

THE IMPORTANCE OF DATA ANALYTICS IN THE TELECOM INDUSTRY WITH ZABBIX

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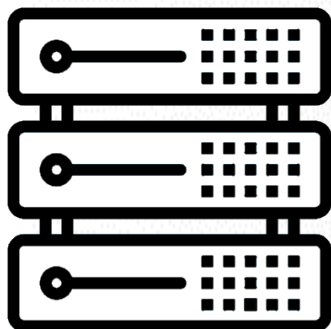
Zabbix Consultant at Lunio Partner Brazil

Speaker in Zabbix Conference LATAM 22/23

Contributor to Zabbix Brasil Community

Help the community in (Facebook, Telegram, LinkedIn, YouTube)





**More than
800 OLTs**

**More than
20 states in Brazil**



Challenges in the telecommunications area



**+280
attendant**

**+400k
Customers**



Challenges of project

01

Integrations

Integrations between systems.

04

Bussines Roles

Development of processes and business rules

02

Integrity

Integrity and updates data

05

Performance

Performance for monitoring and automation of 800 thousand assets monitored.

03

Understand the System Topology

Mapping different systems.

06

High Availability

High Availability between distributed data centers

How to
enhance the customer experience all the time?

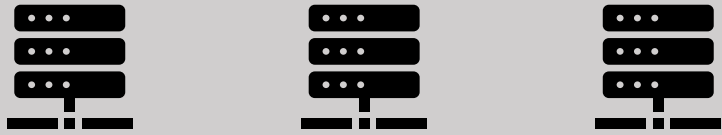
- Monitor all telco data from different sources
- Prepare and build telco structure data in Zabbix
- Delivery data from Zabbix to another systems
- Use telco data to get and improve company process and experience of costumers

What type of data we need?

- ContractNumber
- Index
- Customerid
- Address
- Region
- Devices
- Financial data
- History
- ONU Status
- Signal
- More...
- More...

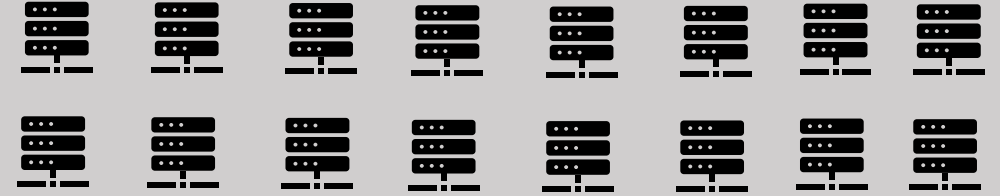
How to deliver it?

03



Zabbix servers in HA

62



Zabbix Proxies

+264.000

Monitored Devices

18.000

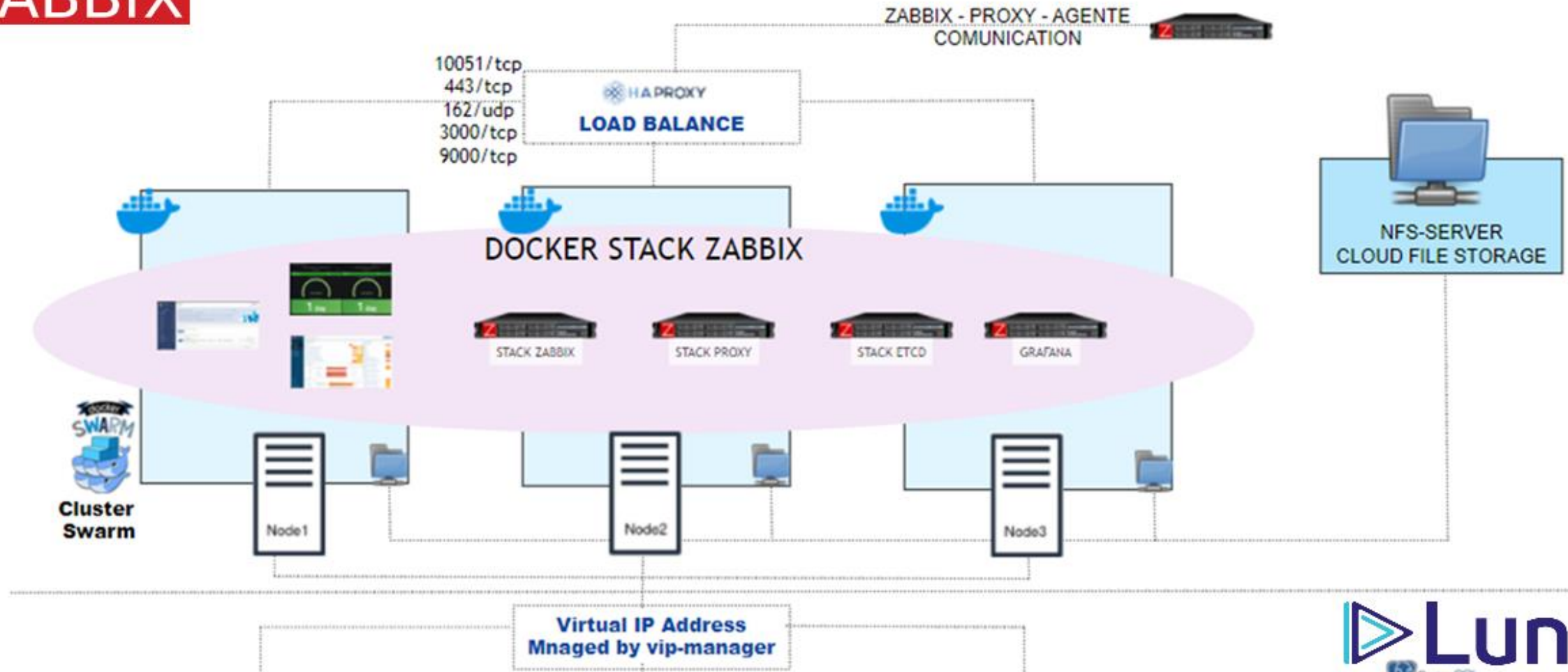
NVPS

Zabbix System Information

System information		
Parameter	Value	Details
Zabbix server is running	Yes	zbx-server-gem_zabbix-server:10051
Number of hosts (enabled/disabled)	264077	263997 / 80
Number of templates	260	
Number of items (enabled/disabled/not supported)	1787605	1373807 / 409898 / 3900
Number of triggers (enabled/disabled [problem/ok])	279129	276781 / 2348 [33754 / 243027]
Number of users (online)	9	1
Required server performance, new values per second	18005.6	

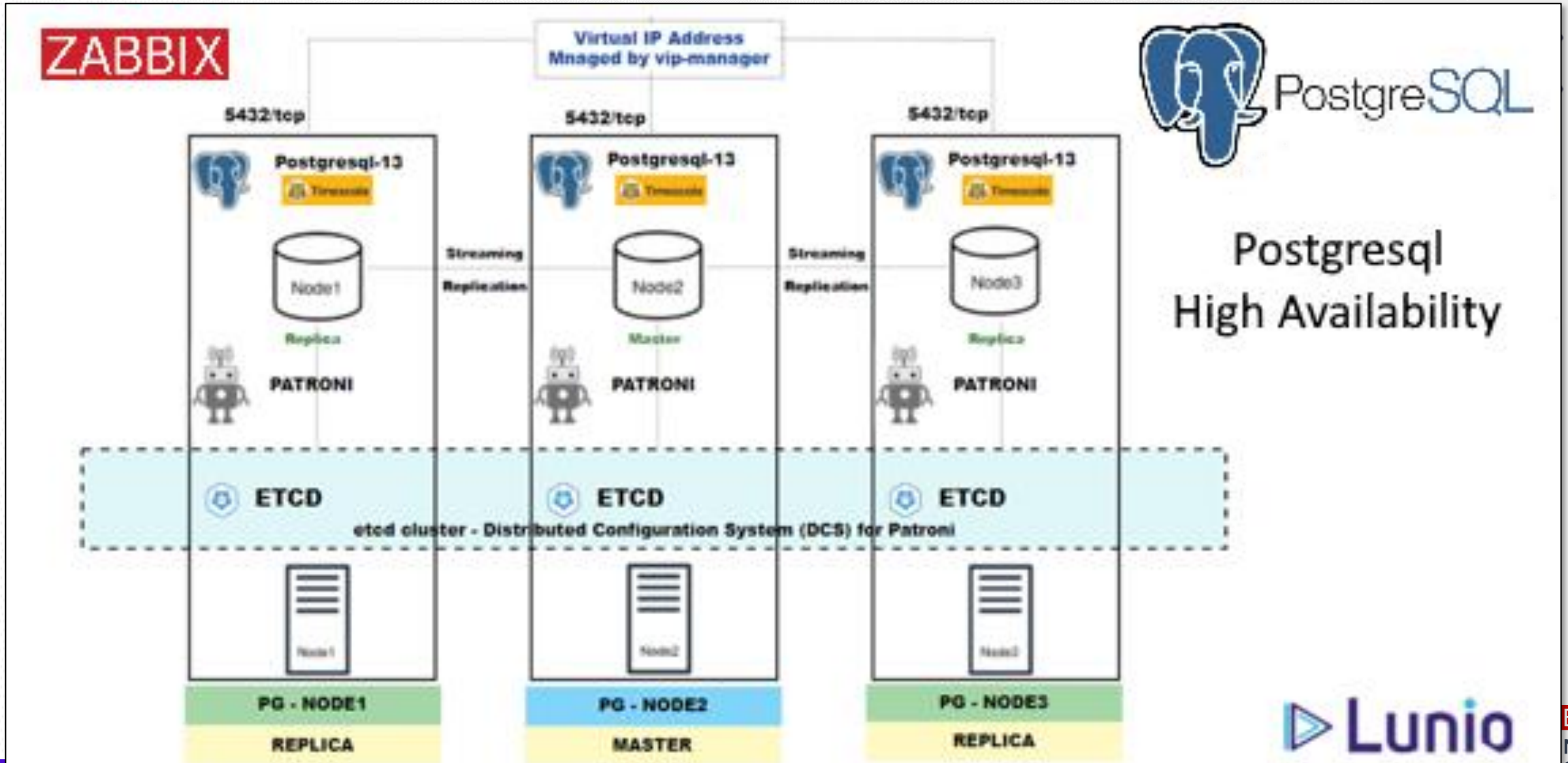
Project Architecture

ZABBIX

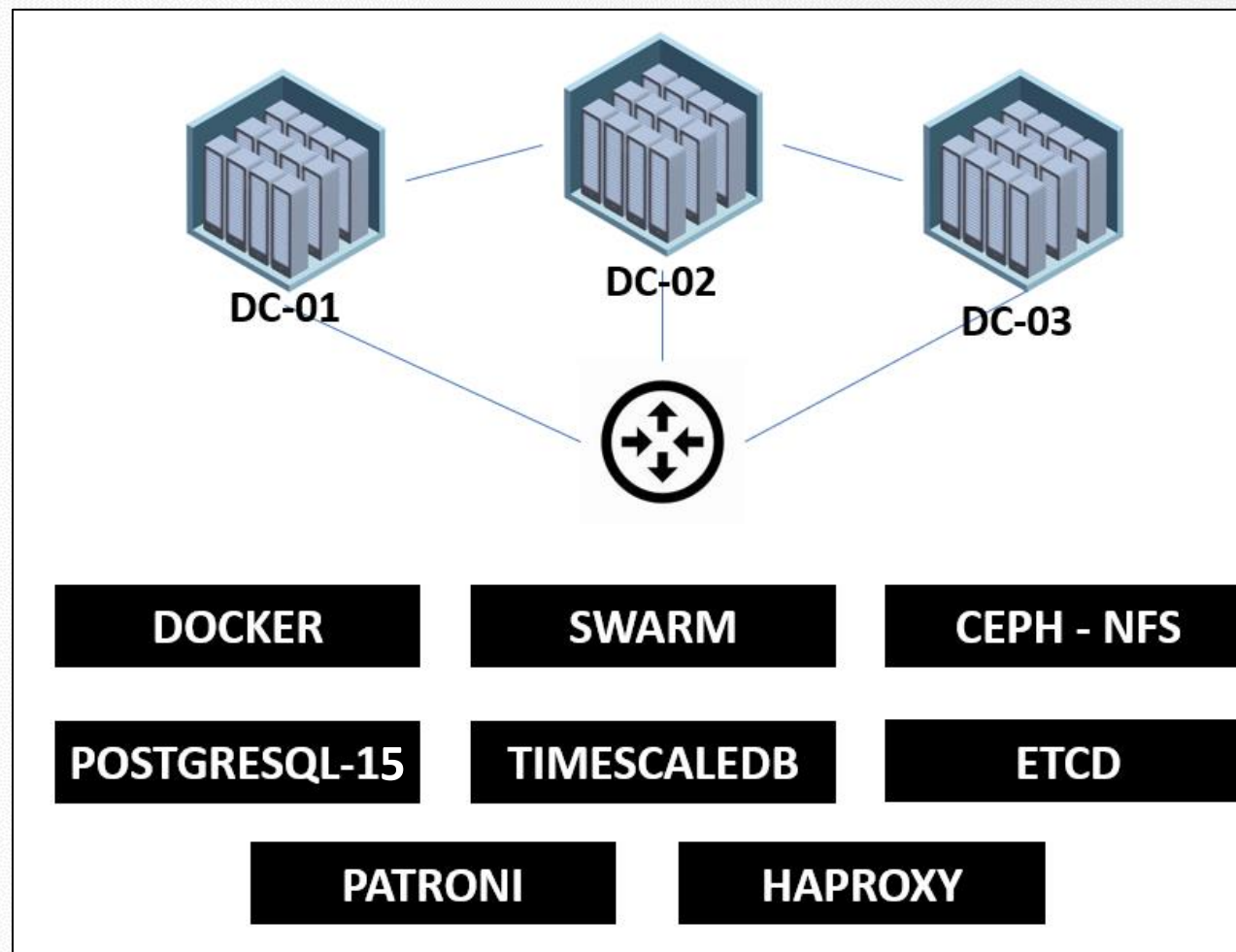


Lunio

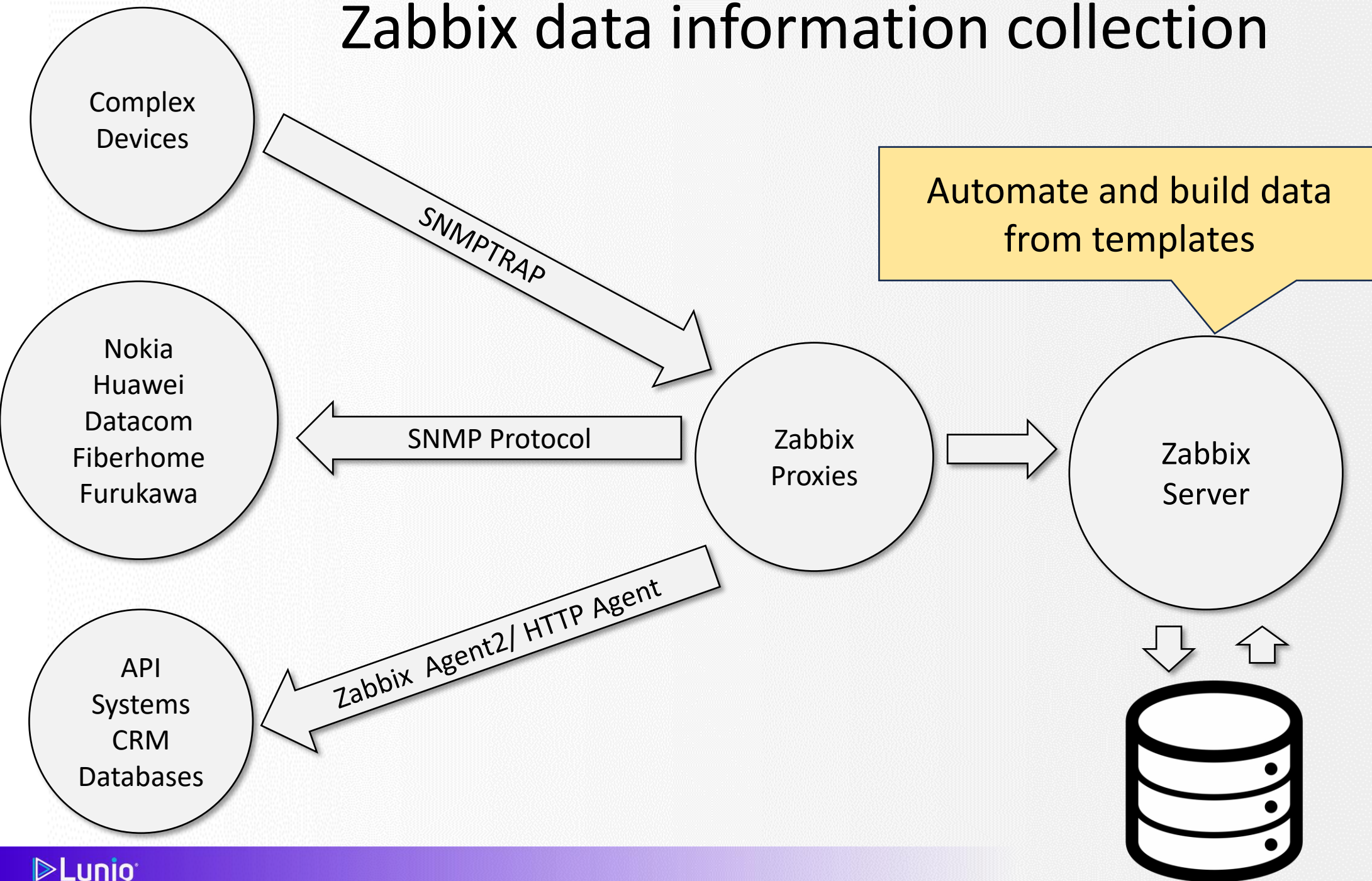
Project Architecture



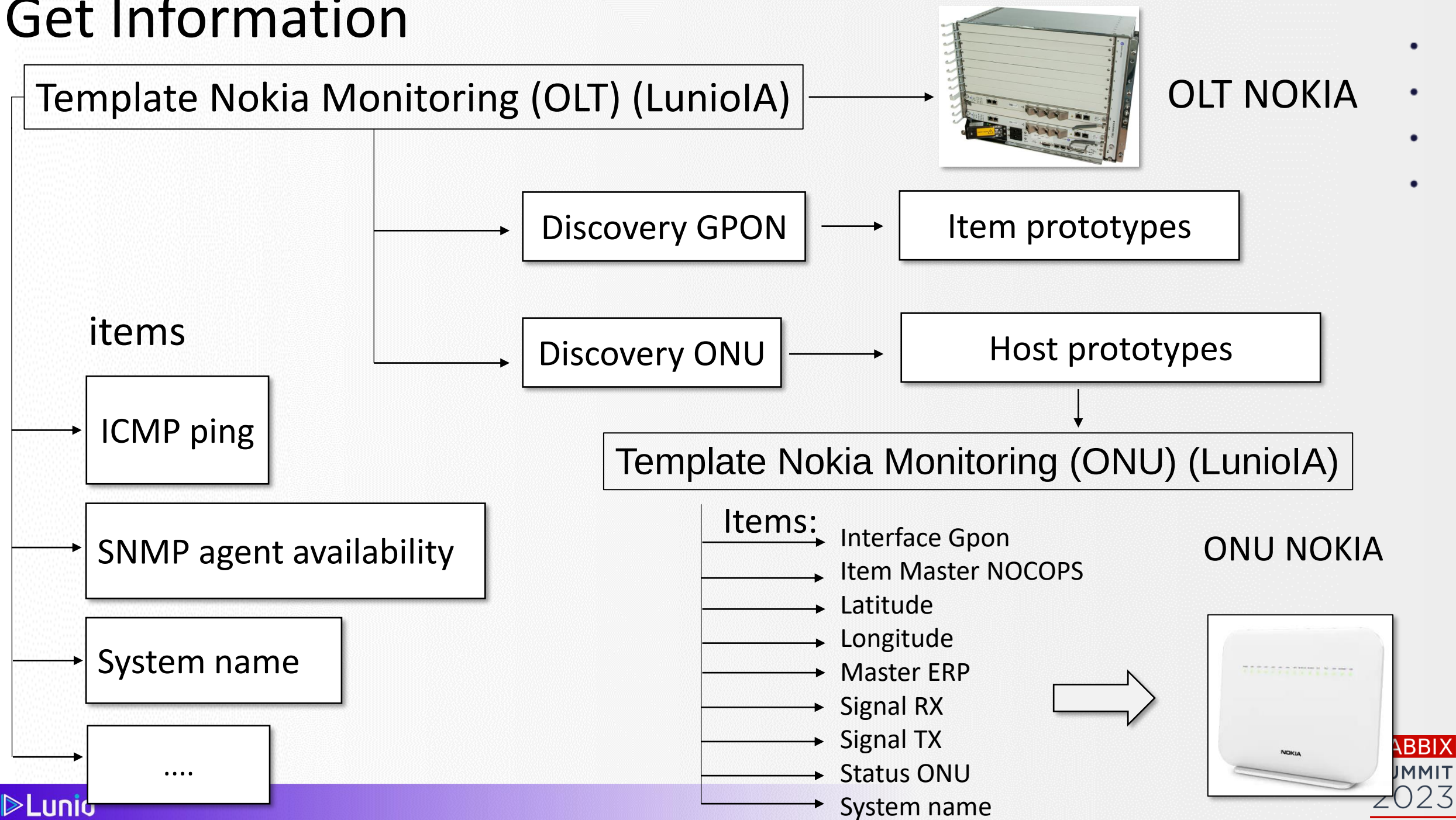
Project technologies architecture



Zabbix data information collection



Get Information



Template Nokia Monitoring (OLT) (LuniolA)

Discovery rule

Preprocessing 3

LLD macros

Filters 1

Overrides

DISCOVERY RULE

Hosts

Host prototypes

Discovery rule

Preprocessing 3

LLD macros

Filters 1

Overrides

Preprocessing steps

Name

Parameters

Custom

* Keep lost resources per

Description

Enabled

```
var result = JSON.parse(value);
var interface = {
  "94371840": "GPON 1/1/1/1",
  "94437376": "GPON 1/1/1/2",
  "94502912": "GPON 1/1/1/3",
  "94568448": "GPON 1/1/1/4"
};
var result2 = [];
for (var i = 0; i < result.length; i++) {
  result2.push({
    '#{SNMPINDEX}': result[i]['#{SNMPINDEX}'],
    '#{IFNAME}': interface[result[i]['#{IFNAME}']] ? interface[result[i]['#{IFNAME}']] :
result[i]['#{IFNAME}']
  })
};
return JSON.stringify(result2);
```

IX

IT

3

Template Nokia Monitoring (OLT) (LuniolA)

Discovery rule Preprocessing 3 LLD macros **Filters 1** Overrides

Filters

	Label Macro		Regular expression	Action
A	{#ONUDESCRIPTION}	matches	.*\-.*\-\d+-.*\.\d+	Remove
Add				

Update

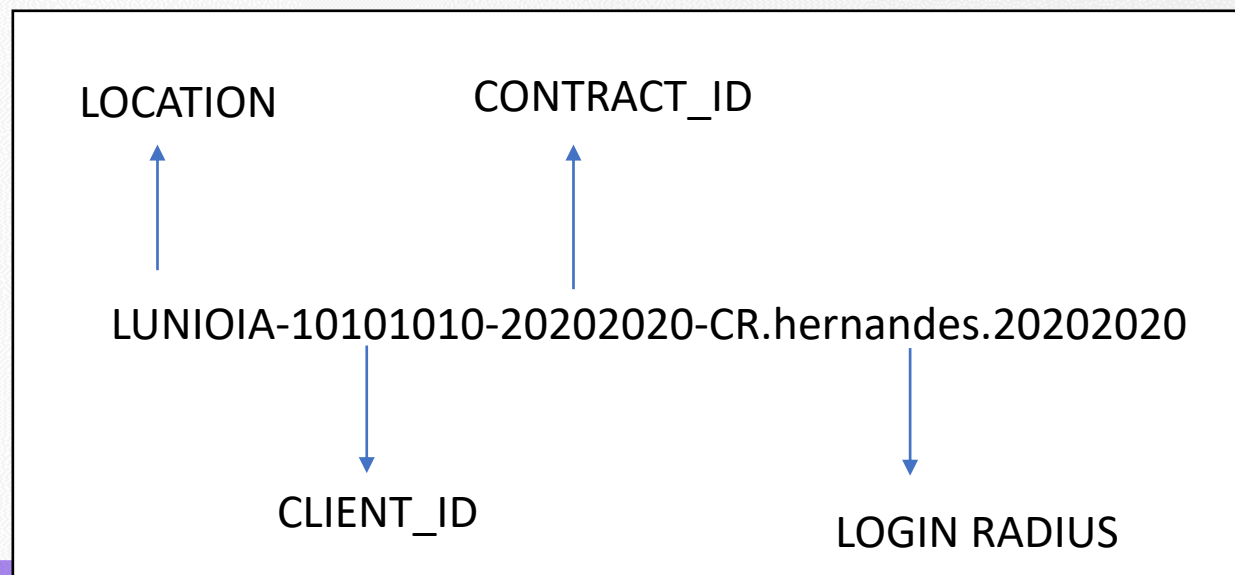
Clone

Test

Delete

Cancel

Model ONT Device Name



Template Nokia Monitoring (OLT) (LuniolA)

☐	Name ▲	Templates	Create enabled	Discover	Tags
☐	{#ONUDESCRIPTION}	[V 1.3 LUNIO] - Nokia Monitoring (ONU) (LuniolA)	Yes	Yes	HOST.ID: {HOST.ID} INTERFACE: {#FNA... OLT: {INVENTORY.AL...

Host

Tags 3

Macros 1

Inventory ●

Encryption

* Host name

{#ONUDESCRIPTION}

Visible name

{#ONUDESCRIPTION}

Templates

Name

[V 1.3 LUNIO] - Nokia Monitoring (ONU) (LuniolA)

type here to search

* Host groups

ONU-Nokia x

type here to search

Select

Group prototypes

{#MACRO}

Remove

Add

Interfaces

Inherit

Custom

Create enabled

☒

Discover

☒

Update

Clone

Delete

Cancel

Host

Tags 3

Macros 1

Inventory ●

Encryption

Name

Value

HOST.ID

{HOST.ID}

Remove

INTERFACE

{#FNAME}

Remove

OLT

{INVENTORY.ALIAS}

Remove

Add

Update

Clone

Delete

Cancel

Macros

Template Nokia Monitoring (OLT) (LuniolA)

HostTags 3Macros 7InventoryEncryption

Host prototype macrosInherited and host prototype macros

Macro	Value	Description
{ \$CONTRATO }	{{#ONUDESCRIPTION}.regsub("V(.*)V", "\1")}	descriptionRemove
{ \$DSN }	zabbix	descriptionRemove
{ \$DSN1 }	adapter	descriptionRemove
{ \$GPON }	{{#SNMPINDEX}.regsub("(.*)\.", "\1")}	descriptionRemove
{ \$MAT }	{{#ONUDESCRIPTION}.regsub("\.(d+)", "\1")}	descriptionRemove
{ \$OIDINDEX }	{#SNMPINDEX}	descriptionRemove
{ \$RADIUS }	{{#ONUDESCRIPTION}.regsub(".*-(.*)", "\1")}	descriptionRemove

Add

regsub

LUNIOIA-10101010-20202020-CR.hernandes.20202020

RESULT

0101010

20202020

CR.hernandes.20202020

SNMPINDEX 342476151.1

RESULT

342476151

342476151.1

Template Nokia Monitoring (OLT) (LuniolA)

☐	ONU: LUNIO-1242945-1784253-SOB.michell.1784253	Items 8	Triggers 1	Graphs	Discovery	Web	172.20.106.37:161	proxy-odbc7	V1.0 - 002 - LUNIO ONU	Enabled	SNMP	None	HOST.ID: {HOST.ID}	INTERFACE: {INVEN...	OLT: {INVENTORY.AL...
☐	ONU: LUNIO-1242945-1784253-SOB.michell.1784253 3	Items 3	Triggers 1	Graphs	Discovery	Web	172.16.105.194:161	proxy-odbc9	[V 1.3 LUNIO] - Nokia Monitoring (ONU) (LuniolA)	Enabled	SNMP	None	HOST.ID: {HOST.ID}	INTERFACE: GPON 1...	OLT: {INVENTORY.AL...
☐	ONU: LUNIO-1242945-1784253-SOB.michell.1784253	Items 8	Triggers 1	Graphs	Discovery	Web	172.20.104.26:161	proxy-odbc	V1.0 - 002 - LUNIO ONU	Enabled	SNMP	None	HOST.ID: {HOST.ID}	INTERFACE: {INVEN...	OLT: {INVENTORY.AL...

Host macros		Inherited and host macros			
Macro	Value		Description		
{ \$CONTRATO }	value	T v	description	Change	Remove (created by host discovery)
{ \$DSN }	zabbix	T v	description	Change	Remove (created by host discovery)
{ \$DSN1 }	adapter	T v	description	Change	Remove (created by host discovery)
{ \$GPON }	4194315776	T v	description	Change	Remove (created by host discovery)
{ \$MAT }	1611097	T v	description	Change	Remove (created by host discovery)
{ \$OIDINDEX }	4194312704.18	T v	description	Change	Remove (created by host discovery)
{ \$RADIUS }	TER.felipe.1611097	T v	description	Change	Remove (created by host discovery)

Template Nokia Monitoring (OLT) (LuniolA)

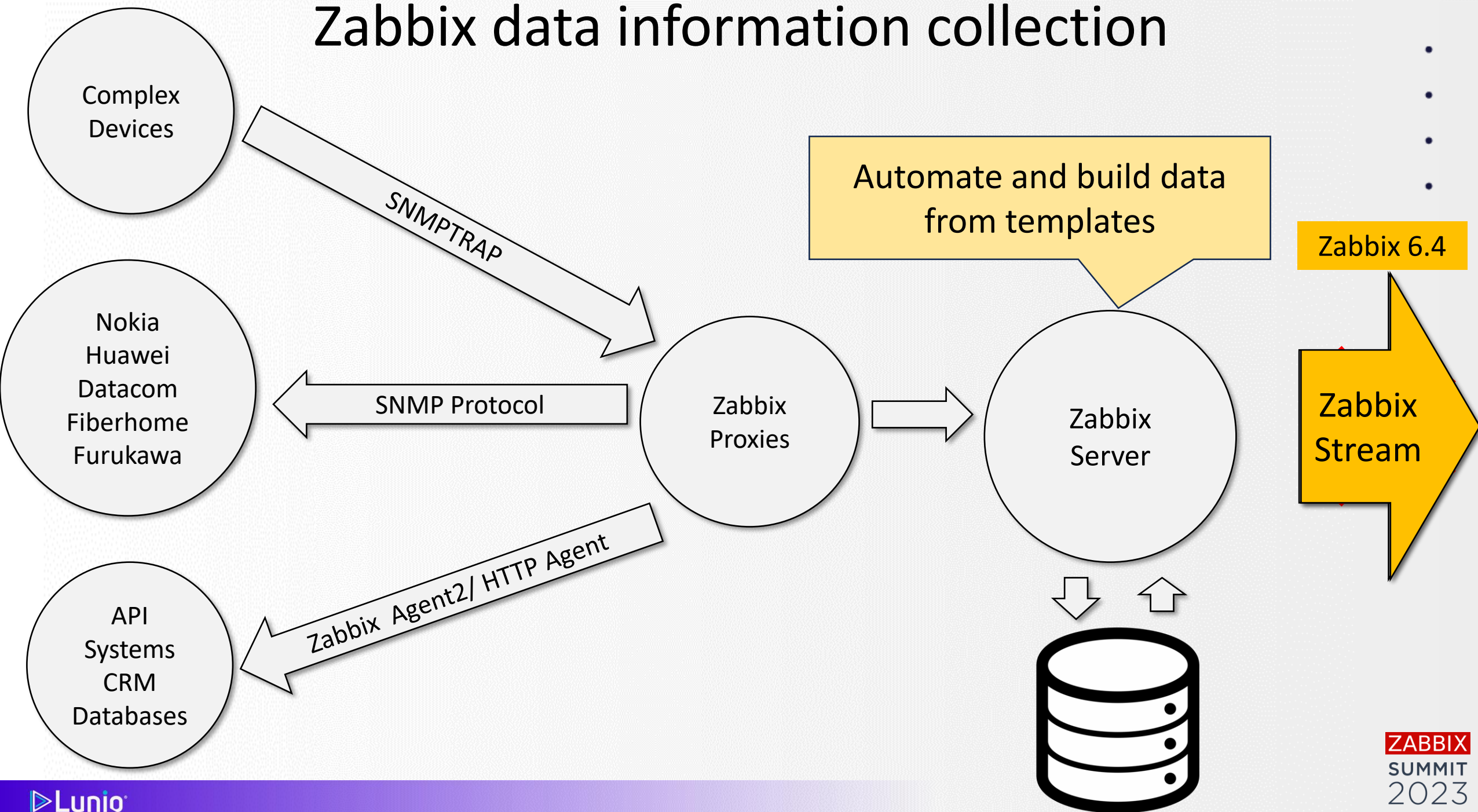
Name ▲	Triggers	Key	Interval	History	Trends	Type	Status
Interface Gpon		hw.gpon.onu	1h	90d		SNMP agent	Enabled
Item Master		nocops	5m	1d		HTTP agent	Enabled
Master Item Adapter: Latitude		latitude		90d		Dependent item	Enabled
Master Item Adapter: Longitude		longitude		90d		Dependent item	Enabled
Master Item Adapter		db.odbc.select[clientID,{SDSN1}]	1h	1h		Database monitor	Enabled
Sinal RX		hw.sinal.rx.onu	5m	90d	365d	SNMP agent	Enabled
Status	Triggers 1	hw.status.onu	5m	90d	365d	SNMP agent	Enabled
System name		system.name	1h	2w		SNMP agent	Enabled

Time ▼	☐	Severity	Recovery time	Status	Info	Host	Problem	Duration	Ack	Actions	Tags
11:21:55	☐	Warning		PROBLEM	BLARG-935825-1169027-FOR.camila.1169027	LUNIO3-935825-1169027-FOR.camila.1169027 - ONU Down	2m 38s	No	1	→	HOST.ID: 1183575 INTERFACE: GPON 0... OLT:
11:21:55	☐	Warning		PROBLEM	BLARG-935825-1169027-FOR.camila.1169027	LUNIO2-935825-1169027-FOR.camila.1169027 - ONU Down	2m 38s	No	1	→	HOST.ID: 1183575 INTERFACE: GPON 0... OLT:
11:21:55	☐	Warning		PROBLEM	BLARG-935825-1169027-FOR.camila.1169027	LUNIO1-935825-1169027-FOR.camila.1169027 - ONU Down	2m 38s	No	1	→	HOST.ID: 1183575 INTERFACE: GPON 0... OLT:

Host prototypes

☐	Name	Items	Triggers	Graphs	Discovery	Web	Interface	Proxy	Templates	Status ▲	Availability	Agent encryption	Info	Tags	
☐	ONU: BLARG-1135689-1563009-CAM.maria.1563009	Items 8	Triggers 1	Graphs	Discovery	Web	172.16.107.50:161	proxy-odbc3	V1.0 - 002 - LUNIO ONU	Enabled	SNMP	None	HOST.ID: {HOST.ID}	INTERFACE: {INVEN...	OLT: {INVENTORY.AL...
☐	ONU: BLARG-1136179-1564385-FOR.maria.1564385	Items 8	Triggers 1	Graphs	Discovery	Web	10.6.1.10:161	proxy-odbc2	V1.0 - 002 - LUNIO ONU	Enabled	SNMP	None	HOST.ID: {HOST.ID}	INTERFACE: {INVEN...	OLT: {INVENTORY.AL...
☐	ONU: BLARG-42065-493983-TAB.fabricia.493983	Items 8	Triggers 1	Graphs	Discovery	Web	172.20.106.37:161	proxy-odbc7	V1.0 - 002 - LUNIO ONU	Enabled	SNMP	None	HOST.ID: {HOST.ID}	INTERFACE: {INVEN...	OLT: {INVENTORY.AL...
☐	ONU: BLARG-1157221-1607337-TAB.maria.1607337	Items 8	Triggers 1	Graphs	Discovery	Web	172.20.106.37:161	proxy-odbc7	V1.0 - 002 - LUNIO ONU	Enabled	SNMP	None	HOST.ID: {HOST.ID}	INTERFACE: {INVEN...	OLT: {INVENTORY.AL...
☐	ONU: BLARG-800789-936547-IPO.jose.936547	Items 8	Triggers 1	Graphs	Discovery	Web	172.16.111.162:161	proxy-odbc	V1.0 - 002 - LUNIO ONU	Enabled	SNMP	None	HOST.ID: {HOST.ID}	INTERFACE: {INVEN...	OLT: {INVENTORY.AL...
☐	ONU: BLARG-950017-1200131-MAR.crisnayane.1200131	Items 8	Triggers 1	Graphs	Discovery	Web	10.6.0.66:161	proxy-odbc8	V1.0 - 002 - LUNIO ONU	Enabled	SNMP	None	HOST.ID: {HOST.ID}	INTERFACE: {INVEN...	OLT: {INVENTORY.AL...
☐	ONU: BLARG-0-0-FOR.maria.386800	Items 8	Triggers 1	Graphs	Discovery	Web	10.6.0.66:161	proxy-odbc8	V1.0 - 002 - LUNIO ONU	Enabled	SNMP	None	HOST.ID: {HOST.ID}	INTERFACE: {INVEN...	OLT: {INVENTORY.AL...
☐	ONU: BLARG-1042263-1356065-TER.francisca.1356065	Items 8	Triggers 1	Graphs	Discovery	Web	172.16.103.194:161	proxy-odbc8	V1.0 - 002 - LUNIO ONU	Enabled	SNMP	None	HOST.ID: {HOST.ID}	INTERFACE: {INVEN...	OLT: {INVENTORY.AL...
☐	ONU: BLARG-1159237-1611097-TER.felipe.1611097	Items 8	Triggers 1	Graphs	Discovery	Web	172.16.103.194:161	proxy-odbc8	V1.0 - 002 - LUNIO ONU	Enabled	SNMP	None	HOST.ID: {HOST.ID}	INTERFACE: {INVEN...	OLT: {INVENTORY.AL...
☐	ONU: BLARG-88935-105425-aqu.premium.105425	Items 8	Triggers 1	Graphs	Discovery	Web	172.20.104.26:161	proxy-odbc	V1.0 - 002 - LUNIO ONU	Enabled	SNMP	None	HOST.ID: {HOST.ID}	INTERFACE: {INVEN...	OLT: {INVENTORY.AL...
☐	ONU: BLARG-92889-110353-aqu.marilia.110353	Items 8	Triggers 1	Graphs	Discovery	Web	172.20.104.26:161	proxy-odbc	V1.0 - 002 - LUNIO ONU	Enabled	SNMP	None	HOST.ID: {HOST.ID}	INTERFACE: {INVEN...	OLT: {INVENTORY.AL...
☐	ONU: BLARG-198299-236077-sao.rogerio.236077	Items 8	Triggers 1	Graphs	Discovery	Web	172.20.104.90:161	proxy-odbc4	V1.0 - 002 - LUNIO ONU	Enabled	SNMP	None	HOST.ID: {HOST.ID}	INTERFACE: {INVEN...	OLT: {INVENTORY.AL...
☐	Discovery ONU: BLARG-1206413-1708747-FAR.laercio.1708747	Items 3	Triggers 1	Graphs	Discovery	Web	172.20.98.71:161	proxy-odbc8	V1.0 - 003 - LUNIO ONU FURUKAWA	Enabled	SNMP	None	HOST.ID: {HOST.ID}	INTERFACE: {INVEN...	OLT: {INVENTORY.AL...
☐	ONU: BLARG-1206007-1708035-TER.maria.1708035	Items 3	Triggers 1	Graphs	Discovery	Web	172.16.105.98:161	proxy-odbc10	[V 1.3 LUNIO] - Nokia Monitoring (ONU) (LuniolA)	Enabled	SNMP	None	HOST.ID: {HOST.ID}	INTERFACE: GPON 1...	OLT: {INVENTORY.AL...
☐	ONU: BLARG-1205693-1707403-TER.gabriel.1707403	Items 3	Triggers 1	Graphs	Discovery	Web	172.16.105.98:161	proxy-odbc10	[V 1.3 LUNIO] - Nokia Monitoring (ONU) (LuniolA)	Enabled	SNMP	None	HOST.ID: {HOST.ID}	INTERFACE: GPON 1...	OLT: {INVENTORY.AL...
☐	ONU: BLARG-1203781-1703507-FOR.robes.1703507	Items 3	Triggers 1	Graphs	Discovery	Web	172.20.41.105:161	proxy-odbc8	[V 1.3 LUNIO] - Nokia Monitoring (ONU) (LuniolA)	Enabled	SNMP	None	HOST.ID: {HOST.ID}	INTERFACE: GPON 1...	OLT: {INVENTORY.AL...
☐	ONU: BLARG-320108-1361455-ara.douglas.327720	Items 8	Triggers 1	Graphs	Discovery	Web	172.20.102.12:161	proxy-odbc4	V1.0 - 002 - LUNIO ONU	Enabled	SNMP	None	HOST.ID: {HOST.ID}	INTERFACE: {INVEN...	OLT: {INVENTORY.AL...

Zabbix data information collection



Zabbix Stream

Zabbix Server

Zabbix Stream

Connector

* Name

Protocol

Data type

* URL

Tag filter

ONU	Equals	DATACOM	Remove
ONU	Equals	FURUKAWA	Remove
ONU	Equals	HUAWEI	Remove
ONU	Equals	NOKIA	Remove
ONU	Equals	ZTE	Remove

[Add](#)

HTTP authentication

Username

Connectors http stream Zabbix 6.4

Connectors http stream Zabbix 6.4

Z

Connectors

?

Create connector

0 selected

Enable

Disable

Delete

Name

Events Stream BRAS

Events Stream GPON

Events Stream ONT

Item Stream Data BRAS

Item Stream Data GPON

Item Stream Data ONU

Connector

?

x

Protocol

Zabbix Streaming Protocol v1.0

Data type

Item values

Events

* URL

https://hostname/api/exchanges/vhost/amq.default/publish

Tag filter

And/Or

Or

ONU

Equals

DATACOM

Remove

ONU

Equals

FURUKAWA

Remove

ONU

Equals

HUAWEI

Remove

ONU

Equals

NOKIA

Remove

ONU

Equals

ZTE

Remove

Add

HTTP authentication

Basic

Username

username

Password

password

Update

Clone

Delete

Cancel

Filter

Status

Enabled

Enabled

Enabled

Enabled

Enabled

Enabled

Displaying 6 of 6 found

Zabbix 6.4.3. © 2001–2023, Zabbix SIA

Zabbix Stream Data

POST /api/exchanges/vhost/amq.default/publish HTTP/1.1

Host: hostname

Accept: */*

Accept-Encoding: deflate, gzip, br, zstd

Content-Length: 628

Content-Type: application/x-ndjson

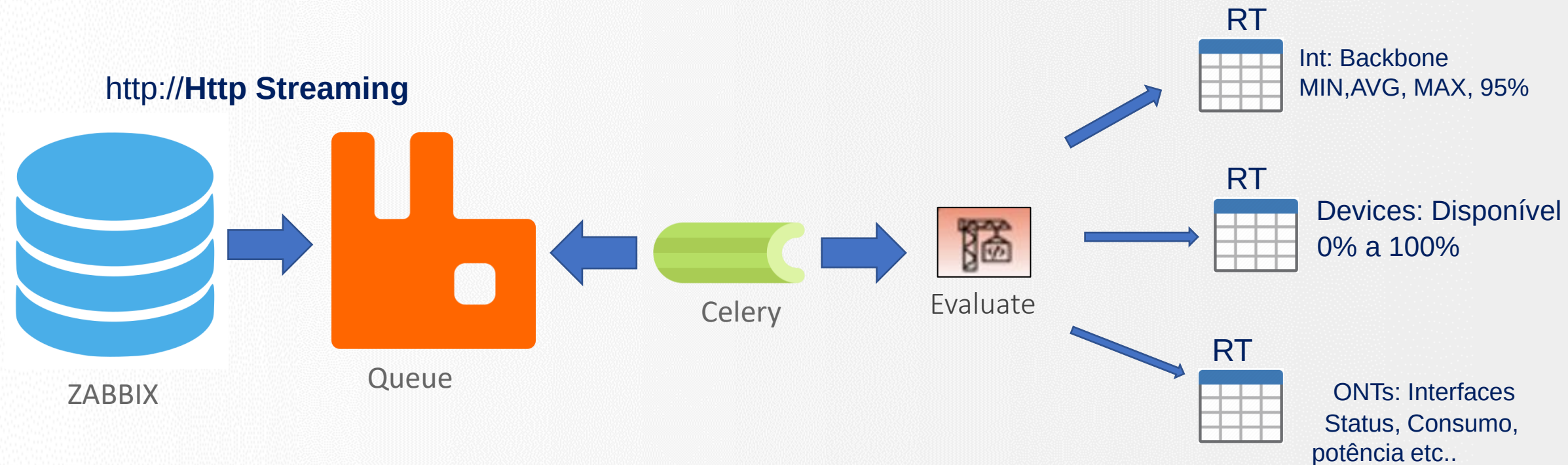
```
{"clock":1673454303,"ns":800155804,"value":1,"eventid":109873,"name":"BLARG-1088002-1450222-FOR.hernandes.1450222 - ONU Down","severity":4,"hosts":[{"host":"BLARG-1088002-1450222-FOR.hernandes.1450222","name":"BLARG-1088002-1450222-FOR.hernandes.1450222"}],"groups":["ONTs"],"tags":[{"tag":"NOKIA","value":""}, {"tag":"HOST.ID","value":"687817"}, {"tag":"INTERFACE","value":"GPON 1/1/2/1"}, {"tag":"OLT","value":"GCAMOBGP1"}, {"tag":"TAG","value":"FISICO"}]}
```

Tag List:

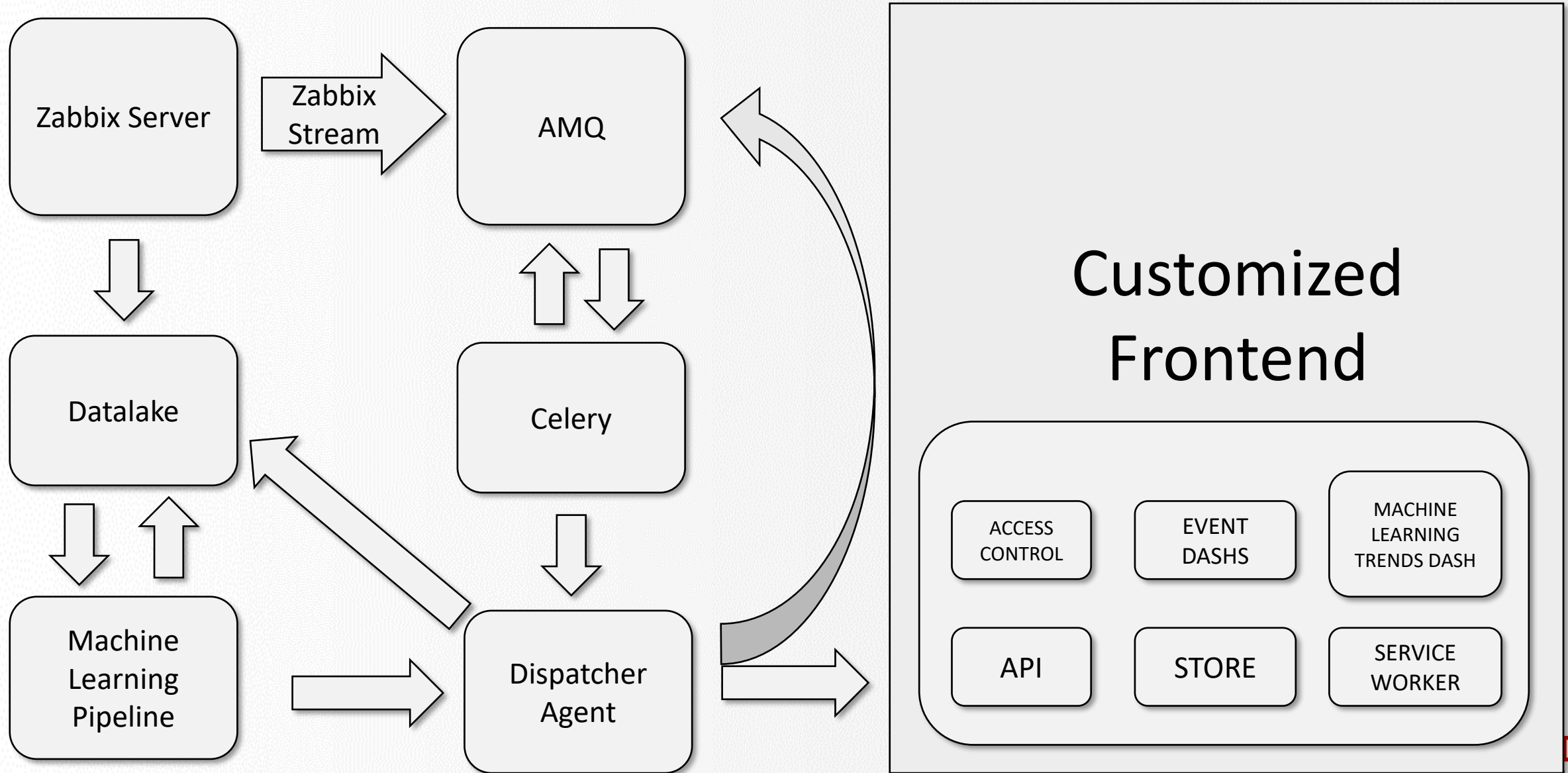
- VENDOR: **NOKIA**
- HOST.ID: 687817
- INTERFACE: GPON **1/1/2/1**
- OLT: GCAMOBGP1
- TAG: FISICO

Zabbix Stream

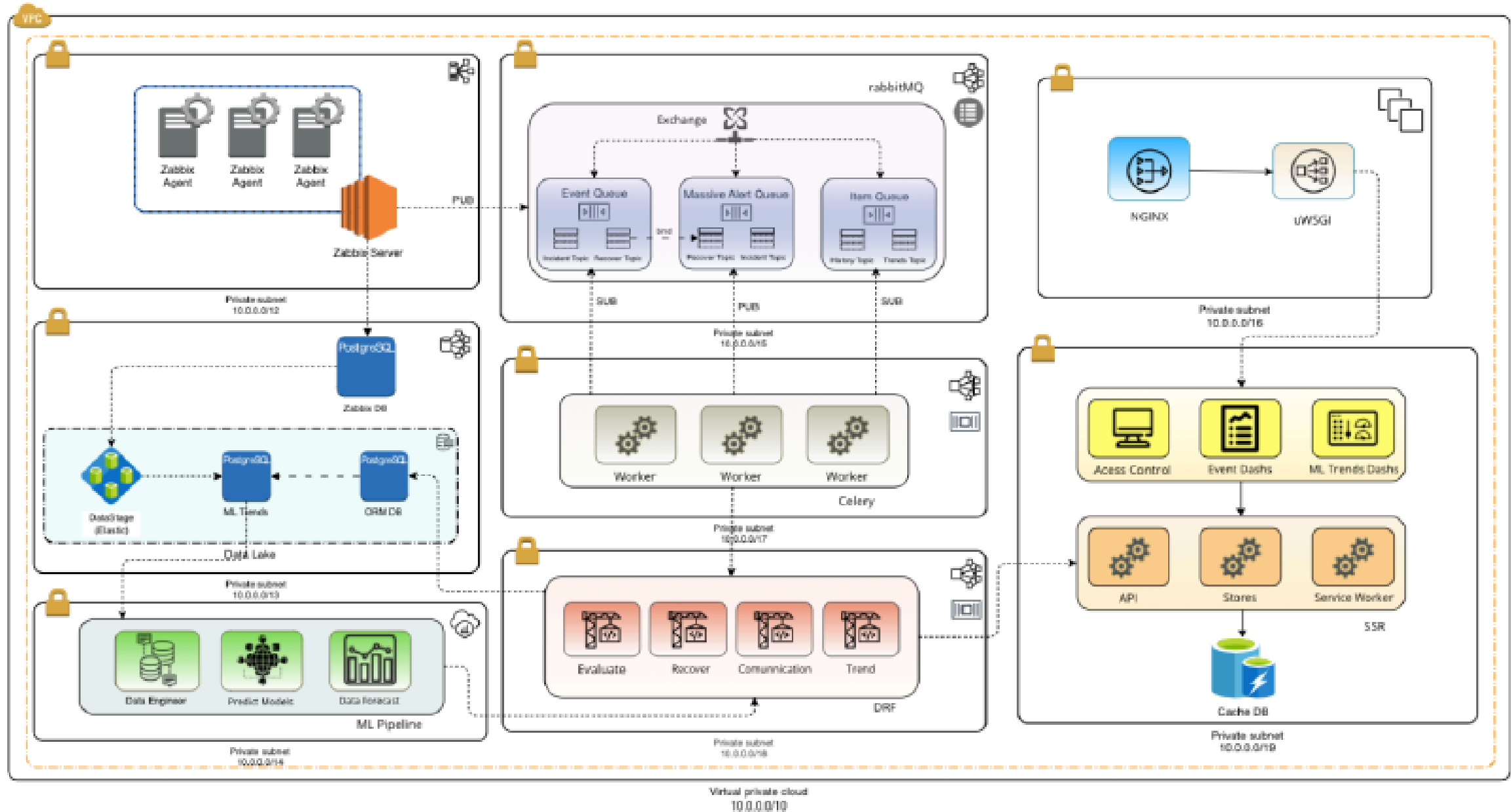
☐ Name ▲	Data type	Status
☐ Events Stream BRAS	Events	Enabled
☐ Events Stream GPON	Events	Enabled
☐ Events Stream ONT	Events	Enabled
☐ Item Stream Data BRAS	Item values	Enabled
☐ Item Stream Data GPON	Item values	Enabled
☐ Item Stream Data ONU	Item values	Enabled



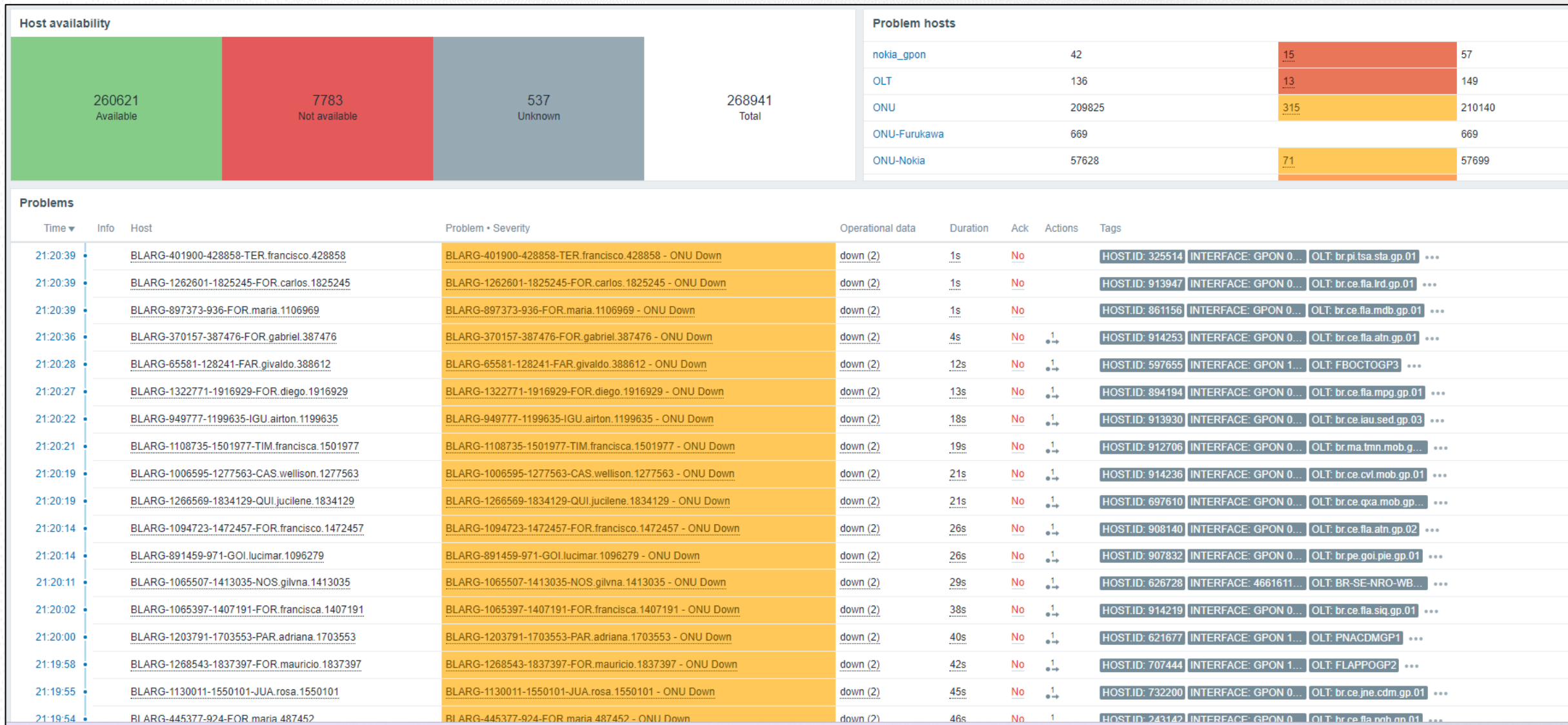
Data solution flow



Data solution topology



Problems Overview

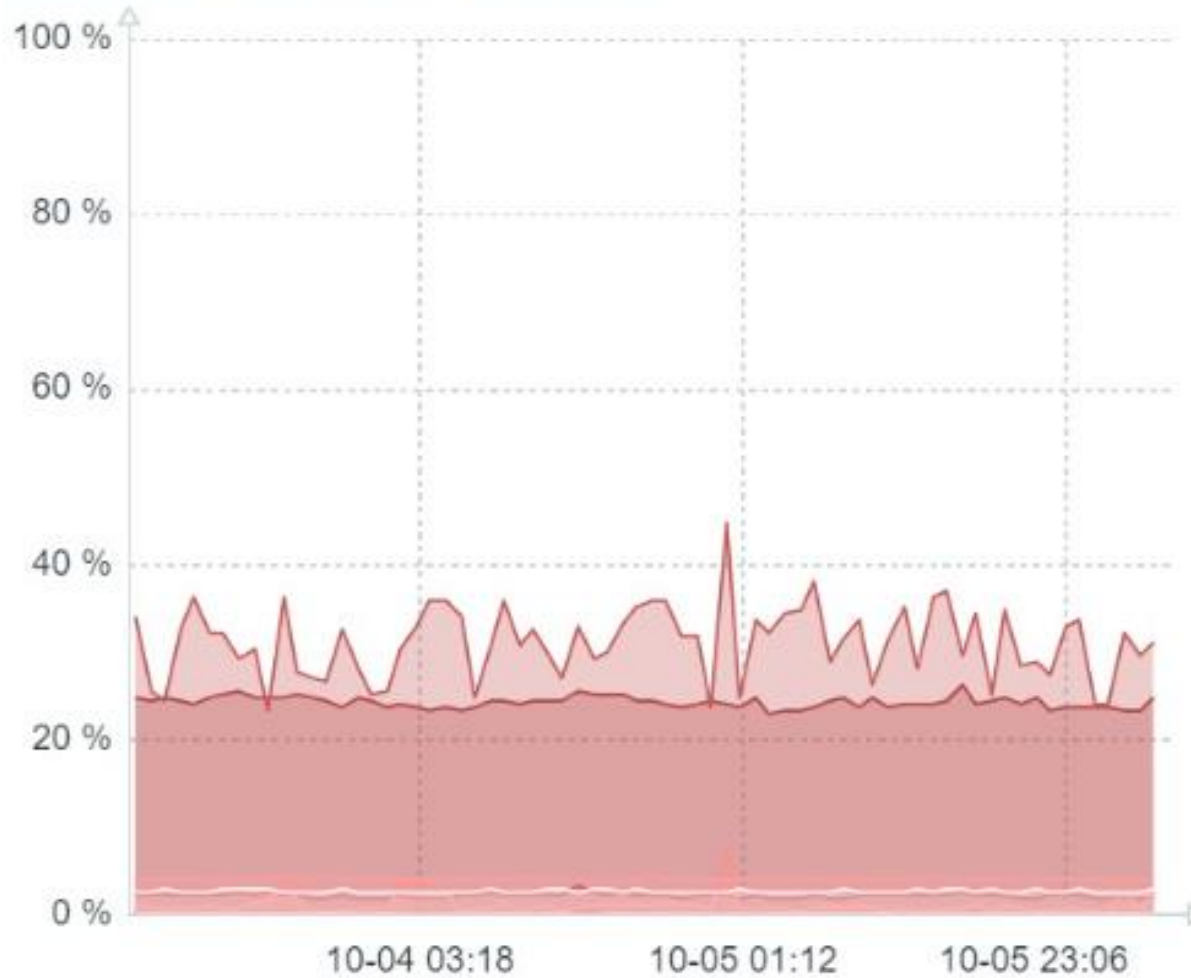


Queue overview

Queue overview ▾

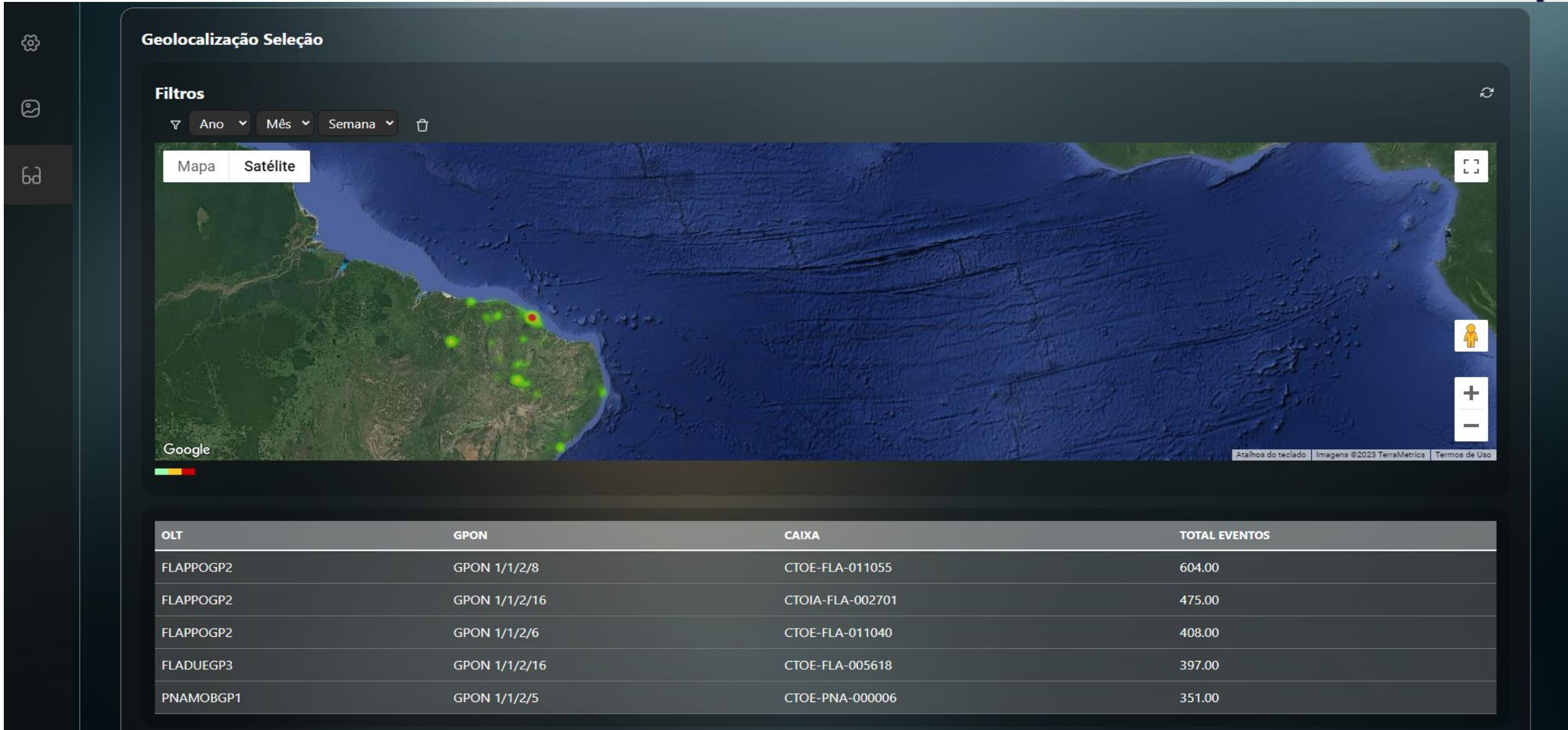
Items	5 seconds	10 seconds	30 seconds	1 minute	5 minutes	More than 10 minutes
Zabbix agent	0	0	0	0	0	0
Zabbix agent (active)	0					0
Simple check	0					0
SNMP agent	50					10782
Zabbix internal	0					0
External check	0					0
Database monitor	0					0
HTTP agent	0					0
IPMI agent	0					0
SSH agent	0					0
TELNET agent	0					0
JMX agent	0					0
Calculated	0					0
Script	0					0

Utilization of internal processes



Custom Interface

Regions with high attenuation



Regions with Incident history by day of the week



Incident history by day of the week

Massive Incident Analytics - Geo Analytics UI

Últimos Incidentes

Show
5
entries

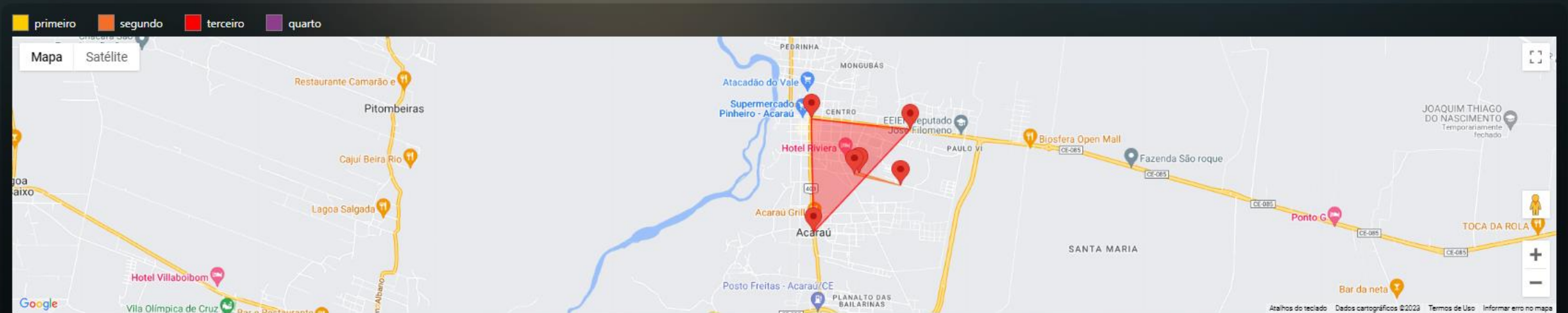
Search:

CAIXA	OLT	INTERFACES	CONTRATOS	INDICE	INCIDENTES	DIAS
☒ CTOE-AAU-000012	br.ce.aau.mob.gp.01	GPON 0/1/0	4	2	10	10
☒ CTOE-AAU-000024	br.ce.aau.mob.gp.01	GPON 0/1/3	1	1	1	1
☐ CTOE-AAU-000024	br.ce.aau.mob.gp.01	GPON 0/1/4	1	2	9	7
☐ CTOE-AAU-000024	br.ce.aau.mob.gp.01	GPON 0/1/9	1	1	1	1
☐ CTOE-AAU-000075	br.ce.aau.mob.gp.01	GPON 0/1/9	6	4	31	23

Showing 1 to 5 of 53 entries

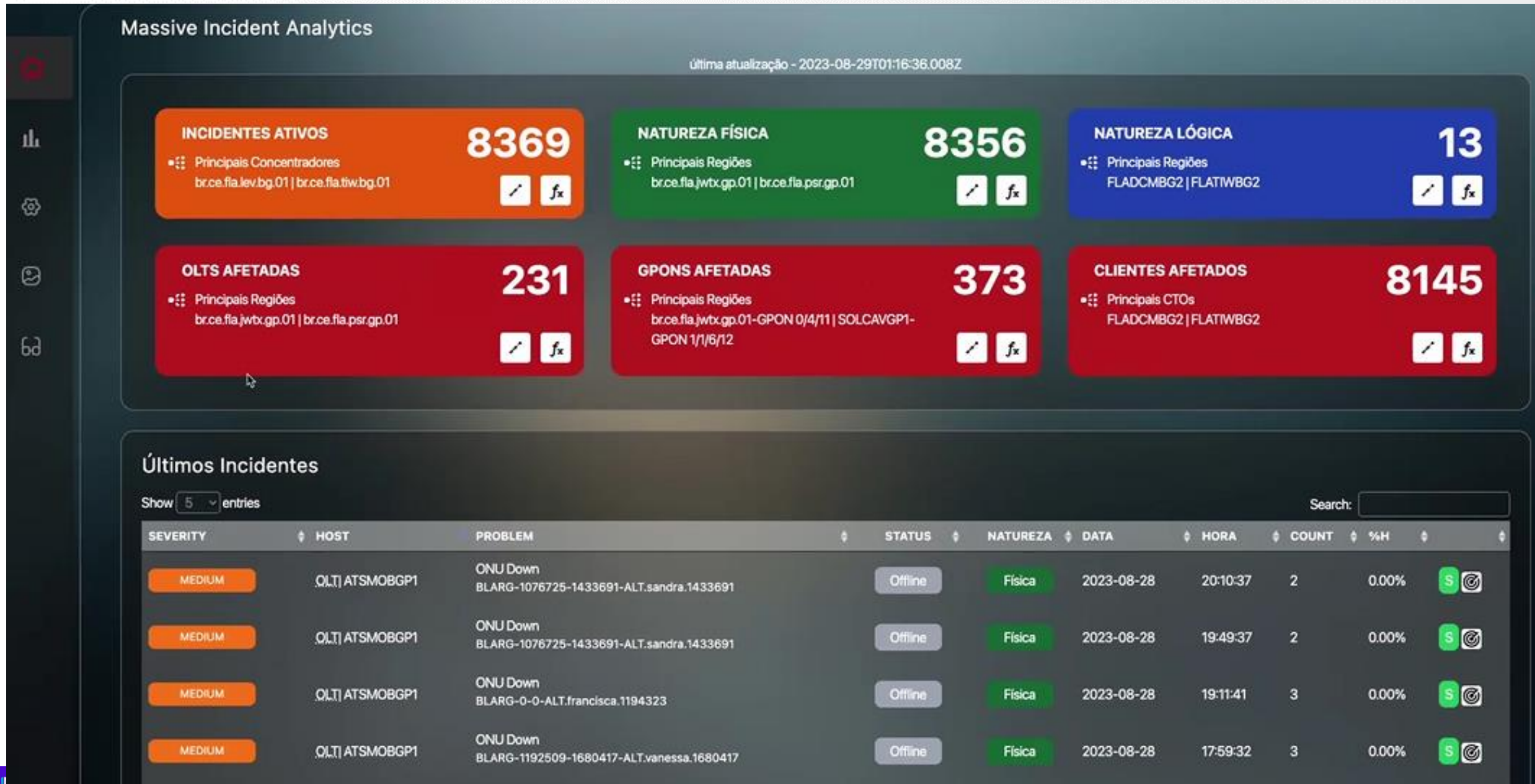
Previous
1
2
3
4
5
...
11
Next

Geolocalização Seleção



CAIXA	OLT	GPON	CONTRATO	LATITUDE	LONGITUDE	INCIDENTES	DIAS
CTOE-AAU-000012	br.ce.aau.mob.gp.01	GPON 0/1/0	1652175	-2.8921346	-40.10840109999999	3	3

Massive Incident Analytics



Incident Summary and Recovered Region

Search

Massive Incident Analytics - Recovery UI

Últimos Incidentes

SEVERITY	HOST	PROBLEM	STATUS	NATUREZA	DATA	HORA	
✓	MEDIUM	INTERFACE GPON 0/3/8 High error rate for 5m	Online	Fisica	21/11/21	14:02:55	
✓	HIGH	INTERFACE GPON 0/5/12 Link Down	Offline	Fisica	21/11/21	14:03:44	
✓	MEDIUM	INTERFACE GPON 0/3/3 High error rate for 5m	Online	Fisica	21/11/21	14:08:10	

Geolocalização Seleção



Filtros

+ Filter

HOST	DESCRIÇÃO	SIDE	POINT NAME	GEO X	GEO Y
54216	BLARG.317451-FOR.antonio.324429	R	OUT5	-38.75901	-3.7859001
54217	BLARG.317451-FOR.antonio.324429	R	OUT6	-38.75901	-3.7859001
54218	BLARG.317451-FOR.antonio.324429	R	OUT7	-38.75901	-3.7859001
54219	BLARG.317451-FOR.antonio.324429	R	OUT8	-38.75901	-3.7859001

Automations

The screenshot displays the 'Massive Incident Analytics' interface. At the top, there is a search bar and a user profile icon. The main section shows event details for Event ID 199845, including the problem 'GPON Link Down', host ID 11513, and a severity level of 'HIGH'. It also indicates 126 affected clients and the time zone as Oct. 25, 2021, 08:03:47, p.m. Below this, there are three tabs: 'Event Tracer', 'Alertar Canais', and 'Dados Concentrador'. The 'Alertar Canais' tab is active, showing three automation channels: URA, ADAPTER, and SMS. Each channel has a status indicator (Ativo or Inativo) and a 'Time Zone Alerta' button. The URA and ADAPTER channels are currently active, while the SMS channel is inactive. A 'Desativar' button is present for each active channel, and an 'Ativar' button is present for the inactive SMS channel. A large 'ATIVAR TODOS' button is located at the bottom of the automation section.

Massive Incident Analytics

Event ID - 199845 Clientes Afetados - 126 Time Zone Oct. 25, 2021, 08:03:47, p.m.

Problema GPON Link Down

HOST.ID 11513

SEVERIDADE
((!)) HIGH

OLT | FORMOMBGP2
Concentrador FLADCMBG1

GPON 0/3/8
CAIXA CTOE-FLA-007426

Event Tracer Alertar Canais Dados Concentrador Análise Recovery

URA
STATUS Ativo
Time Zone Alerta Oct. 25, 2021, 08:05:00, p.m.
Desativar

ADAPTER
STATUS Ativo
Time Zone Alerta Oct. 25, 2021, 08:03:47, p.m.
Desativar

SMS
STATUS Inativo
Time Zone Alerta ---
Ativar

ATIVAR TODOS

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Thanks

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