

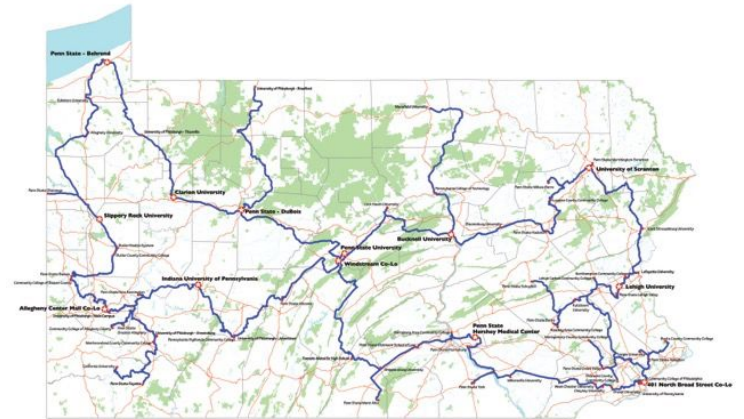
Understanding and Determining the Value of Network Automation for Small Regional and Campus Networks

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PRIMARY TRACK **Advanced Networking**

Understanding and Determining the Value of Network Automation for Small Regional and Campus Networks

- Who is KINBER and How Does that Effect our Network Automation Strategy
- KINBER's Automation Strategy
- Automation Tools & Partners
- Successes and Challenges



KINBER/PennREN

- 125 Connections
 - 25 10G Connections
- 30G+ Egress Traffic
- Own 1800+ miles of fiber, 84 POPs
- Small Staff
 - 7 Full-Time
 - 3 Engineers including myself
 - Tier I (Service Desk) & II (1st Level Engineering) NOC Services contracted to GlobalNOC
 - Systems Support (Database, Servers) contracted to GlobalNOC
 - KINBER engineers maintain our own tools as well
 - perfSONAR
 - Observium

Keystone Initiative for Network Based Education and Research
Customer and Route Map for the Pennsylvania Research & Education Network



02/20/16



KINBER/PennREN

- KINBER Business Life Cycle

- Seed ✓
- Startup ✓
- Growth

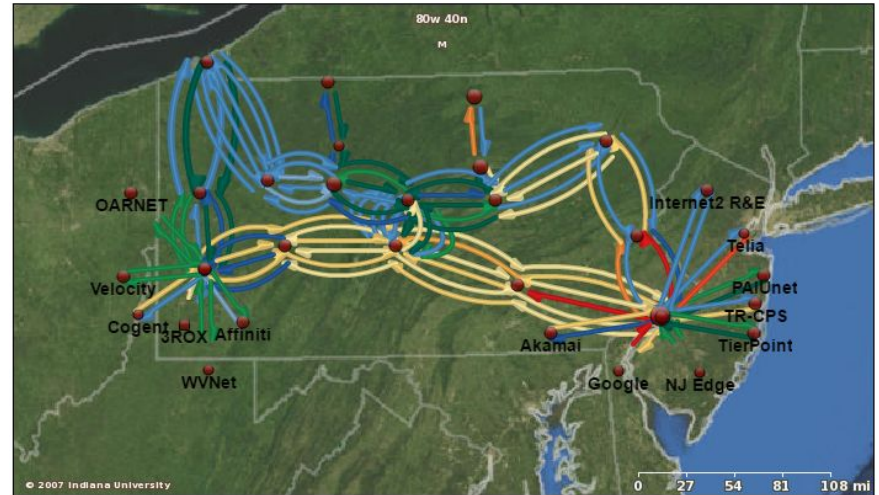
- Engineering Resource Focus

- 80% of Engineering is Provisioning New Customers
- 15% is Tier III Break/Fix Situations
- 5% Network Enhancement Projects (Improvements, Better Services, Better Responses)

- Constant range of issues bidding for time

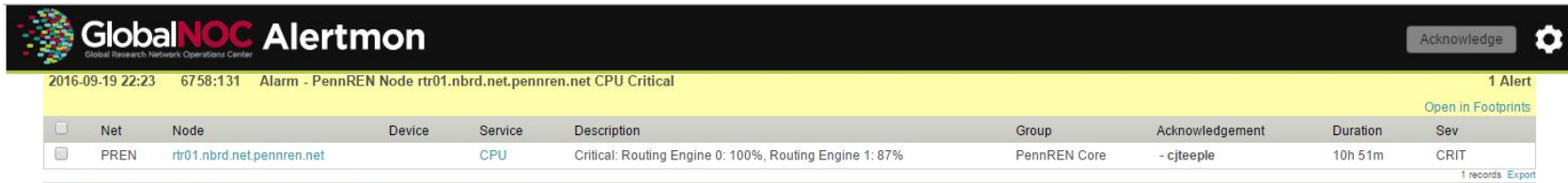
- R&R

- Revenue
- Reputation



KINBER Automation Strategy

- Relate to Business Life Cycle & Business Processes
 - **Provisioning**
 - Faster Provisioning = Faster Revenue
 - Faster Provisioning = Better Customer Experience
 - Less Errors = Better Customer Service
 - **Break/Fix**
 - Faster Data Collection to Solve a Problem



The screenshot displays the GlobalNOC Alertmon interface. At the top left is the logo for GlobalNOC Alertmon, with the tagline "Global Research Network Operations Center". On the top right, there is an "Acknowledge" button and a gear icon. The main content area shows a critical alert: "2016-09-19 22:23 6758:131 Alarm - PennREN Node rtr01.nbrd.net.pennren.net CPU Critical". Below this, a table lists the alert details. The table has columns for Net, Node, Device, Service, Description, Group, Acknowledgement, Duration, and Sev. The data row shows: Net: PREN, Node: rtr01.nbrd.net.pennren.net, Device: CPU, Service: CPU, Description: Critical: Routing Engine 0: 100%, Routing Engine 1: 87%, Group: PennREN Core, Acknowledgement: - cjteepie, Duration: 10h 51m, Sev: CRIT. At the bottom right, it indicates "1 records" and an "Export" link.

Net	Node	Device	Service	Description	Group	Acknowledgement	Duration	Sev
PREN	rtr01.nbrd.net.pennren.net	CPU	CPU	Critical: Routing Engine 0: 100%, Routing Engine 1: 87%	PennREN Core	- cjteepie	10h 51m	CRIT

KINBER Automation Strategy

- **Provisioning**

- Network Design
- Procurement
- **Network Deployment**
- **Network Configuration**
- Certification of Services
- Certification of Database Records

- **Break/Fix**

- Alerts or Customer Request Generates a ticket
- Tier I does some **data collection** for ticket before escalation for Tier II

KINBER Automation Strategy

- **What provisioning steps can we improve on?**
 - Network Deployment
 - Network Configuration
- **What break-fix steps can we improve on?**
 - Initial Data Collection
- **Metrics**
 - Time Spent on Configuration
 - Time from Ticket Opening (Alert, Call, or Email)
 - Faster Data Collection to Solve a Problem

Network Automation Tools and Implementation



- **Partner**
 - GlobalNOC
- **Tools**
 - Dist-Tool
- **Process**
 - **System-wide configuration changes**
 - `dist-tool --template VPLS_Service.json --node-name swt01.psup.net.pennren.net`
 - **Push-Button Break/Fix Data Collection**
 - `dist-tool --template BGP_Ticket.json --node-name swt01.psup.net.pennren.net`
 - `dist-tool --template Backbone_Ticket.json --node-name swt01.psup.net.pennren.net`

Network Automation Tools and Implementation

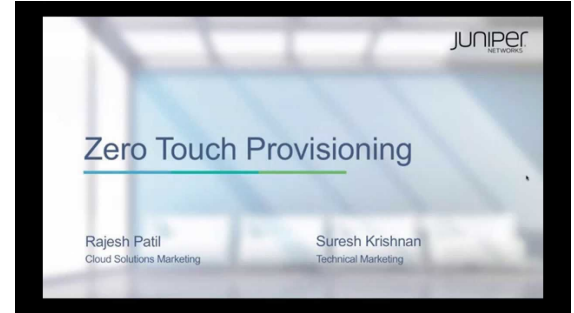


- **Partner**
 - Integration Partners
- **Tools**
 - Provisioning Application for Peering
- **Process**
 - Streamline process of adding new peers
 - Automate AS-SET

```
Enter the Customer ID (This cannot be blank): 9999
Enter the Customer Internet Routing Registry maintainer ID: MNT-NNCITL
Enter the Customer Autonomous System (format - AS<asnumber>): AS62489
Will the Customer be in test mode (y or n): n
Will the Customer have a ipv4 neighbor (y or n): y
Does the customer have more than one ipv4 neighbor (y or n): n
Enter the Customer IPv4 peer address (format - nnn.nnn.nnn.nnn): 10.0.0.120
Does the customer have a v6 neighbor (y or n): n
Will the customer have a MD5 password for their BGP neighbors (y or n): y
What is the is the MD5 password: testit
*****
Building Policies for the Customer Routes
█
```

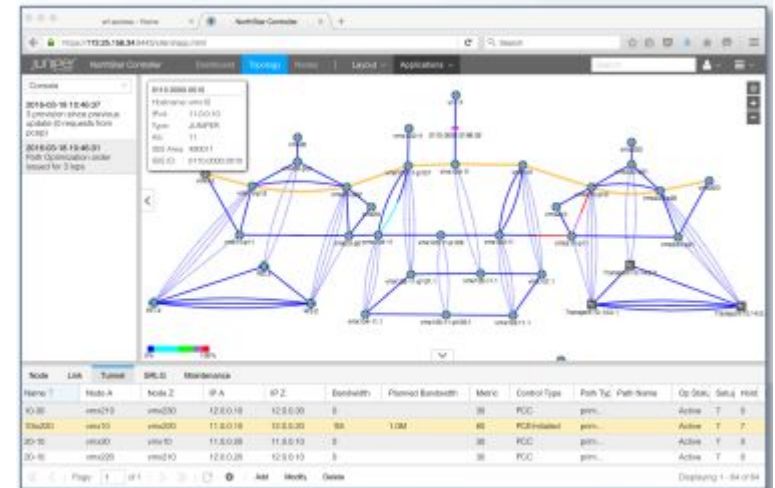
Network Automation Tools and Implementation

- **Partner**
 - Juniper
- **Tools**
 - Zero-Touch Provisioning (ZTP)
- **Process**
 - Majority of our Node Expansion is Juniper EX Models off a Core Node
 - DOA testing can involve non-engineering staff powering up unit and plugging into lab environment where ZTP performs an initial code upgrade and base configuration load



Network Automation Tools and Implementation

- **Partners**
 - Integration Partners
 - ADVA
 - Juniper
- **Tools**
 - Northstar Controller
- **Process**
 - Link MPLS Core and Optical Core into decisions



Successes and Challenges

- **Successes**

- While very little is implemented today, continuous theme of “Benefits in Automation”
- Metrics are starting to form to detail reasons for automation
- Baseline Implementation Taking Form
 - Translating Ideas to Solutions

- **Challenges**

- Resources availability in Growth-Stage our the Company
 - Translating Ideas to Solutions