

ZABBIX '25

CONFERENCE

LATIN AMERICA

Monitoramento de serviços de missão crítica na Mineração

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Agenda

Introdução

A jornada Vale e Zabbix

Cases

- ▶ Modelagem automática de APs via API
- ▶ Monitoramento de serviços de missão crítica

Encerramento

Introdução

Quem somos

Thiago Campos

(ZCP CP-2412-070)



- ⚡ Brasiense
- ⚡ Motivado por desafios técnicos
- ⚡ 28 anos em Tecnologia, Automação, Monitoramento, Observabilidade, Servidores Linux e Banco de Dados

Gil Amaral

(ZCS AS-2211-067)



- ⚡ Mineiro
- ⚡ Casado, dois filhos
- ⚡ 23 anos em Telecom, Automação, Elétrica, Mineração, Monitoramento e Observabilidade

Jornada Vale & Zabbix

- ⚡ Produção desde 2023 – 32k hosts
- ⚡ Ambiente híbrido – IT + OT
- ⚡ Relatórios personalizados
- ⚡ Integrações com sistemas e CMDB
- ⚡ Automação e orquestração
- ⚡ Cultura Open Source – ELK, GIT, Ansible
- ⚡ Base para Kaizen e análise de causa raiz
- ⚡ Maturidade em Observabilidade
- ⚡ Confiabilidade | Flexibilidade | Escalabilidade
- ⚡ Economia anual ~ R\$ 8 MM



Jornada Vale & Zabbix



5 continentes + 20 países



328 Mt minério Fe



234 K colaboradores



5G, LTE, Wimax, LoRa,
MPLS,
SDH, Radiocomunicação,
DWDM, SDN, Energia,
Automação, Instrumentação,
default



71 Proxies (47 - 2024)



48.3K Hosts (45.7K - 2024)



8.8M Itens (7.2M - 2024)



2.2K Users (1.6K - 2024)



5.9K Nvps (3.5K - 2024)

FIRST CASE

Modelagem automática de
APs via API

Modelagem automática de APs via API

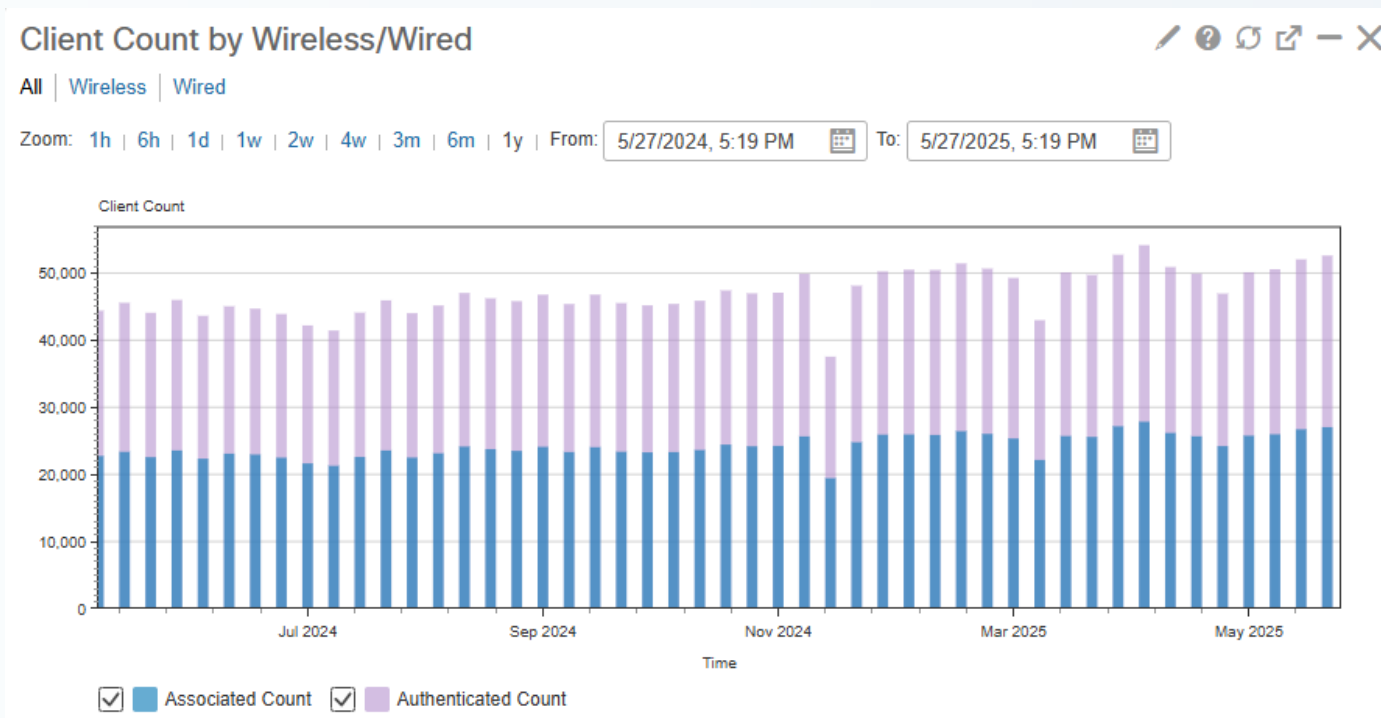
► Objetivo

Demonstrar uma solução automatizada para integrar o Cisco Prime ao Zabbix, Otimizando a descoberta e o monitoramento de Access Points via API, com redução significativa de carga e consumo de recursos no ambiente de monitoramento.

Modelagem automática de APs via API

► Motivação

- Monitoramento Legado
- SNMP limitado
- HTTP Agent gerando lentidão
- Ambiente em grande escala
 - 5.300+ Aps no Brasil
 - 2.200+ Aps Mundo



Modelagem automática de APs via API

► Solução

- Estudo da documentação do fabricante
[Cisco Prime Infrastructure - Programming Guides - Cisco](#)



Programming Guides

View Documents by Topic

Cisco Prime Infrastructure 3.10

[Cisco Prime Infrastructure 3.10 API Reference Guide](#) (ZIP - 12 MB)

Cisco Prime Infrastructure 3.9

[Cisco Prime Infrastructure 3.9 API Reference Guide](#) (ZIP - 12 MB)

Cisco Prime Infrastructure 3.8

[Cisco Prime Infrastructure 3.8 API Reference Guide](#) (ZIP - 12 MB)

Cisco Prime Infrastructure 3.7

[Cisco Prime Infrastructure 3.7 API Reference Guide](#) (ZIP - 12 MB)

Cisco Prime Infrastructure 3.6

[Cisco Prime Infrastructure 3.6 API Reference Guide](#) (ZIP - 11 MB)

Support Documentation

[All Support Documentation for this Series](#)

Modelagem automática de APs via API

► Solução

- Desenvolvimento do Script (Shellscript)
1ª Etapa: Extração das informações de todos os APs da API

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{
  "@dtoType": "accessPointDetailsDTO",
  "@type": "AccessPointDetails",
  "@url": "https://[redacted]/webacs/api/v3/data/AccessPointDetails/24871089",
  "accessPointDetailsDTO": {
    "@displayName": "24871089",
    "@id": "24871089",
    "cdpNeighbor": {
      "capabilities": "Switch IGMP",
      "duplex": "Full Duplex",
      "interfaceSpeed": "1Gbps",
      "localPort": "3",
      "neighborIpAddress": "172.19.147.174",
      "neighborName": "BRMAB3ACCSSW004.valenet.valeglobal.net",
      "neighborPort": "24",
      "neighborType": "24P-4G"
    },
    "clientCount": "4",
    "clientCount_2_4GHz": "3",
    "clientCount_5GHz": "1",
    "ethernetMac": "[redacted]",
    "ipAddress": "10.219.81.51",
    "locationHierarchy": "Root Area",
    "macAddress": "[redacted]",
    "mapLocation": "Brasil;PA;BRCUS1",
    "model": "AIR-AP1572EAC-Z-K9",
    "name": "BRMAB3WIFIAP203",
    "reachabilityStatus": "REACHABLE",
    "serialNumber": "FGL2332L8GB",
    "softwareVersion": "8.5.160.4",
    "status": "CLEARED",
    "type": "UnifiedAp",
    "unifiedApInfo": {
      "WIPSEnabled": "0",
      "apCertType": "1",
      "apGroup": "BRMAB3-SAL0B0",
      "apMode": "2",
      "apStaticEnabled": "0",
      "bootVersion": "15.3.0.0",
      "capwapJoinTakenTime": "17700",
      "capwapUpTime": "258074303",
      "controllerIpAddress": "172.19.79.174",
      "controllerName": "BRPRS1WIFIWC003",
      "countryCode": "BR",
      "encryptionEnabled": "0",
      "flexConnectMode": "false",
      "iosVersion": "15.3(20191224:041811)$",
      "linkLatencyEnabled": "false",
      "maintenanceMode": "false",
      "poEStatus": "5",
      "poEStatusEnum": "EXTERNAL",
      "portNumber": "8",
      "powerInjectorState": "1",
      "preStandardState": "0",
      "primaryMwar": "BRPRS1WIFIWC003",
      "rogueDetectionEnabled": "true",
      "sshEnabled": "false",
      "statisticsTimer": "180",
      "telnetEnabled": "false",
      "vlanEnabled": "true",
      "vlanNativeId": "940",
      "wlanProfiles": {
        "wlanProfile": {
          "broadcastSsidEnabled": "false",
          "profileName": "V-NET",
          "ssid": "V-NET"
        }
      },
      "wlanVlanMappings": {
        "wlanVlanMapping": {
          "ssid": "V-NET",
          "vlanId": "445",
          "wlanId": "1"
        }
      },
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  "@dtoType": "accessPointDetailsDTO",
  "@type": "AccessPointDetails",
  "@url": "https://[redacted]/webacs/api/v3/data/AccessPointDetails/24871091",
  "accessPointDetailsDTO": {
    "@displayName": "24871091",
    "@id": "24871091",
    "cdpNeighbor": {
      "capabilities": "Switch IGMP",
      "duplex": "Full Duplex",
      "interfaceSpeed": "1Gbps",
      "localPort": "1",
      "neighborIpAddress": "172.19.32.10",
      "neighborName": "BRPRS2ACCSSW022.valenet.valeglobal.net",
      "neighborPort": "24",
      "neighborType": "24PS-L"
    },
    "clientCount": "0",
    "clientCount_2_4GHz": "0",
    "clientCount_5GHz": "0",
    "ethernetMac": "[redacted]",
    "ipAddress": "10.219.158.18",
    "locationHierarchy": "System Campus > BRAZIL - Carajas N5 > Galpão de Manutenção",
    "model": "AIR-AP2802I-Z-K9",
    "name": "BRPRS2WIFIAP064",
    "reachabilityStatus": "REACHABLE",
    "serialNumber": "TSP2336ACJD",
    "softwareVersion": "17.12.4.158",
    "status": "CLEARED",
    "type": "UnifiedAp",
    "unifiedApInfo": {
      "WIPSEnabled": "0",
      "apCertType": "1",
      "apGroup": "BRPRS2-24PS-L",
      "apMode": "2",
      "apStaticEnabled": "0",
      "bootVersion": "1.1.2.4",
      "capwapJoinTakenTime": "600",
      "capwapUpTime": "200091200",
      "controllerIpAddress": "10.219.250.10",
      "controllerName": "BRPRS1WIFIWC004.valenet.valeglobal.net",
      "countryCode": "BR",
      "encryptionEnabled": "0",
      "flexConnectMode": "false",
      "iosVersion": "17.12.4.158",
      "linkLatencyEnabled": "false",
      "maintenanceMode": "false",
      "poEStatus": "4",
      "poEStatusEnum": "NORMAL",
      "portNumber": "0",
      "powerInjectorState": "1",
      "preStandardState": "0",
      "primaryMwar": "BRPRS1WIFIWC003",
      "rogueDetectionEnabled": "false",
      "sshEnabled": "false",
      "statisticsTimer": "180",
      "tagInfo": {
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        "rfTagName": "RT_STANDARD_INDOOR_V2",
        "siteTagName": "ST_BRPRS2_OFICINA_DE_MANUTENCAO",
        "tagSource": "1",
        "tagType": "1"
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        "wlanProfile": {
          "broadcastSsidEnabled": "false",
          "profileName": "V-NET",
          "ssid": "V-NET"
        }
      },
      "wlanVlanMappings": {
        "wlanVlanMapping": {
          "ssid": "V-NET",
          "vlanId": "407",
          "wlanId": "1"
        }
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      "upTime": "14119168"
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  "@type": "AccessPointDetails",
  "@url": "https://[redacted]/webacs/api/v3/data/AccessPointDetails/24871095",
  "accessPointDetailsDTO": {
    "@displayName": "24871095",
    "@id": "24871095",
    "cdpNeighbor": {
      "capabilities": "Switch IGMP",
      "duplex": "Full Duplex",
      "interfaceSpeed": "1Gbps",
      "localPort": "1",
      "neighborIpAddress": "172.19.209.183",
      "neighborName": "BRCK57ACCSSW033.valenet.valeglobal.net",
      "neighborPort": "24",
      "neighborType": "24PS-L"
    },
    "clientCount": "3",
    "clientCount_2_4GHz": "1",
    "clientCount_5GHz": "2",
    "ethernetMac": "[redacted]",
    "ipAddress": "10.219.148.138",
    "locationHierarchy": "Root Area",
    "macAddress": "[redacted]",
    "mapLocation": "Brasil;PA;BRCUS1",
    "model": "AIR-AP2802I-Z-K9",
    "name": "BRCK57WIFIAP063",
    "reachabilityStatus": "REACHABLE",
    "serialNumber": "TSP2514ACJZ",
    "softwareVersion": "8.5.160.4",
    "status": "CLEARED",
    "type": "UnifiedAp",
    "unifiedApInfo": {
      "WIPSEnabled": "0",
      "apCertType": "1",
      "apGroup": "BRCK57-24PS-L",
      "apMode": "2",
      "apStaticEnabled": "0",
      "bootVersion": "1.1.2.4",
      "capwapJoinTakenTime": "11500",
      "capwapUpTime": "14107568",
      "controllerIpAddress": "172.19.79.174",
      "controllerName": "BRPRS1WIFIWC003",
      "countryCode": "BR",
      "encryptionEnabled": "0",
      "flexConnectMode": "false",
      "iosVersion": "8.5.160.4",
      "linkLatencyEnabled": "false",
      "maintenanceMode": "false",
      "poEStatus": "4",
      "poEStatusEnum": "NORMAL",
      "portNumber": "8",
      "powerInjectorState": "1",
      "preStandardState": "0",
      "primaryMwar": "BRCKSEWIFIWC001",
      "rogueDetectionEnabled": "false",
      "sshEnabled": "false",
      "statisticsTimer": "180",
      "telnetEnabled": "false",
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      "wlanProfiles": {
        "wlanProfile": {
          "broadcastSsidEnabled": "false",
          "profileName": "V-NET",
          "ssid": "V-NET"
        }
      },
      "wlanVlanMappings": {
        "wlanVlanMapping": {
          "ssid": "V-NET",
          "vlanId": "407",
          "wlanId": "1"
        }
      },
      "upTime": "14119168"
    }
  },
  "@dtoType": "accessPointDetailsDTO",
  "@type": "AccessPointDetails",
  "@url": "https://[redacted]/webacs/api/v3/data/AccessPointDetails/24871097",
  "accessPointDetailsDTO": {
    "@displayName": "24871097",
    "@id": "24871097",
    "cdpNeighbor": {
      "capabilities": "Switch IGMP",
      "duplex": "Full Duplex",
      "interfaceSpeed": "1Gbps",
      "localPort": "7",
      "neighborIpAddress": "172.19.69.172",
      "neighborName": "BRMAB3ACCSSW143.valenet.valeglobal.net",
      "neighborPort": "24",
      "neighborType": "24PS-L"
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    "ethernetMac": "[redacted]",
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    "locationHierarchy": "Root Area",
    "macAddress": "[redacted]",
    "mapLocation": "Brasil;PA;BRCUS1",
    "model": "AIR-AP2802I-Z-K9",
    "name": "BRMAB3WIFIAP142",
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    "serialNumber": "FGL2237E003",
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    "status": "WARNING",
    "type": "UnifiedAp",
    "unifiedApInfo": {
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      "apCertType": "1",
      "apGroup": "BRMAB3-12S",
      "apMode": "2",
      "apStaticEnabled": "0",
      "bootVersion": "15.3.0.0",
      "capwapJoinTakenTime": "9600",
      "countryCode": "BR",
      "encryptionEnabled": "false",
      "flexConnectMode": "false",
      "iosVersion": "15.3(20191224:041811)$",
      "linkLatencyEnabled": "false",
      "maintenanceMode": "false",
      "poEStatus": "5",
      "poEStatusEnum": "EXTERNAL",
      "portNumber": "8",
      "powerInjectorState": "1",
      "preStandardState": "0",
      "primaryMwar": "BRPRS1WIFIWC003",
      "rogueDetectionEnabled": "true",
      "sshEnabled": "false",
      "statisticsTimer": "180",
      "telnetEnabled": "false",
      "vlanEnabled": "true",
      "vlanNativeId": "940",
      "wlanProfiles": {
        "wlanProfile": {
          "broadcastSsidEnabled": "false",
          "profileName": "V-NET",
          "ssid": "V-NET"
        }
      },
      "wlanVlanMappings": {
        "wlanVlanMapping": {
          "ssid": "V-NET",
          "vlanId": "453",
          "wlanId": "1"
        }
      },
      "upTime": "14119168"
    }
  },
  "@dtoType": "accessPointDetailsDTO",
  "@type": "AccessPointDetails",
  "@url": "https://[redacted]/webacs/api/v3/data/AccessPointDetails/24871099",
  "accessPointDetailsDTO": {
    "@displayName": "24871099",
    "@id": "24871099",
    "cdpNeighbor": {
      "capabilities": "Switch IGMP",
      "duplex": "Full Duplex",
      "interfaceSpeed": "1Gbps",
      "localPort": "3",
      "neighborIpAddress": "172.19.147.174",
      "neighborName": "BRMAB3ACCSSW004.valenet.valeglobal.net",
      "neighborPort": "24",
      "neighborType": "24P-4G"
    },
    "clientCount": "4",
    "clientCount_2_4GHz": "3",
    "clientCount_5GHz": "1",
    "ethernetMac": "[redacted]",
    "ipAddress": "10.219.81.51",
    "locationHierarchy": "Root Area",
    "macAddress": "[redacted]",
    "mapLocation": "Brasil;PA;BRCUS1",
    "model": "AIR-AP1572EAC-Z-K9",
    "name": "BRMAB3WIFIAP203",
    "reachabilityStatus": "REACHABLE",
    "serialNumber": "FGL2332L8GB",
    "softwareVersion": "8.5.160.4",
    "status": "CLEARED",
    "type": "UnifiedAp",
    "unifiedApInfo": {
      "WIPSEnabled": "0",
      "apCertType": "1",
      "apGroup": "BRMAB3-SAL0B0",
      "apMode": "2",
      "apStaticEnabled": "0",
      "bootVersion": "15.3.0.0",
      "capwapJoinTakenTime": "17700",
      "capwapUpTime": "258074303",
      "controllerIpAddress": "172.19.79.174",
      "controllerName": "BRPRS1WIFIWC003",
      "countryCode": "BR",
      "encryptionEnabled": "0",
      "flexConnectMode": "false",
      "iosVersion": "15.3(20191224:041811)$",
      "linkLatencyEnabled": "false",
      "maintenanceMode": "false",
      "poEStatus": "5",
      "poEStatusEnum": "EXTERNAL",
      "portNumber": "8",
      "powerInjectorState": "1",
      "preStandardState": "0",
      "primaryMwar": "BRPRS1WIFIWC003",
      "rogueDetectionEnabled": "true",
      "sshEnabled": "false",
      "statisticsTimer": "180",
      "telnetEnabled": "false",
      "vlanEnabled": "true",
      "vlanNativeId": "940",
      "wlanProfiles": {
        "wlanProfile": {
          "broadcastSsidEnabled": "false",
          "profileName": "V-NET",
          "ssid": "V-NET"
        }
      },
      "wlanVlanMappings": {
        "wlanVlanMapping": {
          "ssid": "V-NET",
          "vlanId": "445",
          "wlanId": "1"
        }
      },
      "upTime": "258092103"
    }
  }
}
```

Modelagem automática de APs via API

► Solução

- Desenvolvimento do Script (Shellscript) + Template para Host Prototypes

Hosts

Create host

Import

Filter

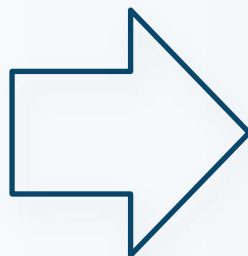
☐	Name ▲	Items	Triggers	Graphs	Discovery	Web	Interface	Proxy	Templates	Status	Availability	Agent encryption	Info	Tags
☐	Cisco Prime API: Discovery Access Point: BRACL1VALEAP012	Items 84	Triggers 3	Graphs	Discovery 1	Web	10.220.1.15:10050	VALENET-AZU-BR-04	VALE - TEMP - CISCO PRIME AP - BR, VALE - TEMP CONTEXT2 - AP PRIME, VALE - TEMP EN NETWORK CMDB - DATABASE - CISCO PRIME AP - BR, VALE - TEMP TYPE - NETWORK	Enabled	ZBX SNMP	None	NGI	SN-Impact: 4 SN-IncidentQueue: Tel... ...
☐	Cisco Prime API: Discovery Access Point: BRACL1WIFIAP001	Items 84	Triggers 3	Graphs	Discovery 1	Web	10.220.1.11:10050	VALENET-AZU-BR-04	VALE - TEMP - CISCO PRIME AP - BR, VALE - TEMP CONTEXT2 - AP PRIME, VALE - TEMP EN NETWORK CMDB - DATABASE - CISCO PRIME AP - BR, VALE - TEMP TYPE - NETWORK	Enabled	ZBX SNMP	None	NGI	SN-Impact: 4 SN-IncidentQueue: Tel... ...
☐	Cisco Prime API: Discovery Access Point: BRACL1WIFIAP002	Items 84	Triggers 3	Graphs	Discovery 1	Web	10.220.1.31:10050	VALENET-AZU-BR-04	VALE - TEMP - CISCO PRIME AP - BR, VALE - TEMP CONTEXT2 - AP PRIME, VALE - TEMP EN NETWORK CMDB - DATABASE - CISCO PRIME AP - BR, VALE - TEMP TYPE - NETWORK	Enabled	ZBX SNMP	None	NGI	SN-Impact: 4 SN-IncidentQueue: Tel... ...
☐	Cisco Prime API: Discovery Access Point: BRACL1WIFIAP003	Items 84	Triggers 3	Graphs	Discovery 1	Web	10.220.1.32:10050	VALENET-AZU-BR-04	VALE - TEMP - CISCO PRIME AP - BR, VALE - TEMP CONTEXT2 - AP PRIME, VALE - TEMP EN NETWORK CMDB - DATABASE - CISCO PRIME AP - BR, VALE - TEMP TYPE - NETWORK	Enabled	ZBX SNMP	None	NGI	SN-Impact: 4 SN-IncidentQueue: Tel... ...
☐	Cisco Prime API: Discovery Access Point: BRACL1WIFIAP004	Items 84	Triggers 3	Graphs	Discovery 1	Web	10.220.1.27:10050	VALENET-AZU-BR-04	VALE - TEMP - CISCO PRIME AP - BR, VALE - TEMP CONTEXT2 - AP PRIME, VALE - TEMP EN NETWORK CMDB - DATABASE - CISCO PRIME AP - BR, VALE - TEMP TYPE - NETWORK	Enabled	ZBX SNMP	None	NGI	SN-Impact: 4 SN-IncidentQueue: Tel... ...
☐	Cisco Prime API: Discovery Access Point: BRACL1WIFIAP006	Items 84	Triggers 3	Graphs	Discovery 1	Web	10.220.1.23:10050	VALENET-AZU-BR-04	VALE - TEMP - CISCO PRIME AP - BR, VALE - TEMP CONTEXT2 - AP PRIME, VALE - TEMP EN NETWORK CMDB - DATABASE - CISCO PRIME AP - BR, VALE - TEMP TYPE - NETWORK	Enabled	ZBX SNMP	None	NGI	SN-Impact: 4 SN-IncidentQueue: Tel... ...
☐	Cisco Prime API: Discovery Access Point: BRACL1WIFIAP008	Items 84	Triggers 3	Graphs	Discovery 1	Web	10.220.1.14:10050	VALENET-AZU-BR-04	VALE - TEMP - CISCO PRIME AP - BR, VALE - TEMP CONTEXT2 - AP PRIME, VALE - TEMP EN NETWORK CMDB - DATABASE - CISCO PRIME AP - BR, VALE - TEMP TYPE - NETWORK	Enabled	ZBX SNMP	None	NGI	SN-Impact: 4 SN-IncidentQueue: Tel... ...
☐	Cisco Prime API: Discovery Access Point: BRACL1WIFIAP010	Items 84	Triggers 3	Graphs	Discovery 1	Web	10.220.1.13:10050	VALENET-AZU-BR-04	VALE - TEMP - CISCO PRIME AP - BR, VALE - TEMP CONTEXT2 - AP PRIME, VALE - TEMP EN NETWORK CMDB - DATABASE - CISCO PRIME AP - BR, VALE - TEMP TYPE - NETWORK	Enabled	ZBX SNMP	None	NGI	SN-Impact: 4 SN-IncidentQueue: Tel... ...

Modelagem automática de APs via API

► Solução

- Desenvolvimento do Script (Shellscript) + Template dados dos Itens do AP
- 3ª Etapa: Extração dos dados dos AP

```
[{"@dtoType": "accessPointDetailsDTO",
"@type": "AccessPointDetails",
"@url": "https://142.40.22.168/webacs/api/v3/data/AccessPointDetails/12899916",
"accessPointDetailsDTO": {
"@displayName": "12899916",
"@id": 12899916,
"adminStatus": "ENABLE",
"apType": "AP1240",
"cdpNeighbors": {
"cdpNeighbor": [
{
"capabilities": "Switch IGMP ",
"duplex": "Full Duplex",
"interfaceSpeed": "100Mbps",
"localPort": "2",
"neighborIpAddress": "172.23.136.59",
"neighborName": "BRVIX5ACCSW366.valenet.valeglobal.net",
"neighborPort": "GigabitEthernet0/3",
"platform": "cisco WS-C3560CX-12PC-S"
}
]
}
},
"clientCount": "0",
"clientCount_2_4GHz": "0",
"clientCount_5GHz": "0",
"ethernetMac": "00:00:00:00:00:00",
"ipAddress": "172.23.140.240",
"locationHierarchy": "BRVIX5 - TUBARAO > Almoxarifado 1-2",
"macAddress": "00:00:00:00:00:00",
"mapLocation": "BRVIX5:DIPE:HISpanoBRAS",
"model": "AIR-LAP1242AG-A-K9",
"name": "BRVIX5WIFIAP376",
"reachabilityStatus": "REACHABLE",
"serialNumber": "FTX1142B0AE",
"softwareVersion": "8.0.152.0",
"status": "MINOR",
"type": "UnifiedAp",
"unifiedApInfo": {
"WIPSEnabled": "0",
"apCertType": 1,
"apGroupName": "BRVIX5_ALMOXARIFADO_084",
"apMode": "0",
"apStaticEnabled": 0,
"bootVersion": "12.3.7.1",
"capwapJoinTakenTime": 27800,
"capwapUpTime": 39309094,
"controllerIpAddress": "172.23.6.90",
"controllerName": "BRVIX5VALEWC002",
"contryCode": "BR",
"encryptionEnabled": false,
"flexConnectMode": false,
"iosVersion": "12.4(25e)JAP12s",
"linkLatencyEnabled": false,
"maintenanceMode": false,
"poeStatus": "5",
"staticIp": "172.23.140.240",
"staticMac": "00:00:00:00:00:00"
}
}]
```



BRVIX5WIFIAP376: Cisco Prime API: Get API Access Points Detail

Timestamp	Value
2025-05-27 09:58:46	[{"@dtoType": "accessPointDetailsDTO", "@type": "AccessPointDetails", "@url": "https://142.40.22.168/webacs/api/v3/data/AccessPointDetails/12899916", "accessPointDetailsDTO": { "@displayName": "12899916", "@id": 12899916, "adminStatus": "ENABLE", "apType": "AP1240", "cdpNeighbors": { "cdpNeighbor": [{ "capabilities": "Switch IGMP ", "duplex": "Full Duplex", "interfaceSpeed": "100Mbps", "localPort": "2", "neighborIpAddress": "172.23.136.59", "neighborName": "BRVIX5ACCSW366.valenet.valeglobal.net", "neighborPort": "GigabitEthernet0/3", "platform": "cisco WS-C3560CX-12PC-S" }] } }, "clientCount": "0", "clientCount_2_4GHz": "0", "clientCount_5GHz": "0", "ethernetMac": "00:00:00:00:00:00", "ipAddress": "172.23.140.240", "locationHierarchy": "BRVIX5 - TUBARAO > Almoxarifado 1-2", "macAddress": "00:00:00:00:00:00", "mapLocation": "BRVIX5:DIPE:HISpanoBRAS", "model": "AIR-LAP1242AG-A-K9", "name": "BRVIX5WIFIAP376", "reachabilityStatus": "REACHABLE", "serialNumber": "FTX1142B0AE", "softwareVersion": "8.0.152.0", "status": "MINOR", "type": "UnifiedAp", "unifiedApInfo": { "WIPSEnabled": "0", "apCertType": 1, "apGroupName": "BRVIX5_ALMOXARIFADO_084", "apMode": "0", "apStaticEnabled": 0, "bootVersion": "12.3.7.1", "capwapJoinTakenTime": 27800, "capwapUpTime": 39309094, "controllerIpAddress": "172.23.6.90", "controllerName": "BRVIX5VALEWC002", "contryCode": "BR", "encryptionEnabled": false, "flexConnectMode": false, "iosVersion": "12.4(25e)JAP12s", "linkLatencyEnabled": false, "maintenanceMode": false, "poeStatus": "5", "staticIp": "172.23.140.240", "staticMac": "00:00:00:00:00:00" } }]



Modelagem automática de APs via API

► Solução

☐ Host	Name ▲	Last check	Last value
☐ BRVIX5WIFIAP376	AP group name	58m 20s	BRVIX5_ALMOXARIFADO_084
☐ BRVIX5WIFIAP376	AP Mode	3m 20s	Local (0)
☐ BRVIX5WIFIAP376	Client count	3m 20s	17
☐ BRVIX5WIFIAP376	Client count 2.4GHz	3m 20s	12
☐ BRVIX5WIFIAP376	Client count 5GHz	3m 20s	5
☐ BRVIX5WIFIAP376	Controller IP	58m 20s	172.23.6.90
☐ BRVIX5WIFIAP376	Controller name	58m 20s	BRVIX5VALEWC002
☐ BRVIX5WIFIAP376	Contry code	58m 20s	BR
☐ BRVIX5WIFIAP376	Encryption enabled	58m 20s	false
☐ BRVIX5WIFIAP376	Flex Connect Group Name		
☐ BRVIX5WIFIAP376	Flex connect mode	58m 20s	false
☐ BRVIX5WIFIAP376	iosVersion	58m 20s	12.4(25e)JAP12\$
☐ BRVIX5WIFIAP376	IP Address	58m 20s	172.23.140.240
☐ BRVIX5WIFIAP376	Link latency enabled	58m 20s	false
☐ BRVIX5WIFIAP376	Location	58m 20s	BRVIX5.DIPE:HISPANOBRAS
☐ BRVIX5WIFIAP376	Location hierarchy	58m 20s	BRVIX5 - TUBARAO > Almox...
☐ BRVIX5WIFIAP376	MAC Address	58m 20s	
☐ BRVIX5WIFIAP376	Model	58m 20s	AIR-LAP1242AG-A-K9
☐ BRVIX5WIFIAP376	Reachability status	3m 20s	REACHABLE
☐ BRVIX5WIFIAP376	Serial number	58m 20s	FTX1142B0AE
☐ BRVIX5WIFIAP376	Software version	58m 20s	8.0.152.0
☐ BRVIX5WIFIAP376	sshEnable	58m 20s	false
☐ BRVIX5WIFIAP376	Status	58m 20s	MINOR
☐ BRVIX5WIFIAP376	TagInfo: Policy Tag Name		

Modelagem automática de APs via API

► Solução

- Configuração da inclusão automática de TAGs

0 macros Filters 1 Overrides 21

Overrides	Name	Stop processing	Action
1:	Telecom Network Sonda -LA BR MG Paraopeba Norte	No	Remove
2:	Telecom Network Sonda -LA BR MG Paraopeba Sul	No	Remove
3:	Telecom Network Sonda -LA BR MG Vargem Grande	No	Remove
4:	Telecom Network Sonda -LA BR North MA	No	Remove
5:	Telecom Network Sonda -LA BR North PA Carajas	No	Remove
6:	Telecom Network Sonda -LA BR North PA PA Ourilândia do Norte	No	Remove
7:	Telecom Network Sonda -LA BR North PA PA S11D	No	Remove
8:	Telecom Network Sonda -LA BR North PA Salobo	No	Remove
9:	Telecom Network Sonda -LA BR North PA Serra Leste	No	Remove
10:	Telecom Network Sonda -LA BR North PA Sossego	No	Remove
11:	Telecom Network Sonda -LA BR South BA	No	Remove
12:	Telecom Network Sonda -LA BR South ES	No	Remove
13:	Telecom Network Sonda -LA BR South MG Brucutu	No	Remove
14:	Telecom Network Sonda -LA BR South MG Itabira	No	Remove
15:	Telecom Network Sonda -LA BR South MG Mariana	No	Remove
16:	Telecom Network Sonda -LA BR South MS	No	Remove
17:	Telecom Network Sonda -LA BR South RJ	No	Remove
18:	Telecom Network Sonda -LA BR South RJ Portos	No	Remove
19:	Telecom Network Sonda -LA BR MG Paraopeba-VGR	No	Remove
20:	Telecom Network OT Sonda -LA BR North PA S11D	No	Remove
21:	Telecom Network Sonda -LA BR North PA Belem	No	Remove

[Add](#)

[Update](#) [Clone](#) [Test](#) [Delete](#) [Cancel](#)

Override

Name:

If filter matches: [Continue overrides](#) [Stop processing](#)

Filters: Type of calculation: A or B or C or D or E or F or G or H or I or J or K or L or M or N or O or P or Q or R or S or T or U or V

Label	Macro		Regular expression	Action
A	{#APNAME}	matches	BRBCI6	Remove
B	{#APNAME}	matches	BRBHO1	Remove
C	{#APNAME}	matches	BRBHO2	Remove
D	{#APNAME}	matches	BRBHO5	Remove
E	{#APNAME}	matches	BRBHZF	Remove
F	{#APNAME}	matches	BRBHZH	Remove
G	{#APNAME}	matches	BRBHZI	Remove
H	{#APNAME}	matches	BRBHZL	Remove
I	{#APNAME}	matches	BRBHZS	Remove
J	{#APNAME}	matches	BRBHZU	Remove
K	{#APNAME}	matches	BRBHZV	Remove
L	{#APNAME}	matches	BRIRO2	Remove

Modelagem automática de APs via API

Resultados

Home > Dashboards > Access Point > AP STATUS INFORMATION ☆

AP

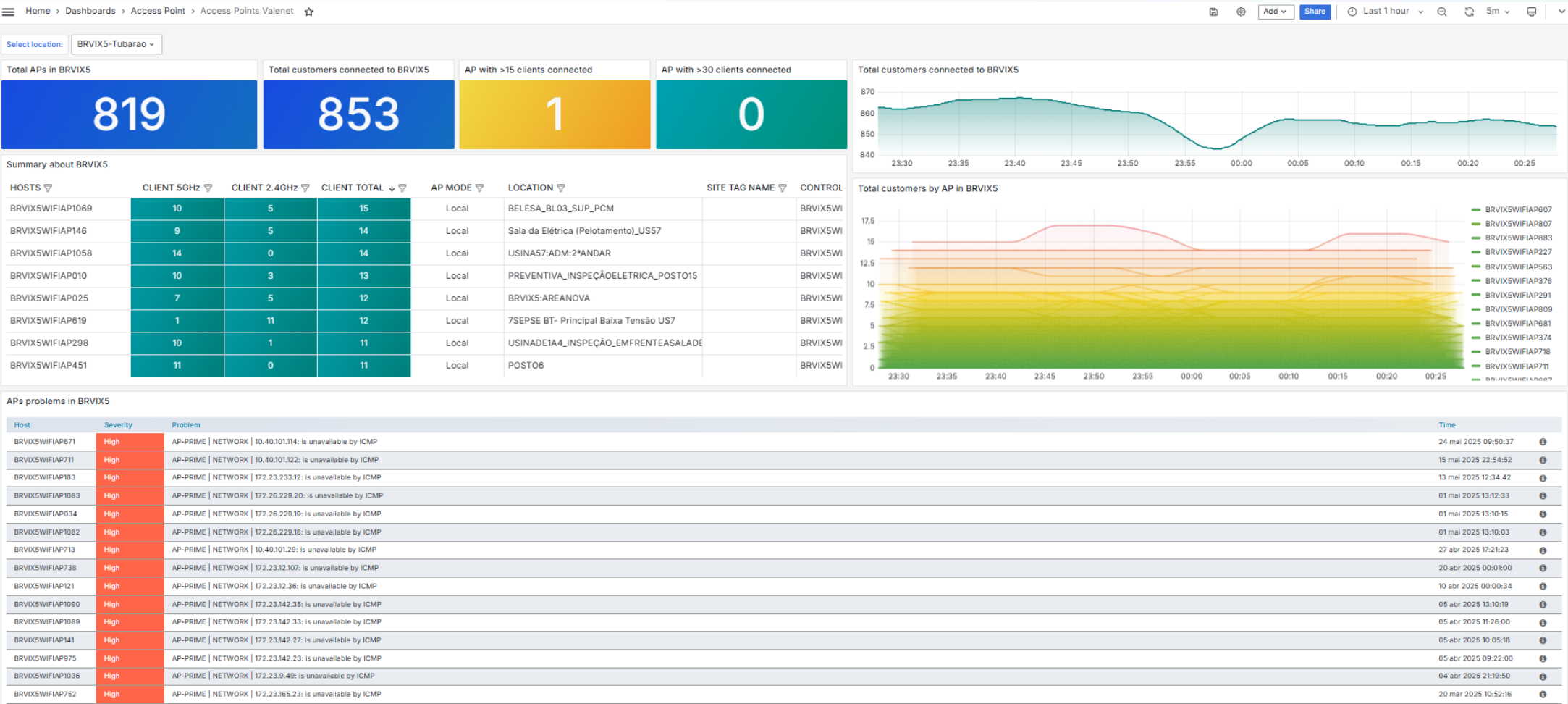
BRVIX5WIFIAP001 + BRVIX5WIFIAP002 + BRVIX5WIFIAP003 + BR...

AP STATUS INFORMATION

STATUS	APNAME	IP AP	AP Mode	Neighbor Name	Neighbor IP	Neighbor Port	Controller Name	Controller IP	Location
UNREACHABLE	BRVIX5WIFIAP607	172.23.18.68	Local	BRVIX5ACCSSW266.valenet.valeglobal.net	172.23.21.27	GigabitEthernet1/0/7			Energia Zero - Subestação 7SEPP
REACHABLE	BRVIX5WIFIAP807	172.23.146.54	Local	BRVIX5ACCSSW291.valenet.valeglobal.net	172.23.136.159	GigabitEthernet1/0/4	BRVIX5WIFIWC001	172.23.6.7	SECG - UTILIDADES
UNREACHABLE	BRVIX5WIFIAP883	172.23.236.28	Local	BRVIX5ACCSSW576.valenet.valeglobal.net	172.23.224.59	GigabitEthernet0/1			HUB ECC
REACHABLE	BRVIX5WIFIAP227	172.23.233.42	Local	BRVIX5ACCSSW502.valenet.valeglobal.net	172.23.224.48	GigabitEthernet0/2	BRVIX5WIFIWC005	172.23.7.9	POSTO 10_FAZENDINHA
REACHABLE	BRVIX5WIFIAP563	172.23.233.74	Local	BRVIX5ACCSSW292.valenet.valeglobal.net	172.23.224.148	GigabitEthernet1/0/14	BRVIX5WIFIWC005	172.23.7.9	6andar_ECC
REACHABLE	BRVIX5WIFIAP376	172.23.140.240	Local	BRVIX5ACCSSW366.valenet.valeglobal.net	172.23.136.59	GigabitEthernet0/3	BRVIX5VALEWC002	172.23.6.90	BRVIX5:DIPE:HISPANOBRAS
REACHABLE	BRVIX5WIFIAP291	172.23.140.34	Local	BRVIX5ACCSSW363.valenet.valeglobal.net	172.23.136.121	GigabitEthernet1/0/19	BRVIX5VALEWC002	172.23.6.90	BRVIX5:DIPE:ANEXO_B
REACHABLE	BRVIX5WIFIAP809	172.23.8.30	Local	BRVIX5ACCSSW612.valenet.valeglobal.net	172.23.1.10	GigabitEthernet0/3	BRVIX5WIFIWC002	172.31.3.32	SUBESTACAO SER3
REACHABLE	BRVIX5WIFIAP681	172.23.145.96	Local	BRVIX5ACCSSW563.valenet.valeglobal.net	172.23.136.240	GigabitEthernet0/1	BRVIX5WIFIWC002	172.31.3.32	4SEPE.Patr:1004348
UNKNOWN	BRVIX5WIFIAP374	172.23.140.242	Local	BRVIX5ACCSSW366.valenet.valeglobal.net	172.23.136.59	GigabitEthernet0/1	BRVIX5VALEWC002	172.23.6.90	BRVIX5:DIPE:HISPANOBRAS
REACHABLE	BRVIX5WIFIAP718	10.40.101.112	Local	TU-RC01-PPSWC01.ta-vale.corp.br	10.40.41.34	GigabitEthernet1/8	BRVIX5WIFIWC002	172.31.3.32	RC01
UNREACHABLE	BRVIX5WIFIAP711	10.40.101.122	Local						RC05
UNREACHABLE	BRVIX5WIFIAP667	10.60.31.138	Local						EN0 - EP06. Patr: 1S11742
REACHABLE	BRVIX5WIFIAP564	172.23.233.26	Local	BRVIX5ACCSSW011.valenet.valeglobal.net	172.23.224.191	GigabitEthernet1/0/40	BRVIX5WIFIWC002	172.31.3.32	BRVIX5:AREA_NOVA
REACHABLE	BRVIX5WIFIAP438	10.40.101.90	Local	TU-SEVV-RASWC01.ta-vale.corp.br	10.40.101.3	GigabitEthernet2/0/2	BRVIX5WIFIWC002	172.31.3.32	SEVV
REACHABLE	BRVIX5WIFIAP593	172.23.163.149	Local	BRVIX5ACCSSW434.valenet.valeglobal.net	172.23.161.104	GigabitEthernet0/5	BRVIX5WIFIWC002	172.31.3.32	Energia Zero - Subestação 5SEPR
UNREACHABLE	BRVIX5WIFIAP636	10.60.31.143	Local						SEE02-E0
UNREACHABLE	BRVIX5WIFIAP245	10.40.101.68	Local	TU-VV02-RASWC02.ta-vale.corp.br	10.40.25.72	FastEthernet0/18			SC-VV02/03 - E0
REACHABLE	BRVIX5WIFIAP700	172.23.145.22	Local	BRVIX5ACCSSW664.valenet.valeglobal.net	172.23.136.13	GigabitEthernet1/0/4	BRVIX5WIFIWC002	172.31.3.32	AP Energia Zero - 4SEP. Patr:
REACHABLE	BRVIX5WIFIAP251	172.23.12.77	Local	BRVIX5ACCSSW215.valenet.valeglobal.net	172.23.1.14	GigabitEthernet0/4	BRVIX5WIFIWC005	172.23.7.9	MANUTENÇÃO TELECOM
REACHABLE	BRVIX5WIFIAP515	172.23.229.11	Local	BRVIX5ACCSSW422.valenet.valeglobal.net	172.23.224.66	GigabitEthernet1/0/3	BRVIX5WIFIWC002	172.31.3.32	Portaria-TPD

Modelagem automática de APs via API

Resultados



Modelagem automática de APs via API

► Resultados

- Redução de carga no Zabbix e no Cisco Prime
- Automação da criação e manutenção
- Riqueza na coleta de dados
- Melhoria na visualização e troubleshooting

SECOND CASE

Monitoramento de serviços
de missão crítica

Monitoramento de serviços de missão crítica

- ▶ O que são serviços de missão crítica?

*Serviços de missão crítica são operações industriais cuja **interrupção** ou **falha** pode resultar em **acidentes** graves, **prejuízos materiais** significativos e, em casos extremos, colocar **vidas humanas em risco**, **exigindo**, portanto, **níveis máximos de confiabilidade**, **monitoramento e resposta imediata**.*

Monitoramento de serviços de missão crítica

- ▶ Exemplos:
 - Operação remota



Estação de trabalho de operação remota de máquinas portuárias - Ed. 577. Revista Proteção. Usina de pelletização da Vale em São Luís fecha parceria com Gasmar. Click Petróleo e Gás. Disponível em: <https://protecao.com.br> em: <https://clickpetroleoeogas.com.br/...> (acesso em 2 jun. 2025)

Monitoramento de serviços de missão crítica

- ▶ Exemplos:
 - Mina autônoma



Vale: primeira mina operando com frota autônoma. Disponível em <https://www.youtube.com/watch?v=AiFPdgsdgH8>

Monitoramento de serviços de missão crítica

- ▶ Exemplos:
 - Sinalização ferroviária



Monitoramento de serviços de missão crítica

► Exemplos:

- Radio Comunicação - Trunking PTT inter-sites



Carajas

Documento de uso privado. Divulgação proibida sem autorização prévia

Monitoramento de serviços de missão crítica

► Exemplos:

- Video-monitoramento de estruturas geotécnicas



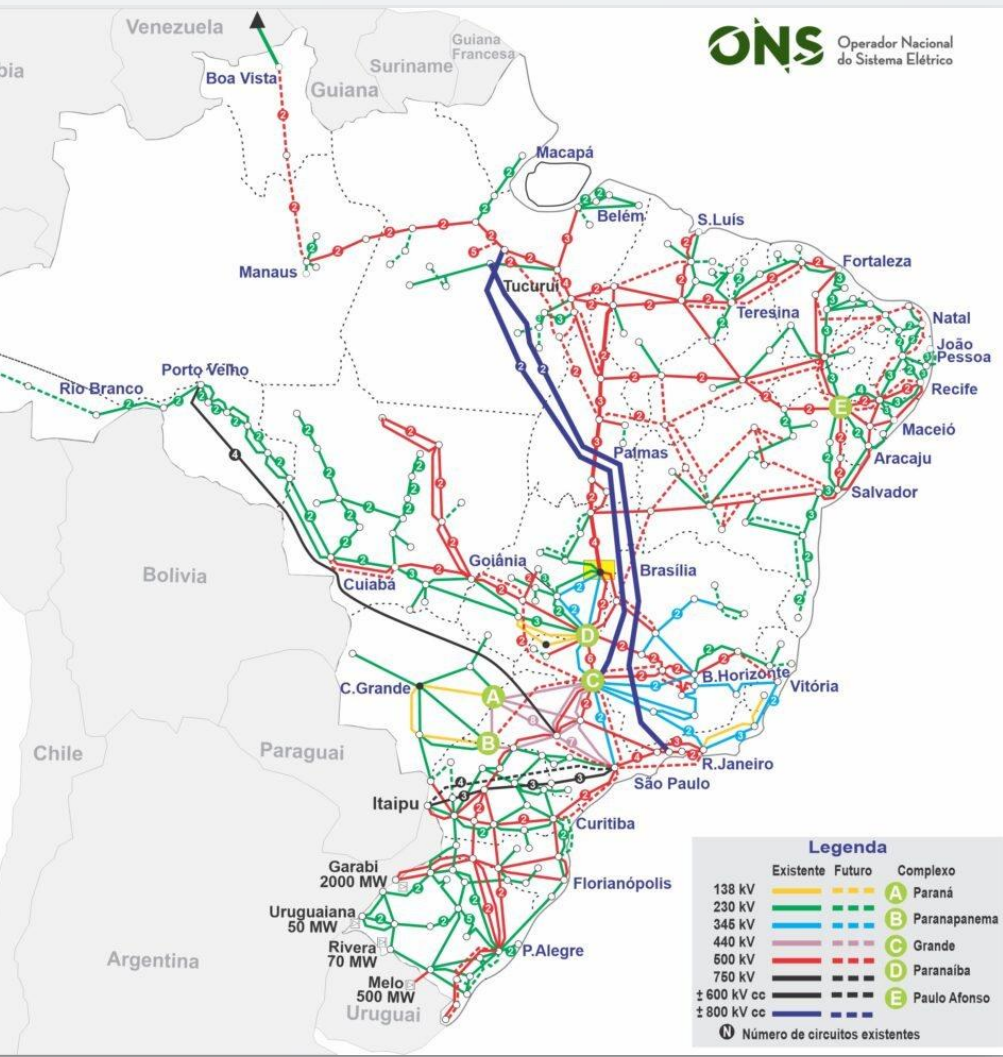
Monitoramento de serviços de missão crítica

ZABBIX '25

CONFERENCE

LATIN AMERICA

- ▶ Exemplos:
 - Proteção de sistemas elétricos



Fonte: <https://www.ons.org.br/>



Monitoramento de serviços de missão crítica

► Exemplos:

- Sistema de evacuação em massa



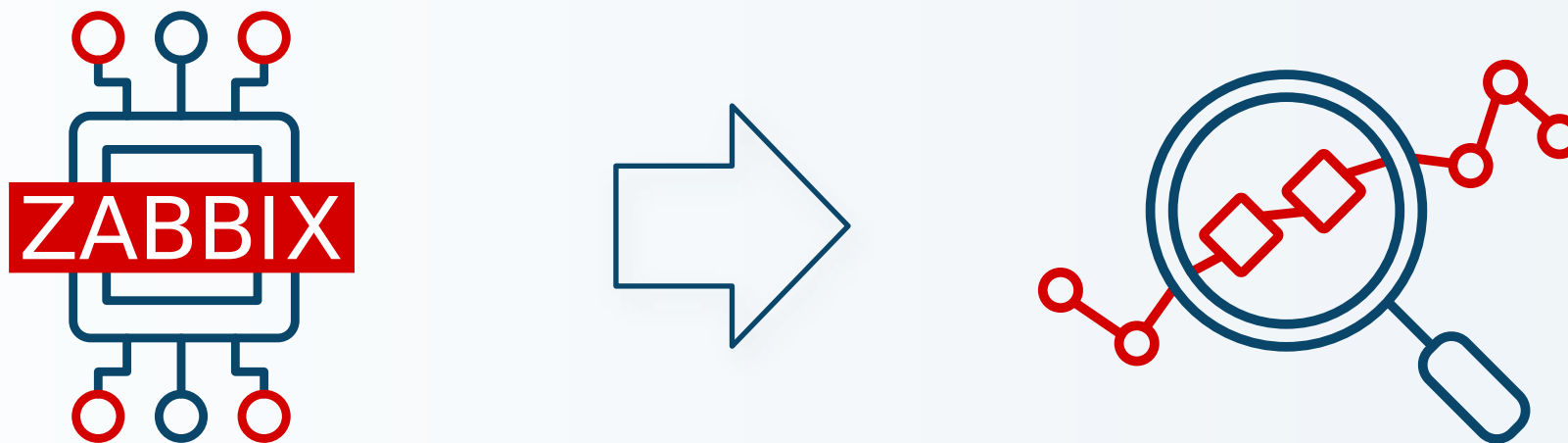
Fontes:

- Simulado Prático de Emergência 27/11/2021 - Itabira/Mg. Disponível em <https://www.youtube.com>
- Resolução MGM-83/2024. Disponível em <https://www.mg.gov.br/>

Monitoramento de serviços de missão crítica

► Monitoramento dos serviços

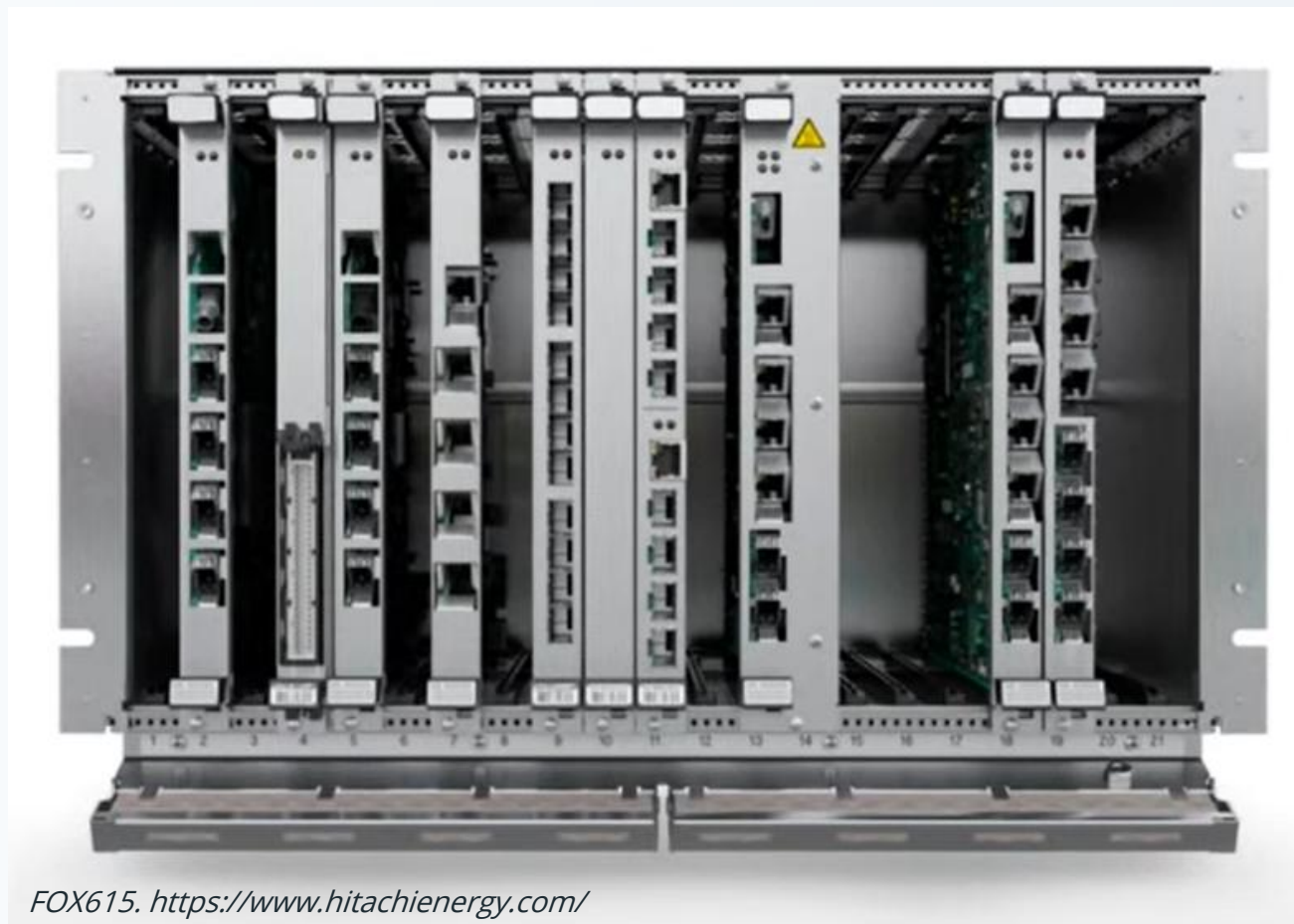
Importante destacar que o monitoramento dos serviços apresentados em grande parte já era feito pelo Zabbix, mas...



Monitoramento de serviços de missão crítica

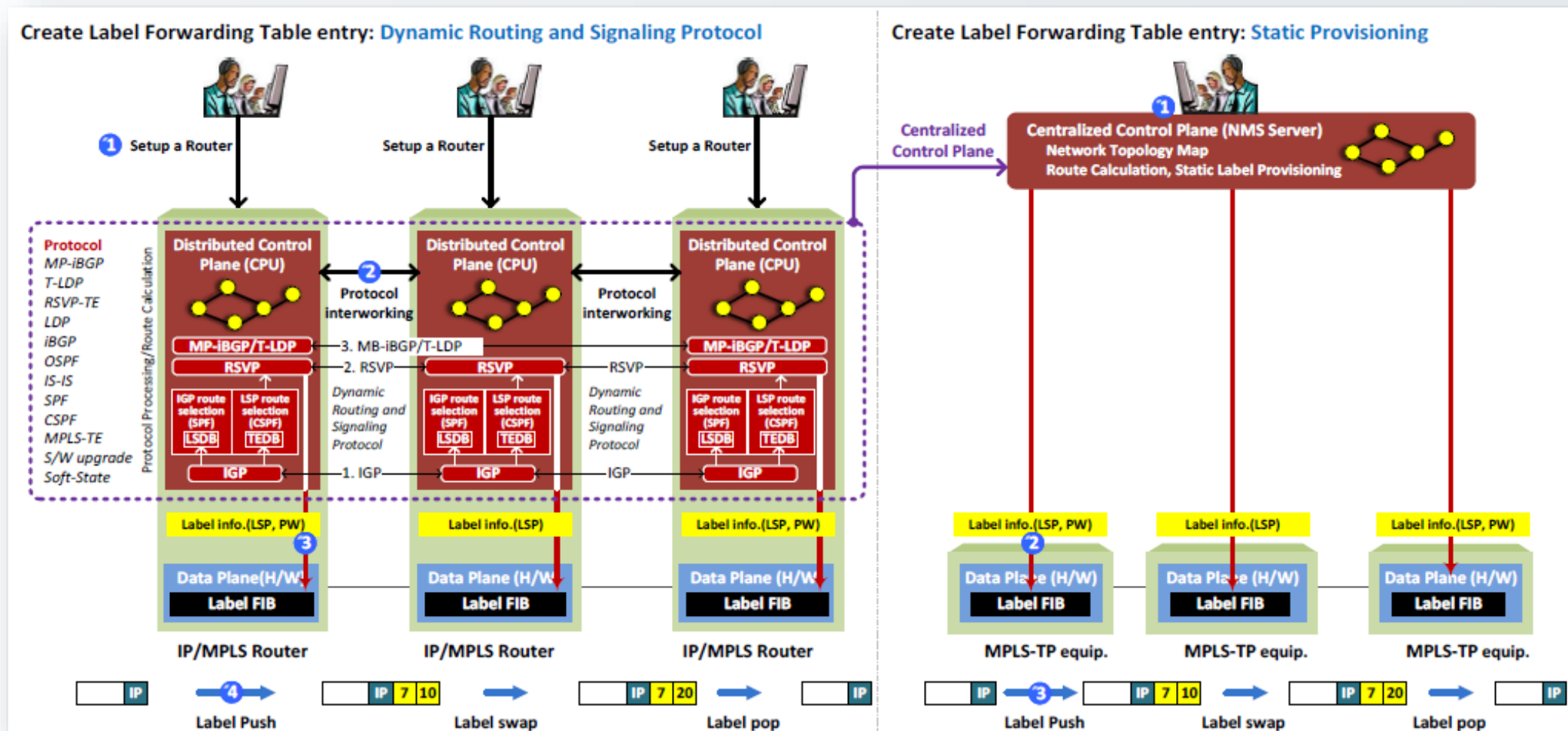
► Sistema de transporte utilizado na Vale

- ⚡ MPLS-TP
- ⚡ Barramentos TDM e IEEE 802.3
- ⚡ IEC61850, IEEE C37.94
- ⚡ SHDSL
- ⚡ Serial Interfaces
- ⚡ Telefonia (2 wire, E&M, voice gateway)



Monitoramento de serviços de missão crítica

- Sistema de transporte utilizado na Vale
 - MPLS-TP vx MPLS-IP

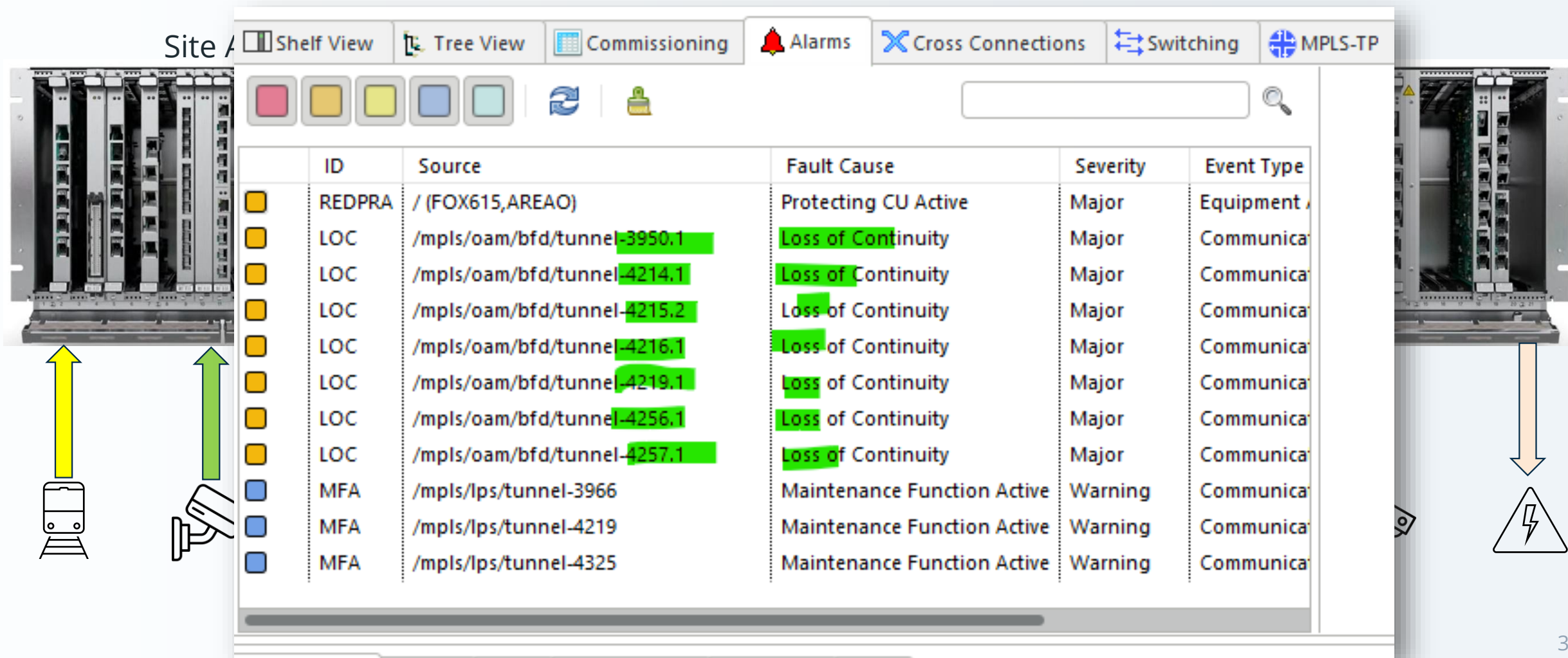


MPLS-TP vs. IP/MPLS: Control Plane. Disponível em <https://www.netmanias.com/>

Monitoramento de serviços de missão crítica

► Problema

- Monitoramento proprietário
- Falta de visibilidade de falhas dos túneis



The screenshot displays the Zabbix web interface for monitoring network equipment. On the left, a rack of network devices is shown with a yellow arrow pointing up and a green arrow pointing up. On the right, another rack of network devices is shown with an orange arrow pointing down and a lightning bolt icon. The main area shows a table of faults.

Site /

	ID	Source	Fault Cause	Severity	Event Type
☐	REDPRA	/ (FOX615,AREAO)	Protecting CU Active	Major	Equipment
☐	LOC	/mpls/oam/bfd/tunnel-3950.1	Loss of Continuity	Major	Communication
☐	LOC	/mpls/oam/bfd/tunnel-4214.1	Loss of Continuity	Major	Communication
☐	LOC	/mpls/oam/bfd/tunnel-4215.2	Loss of Continuity	Major	Communication
☐	LOC	/mpls/oam/bfd/tunnel-4216.1	Loss of Continuity	Major	Communication
☐	LOC	/mpls/oam/bfd/tunnel-4219.1	Loss of Continuity	Major	Communication
☐	LOC	/mpls/oam/bfd/tunnel-4256.1	Loss of Continuity	Major	Communication
☐	LOC	/mpls/oam/bfd/tunnel-4257.1	Loss of Continuity	Major	Communication
☐	MFA	/mpls/lps/tunnel-3966	Maintenance Function Active	Warning	Communication
☐	MFA	/mpls/lps/tunnel-4219	Maintenance Function Active	Warning	Communication
☐	MFA	/mpls/lps/tunnel-4325	Maintenance Function Active	Warning	Communication

Monitoramento de serviços de missão crítica

► Solução

- Zabbix Agent no servidor e script shell coletando as informações dos tuneis diretamente no banco de dados.

TUNNEL - FOX 615

Tunnel Status

TUNNEL TOTALMENTE DOWN

TOTAL DE TUNEIS

242

TUNNEL TOTALMENTE DOWN

0

TUNNEL PRIMARIO DOWN

13

TUNNEL SECUNDARIO DOWN

21

TUNNEL SEM REDUNDANCIA

49

Host	Severity	Status	Problem	Ack	Time
FOX 615 MAC-P4	TUNNEL-DOWN	PROBLEM	ALARM : mpls/oam/bfd/tunnel-4354.1:Loss of Continuity		16 jan 2
FOX 615 VGR-2	TUNNEL-DOWN	PROBLEM	ALARM : mpls/oam/bfd/tunnel-4354.1:Loss of Continuity		16 jan 2
FOX 615 FAB	TUNNEL-DOWN	PROBLEM	ALARM : mpls/oam/bfd/tunnel-4219.1:Loss of Continuity		28 out 2
FOX 615 FAB	TUNNEL-DOWN	PROBLEM	ALARM : mpls/oam/bfd/tunnel-4263.1:Loss of Continuity		28 out 2
FOX 615 FAB	TUNNEL-DOWN	PROBLEM	ALARM : mpls/oam/bfd/tunnel-4074.1:Loss of Continuity		28 out 2
FOX 615 FAB	TUNNEL-DOWN	PROBLEM	ALARM : mpls/oam/bfd/tunnel-4264.1:Loss of Continuity		28 out 2
FOX 615 FAB	TUNNEL-DOWN	PROBLEM	ALARM : mpls/oam/bfd/tunnel-4265.1:Loss of Continuity		28 out 2
FOX 615 PIC-TRK	TUNNEL-DOWN	PROBLEM	ALARM : mpls/oam/bfd/tunnel-4172.1:Loss of Continuity		26 out 2

Host	Severity	Status	Problem	Ack	Time
FOX 615 VGR-2	TUNNEL-DOWN	PROBLEM	ALARM : mpls/oam/bfd/tunnel-4358.2:Loss of Continuity		17 jan 2
FOX 615 TFA	TUNNEL-DOWN	PROBLEM	ALARM : mpls/oam/bfd/tunnel-4358.2:Loss of Continuity		17 jan 2
FOX 615 PIC-TRK	TUNNEL-DOWN	PROBLEM	ALARM : mpls/oam/bfd/tunnel-4277.2:Loss of Continuity		16 jan 2
FOX 615 VGR-2	TUNNEL-DOWN	PROBLEM	ALARM : mpls/oam/bfd/tunnel-4277.2:Loss of Continuity		16 jan 2
FOX 615 FAB	TUNNEL-DOWN	PROBLEM	ALARM : mpls/oam/bfd/tunnel-4042.2:Loss of Continuity		28 out 2
FOX 615 FNO	TUNNEL-DOWN	PROBLEM	ALARM : mpls/oam/bfd/tunnel-4326.2:Loss of Continuity		15 out 2
FOX 615 TORRE-DC	TUNNEL-DOWN	PROBLEM	ALARM : mpls/oam/bfd/tunnel-4326.2:Loss of Continuity		15 out 2
FOX 615 DCI	TUNNEL-DOWN	PROBLEM	ALARM : mpls/oam/bfd/tunnel-4036.2:Loss of Continuity		09 out 2

Enabled ☒

3976 | 1 | 1 | 1 | VPWS_FAB-TTV-SW-TI

Modelagem automática de APs via API

► Resultados

- Visibilidade da disponibilidade dos serviços de missão crítica suportados pelo Sistema de Transmissão
- Atuação proativa e preventiva
- Otimização dos pseudo-wires PRI & SEC

Encerramiento

Time de Tools



Allan Dymitri



Anderson Carvalho



Bharbara Vasconcellos



Douglas Ponciano



Edson Nunes



Euzebio Viana



Fabiana Milanez



Heitor Cortat



Higor Campos



Igor Soares



João Victor



Lucas de Oliveira



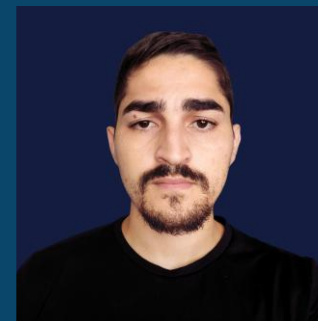
Marcell de Oliveira



Marcos Vinicius



Matheus Lino



Maycon Borges



Nikolas Ferreira



Wanderson Pamplona



Obrigado!

Gil Amaral



Thiago Campos



ZABBIX

