Prometheus for Network Engineers

Or, how to build vs buy your network monitoring

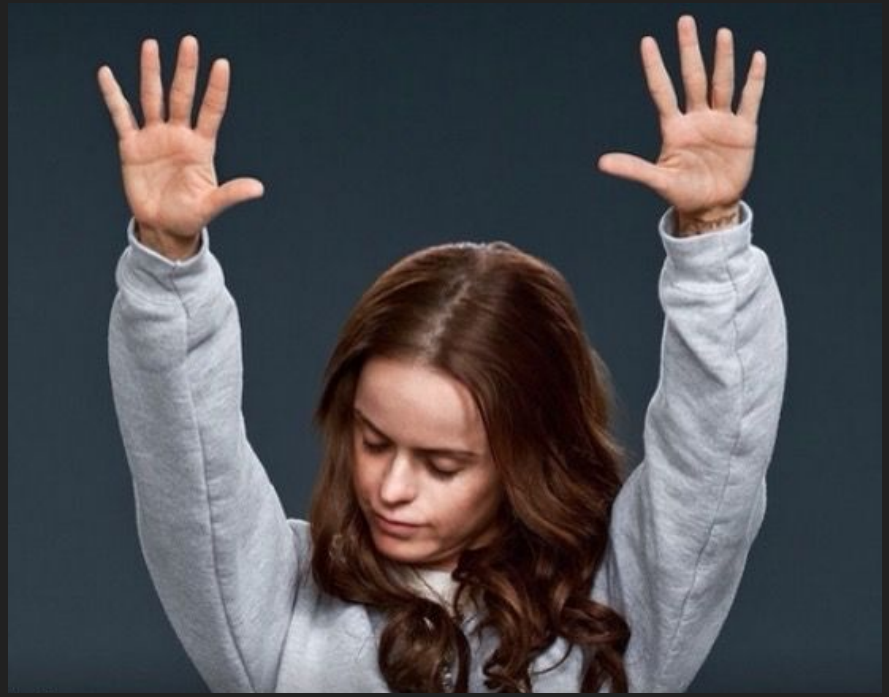
Disclaimer:

*This talk will contain a lot of my *opinions*, some may be right, some may not but they're based on my experience and analysis. If you have a problem with that, the price is a beer to come chat about it :)*

Who am I?

- Network Engineer (12+ years in MSP/SP/Cloud)
- Background in software engineering / dev
- Passion for monitoring, automation and routing security.
- Unemployed*

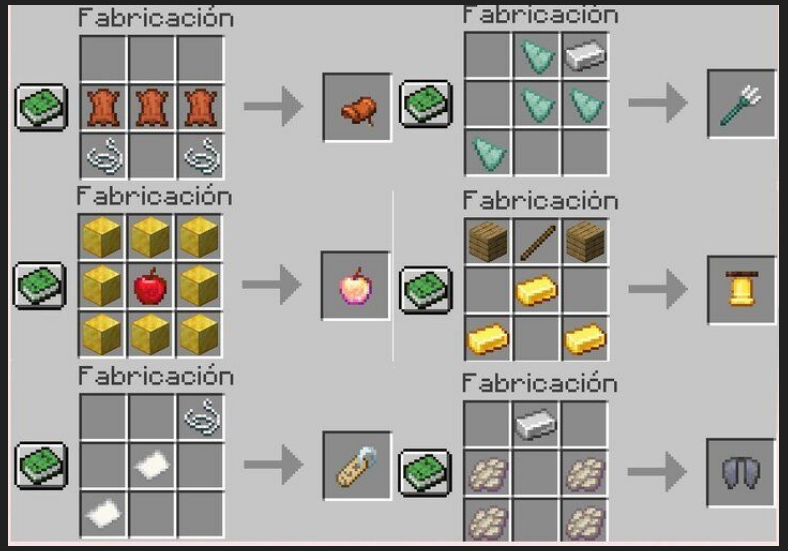
Fess-Up…



12

Buy

Build

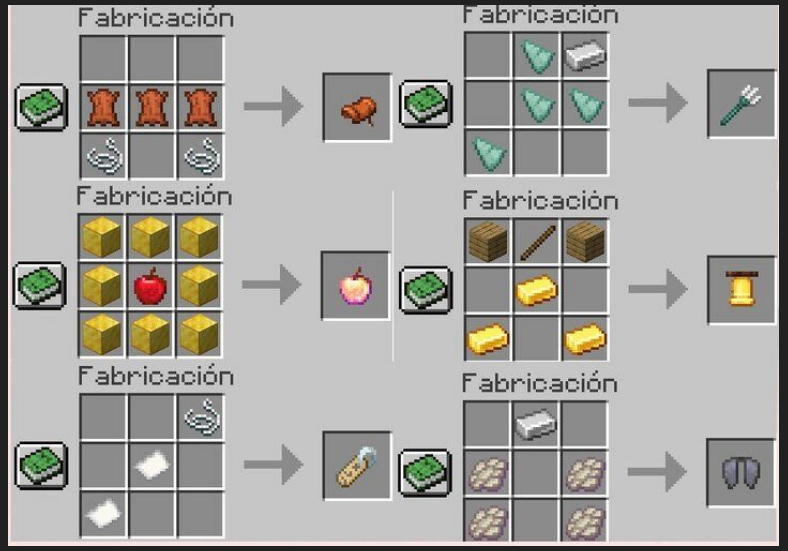

Fabricación
Fabricación
Fabricación
Fabricación
Fabricación
Fabricación

MONITOR
ALL THE THINGS
imgflip.com

7
21
4

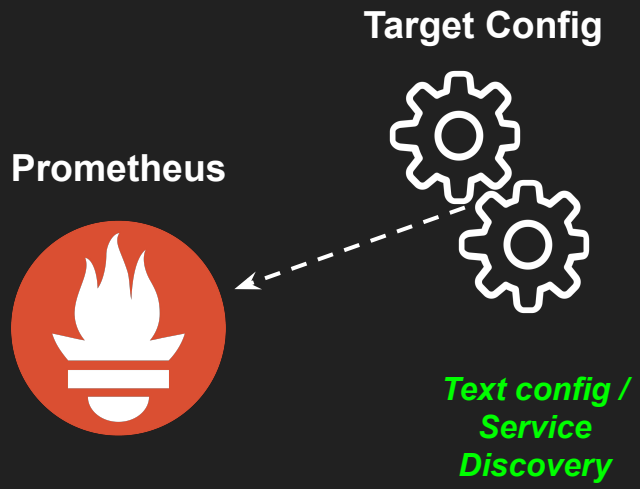
Buy

Build


Fabricación
Fabricación
Fabricación
Fabricación
Fabricación
Fabricación

GitHub

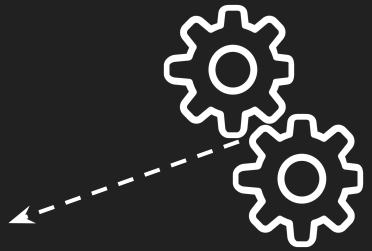
Prometheus


Target Config
Prometheus
Text config /
Service
Discovery

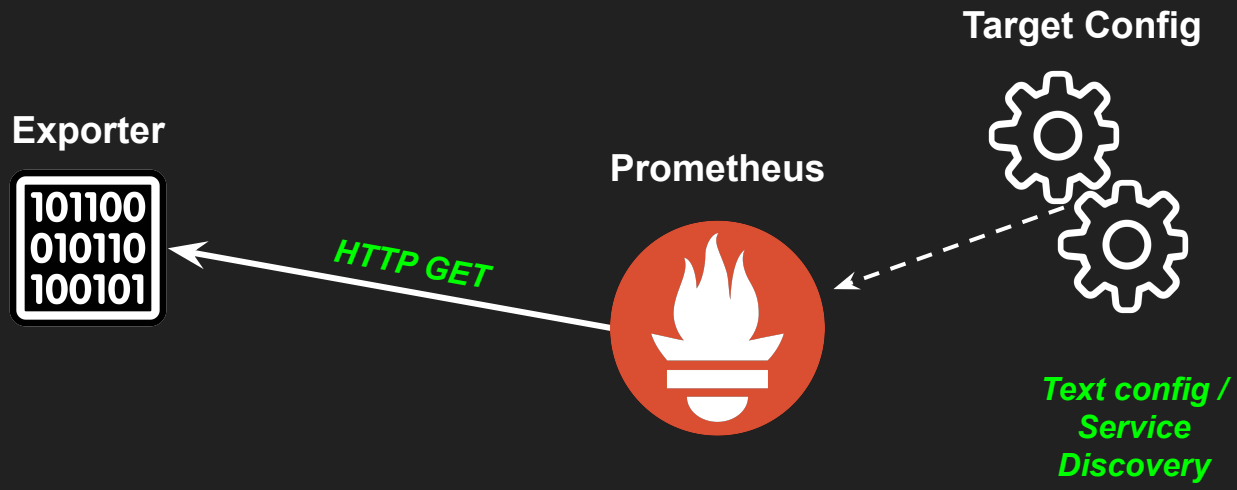
Target Config

Exporter

Prometheus

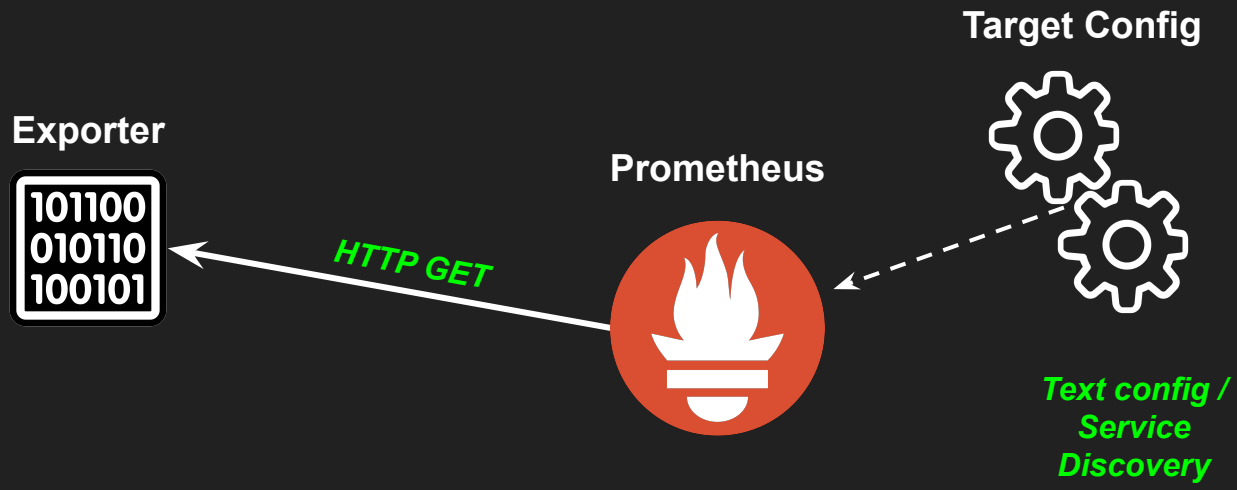


Text config / Service Discovery


Target Config
Exporter
Prometheus
101100
010110
100101
HTTP GET
Text config /
Service
Discovery

```
## Openconfig Streaming
oc_interfaces_in_octets{interface_name="Ethernet3/1",source="pe1bne1"} 2.422702891646 54e+15
oc_interfaces_in_octets{interface_name="Ethernet4/1",source="pe1bne1"} 1.027039422994083e+15
oc_interfaces_in_octets{interface_name="Ethernet5/1",source="pe1bne1"} 7.861197801489082e+15
oc_interfaces_in_octets{interface_name="Ethernet6/1",source="pe1bne1"} 1.851141634241e+12
```

Metric Name *Labels* *Value*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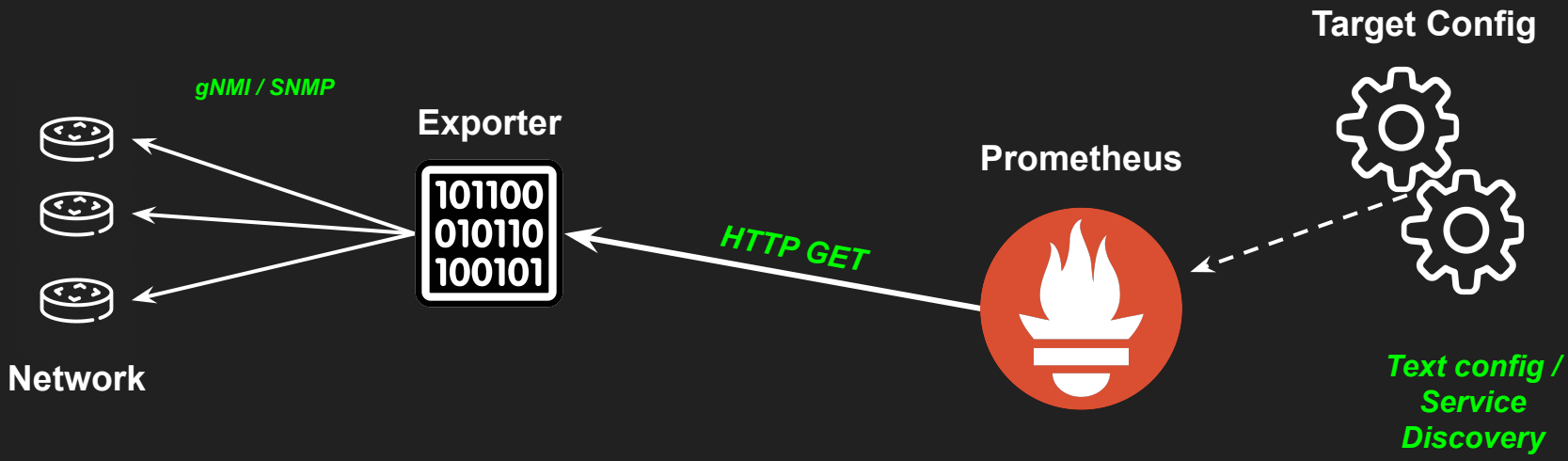
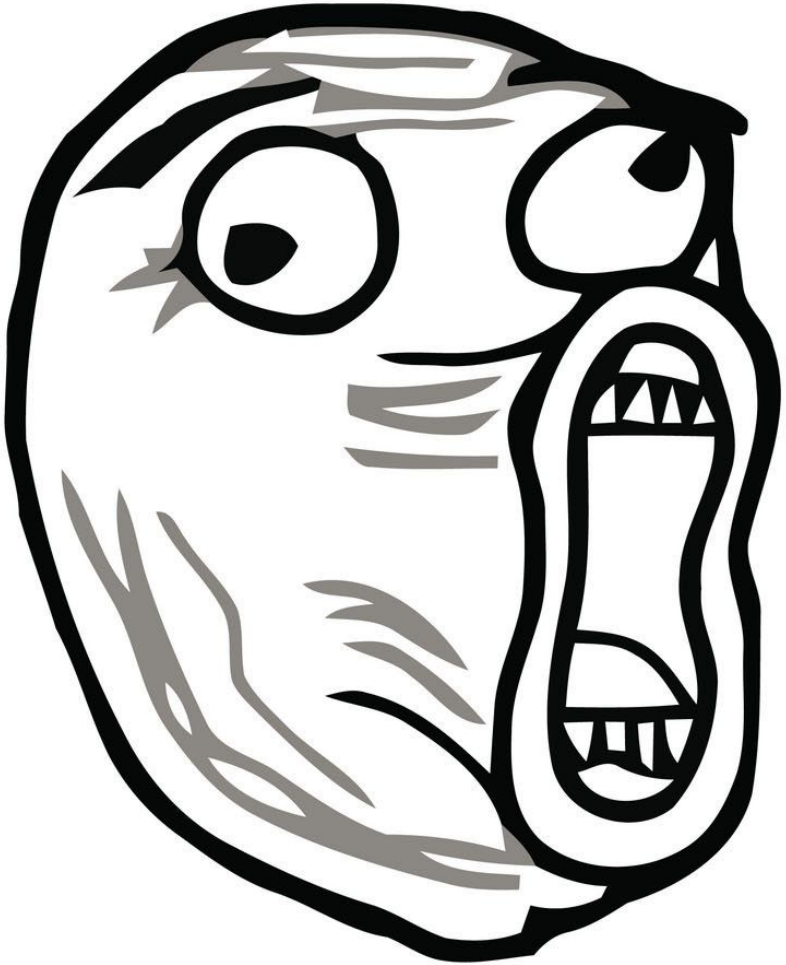
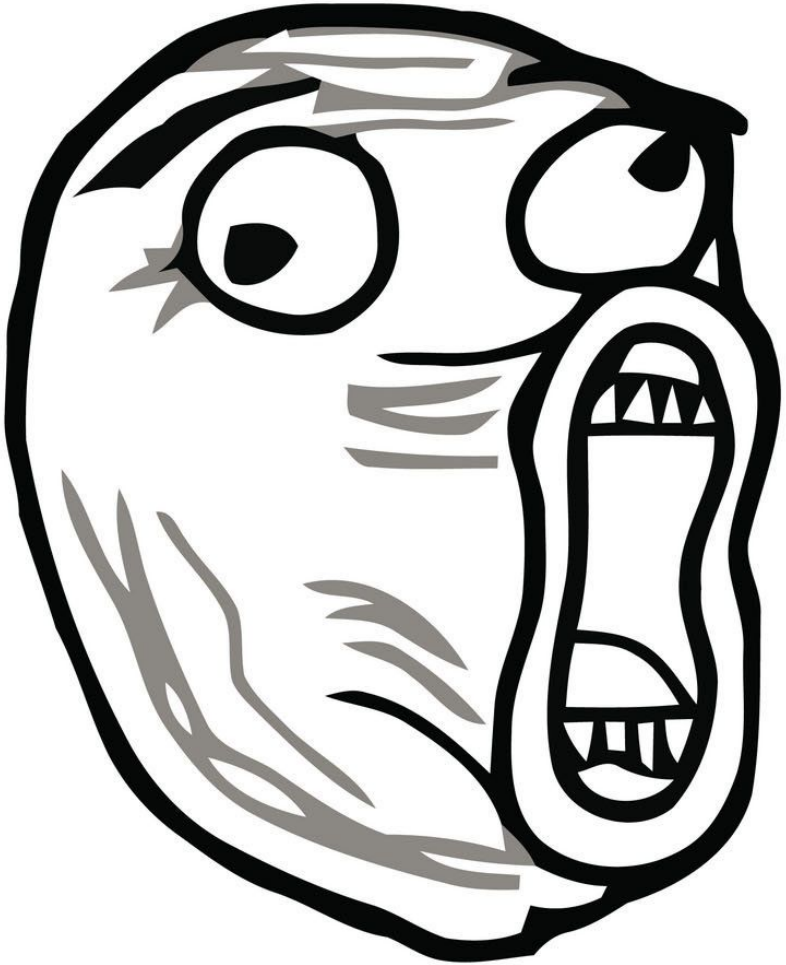
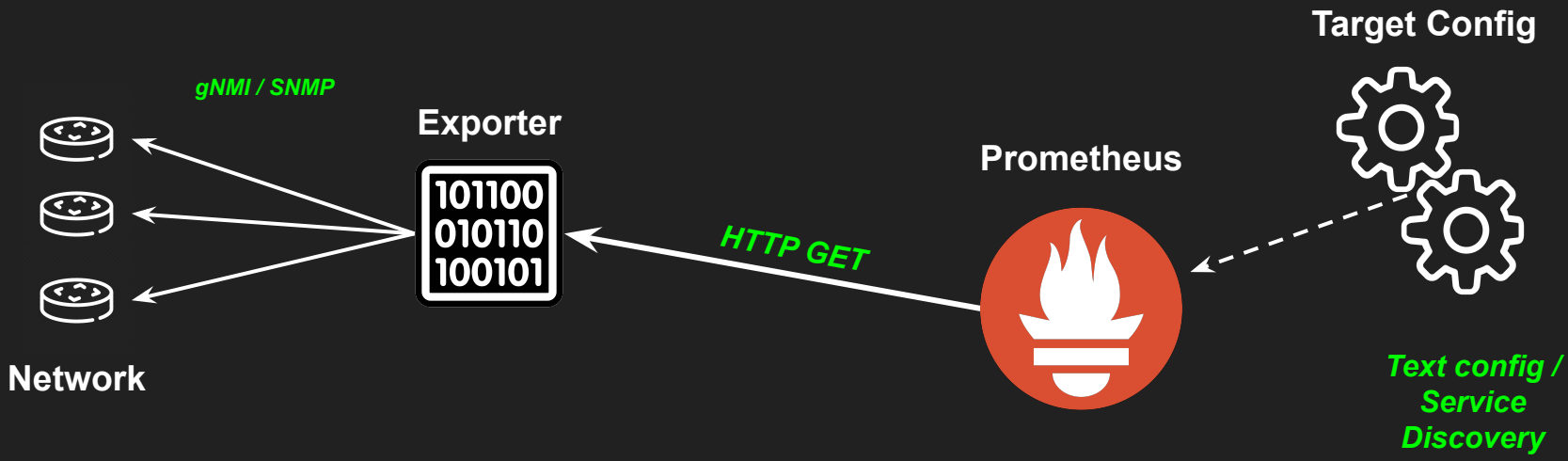

Target Config
gNMI / SNMP
Exporter
Prometheus
101100
010110
100101
HTTP GET
Network
Text config /
Service
Discovery



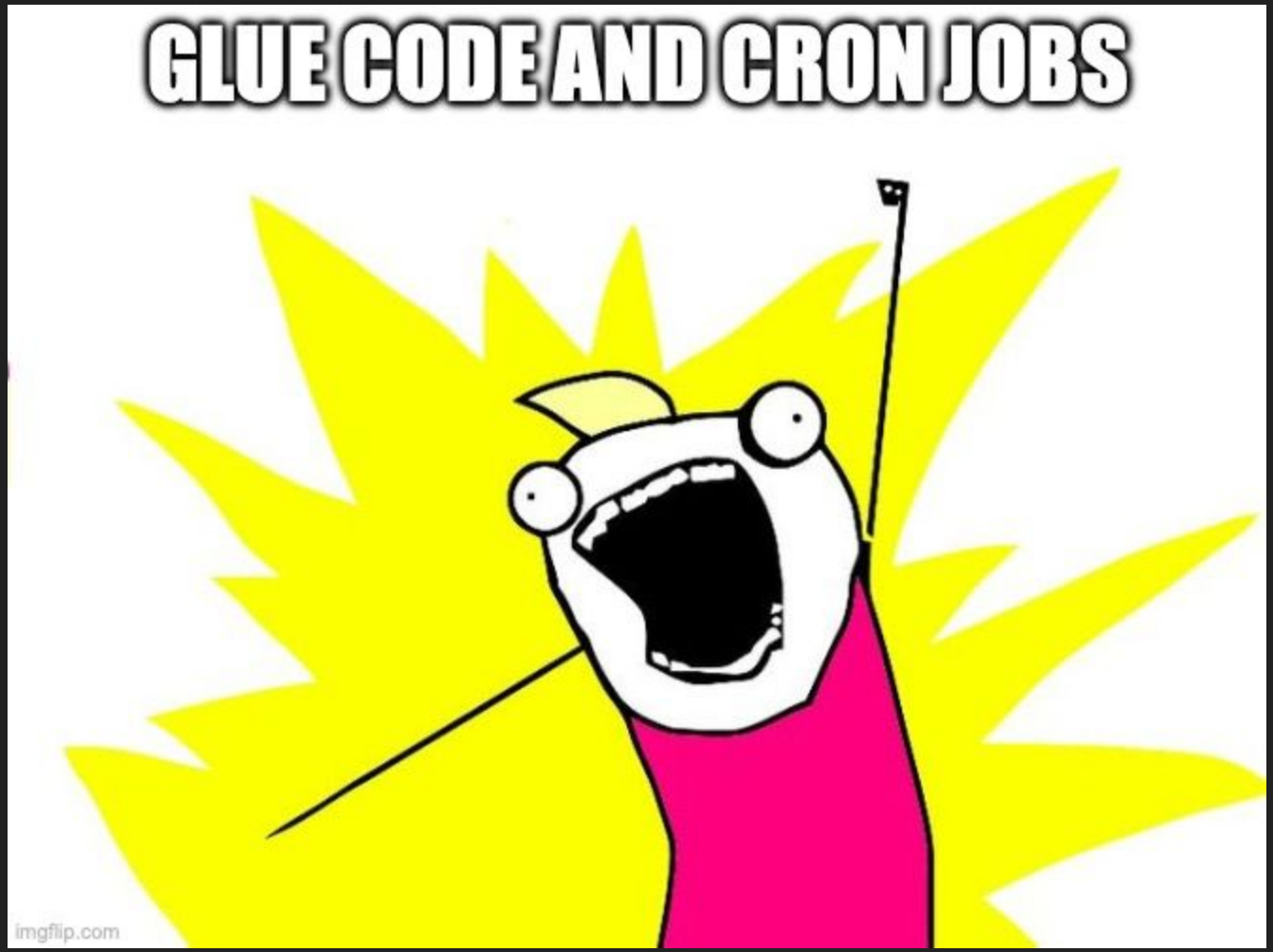


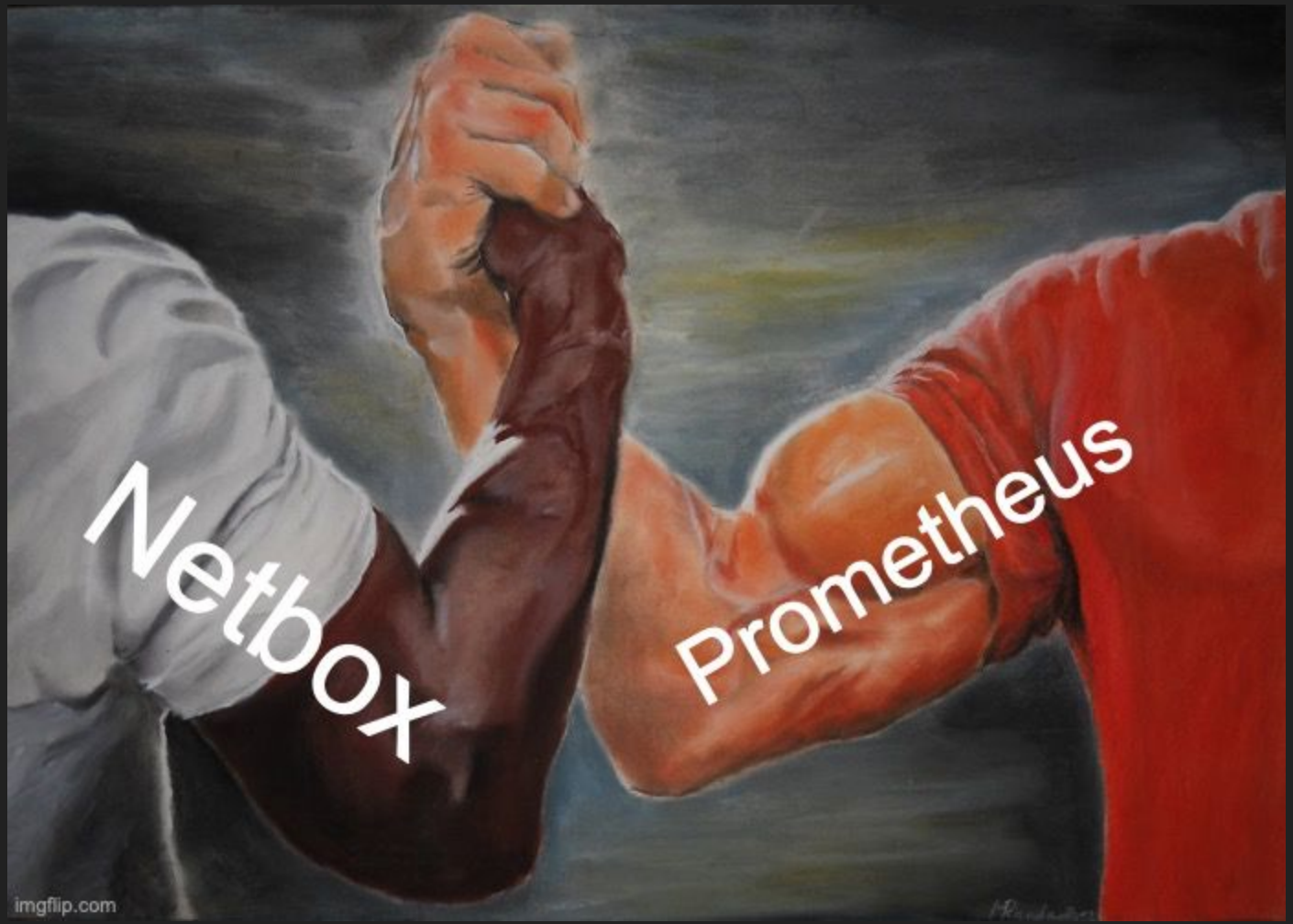
*

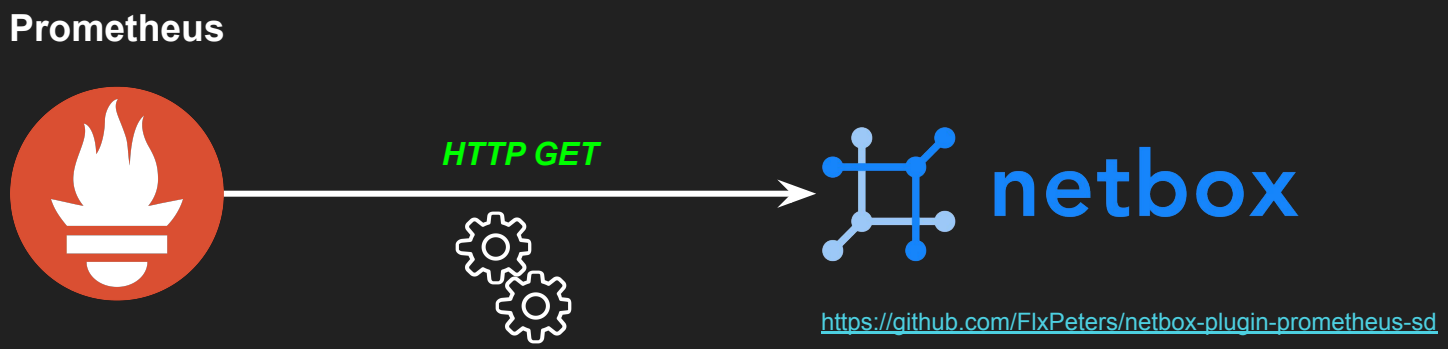

Target Config
gNMI / SNMP
Exporter
Prometheus
101100
010110
100101
HTTP GET
Network
Text config /
Service
Discovery

```
- job_name: snmp_devices
  static_configs:
    targets:
      -  syd1-pe1
      -  syd2-pe1
  metrics_path: /metrics
  relabel_configs:
    - source_labels: [__address__]
      target_label: __param_target
    - source_labels: [__param_target]
      target_label: instance
    - target_label: __address__
      replacement: snmp_exporter:9115
```

http://snmp_exporter:9115/?target=syd1-pe1
http://snmp_exporter:9115/?target=syd2-pe1


GLUE CODE AND CRON JOBS
imgflip.com


Netbox
Prometheus
imgflip.com



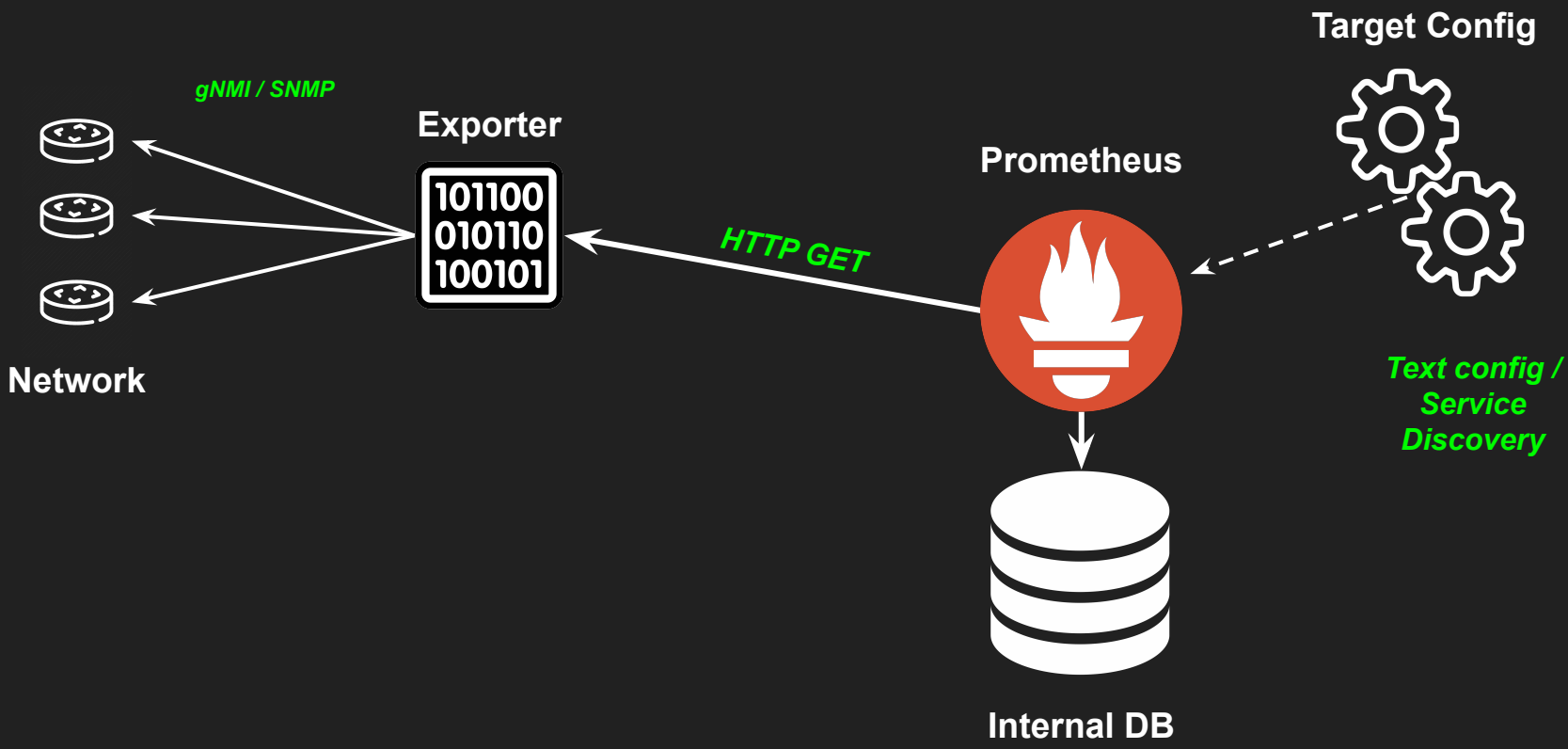
https://github.com/FlxPeters/netbox-plugin-prometheus-sd

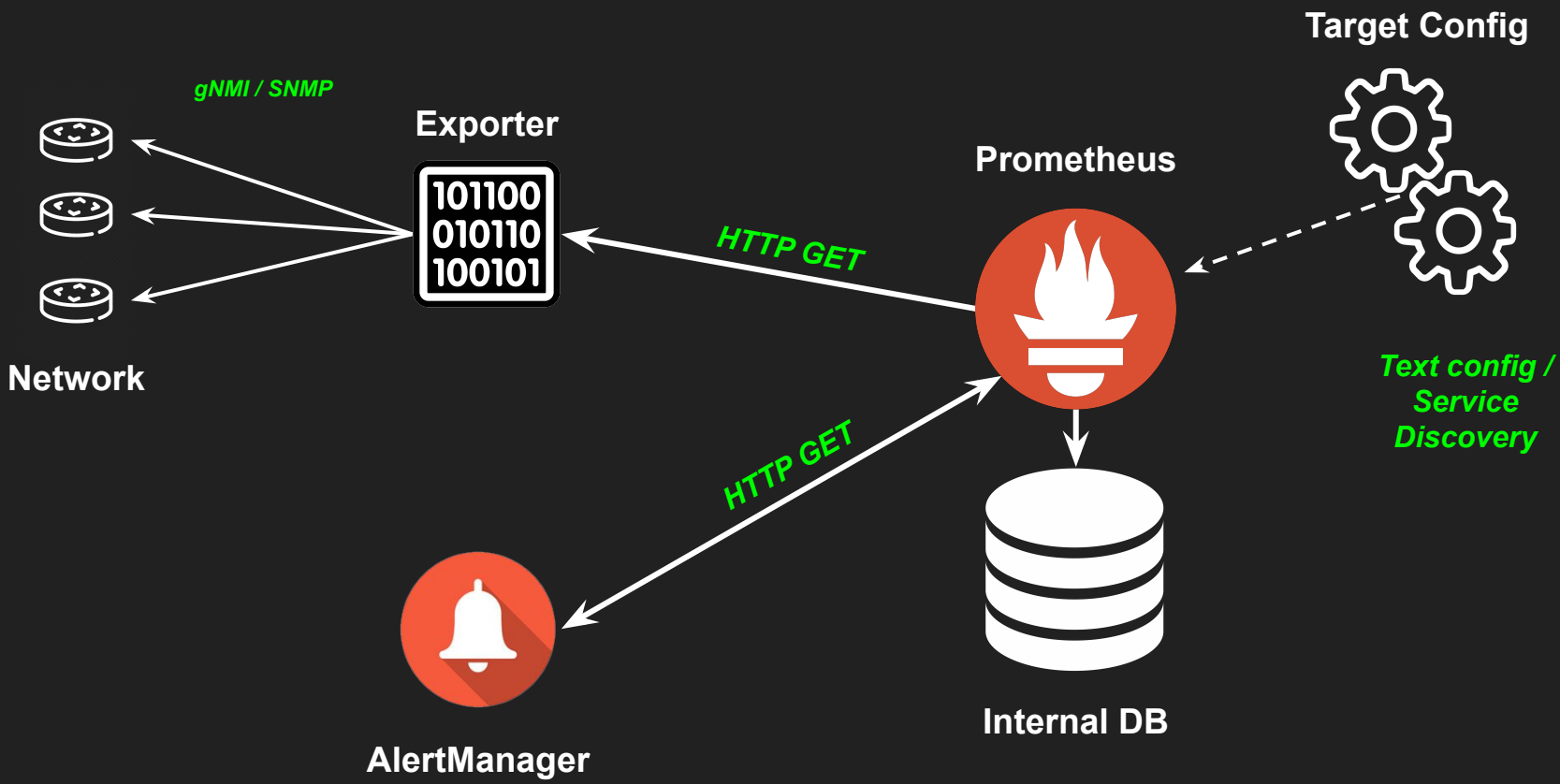
ping_nb_devices

show less

Discovered Labels	Target Labels
__address__="edge1.tdr.id.au"	instance="edge1.tdr.id.au"
__meta_netbox_device_type="7220 IXR-D3L 32*100GE"	job="ping_nb_devices"
__meta_netbox_device_type_slug="nokia-7220-ixr-d3l-32-100ge"	
__meta_netbox_id="1"	
__meta_netbox_model="Device"	
__meta_netbox_name="edge1.tdr.id.au"	
__meta_netbox_primary_ip="172.30.0.11"	
__meta_netbox_primary_ip4="172.30.0.11"	
__meta_netbox_rack="R001"	
__meta_netbox_role="edge-router"	
__meta_netbox_role_slug="edge-router"	
__meta_netbox_site="AU-SYD1"	
__meta_netbox_site_slug="au-syd1"	
__meta_netbox_status="active"	
__meta_url="http://netbox:8080/api/plugins/prometheus-sd/devices?status=active"	
__metrics_path__="/probe"	
__param_module="icmp"	
__scheme__="http"	
__scrape_interval__="10s"	
__scrape_timeout__="10s"	
job="ping_nb_devices"	

```
- job_name: snmp_devices
  http_sd_configs:
    - url: http://netbox:8080/api/plugins/prometheus-sd/devices?status=active
      refresh_interval: 15m
      authorization:
        type: Token
        credentials: 13011cc19731ad3a3c6de287e10211b44c6a43a2
  metrics_path: /metrics
  relabel_configs:
    - source_labels: [__address__]
      target_label: __param_target
    - source_labels: [__param_target]
      target_label: instance
    - target_label: __address__
      replacement: snmp_exporter:9115
```


Target Config
gNMI / SNMP
Exporter
Prometheus
101100
010110
100101
HTTP GET
Network
Text config /
Service
Discovery
Internal DB


Target Config
gNMI / SNMP
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Prometheus
101100
010110
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HTTP GET
Network
Text config /
Service
Discovery
HTTP GET
Internal DB
AlertManager

What is my global uptime percentage for ethernet customers based on link-state?

What is my global uptime percentage for ethernet customers based on link-state?

What percentile am I currently running my upstream transit circuits?

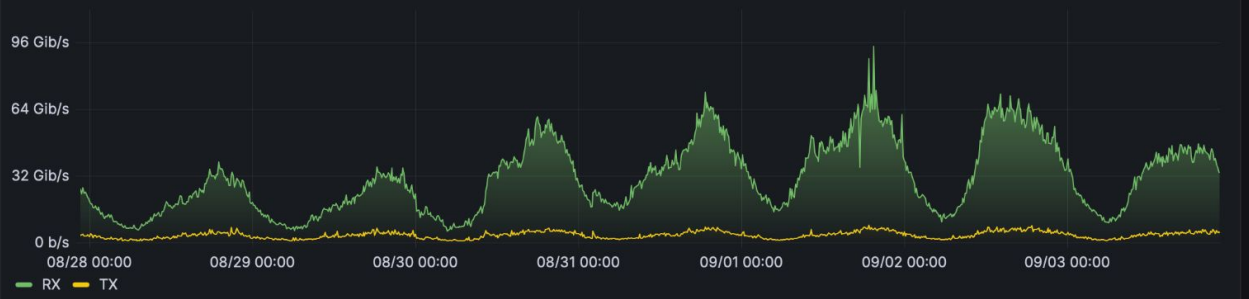
```
## Openconfig Streaming
oc_interfaces_in_octets{interface_name="Ethernet3/1",source="pe1bne1"} 2.422702891646 54e+15
oc_interfaces_in_octets{interface_name="Ethernet4/1",source="pe1bne1"} 1.027039422994083e+15
oc_interfaces_in_octets{interface_name="Ethernet5/1",source="pe1bne1"} 7.861197801489082e+15
oc_interfaces_in_octets{interface_name="Ethernet6/1",source="pe1bne1"} 1.851141634241e+12
```

Metric Name *Labels* *Value*

Customers | EdgeIX-Net

Aggregates

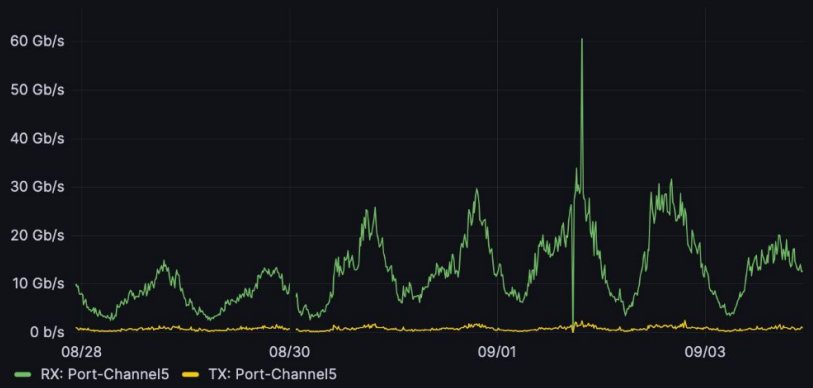
EdgeIX-Net



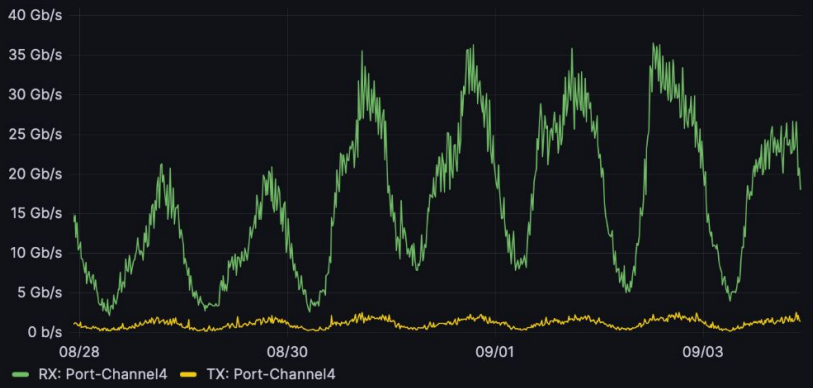
Instant

Ports

pe1bne2:Port-Channel5



pe1mel3:Port-Channel4



```
services{customer="Telco News BV",router="pe1bne1",interface="Ethernet3/1",cid="10G"} 1
services{customer="CubbyColo Pty Ltd",router="pe1bne1",interface="Ethernet3/2",cid="1G"} 1
services{customer="Meme ISP Ltd",router="pe1bne1",interface="Ethernet3/3",cid="1G"} 1
```

```
## Openconfig Streaming
oc_interfaces_in_octets{interface_name="Ethernet3/1",source="pe1bne1"} 2.422720289164654e+15
oc_interfaces_in_octets{interface_name="Ethernet4/1",source="pe1bne1"} 1.027039422994083e+15
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oc_interfaces_out_octets{interface_name="Ethernet3/1",source="pe1bne1"} 2.422720289164654e+15
oc_interfaces_out_octets{interface_name="Ethernet4/1",source="pe1bne1"} 1.027039422994083e+15
oc_interfaces_out_octets{interface_name="Ethernet5/1",source="pe1bne1"} 7.861197801489082e+15
oc_interfaces_out_octets{interface_name="Ethernet6/1",source="pe1bne1"} 1.851141634241e+12

## SNMP
snmp_ifmib_ucast_in_octet{ifalias="Ethernet1/1",target="pe1syd1"} 2.422720289164654e+15
snmp_ifmib_ucast_in_octet{ifalias="Ethernet2/1",target="pe1syd1"} 1.027039422994083e+15
snmp_ifmib_ucast_in_octet{ifalias="Ethernet3/1",target="pe1syd1"} 7.861197801489082e+15
snmp_ifmib_ucast_in_octet{ifalias="Ethernet4/1",target="pe1syd1"} 1.851141634241e+12

snmp_ifmib_ucast_out_octet{ifalias="Ethernet1/1",target="pe1syd1"} 2.422720289164654e+15
snmp_ifmib_ucast_out_octet{ifalias="Ethernet2/1",target="pe1syd1"} 1.027039422994083e+15
snmp_ifmib_ucast_out_octet{ifalias="Ethernet3/1",target="pe1syd1"} 7.861197801489082e+15
snmp_ifmib_ucast_out_octet{ifalias="Ethernet4/1",target="pe1syd1"} 1.851141634241e+12
```
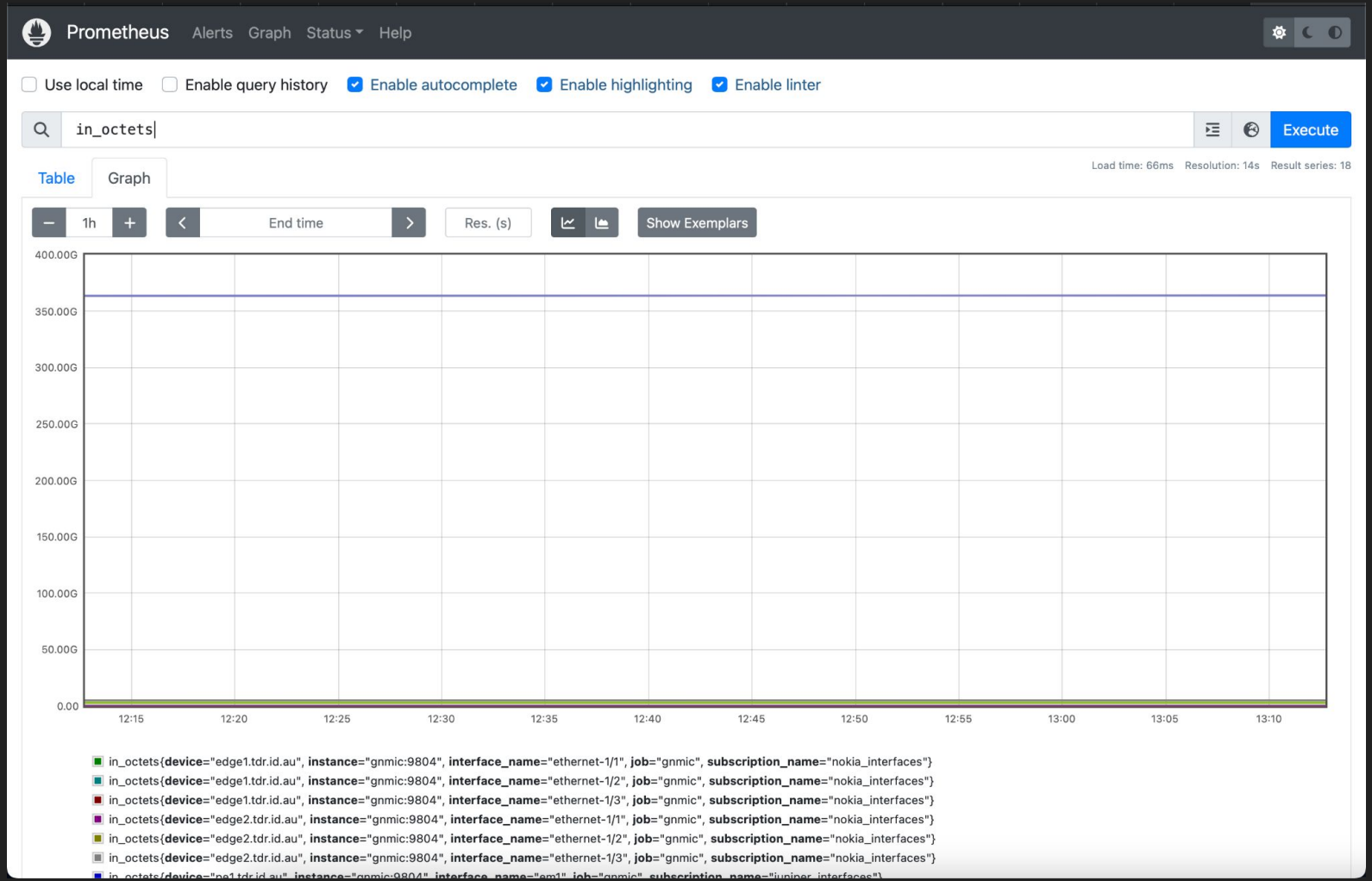
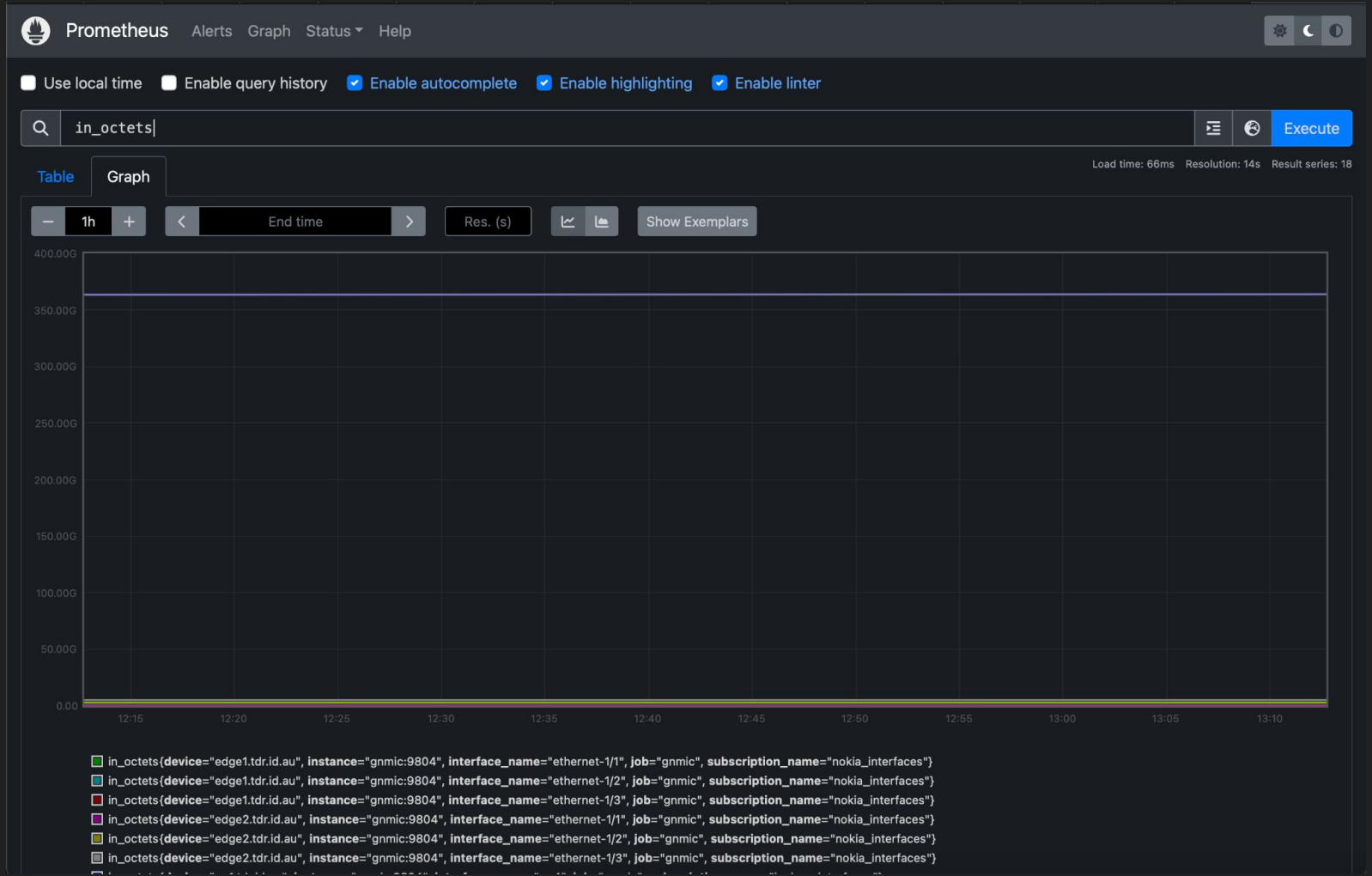


Prometheus
Alerts
Graph
Status
Help
Use local time
Enable query history
Enable autocomplete
Enable highlighting
Enable linter
in_octets
Execute
Table
Graph
Load time: 66ms
Resolution: 14s
Result series: 18
1h
End time
Res. (s)
Show Exemplars
400.00G
350.00G
300.00G
250.00G
200.00G
150.00G
100.00G
50.00G
0.00
12:15
12:20
12:25
12:30
12:35
12:40
12:45
12:50
12:55
13:00
13:05
13:10
in_octets{device="edge1.tdr.id.au", instance="gnmic:9804", interface_name="ethernet-1/1", job="gnmic", subscription_name="nokia_interfaces"}
in_octets{device="edge1.tdr.id.au", instance="gnmic:9804", interface_name="ethernet-1/2", job="gnmic", subscription_name="nokia_interfaces"}
in_octets{device="edge1.tdr.id.au", instance="gnmic:9804", interface_name="ethernet-1/3", job="gnmic", subscription_name="nokia_interfaces"}
in_octets{device="edge2.tdr.id.au", instance="gnmic:9804", interface_name="ethernet-1/1", job="gnmic", subscription_name="nokia_interfaces"}
in_octets{device="edge2.tdr.id.au", instance="gnmic:9804", interface_name="ethernet-1/2", job="gnmic", subscription_name="nokia_interfaces"}
in_octets{device="edge2.tdr.id.au", instance="gnmic:9804", interface_name="ethernet-1/3", job="gnmic", subscription_name="nokia_interfaces"}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12:40
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in_octets{device="edge2.tdr.id.au", instance="gnmic:9804", interface_name="ethernet-1/2", job="gnmic", subscription_name="nokia_interfaces"}
in_octets{device="edge2.tdr.id.au", instance="gnmic:9804", interface_name="ethernet-1/3", job="gnmic", subscription_name="nokia_interfaces"}

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oc_interfaces_in_octets{interface_name="Ethernet4/1",source="pe1bne1"} 1.027039422994083e+15
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oc_interfaces_out_octets{interface_name="Ethernet4/1",source="pe1bne1"} 1.027039422994083e+15
oc_interfaces_out_octets{interface_name="Ethernet5/1",source="pe1bne1"} 7.861197801489082e+15
oc_interfaces_out_octets{interface_name="Ethernet6/1",source="pe1bne1"} 1.851141634241e+12
```

+

```
services{customer="Telco News BV",router="pe1bne1",interface="Ethernet3/1",cid="10G"} 1
services{customer="CubbyColo Pty Ltd",router="pe1bne1",interface="Ethernet3/2",cid="1G"} 1
services{customer="Meme ISP Ltd",router="pe1bne1",interface="Ethernet3/3",cid="1G"} 1
```

```
## Openconfig Streaming
oc_interfaces_in_octets{interface="Ethernet3/1",router="pe1bne1"} 2.422720289164654e+15
oc_interfaces_in_octets{interface="Ethernet4/1",router="pe1bne1"} 1.027039422994083e+15
oc_interfaces_in_octets{interface="Ethernet5/1",router="pe1bne1"} 7.861197801489082e+15
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oc_interfaces_out_octets{interface="Ethernet6/1",router="pe1bne1"} 1.851141634241e+12
```

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services{customer="Telco News BV",router="pe1bne1",interface="Ethernet3/1",cid="10G"} 1
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services{customer="Meme ISP Ltd",router="pe1bne1",interface="Ethernet3/3",cid="1G"} 1
```

```
groups:
 - name: enrichment
   interval: 30s
   rules:
     - record: port_bitrate_rx:30s
       expr: rate(oc_interfaces_in_octets[30s]) * 8
             * on (router,interface)
             group_left(customer,cid) services
   - record: port_bitrate_tx:30s
       expr: rate(oc_interfaces_out_octets[30s]) * 8
             * on (router,interface)
             group_left(customer,cid) services
```

```
port_bitrate_rx:30s{interface="Ethernet3/1",router="pe1bne1",customer="Telco News BV", cid="10G"}
1738753232
port_bitrate_rx:30s{interface="Ethernet3/2",router="pe1bne1",customer="CubbyColo Pty Ltd",
cid="1G"} 921273210
port_bitrate_rx:30s{interface="Ethernet3/3",router="pe1bne1",customer="Meme ISP Ltd", cid="1G"}
632713236


port_bitrate_tx:30s{interface="Ethernet3/1",router="pe1bne1",customer="Telco News BV", cid="10G"}
5778213282
port_bitrate_tx:30s{interface="Ethernet3/2",router="pe1bne1",customer="CubbyColo Pty Ltd",
cid="1G"} 278222481
port_bitrate_tx:30s{interface="Ethernet3/3",router="pe1bne1",customer="Meme ISP Ltd", cid="1G"}
368913450
```

Config on slides

Interactive Demo

Advice

Thanks

Joe @ EdgeIX

Roman & Karim @ Nokia (Containerlab)

Brody @ MemeISP

Where to find me

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