NIGHT, DENVER, COLO.
BEST LIGHTED BUILDING IN THE WORLD



Just a switch?

- Juniper EX4550
 - A reasonable 'non-blocked' starter switch
- Servers
 - Salvage for now
- OOB access
 - Inexpensive 4g plan (tmob) & capable <\$100 oob router
- Cabling
 - Panels and fiber (all donated)
- Power



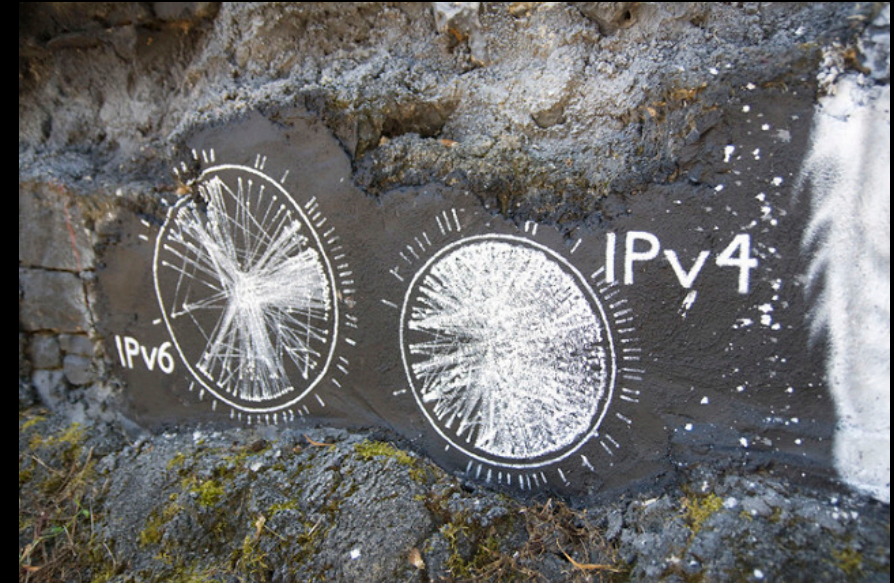
What else?

- Website + social media stuff + Slack
- Route server (Bird)
- IXP Manager (includes MRTG)
- Nagios (Slack integration)
- Google docs
- Financial software
- Email lists
 - we still need to get this right



What about IPs?

- ASN - 394594
- IPv4 - 206.53.175.0/24
 - Should have asked for more
- IPV6 - 2001:504:58::/48
 - Use the bottom /64 for the public IX subnet
 - Use visually identical host IDs
 - E.g. A member with IPv4 address 206.53.175.10 will also have IPv6 address 2001:504:58::10



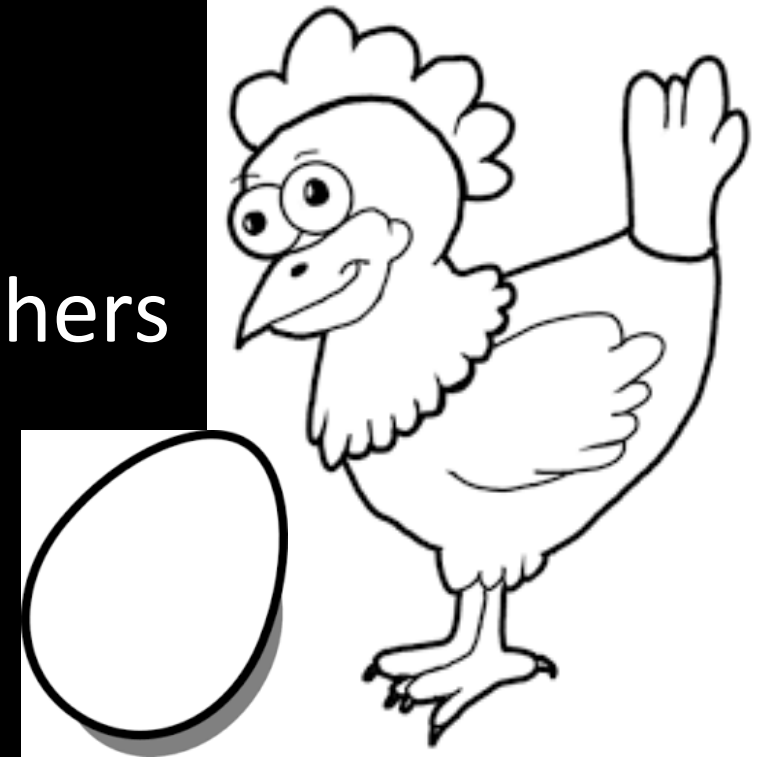
How are we structured?

- Bylaws (“borrowed” from SIX & NWAX)
- Colorado non-profit corporation
- Bank Account
- Taxes (W9)
- Insurance
- Federal non-profit...
 - 501(c)(6) -or- 501(c)(12)



Why would anyone join?

- Classic chicken and egg situation
- The value of an IX is in connecting to others
- The first member gets no value
- Lucky that many folks see future value
- Fees waived to start
 - 'At cost' recommended donations to members (\$200 for 1g or 10g)
- Community / connections are key



Who joined right away?

- Aerux Broadband
- Blackfoot Communication
- CloudFlare
- Colorado Central Telecom
- Front Range GigaPop
- Hurricane Electric
- Mammoth Networks
- SoftLayer
- Teliax
- Yahoo

Thank you, founding members!

What surprised us?

- Transit

- Poor non-profit
- Should it be this hard?
- Or are we a unique case?

- ARIN

- \$1500 - our largest expense

- Focus on eyeballs

- Content will come



Can we do more?

- Interconnection is great
 - Especially low cost, neutral IX
 - Lower barrier to enter for new to peering networks
- Platform for innovation
 - Member driven = innovation
 - Try new things, set an example (route server script)
 - Publish & present (hi there)

I SNEEZED
ON THE BEAT
AND THE BEAT
GOT SICKAH

Even more?

- Educating (new) members

- Why Peer?

- Finding leverage

- Route server policy!

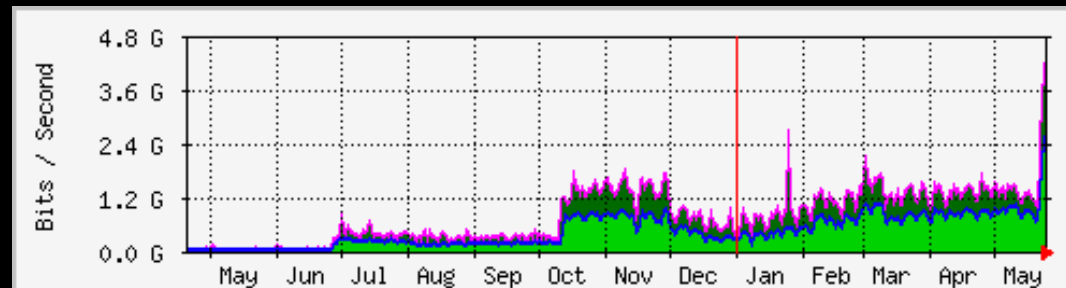
- Creating community

- D-NOG?



How far have we come?

- 20 members
- >5G traffic
- Extension switch
 - Thanks MICE & NPN!
- First event
 - 5 December 2016 @ “The Corner Office”



Where are we going?

- More facilities
- More members
- More community
- 2017 Elections
- Federal status
- Member portal?
- DNS



What have we learned?

- This can be done
- Help is available
- The right team matters
- Community is required
- Technology is the easy part
- It doesn't have to cost a fortune
- Eyeballs drive traffic (duh)



What can you do?

- Come peer at IX-Denver!
- Help us innovate!
- **Start a local IX!**

