

ZABBIX

# Monitoring the London Underground

# Who am I?



Adan Mohammed  
Project Manager - DevOps

# Who am I?



Nathan Liefting  
Zabbix Consultant / Trainer



# Opensource ICT Solutions

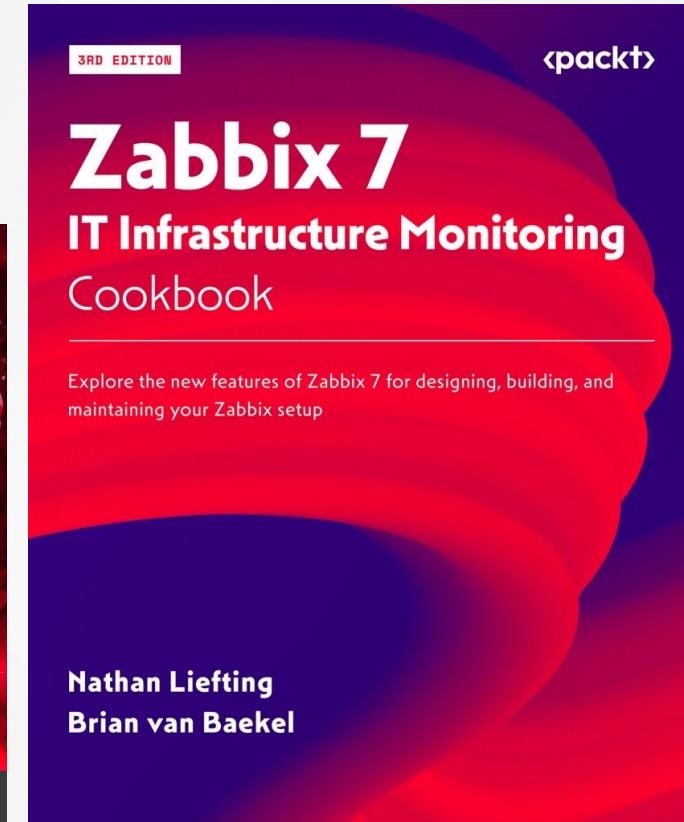
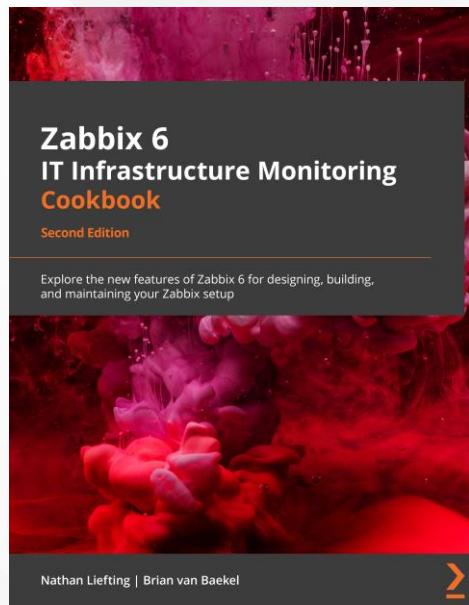
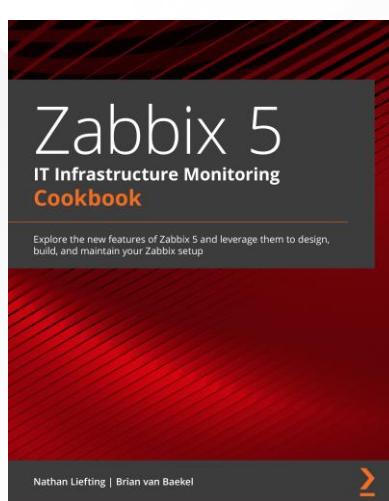
- Zabbix support
- Zabbix training
- Zabbix consultancy
- And more...



**ZABBIX**  
PREMIUM PARTNER



**ZABBIX**  
CERTIFIED TRAINER



**Nathan Liefting  
Brian van Baekel**



# UNLOCKING THE POWER OF AN INTERCONNECTED FUTURE

**Boldyn Networks is one of the largest neutral host providers in the world. Our shared network infrastructures and cutting-edge connectivity solutions are the building blocks for an interconnected future – for everyone.**

## 6 MAJOR TRANSIT NETWORKS

connecting **550m+** passengers annually

## 300+ NEUTRAL HOST venues

**550+** U.S. sports games connected every year

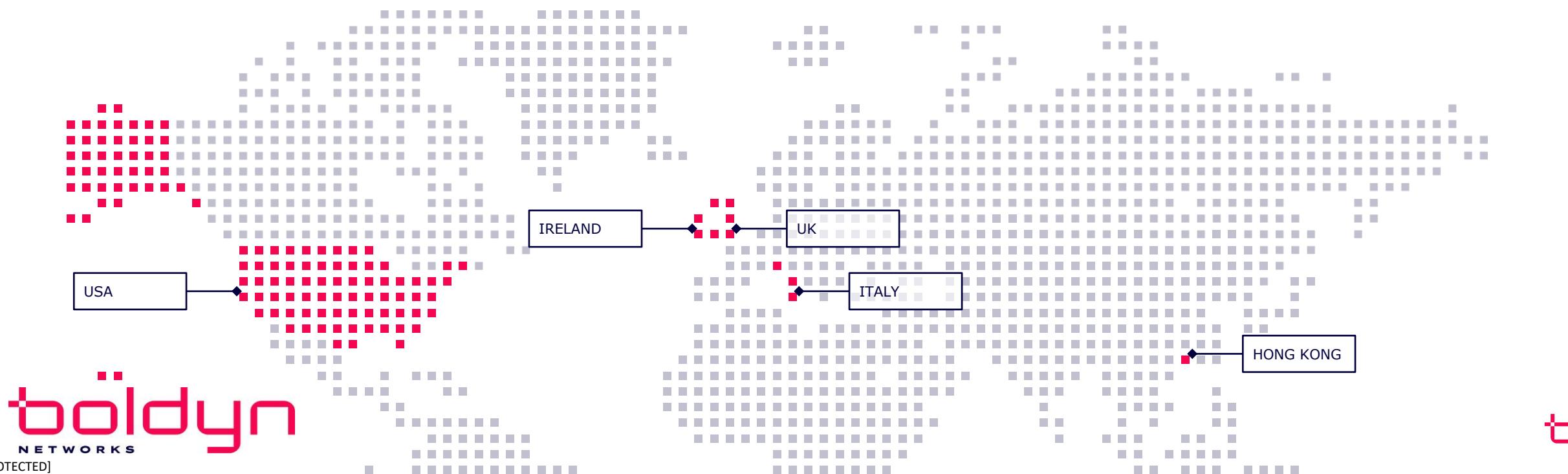
## 120k small cell sites with **13k Online**

**3,000+** route KMs Fibre

## 3 city wide networks

**75+** Military bases

**Majority-owned** by Canada Pension Plan Investment Board since 2009. A trusted long-term investor with C\$570 billion Net assets.





Transport for London(TFL) has awarded **BOLDYN** a 20+5 years contract to deliver a whole range of improvements to connectivity across London, significantly enhancing the Mayor's **Connected London** programme



[oict.com](http://oict.com)



# Building a connected London with Transport for London (TfL)

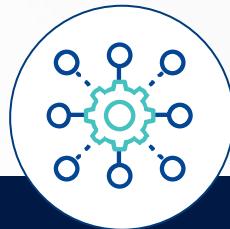


Mobile coverage in **136** stations, platforms and **400km** tunnels

**Emergency services network rollout**



**10** edge data centres  
Base station hotels in **10** city locations



+**400km** dense underground fibre



**TfL Public Wi-Fi**



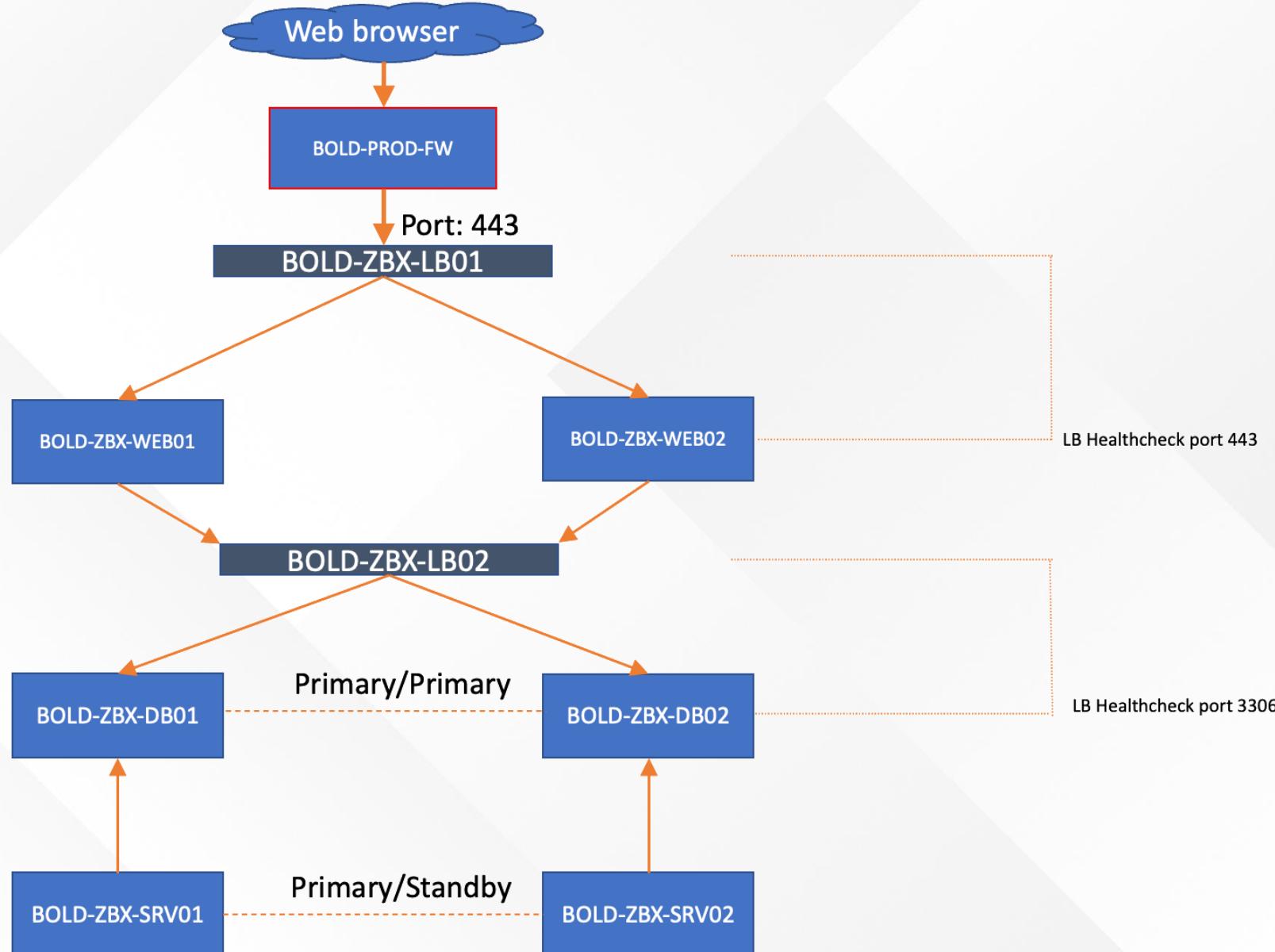
**120k** small cell locations assets including stations, lamp posts, and bus shelters

# Installation

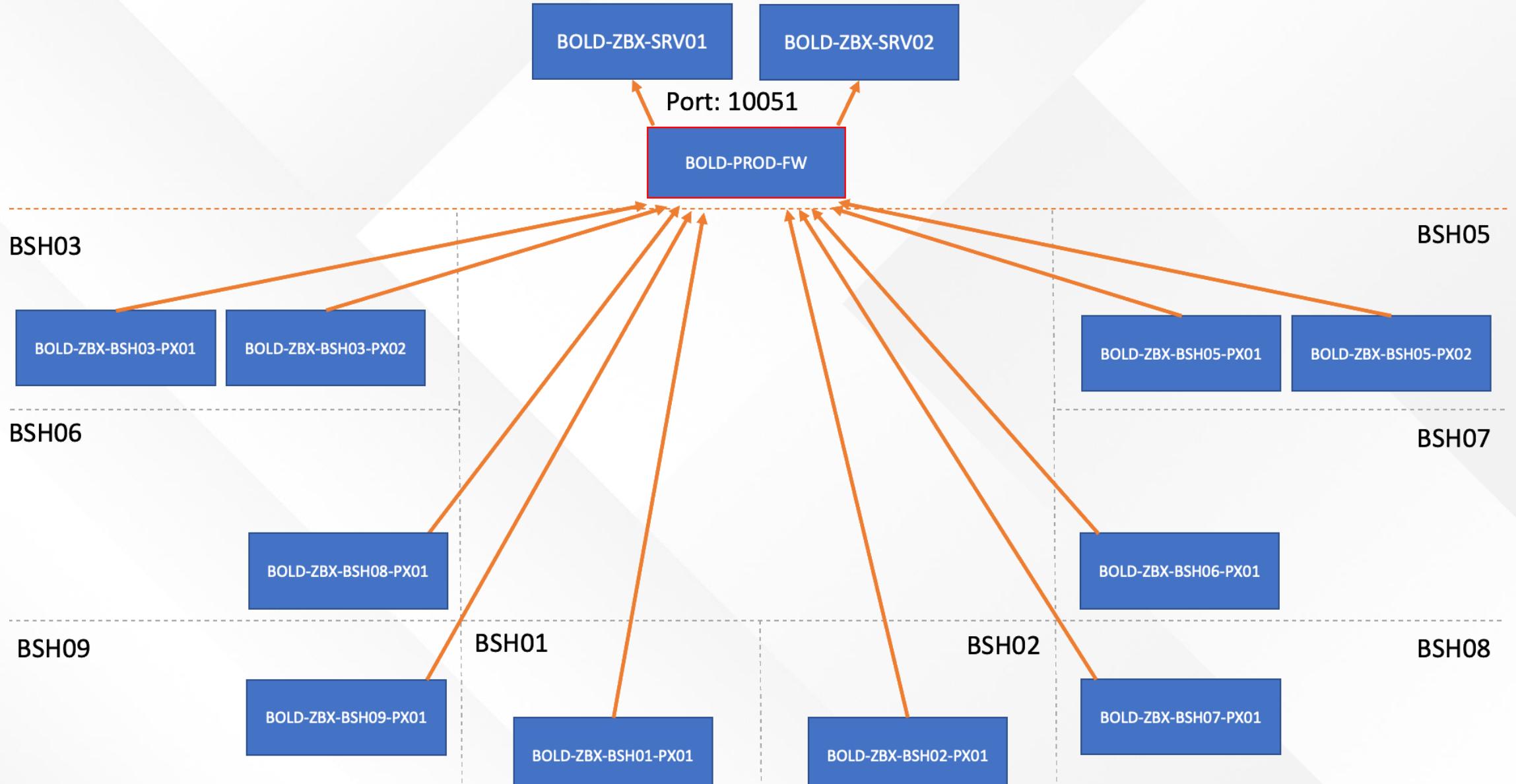
136 stations, platforms , and 400km tunnel network



# High availability



# Base station Proxies



# Custom Proxy loadbalancing

<input type="checkbox"/> BOLD-ZBX-BSH05-PX01	Items 83	Triggers 46	Graphs 13	Discovery 5	Web 10.35.31.5:10050	BOLD-ZBX-BSH05-PX01	BOLDYN Linux by Zabbix agent active, BOLDYN Systemd by Zabbix agent 2 active, BOLDYN Zabbix proxy health	Enabled	ZBX	None	counterpart: BOLD-ZBX-BSH05-PX02
<input type="checkbox"/> BOLD-ZBX-BSH05-PX02	Items 83	Triggers 46	Graphs 13	Discovery 5	Web 10.35.31.6:10050	BOLD-ZBX-BSH05-PX02	BOLDYN Linux by Zabbix agent active, BOLDYN Systemd by Zabbix agent 2 active, BOLDYN Zabbix proxy health	Enabled	ZBX	None	counterpart: BOLD-ZBX-BSH05-PX01

August	2023-07-31 14:46:21	<input type="checkbox"/> Information	PROBLEM	BOLD-ZBX-BSH05-PX01	Zabbix proxy: VIP not present (10.35.31.7/24)	1M 8d 5h	No	1	counterpart: BAIUK-Z... class: software component: system	...
July	2023-06-19 14:36:54	<input type="checkbox"/> High	PROBLEM	BOLD-ZBX-BSH05-PX02	Zabbix proxy: Down	1m 58s	No	1	counterpart: BAIUK-Z... class: software component: system	...

Proxy failover

Tag name equals *counterpart*  
Trigger name contains *Zabbix proxy: VIP not present*  
Trigger name contains *Zabbix proxy: Down*  
Host group equals *App/Zabbix/Proxies*

Run script "Proxy failover" on current host

Problem

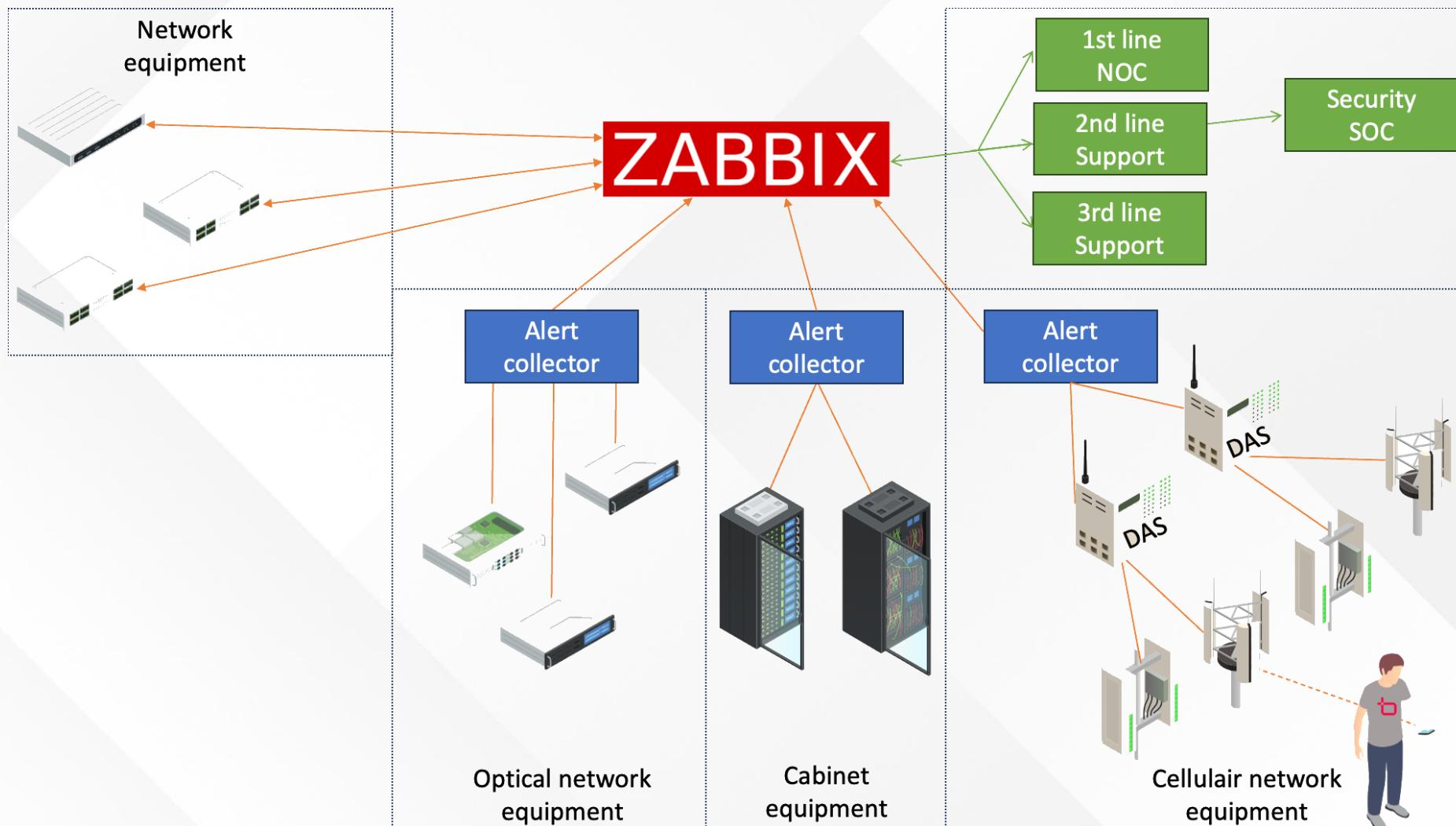
-> Action

-> Script change Hosts proxy

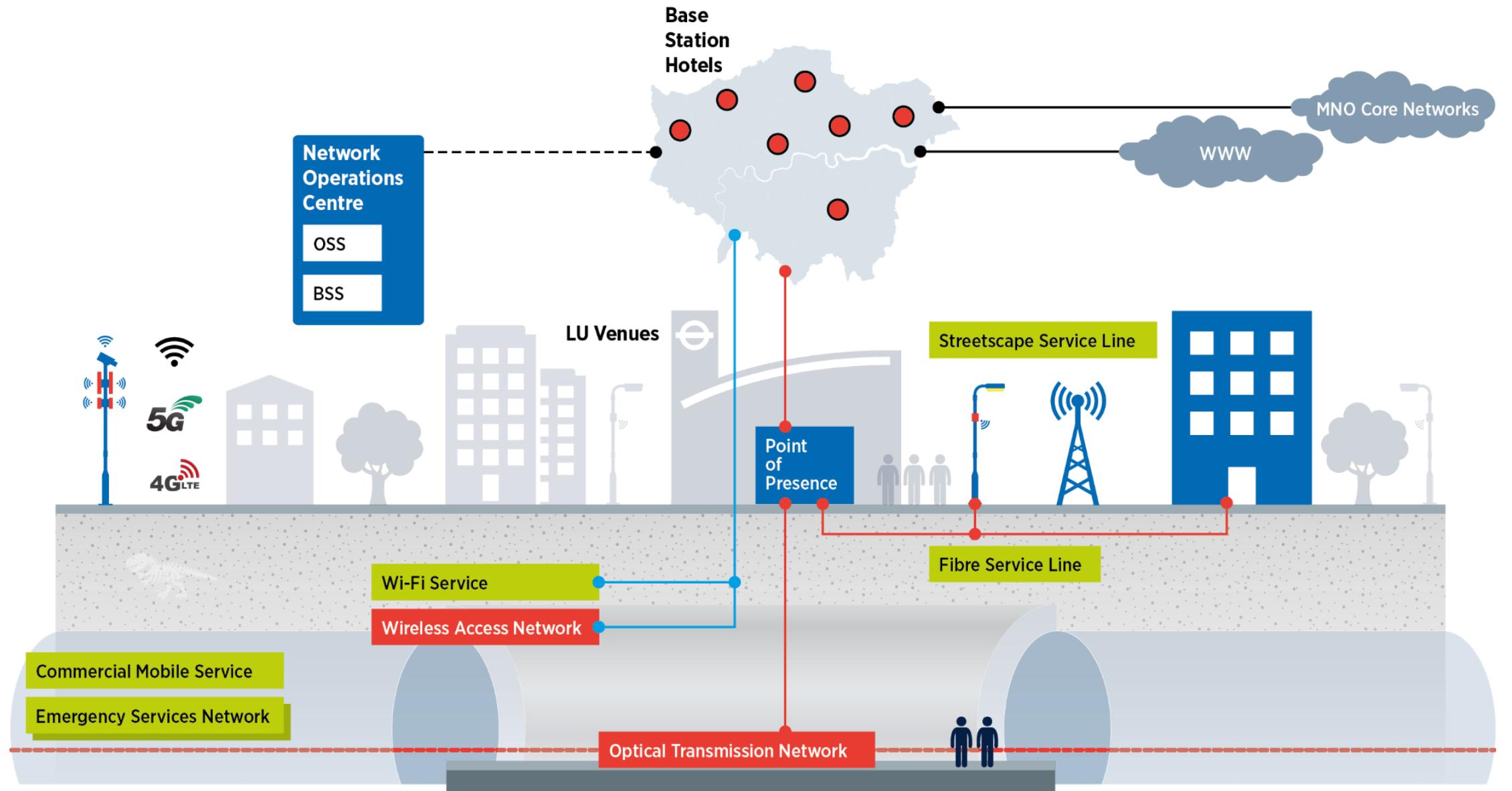
-> Reload config cache

# Monitoring overview

- Networking:
- Fibre equipment:
- Cellulair equipment:
- Cabinets:
- Linux and Windows server
- Everything else
- Other projects



# TCP - High Level Architecture



# Cellular - SNMPTraps

- 1 item, 4 triggers, all events?
  - Macro functions are:  
**all-powerful**

Trigger Tags 4 Dependencies

\* Name Node Alarm: {{ITEM.VALUE}}.regsub("AlarmSequenceNumber|1\.\.3\.\.6\.\.1\.\.1\.\.7\.\.1\.\.1\.\.2\.\.0\.\.2", "1\.\.3\.\.6\.\.1\.\.1\.\.7\.\.1\.\.1\.\.2\.\.0\.\.2")

Event name {{ITEM.VALUE}}.regsub("DasName.\*STRING:\\$1\"([A-Z-a-z0-9]+)\\"|1\.\.3\.\.6\.\.1\.\.1\.\.7\.\.1\.\.0\.\.2", "1\.\.3\.\.6\.\.1\.\.1\.\.7\.\.1\.\.0\.\.2") /{{ITEM.VALUE}}.regsub("EquipmentPath.\*STRING:\\$1\"([A-Z-a-z0-9]+)\\"|1\.\.3\.\.6\.\.1\.\.1\.\.7\.\.1\.\.6\.\.0\.\.2", "1\.\.3\.\.6\.\.1\.\.1\.\.7\.\.1\.\.6\.\.0\.\.2") : {{ITEM.VALUE}}.regsub("AlarmName.\*STRING:\\$1\"([A-Z-a-z0-9]+)\\"|1\.\.3\.\.6\.\.1\.\.1\.\.7\.\.1\.\.9\.\.0\.\.2", "1\.\.3\.\.6\.\.1\.\.1\.\.7\.\.1\.\.9\.\.0\.\.2")

Operational data

Severity Not classified Information Warning Average High **High** Disaster

\* Expression (find(/BOLDYN DAS by SNMP/snmptrap["AlarmNotification|1\.\.3\.\.6\.\.1\.\.1\.\.7\.\.0\.\.2"], #1, "like", "1.1.7.1.11.0 type=2 value=INTEGER: 1")=1  
or  
find(/BOLDYN DAS by SNMP/snmptrap["AlarmNotification|1\.\.3\.\.6\.\.1\.\.1\.\.7\.\.0\.\.2"], #1, "like", "1.1.7.1.11.0 type=2 value=INTEGER: 1")=1)  
and  
find(/BOLDYN DAS by SNMP/snmptrap["AlarmNotification|1\.\.3\.\.6\.\.1\.\.1\.\.7\.\.0\.\.2"], #1, "like", "1.1.7.1.10.0 type=2 value=INTEGER: 2")=1

[Expression constructor](#)

Item Tags 1 Preprocessing

\* Name Node Alarm

Type SNMP trap

\* Key snmptrap["NodeAlarmNotification|1\.\.3\.\.6\.\.1\.\.1\.\.7\.\.0\.\.2"] [Select](#)

Type of information Log

# Cellular - SNMPTraps

## Name:

Node Alarm: {{ITEM.VALUE}}.regsub("AlarmSequenceNumber|1\.3\.6\.1\. 1\.1\.7\.1\.12\.0.\*INTEGER:\s([0-9]+)", \1)}

## Event name:

{{ITEM.VALUE}}.regsub("DasName.\*STRING:\s\"([A-Za-z\s0-9]+)\"|1\.3\.6\.1\. 1\.1\.7\.1\.2\.0.\*STRING:\s\"([A-Za-z\s0-9()-]+)\\"",\1\2)}

/{{ITEM.VALUE}}.regsub("EquipmentPath.\*STRING:\s\"([A-Za-z\s0-9]+)\"|1\.3\.6\.1\. 1\.1\.7\.1\.6\.0.\*STRING:\s\"([A-Za-z\s0-9\\\.\|]+)\\"",\1\2)}:

{{ITEM.VALUE}}.regsub("AlarmName.\*STRING:\s\"([A-Za-z\s0-9]+)\"|1\.3\.6\.1\. 1\.1\.7\.1\.9\.0.\*STRING:\s\"([A-Za-z\s0-9()-]+)\\"",\1\2)}

Time ▾	Severity	Recovery time	Status	Info	Host	Problem	Duration
10:15:15	High		PROBLEM		BOLD-BSH05-Cellulair	DAS Northern DZ 42/DAU.2/HCU.8/LRN.6: Node Offline	26s

Easy to read path to node + alarm name



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# Cellular - SNMPTraps

Expression:

```
(find(/BOLDYN DAS by SNMP/snmptrap["AlarmNotification|1\.3\.6\.1\.1\.1\.7\.0\.2"],#1,"like","1.1.7.1.11.0 type=2  
value=INTEGER: 1")=1
```

or

```
find(/BOLDYN DAS by SNMP/snmptrap["AlarmNotification|1\.3\.6\.1\.1\.7\.0\.2"],#1,"like","AlarmOnOff type=2  
value=INTEGER: 1")=1
```

and

```
find(/BOLDYN DAS by SNMP/snmptrap["AlarmNotification|1\.3\.6\.1\.1\.1\.7\.0\.2"],#1,"like","1.1.7.1.10.0 type=2  
value=INTEGER: 2")=1
```

# Alarm resolution

PROBLEM event generation mode:

Multiple

OK event closes:

All problems if tag value match

Tag for matching:

alarm-number

OK event generation	Expression	Recovery expression	None
PROBLEM event generation mode	Single	Multiple	
OK event closes	All problems	All problems if tag values match	
* Tag for matching	alarm-number		

Make sure the TAG uses the {ITEM.VALUE} + macro function to get the unique **alarm-number**, which is the same at problem **start** and **resolution**.

Trigger	Tags 4	Dependencies						
<table border="1"><tr><td>Trigger tags</td><td>Inherited and trigger tags</td></tr><tr><td>Name</td><td>Value</td></tr><tr><td>alarm-number</td><td><code>{{ITEM.VALUE}.regsub("1\.\3\.\6\.\1\.\1\.\7\.\1\.\12\.\0.*INTEGER:\s([0-9]+)", \1)}</code></td></tr></table>			Trigger tags	Inherited and trigger tags	Name	Value	alarm-number	<code>{{ITEM.VALUE}.regsub("1\.\3\.\6\.\1\.\1\.\7\.\1\.\12\.\0.*INTEGER:\s([0-9]+)", \1)}</code>
Trigger tags	Inherited and trigger tags							
Name	Value							
alarm-number	<code>{{ITEM.VALUE}.regsub("1\.\3\.\6\.\1\.\1\.\7\.\1\.\12\.\0.*INTEGER:\s([0-9]+)", \1)}</code>							

# Monitoring - NOC - SOC

**ZABBIX**

- [Overview](#)
- [Device info](#)
- [TFL](#)
- [Start slideshow](#)

Q

Monitoring

Dashboard

Problems

Hosts

Latest data

Maps

Services

Inventory

Reports

Configuration

**TCP-DCA-SDWAN01**

2023-10-02 09:06:47

**424.52 Mbps ↓**

Interface twan0: Bits sent

**TCP-DCA-SDWAN01**

2023-10-02 09:06:47

**2.91 Gbps ↑**

Interface twan0: Bits received

**TCP-DCB-SDWAN01**

2023-10-02 09:04:04

**446.27 Mbps ↓**

Interface twan0: Bits sent

**TCP-DCB-SDWAN01**

2023-10-02 09:04:04

**2.88 Gbps ↓**

Interface twan0: Bits received

**DCA-DHCP-EE**  
 2023-10-02 09:03:41  
**70 %**  
 DHCP EE-pool: Addresses leased in %

**DCA-DHCP-O2**  
 2023-10-02 09:03:43  
**62 %**  
 DHCP O2-pool: Addresses leased in %

**DCB-DHCP-EE**  
 2023-10-02 09:06:36  
**72 %**  
 DHCP EE-pool: Addresses leased in %

**DCB-DHCP-O2**  
 2023-10-02 09:06:37  
**64 %**  
 DHCP O2-pool: Addresses leased in %

**DCA-DHCP-3UK**  
 2023-10-02 09:03:44  
**33 %**  
 DHCP 3UK-pool: Addresses leased in %

**DCA-DHCP-VF**  
 2023-10-02 09:03:44  
**67 %**  
 DHCP VF-pool: Addresses leased in %

**DCB-DHCP-3UK**  
 2023-10-02 09:06:38  
**35 %**  
 DHCP 3UK-pool: Addresses leased in %

**DCB-DHCP-VF**  
 2023-10-02 09:03:39  
**71 %**  
 DHCP VF-pool: Addresses leased in %

**DCA-NAT-EE**  
 2023-10-02 08:54:46  
**21 %**  
 NAT EE-515-pool: Addresses allocated in %

**DCA-NAT-O2**  
 2023-10-02 08:54:46  
**17 %**  
 NAT O2-715-pool: Addresses allocated in %

**DCB-NAT-EE**  
 2023-10-02 08:55:06  
**21 %**  
 NAT EE-515-pool: Addresses allocated in %

**DCB-NAT-O2**  
 2023-10-02 08:55:06  
**17 %**  
 NAT O2-715-pool: Addresses allocated in %

**DCA-NAT-3UK**  
 2023-10-02 08:54:46  
**17 %**  
 NAT 3UK-415-pool: Addresses allocated in %

**DCA-NAT-VF**  
 2023-10-02 08:54:46  
**17 %**  
 NAT VF-815-pool: Addresses allocated in %

**DCB-NAT-3UK**  
 2023-10-02 08:55:06  
**17 %**  
 NAT 3UK-415-pool: Addresses allocated in %

**DCB-NAT-VF**  
 2023-10-02 08:55:06  
**17 %**  
 NAT VF-815-pool: Addresses allocated in %

**Problems**

Time	Info	Host	Problem + Severity	Operational data	Duration	Ack	Actions	Tags
09:05:45		TCP-DCA-ASR-01	High ICMP ping response time	Value: 940.38ms	54s	No		class: network ...
Today		TCP-DCB-ASR-01	Interface Gi0/0/6(ZABBIX MGMT INTERFACE): Link down	Current state: down (2)	6d 17h 23m	Yes	1 ↗ 1 ↘	class: network ...
2023-09-25 15:43:05								
September								
2023-02-18 13:12:59		TCP-DCB-SDWAN-01	System operational status not Normal	Not normal (1)	7M 15d 18h	Yes	1 ↗ 1 ↘	class: network ...
2023-02-15 13:03:47		TCP-DCA-SDWAN-01	System operational status not Normal	Not normal (1)	7M 18d 19h	Yes	1 ↗ 1 ↘	class: network ...

**Support**

**Integrations**

**Help**

**boldyn**  
NETWORKS

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Opensource ICT Solutions

[SEC=PROTECTED]

# Questions?

