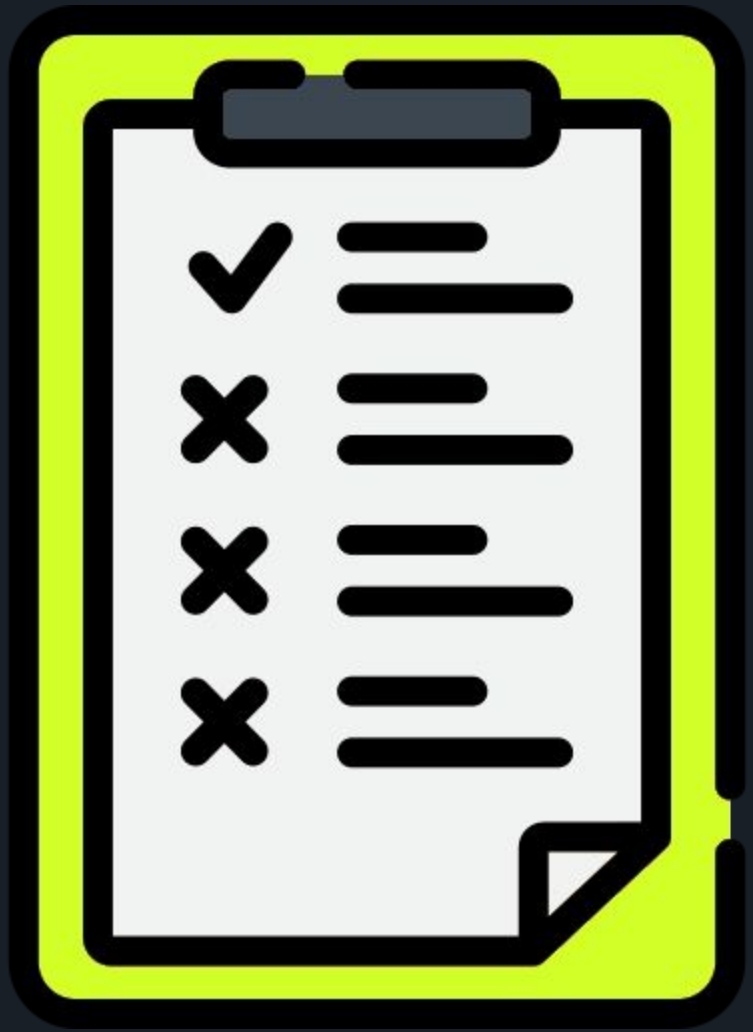
INTERCONNECTION

Then & Now

fullctl

Agenda

1. Who are we?
2. What are we talking about?
3. What have we learned?
4. What are we doing about it?
5. What can you do to help?
6. What else should be done?
7. Comments thinly veiled as questions.



Chris Grundemann

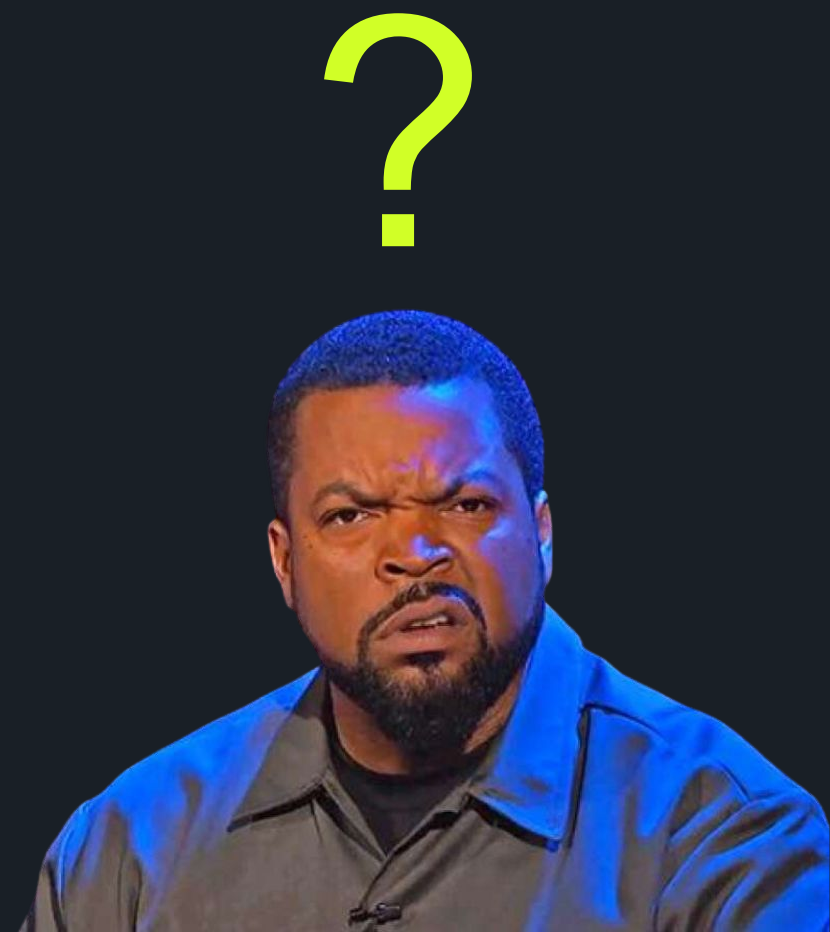
- 20+ years in networking
- Co-founder of IX-Denver
- OIX Director
- 8 patents in NetTech
- Co-founder and CSO at FullCtl

Matt Griswold

- 20+ years in software development
- Co-founder of UIX / ChIX
- OIX Director
- PeeringDB Maintainer
- Co-Founder and CTO at FullCtl

Sure, but why are you here?

- Age of Interconnection
- BGP is hard (for some)
- Lack of Standardization (for all)
- Lack of Automation (for many)



Age of Interconnection

- ~~Peering managers on cruise ships~~
- Death of peering?

Age of Interconnection

- Cloud
- COVID
- Beyond LAN & WAN
- Digital Equity
- Security
- Reliability

But… BGP is hard (for some)

- For many, it’s a FLW, despite being a TLA
- Traditionally avoided by most
  - Enterprise
  - Public Sector
  - SMB (of course?)
- Also hard to find at
  - WISPS
  - FISPS
  - Electric Co-ops
- And now we have RPKI

Plus: Lack of Standardization

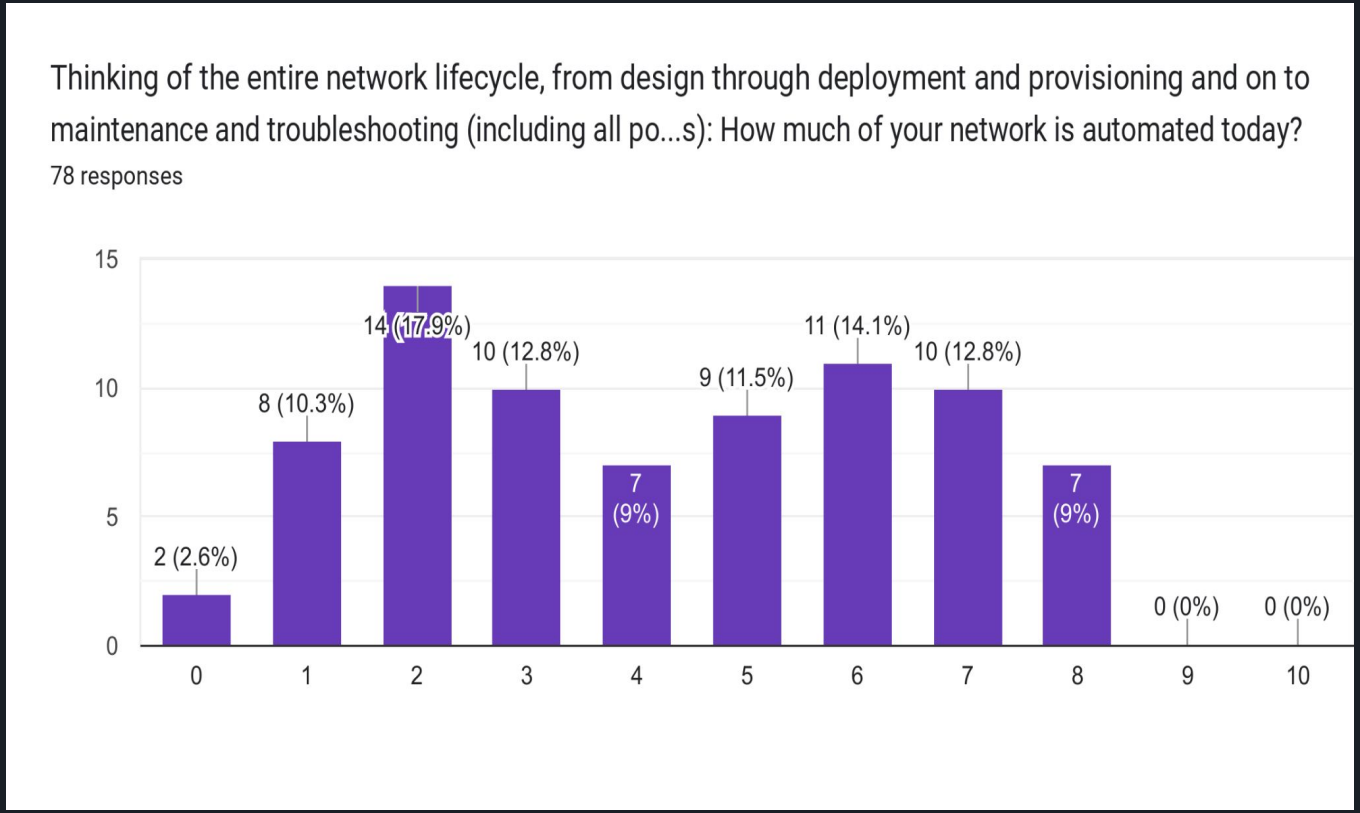
- Most networks heterogeneous
  - And Bespoke
- Unique policy requirements
  - TE, etc.
- Communities in use by ISP/IX
  - More than just RTBH
- How-to request interconnection
  - Coordination can be painful
- LOAs
  - Don’t get us started…

And: Lack of Automation

- Almost nobody has “enough”
- Many lacking SoT
- Most lacking end-to-end flow
- Hard to automate sans standards
- Tough to test sans lab

Sneak Peek: State of Network Automation

0% - Nothing is automated, everything is always done manually.



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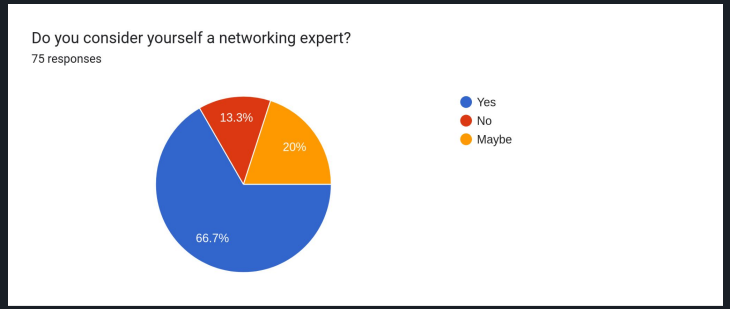
Sneak Peek: State of Network Automation



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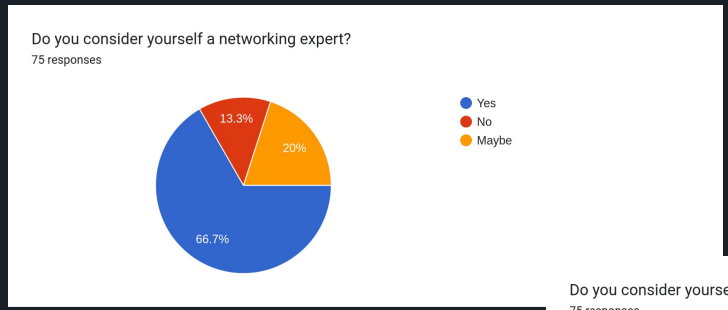

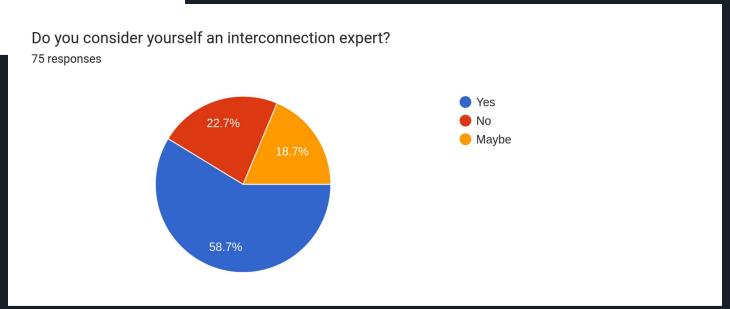

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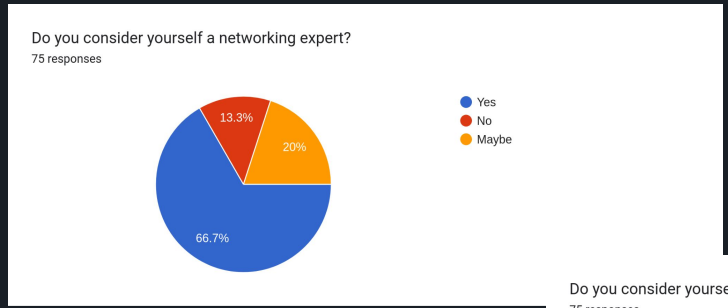
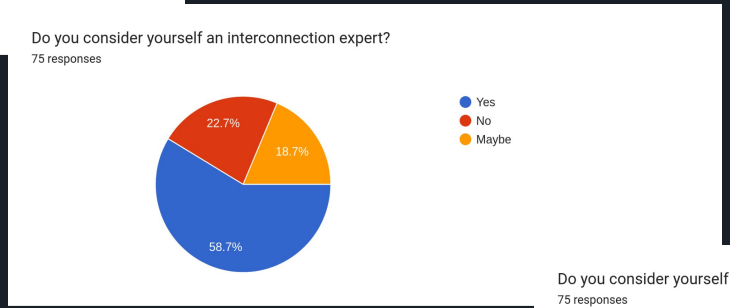
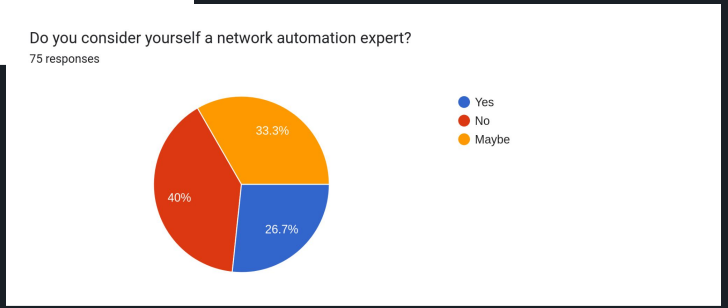






The Path to (from?) Automation

- CHINOG 06
- automation first
  - git log of all topology changes
- uix/auto -> ixCtl

The Path to Automation

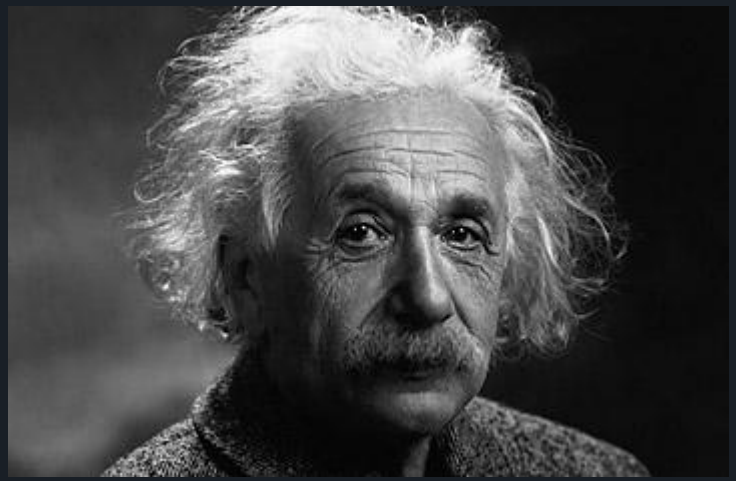
- birth of ixCtl
- then PrefixCtl
- Numerous versions of PeerCtl

And Beyond…

- Why isn’t everyone doing this?
- How can we spread interconnectedness?
- How can we automate seamlessly between ASNs?

So… What are we going to do about it?

- ixCtl
- PeerCtl
- PrefixCtl
- …you get the idea



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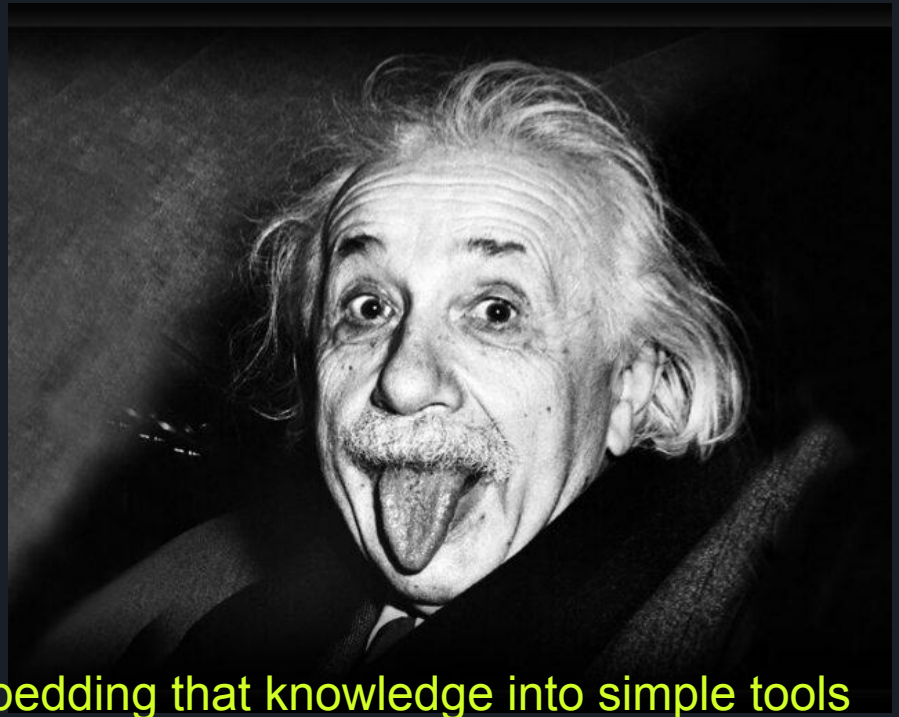
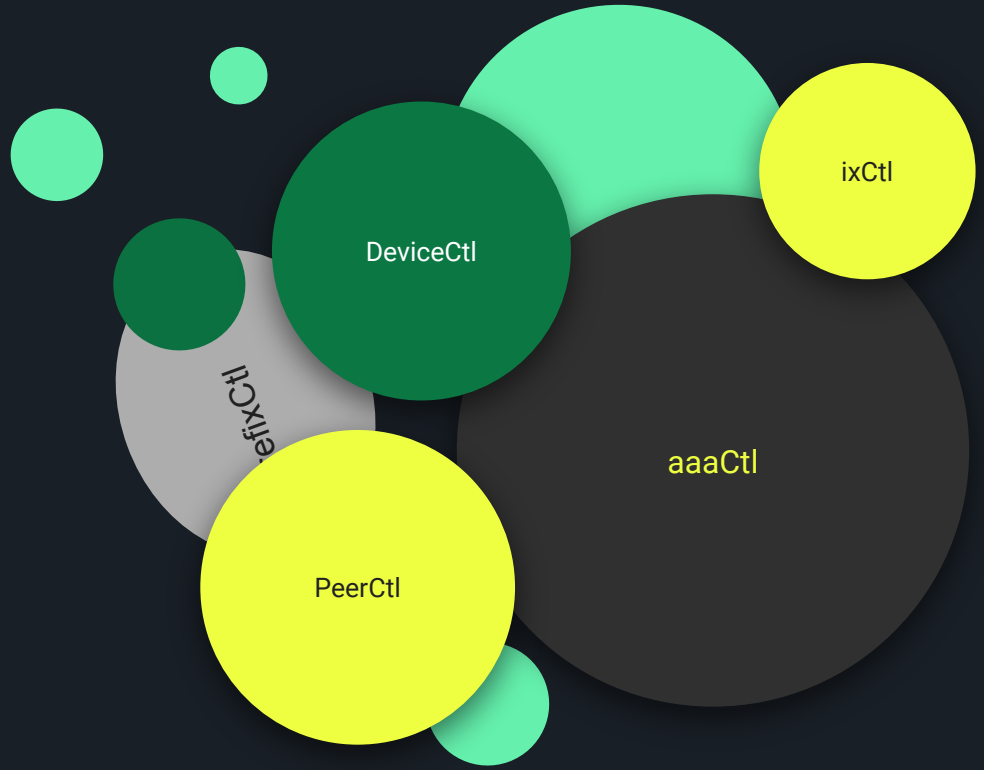


- Taking the best of all of “us” and embedding that knowledge into simple tools

FullCtl Suite



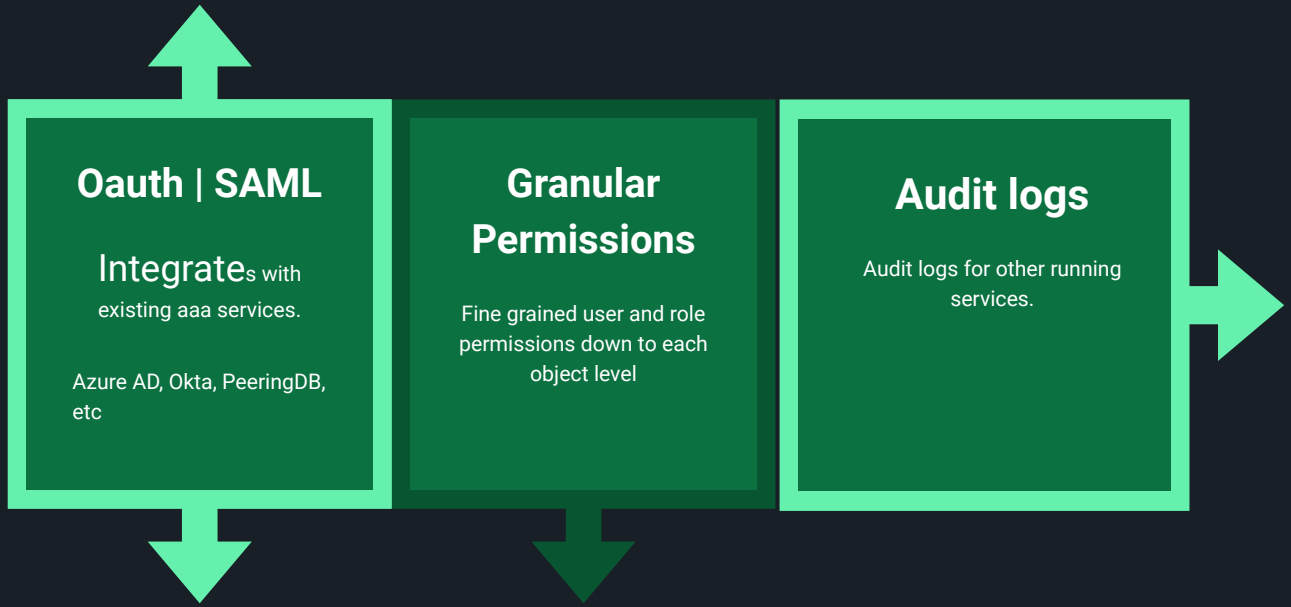
https://github.com/fullctl/

FullCtl Suite

- modern, modular, Unix philosophy services
- 100% API driven
- manage infrastructure
- automate provisioning
- source of truth for wider automation efforts

https://github.com/fullctl/

Foundations :: aaaCtl



https://github.com/fullctl/aaactl

Foundations :: aaaCtl

- Authentication and Authorization gateway
  - Client - integrates with existing directories
  - Provider - can be used as a SoT
- RBAC permissioning
- Audit logging

https://github.com/fullctl/aaactl

Foundations :: DeviceCtl

- Source of truth for devices
- Bidirectional sync to other sources of truth
  - Netbox, Nautobot, Proprietary systems, etc
  - PeeringDB facilities, geoloc data
- Caching and verification

https://github.com/fullctl/devicectl

Metadata :: PrefixCtl

Used as a SoT for prefixes

Bidirectional sync

Attaches and updates metadata

- IRR
- RPKI status
- IP reputation
- Geoloc data

https://github.com/fullctl/prefixctl *OSS coming soon

ixCtl

An automation platform purpose built for internet exchange operators.

- modern, modular application
- 100% API driven
- manage infrastructure
- automate provisioning
- source of truth for wider automation efforts
- connected networks get access to the PeerCtl dashboard

https://github.com/fullctl/ixctl

ixCtl turnkey route servers

1. Click “import” to pull baseline data on connected networks from PeeringDB
2. Hit “configure route server” and add basic info to generate secure configurations
3. 1 time ansible (VM/BM) or helm (k8s) deploy for managed containers, or curl into your own setup
4. enjoy karmic bliss, knowing that your route servers are automatically contributing to the good of the internet!

https://github.com/fullctl/ixctl

ixCtl - Not “Just” Route Servers

- SoT for devices and ports
- Building graphs
- Manage members / IX-F output for PeeringDB, etc
- Allow member access to update mac address, max prefix, etc

https://github.com/fullctl/ixctl

ixCtl - Coming Soon

- Public Portal
- Client Portal
- LOA Generation
- AS112 Configuration
- Advanced Route Server Management
- Automated Switch Configuration
- $your_idea_here

https://github.com/fullctl/ixctl

PeerCtl

Interconnection automation and workflow management.

- modern, modular, Unix philosophy services
- 100% API driven
- manage infrastructure
- automate provisioning
- source of truth for wider automation efforts

https://github.com/fullctl/peerctl

PeerCtl

Peering Toolkit

1. You select an IX. PeerCtl shows you all of the possible peers at that location.
2. You select a peer. PeerCtl provides BGP configurations and email templates to get connected.
3. You want more. PeerCtl shows you all of the other mutual exchanges where you can interconnect with this peer.

https://github.com/fullctl/peerctl

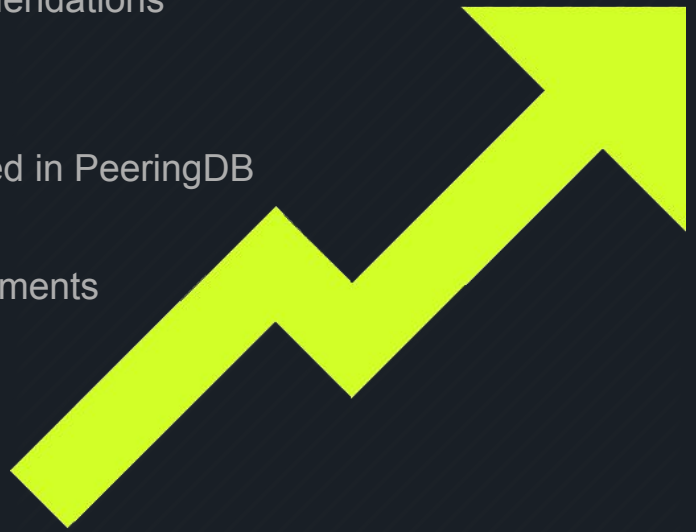
PeerCtl - but wait, there's more

- All kinds of "peers"
  - Bilateral, multilateral, PNI, transit, transport
- Source of truth for your Interconnection efforts
  - Sync with third party inventory via DeviceCtl
  - Stay virtual with `PDB Ports`
- Extensibility
  - PeerCtl BGP configurations are extensible and customizable with templates
  - Templates also allow you to extract peering data for other uses
  - Email templates with override also (and pdb contacts, etc)
- "show BGP summary"
  - View all sessions at once
- Import from network
  - Pull in existing BGP sessions

https://github.com/fullctl/peerctl

PeerCtl - Coming Soon

- Public Peering Portal
  - for third parties to use when requesting peering with your network
- “Where To Peer” Improvements
  - integrating traffic analysis to provide intelligent recommendations
- PeeringDB Integration Improvements
  - enable pushing updates to PeeringDB from PeerCtl
  - enable you to add networks to PeerCtl that are not listed in PeeringDB
- UX Improvements
  - enhanced alerting, along with interface design improvements



https://github.com/fullctl/peerctl

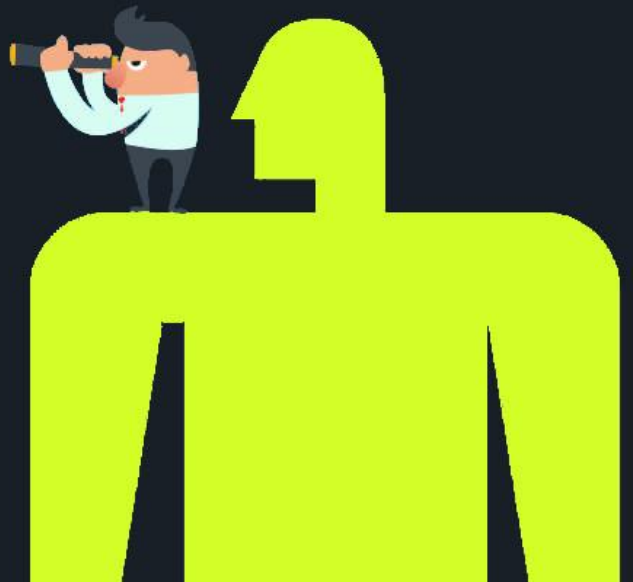
Wanna Play?

https://account.fullctl.io

Contact us about lab demos.

Not Alone

- PeeringDB
- NetBox (& Nautobot)
- BGPQ4
- Global Traceroute
- IXP Manager
- Peering Manager
- Rancid
- Have tools?



https://openpipes.net

Time for comments thinly veiled as questions...

What else can we do?

FullCtl.com