2023
State of Network Automation
Survey Results

Chris Grundemann // chris@fullctl.com

fullctl

Who's This Grundemann Guy?

Co-Founder & CSO at FullCtl

Co-Founder of IX-Denver, Director at OIX

Interconnection and Automation for about 20 years

Past Lightning Talks:

- Will I be replaced by a script?
- The API is the new CLI?
- WTF is SDN?

Man of many hats…

Network Automation is HOT

With Good Reason

Networks are getting larger and more complex

But Where Are We Really?

We Launched a Survey at <u>N87</u> to Find Out!

2023 State of Network Automation Survey

Anonymized results will be provided to all participants, as well as presented at one or more major networking conference(s).

chris@fullctl.com Switch account

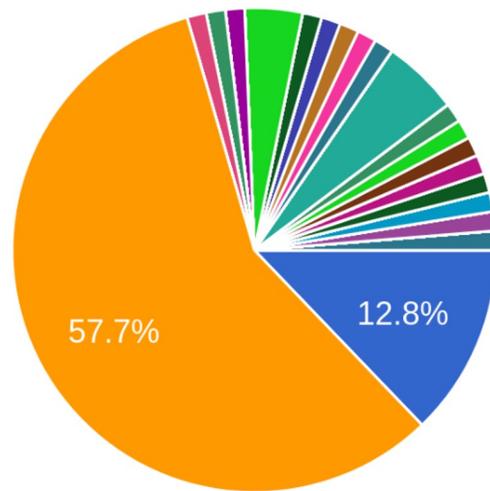* Required

The Results Are In

First: Who answered the survey?

- 78 Responses Total
- 20 Countries Represented
- 14 Different Types of Organizations
- 9 Distinct Job Roles/Functions
- Wide Range of Network Scale

Who answered the survey (Country)?

In which country do you live?

78 responses

- Canada
- Mexico
- United States
- Afghanistan
- Akrotiri
- Albania
- Algeria
- American Samoa

57.7%   12.8%

1/33

Who answered the survey (Country)?

Algeria - 1

Australia - 1

Canada - 10

Denmark - 1

France - 3

Germany - 1

India - 1

Indonesia - 1

Ireland - 1

Italy - 1

Netherlands - 4

Nigeria - 1

Norway - 1

Philippines - 1
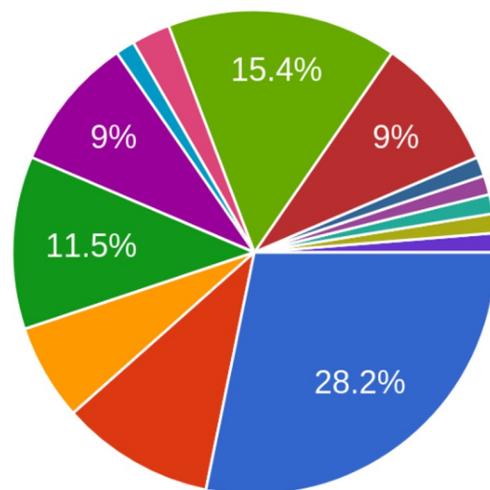
Singapore - 1

Spain - 1

Sweden - 1

Tanzania - 1

United Kingdom - 1

United States - 45

Who answered the survey (Org)?

Internet Service Provider (ISP) - 23

Enterprise IT Network - 13

Public Cloud Operator (IaaS) - 9

Network Service Provider (NSP) - 8

Public Sector - 7

Software as a Service Provider (SaaS) - 7

Managed Service Provider (MSP) - 5
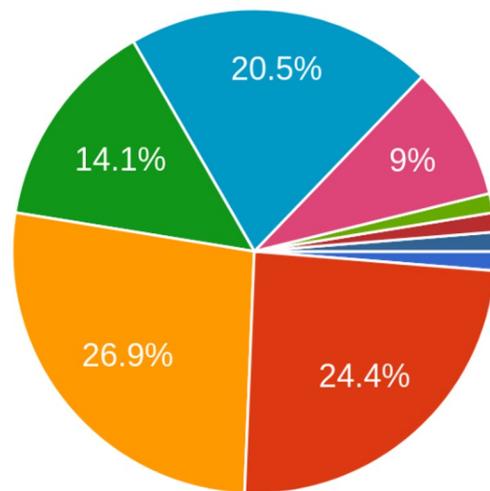
Other - 6

Who answered the survey (Role)?

Which job function / role most closely matches your position?

78 responses

- Network Technician or Administrator
- Network Engineer or Operator
- Network Architect or Designer
- Network Automation Engineer or Dev…
- Peering Manager
- Network Team Manager or Director
- Executive Leadership
- All of the above (except Team Manager)

1/2

Who answered the survey (Role)?

Network Architect or Designer - 21

Network Engineer or Operator - 19

Network Team Manager or Director - 16
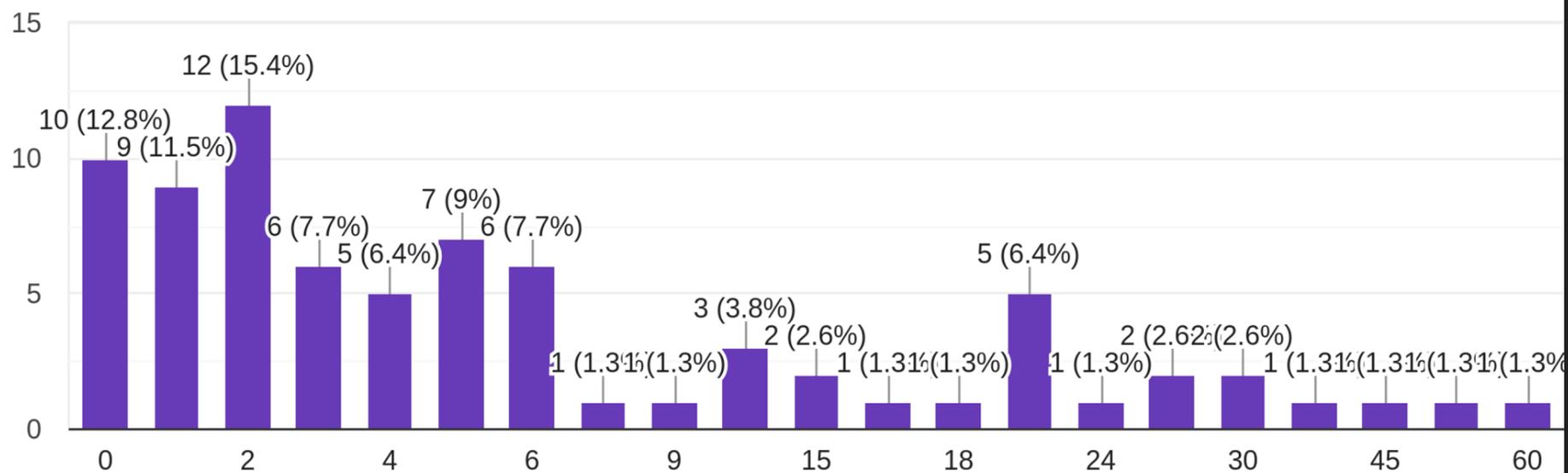
Network Automation Engineer or Developer - 11

Executive Leadership - 7

Other - 4

Who answered the survey (Scale)?

How many IX does your network connect to?

78 responses

Who answered the survey (Scale)?

Number of IX:

Min: 0

Max: 60

Mean: 8.7

Median: 4

Number of Routers:

Min: 2

Max: 30,000

Mean: 1,918

Median: 93

What Did They Say?

How Automated Are We?

0%

-

Nothing is automated, everything is always done manually.

100%

-

Everything is automated, nothing is ever done manually.

Thinking of the entire network lifecycle, from design through deployment and provisioning and on to maintenance and troubleshooting (including all po...): How much of your network is automated today?

78 responses

So, How Automated Are We?

0% - 20% = 24

30 - 40% = 17

50 - 60% = 20

70 - 80% = 17

90 - 100% = 0
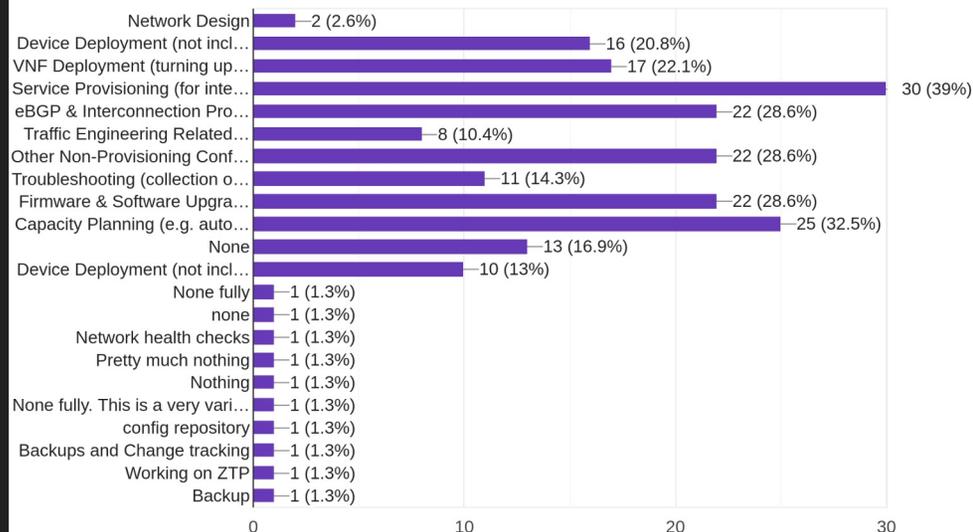
50% and Below: 50

50% and Above: 37

Mean: 42.43%

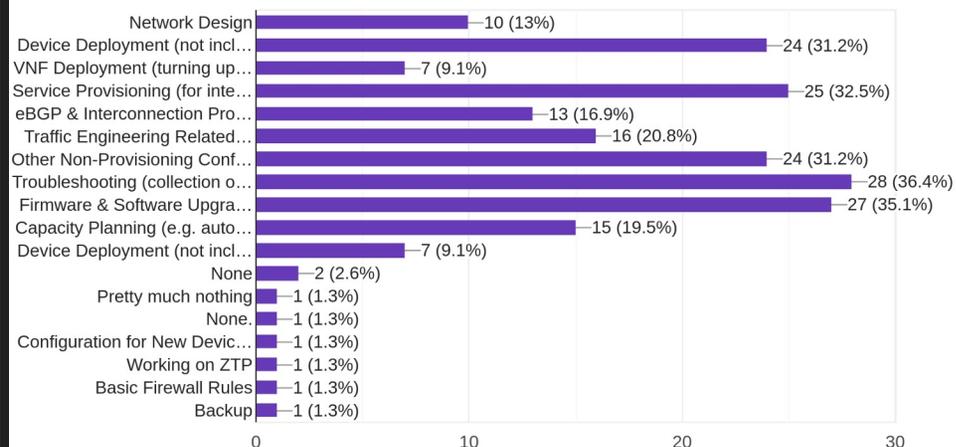Median: 40%

What is Being Automated?

Which specific tasks and functions are fully automated in your network today? (Select all that apply)

77 responses

Category	Count
Network Design	2 (2.6%)
Device Deployment (not incl…	16 (20.8%)
VNF Deployment (turning up…	17 (22.1%)
Service Provisioning (for inte…	30 (39%)
eBGP & Interconnection Pro…	22 (28.6%)
Traffic Engineering Related…	8 (10.4%)
Other Non-Provisioning Conf…	22 (28.6%)
Troubleshooting (collection o…	11 (14.3%)
Firmware & Software Upgra…	22 (28.6%)
Capacity Planning (e.g. auto…	25 (32.5%)
None	13 (16.9%)
Device Deployment (not incl…	10 (13%)
None fully	1 (1.3%)
none	1 (1.3%)
Network health checks	1 (1.3%)
Pretty much nothing	1 (1.3%)
Nothing	1 (1.3%)
None fully. This is a very vari…	1 (1.3%)
config repository	1 (1.3%)
Backups and Change tracking	1 (1.3%)
Working on ZTP	1 (1.3%)
Backup	1 (1.3%)

Which specific tasks and functions are partially automated in your network today? (Select all that apply)

77 responses

Category	Count
Network Design	10 (13%)
Device Deployment (not incl…	24 (31.2%)
VNF Deployment (turning up…	7 (9.1%)
Service Provisioning (for inte…	25 (32.5%)
eBGP & Interconnection Pro…	13 (16.9%)
Traffic Engineering Related…	16 (20.8%)
Other Non-Provisioning Conf…	24 (31.2%)
Troubleshooting (collection o…	28 (36.4%)
Firmware & Software Upgra…	27 (35.1%)
Capacity Planning (e.g. auto…	15 (19.5%)
Device Deployment (not incl…	7 (9.1%)
None	2 (2.6%)
Pretty much nothing	1 (1.3%)
None.	1 (1.3%)
Configuration for New Devic…	1 (1.3%)
Working on ZTP	1 (1.3%)
Basic Firewall Rules	1 (1.3%)
Backup	1 (1.3%)

Device Deployment: 26+32=58
Service Provisioning: 31+25=56
Firmware Upgrades: 22+28=50
Other Non-Provisioning: 22+24=46
Capacity Planning: 26+15=41
Troubleshooting: 11+28=39
eBGP & Interconnection: 22+13=35
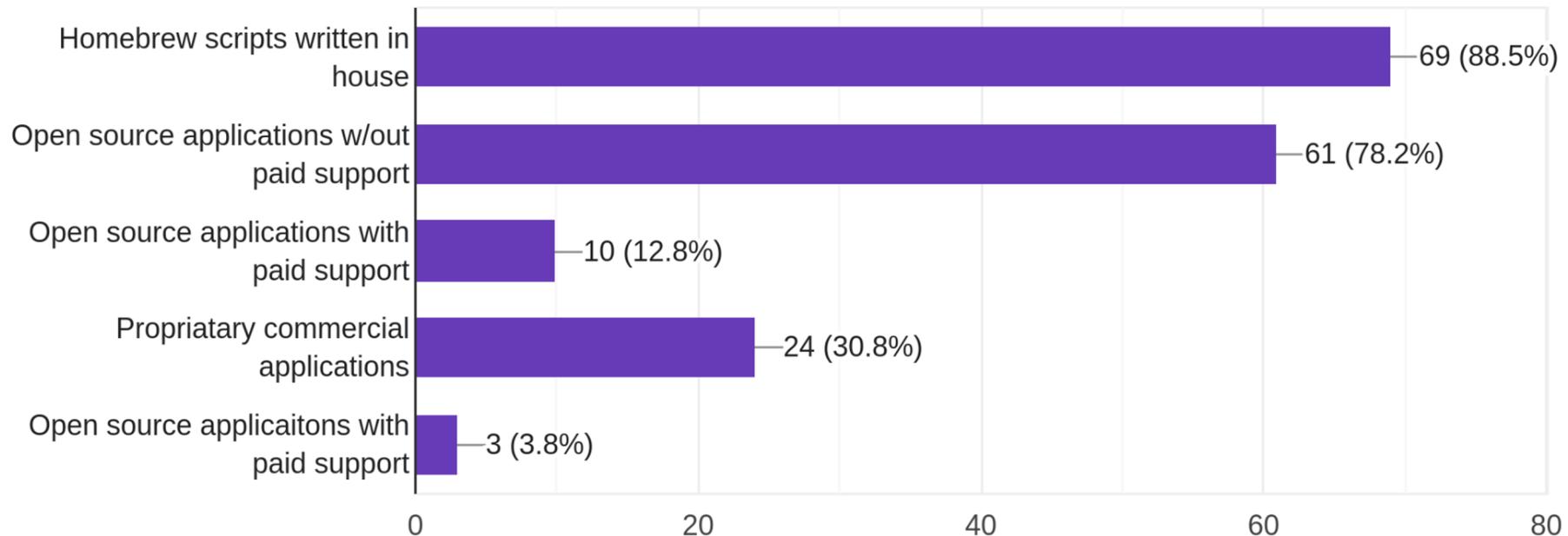VNF Deployment: 17+8=25
Traffic Engineering: 8+16=24
Network Design: 2+10=12

What is Being Automated?

How Is It Being Automated?

What types of automation tools do you use in your network today?   (Select all that apply)

78 responses

How Is It Being Automated?

"Homebrew" - 69 (89%)

OSS w/out support - 61 (78%)

Commercial app - 24 (31%)

OSS with paid support - 13 (17%)

How Is It Being Automated (Languages)?

Python - 73 (of 76)
Shell (bash) - 25
Pearl - 24
Golang - 13
PHP - 12
Ansible - 7
Expect - 4
Ruby - 3
C - 3
TCL - 2

Also:

awk
Erlang
excel
Fish
grep
Jinja2

JSON
powershell
Puppet
Rust
salt

How Is It Being Automated (OSS)?

Ansible - 36 (of 60)
NetBox - 12
Nautobot - 5
Nornir - 5
NAPALM - 5
Salt(stack) - 4
Git - 3
Peering Manager - 3
Rancid - 3

Elastiflow - 2
IXP Manager - 2
Netmiko - 2
Puppet - 2
Rundeck - 2
Terraform - 2
Workflow Orchestrator - 2
Zabbix - 2
*Python libraries (~4)

How Is It Being Automated ($W)?

28 Total Responses:

Cisco NSO - 7 (10 Cisco total)

Ansible (Tower) - 4

Kentik - 3

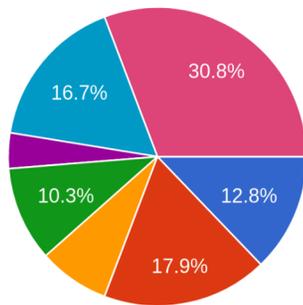Nokia NSP - 2 (4 Nokia total)

Arista CloudVision - 2

19 Other Tools Mentioned Once

Paths to More Automation

Spending Comparison

Roughly how much does your company spend on interconnection fees each month? (Total costs across all transit, IX, cloud connection, and third party connection, etc.)
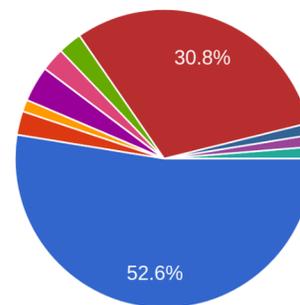
78 responses

- Under $10,000 per Month
- $10,000 - $25,000 per Month
- $25,000 - $50,000 per Month
- $50,000 - $100,000 per Month
- $100,000 - $250,000 per Month
- Over $250,000 per Month
- I don't know

Roughly how much does your company spend on automation tooling each month? (Total costs across all application license fees, software support, etc.)

78 responses

- Under $1,000 per Month
- $1,000 - $2,500 per Month
- $2,500 - $5,000 per Month
- $5,000 - $10,000 per Month
- $10,000 - $25,000 per Month
- $25,000 - $50,000 per Month
- $50,000 - $100,000 per Month
- Over $100,000 per Month

1/2

Spending Comparison

Interconnection Fees

< $10,000 Monthly: 13%

$10k-$100k Monthly: 36%

> $100,000 Monthly: 21%
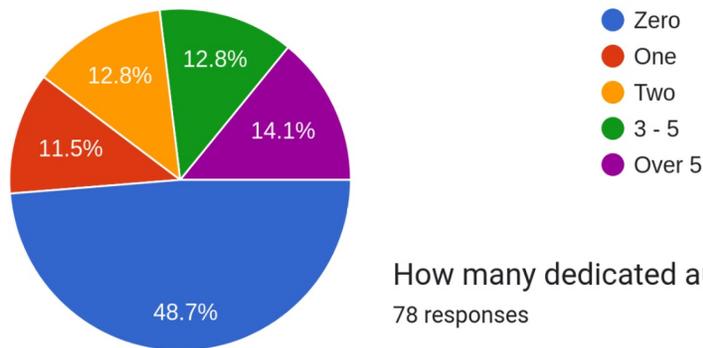
Don't Know / Opt Out: 31%

Automation Tooling

< $1,000 Monthly: 55%

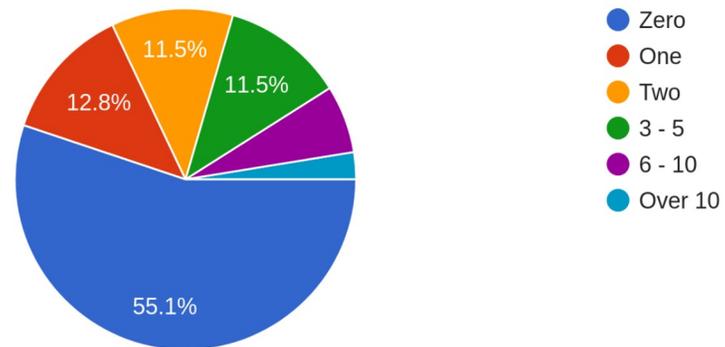> $1,000 Monthly: 13%

Don't Know / Opt Out: 32%

Staffing Comparison

How many dedicated interconnection engineers and/or peering managers work on your network?

78 responses

- Zero
- One
- Two
- 3 - 5
- Over 5

12.8%
12.8%
11.5%
14.1%
48.7%

How many dedicated automation engineers work on your network?

78 responses

- Zero
- One
- Two
- 3 - 5
- 6 - 10
- Over 10

11.5%
12.8%
11.5%
55.1%

Staffing Comparison

Interconnection Staff
Zero: 49%

One: 12%

Two: 13%

3 to 5: 13%

> 5: 14%

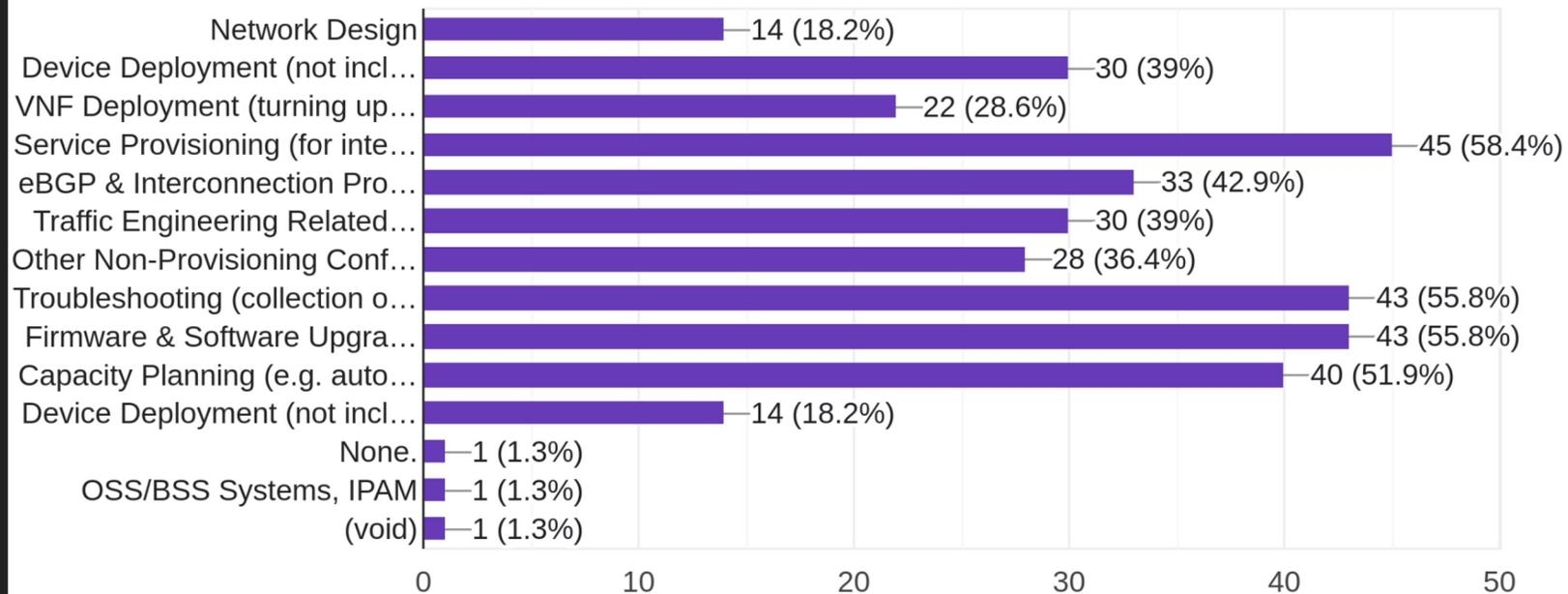## Automation Staff
Zero: 55%

One: 13%

Two: 12%

3 to 5: 12%

> 5: 9%

Not Everyone Agrees On Automation

Which specific tasks and functions should be automated in your network, in your opinion? (Select all that apply)

77 responses

Task	Count
Network Design	14 (18.2%)
Device Deployment (not incl…	30 (39%)
VNF Deployment (turning up…	22 (28.6%)
Service Provisioning (for inte…	45 (58.4%)
eBGP & Interconnection Pro…	33 (42.9%)
Traffic Engineering Related…	30 (39%)
Other Non-Provisioning Conf…	28 (36.4%)
Troubleshooting (collection o…	43 (55.8%)
Firmware & Software Upgra…	43 (55.8%)
Capacity Planning (e.g. auto…	40 (51.9%)
Device Deployment (not incl…	14 (18.2%)
None.	1 (1.3%)
OSS/BSS Systems, IPAM	1 (1.3%)
(void)	1 (1.3%)

Service Provisioning: 59%

Device Deployment: 58%

Firmware Upgrades: 56%

Troubleshooting: 55%

Capacity Planning: 53%

eBGP & Interconnection: 42%

Traffic Engineering: 39%

Other Non-Provisioning: 36%
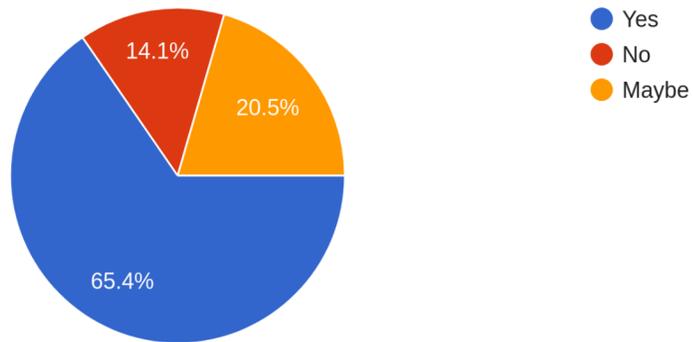
VNF Deployment: 30%

Network Design: 18%

What **Should** be Automated?

Service Provisioning: 59%
Device Deployment: 58%
Firmware Upgrades: 56%
Troubleshooting: 55%
Capacity Planning: 53%
eBGP & Interconnection: 42%
Traffic Engineering: 39%
Other Non-Provisioning: 36%
VNF Deployment: 30%
Network Design: 18%

?

What **Should** be Automated?

?

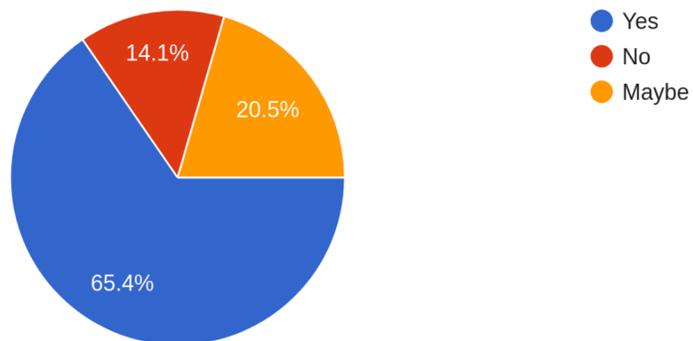# Automation Skills Gap?

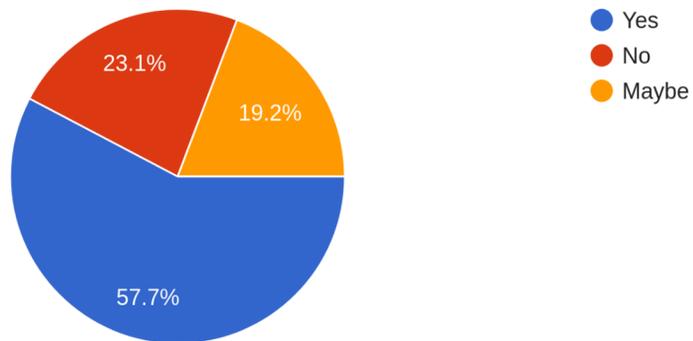Do you consider yourself a networking expert?

78 responses

Legend:
- Yes
- No
- Maybe

14.1%
20.5%
65.4%

Automation Skills Gap?

Do you consider yourself a networking expert?

78 responses

- ● Yes
- ● No
- ● Maybe

14.1%
20.5%
65.4%

Do you consider yourself an interconnection expert?

78 responses

- ● Yes
- ● No
- ● Maybe

23.1%
19.2%
57.7%

Automation Skills Gap?

Do you consider yourself a networking expert?

78 responses

- Yes
- No
- Maybe

14.1%

20.5%

65.4%
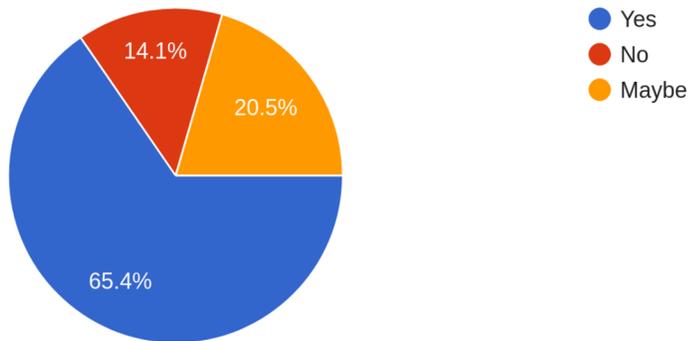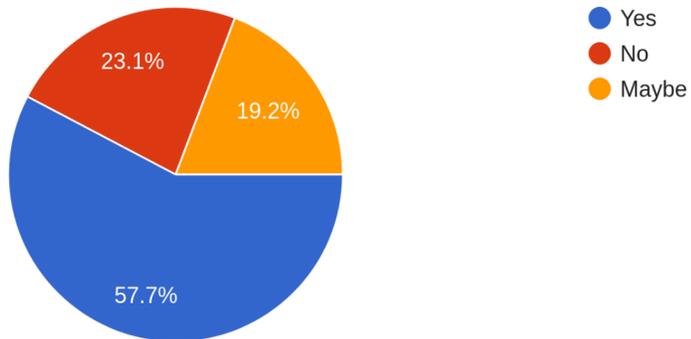
Do you consider yourself a network automation expert?

78 responses
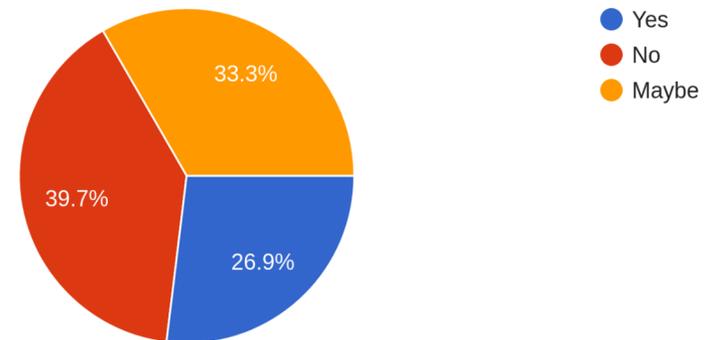
- Yes
- No
- Maybe

33.3%

39.7%

26.9%

Do you consider yourself an interconnection expert?

78 responses

- Yes
- No
- Maybe

23.1%

19.2%

57.7%

Automation Skills Gap?

Expert?	Yes	Maybe	No
Networking	65%	21%	14%
Interconnection	58%	19%	23%
Automation	27%	33%	40%

Automation Skills Gap?

Expert?	Yes	Maybe	No
Networking	65%	21%	14%
Interconnection	58%	19%	23%
Automation	27%	33%	40%

73% Uncertain of Automation Skills

Whaaaaaaaaaaat??? [summary]

78 Diverse Responses

40% of Network Automated (Median)

90% "Homebrewing" && 80% Using OSS (<31% $W)

94% Using Python && At Least 46% using Ansible

55% of Orgs have No Dedicated Automation Staff

73% of Respondents Uncertain of Automation Skills

Next: 2024 Survey!

- How can we improve the survey?
- What questions would you like to see asked?
- How can we increase participation?

Hit Me:

chris@fullctl.com

Improvements…

- Higher Ed (org type)
- Security (role type)
- Backups && Firewall Rules (what's automated)
- Google Form? (account required)