



Autoconfiguration and advanced Monitoring

of MikroTik Devices



Agenda

- Company introduction
- Motivation
- Tools
- Examples





FMS Internetservice GmbH

Value Added Distribution



FMS Internetservice GmbH

- Value Added Distributor
 - Distribution
 - Training
 - Consulting
 - Support
- Founded 1997
- Southern Germany





Our MikroTik History

- Oldest active MikroTik Distributor in Germany
- Early training partner TR11 & TR23
- First MTCSA certified German distributor
- 4 certified MikroTik consultants
- > 60 years of MikroTik experience 😊
- Inhouse training facility for all levels

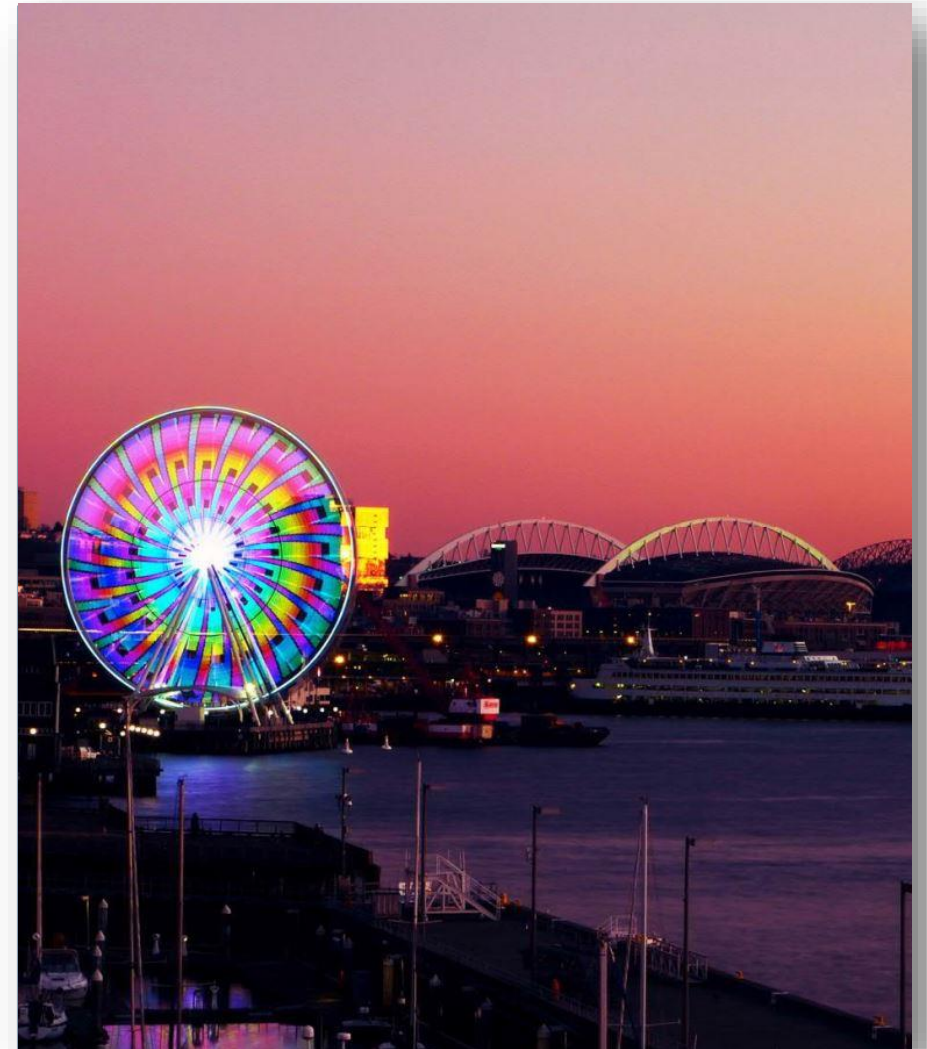
See Training Schedule





MikroTik Consulting, Support and Projects

- Consulting, support, projects all over the world
- Robots, roller coasters, cruise vessels, flight simulators, you name it ...
- Large networks
 - ISPs
 - IoT/M2M projects
 - Municipals
 - Large enterprise customers





Experience & Tools

- Staging and pre configuration environment
- > 10.000 devices / year
- Experience in network design
- Operation of large networks

The screenshot shows the CAPsMAN software interface. The main window displays a table with columns: Address, Board, Version, Identity, and State. The table contains 20 rows of device data, all with a state of 'Run'. Below the table, there are buttons for 'Provision', 'Upgrade', and 'Set Identity'. A sidebar on the left shows a tree view with 'CAPsMAN' and 'CAP Int' expanded. At the bottom, there is a summary bar showing '1026 items (1 selected)' and a detailed view of selected items, including '5GHz-WLAN-23-0005-1-1', '5GHz-WLAN-23-0005-1-2', '5GHz-WLAN-23-0006-1', and '5GHz-WLAN-23-0006-1-1'. The bottom status bar indicates '6154 items out of 6175'.

Address	Board	Version	Identity	State
172.20.2.35	RBD52G-5HacD2HnD	7.12.1	WLAN-2715	Run
172.20.1.92	RBD52G-5HacD2HnD	7.12.1	WLAN-2714	Run
172.20.1.229	RBD52G-5HacD2HnD	7.12.1	WLAN-2713	Run
172.20.1.191	RBD52G-5HacD2HnD	7.12.1	WLAN-2712	Run
172.20.1.85	RBD52G-5HacD2HnD	7.12.1	WLAN-2711	Run
172.20.1.190	RBD52G-5HacD2HnD	7.12.1	WLAN-2710	Run
172.20.0.146	RBD52G-5HacD2HnD	7.12.1	WLAN-2708	Run
172.20.1.84	RBD52G-5HacD2HnD	7.12.1	WLAN-2706	Run
172.20.1.120	RBD52G-5HacD2HnD	7.12.1	WLAN-2705	Run
172.20.1.160	RBD52G-5HacD2HnD	7.12.1	WLAN-2704	Run
172.20.1.200	RBD52G-5HacD2HnD	7.12.1	WLAN-2703	Run
172.20.1.122	RBD52G-5HacD2HnD	7.12.1	WLAN-2702	Run
172.20.1.224	RBD52G-5HacD2HnD	7.12.1	WLAN-2701	Run
172.20.1.114	RBD52G-5HacD2HnD	7.12.1	WLAN-2700	Run
172.20.1.209	RBD52G-5HacD2HnD	7.12.1	WLAN-2699	Run
172.20.1.222	RBD52G-5HacD2HnD	7.12.1	WLAN-2698	Run
172.20.1.216	RBD52G-5HacD2HnD	7.12.1	WLAN-2697	Run
172.20.0.160	RBD52G-5HacD2HnD	7.12.1	WLAN-2696	Run
172.20.3.173	RBD52G-5HacD2HnD	7.12.1	WLAN-2694	Run

Item	Identity
5GHz-WLAN-23-0005-1-1	CLF
5GHz-WLAN-23-0005-1-2	iLive-Guest
5GHz-WLAN-23-0006-1	WLAN-23-0006
5GHz-WLAN-23-0006-1-1	CLF



Motivation – Why should you care?

Autoconfiguration, Monitoring, Visualisation



Motivation

- Faster implementation
 - Time to market
- Better service quality
- Improved security
- Less resources
 - Implementation & Operation
 - Cost & manpower
- Scalibility





Tools – What can we use?

Protocols and Software



Available and unavailable Protocols

AVAILABLE

- SNMP (Simple Networks Management Protocol)
- TR069
- API
 - “Old” API
 - REST API
- Trafficflow (Netflow 9)
- Syslog
- MNDP (MikroTik Neighbor Discovery)
- LLDP (Link Layer Discovery Protocol)

UNAVAILABLE

- No Netconf/Yang support
(used in modern SDN setups)
- No TR369 support



Third Party Tools

- NMS
 - Monitoring
 - Alarms
 - Visualization
- ACS (TR069 Autoconfiguration Server)
 - Update and configuration of devices
 - Usually rule based



POSTMAN

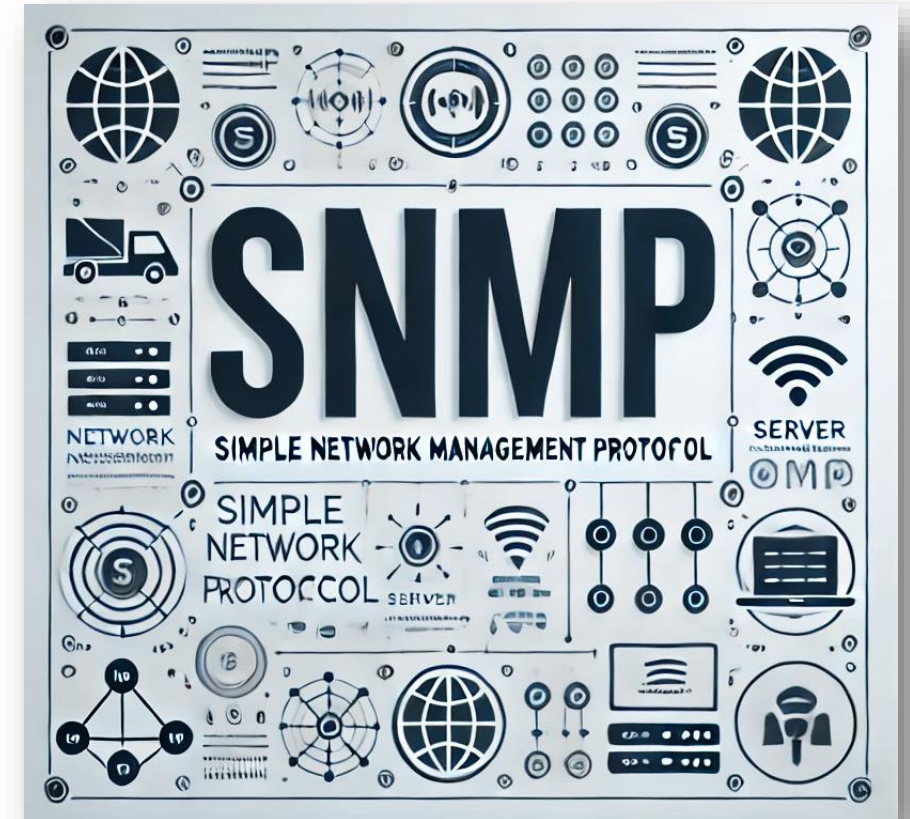


SNMP

- Use v3
- Need of an individual engine id
- Set engine id by script

- MIB is not extensive
- Few traps

- /print oid





SNMP Configuration

The image shows the configuration process for SNMP in Mikrotik WinBox. The left sidebar contains the following menu items:

- WiFi
- Interfaces
- WireGuard
- Bridge
- PPP
- Mesh
- IP
- IPv6
- MPLS
- Routing
- System
- Queues
- Dot1X
- Files
- Log
- New Terminal
- RADIUS
- Tools
- Make Supout.rif

The 'SNMP Settings' dialog is configured as follows:

- Enabled:**
- Contact Info:** FMS Internetservice GmbH
- Location:** Datacenter FFM
- Engine ID suffix:** +
- Engine ID:** 80003a8c04
- Trap Target:** +
- Trap Community:** public
- Trap Version:** 1
- Trap Generators:** +
- Trap Interfaces:** +
- Src. Address:** ::
- VRF:** main

The 'SNMP Server' dialog shows the following configuration:

- Communities:** public (Address: ::/0, Security: none)
- Communities Dialog:**
 - Enabled:**
 - Comment:** SNMPv3 Monitoring Community
 - Name:** Monitoring
 - Addresses:** +
 - Security:** private
 - Read Access:**
 - Write Access:**
 - Authentication Protocol:** MD5
 - Encryption Protocol:** AES
 - Authentication Password:** [Redacted]
 - Encryption Password:** [Redacted]



SNMP Configuration

SNMP Settings

Enabled

Contact Info FMS Internetservice GmbH

Location Datacenter FFM

Engine ID suffix +

Engine ID 80003a8c04

Configuration

Communities

SNMP Settings

Enabled

Contact Info FMS Internetservice GmbH

Location Datacenter FFM

Engine ID suffix xxx -

Engine ID 80003a8c04787878

Configuration

Communities

Set Engine Id suffix to receive a unique Engine Id

RouterOS 7.x on MikroTik hardware

```
/snmp/set enabled=yes engine-id-suffix=[/system/routerboard/get serial-number]
```

RouterOS 7.x on CHR

```
# /snmp set enabled=yes engine-id-suffix=[/system/license/get system-id]
```

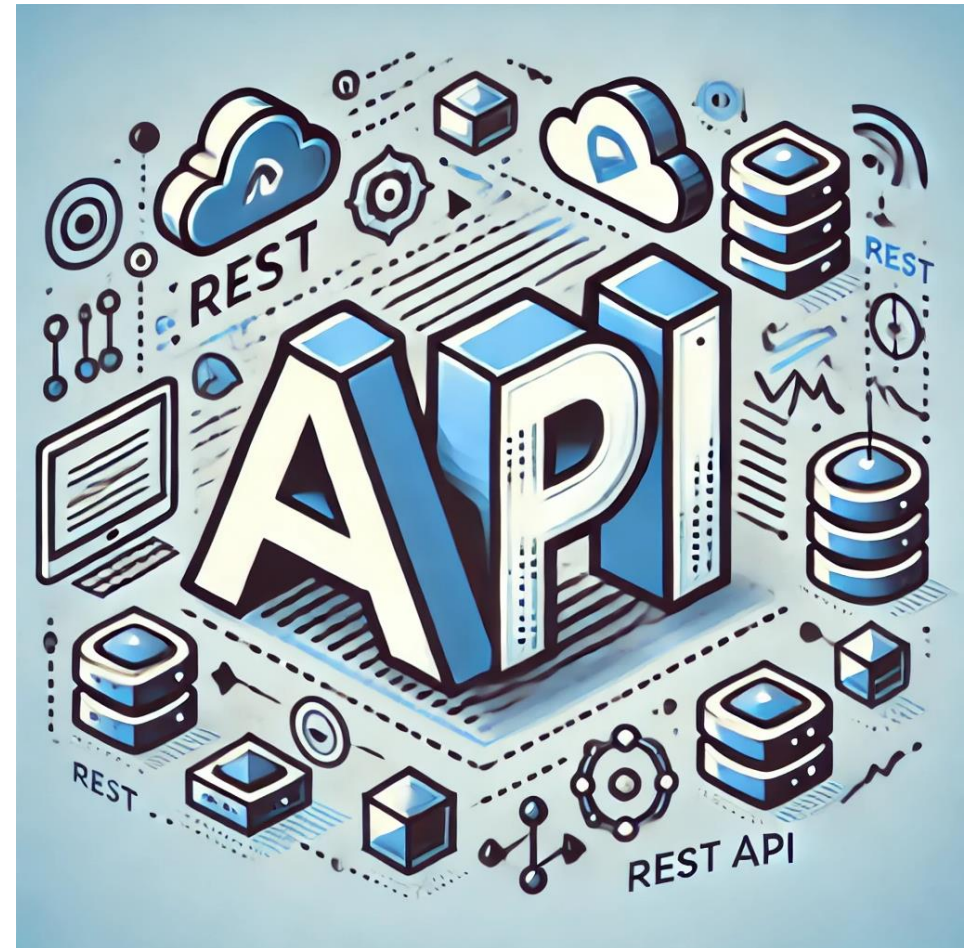
RouterOS 6.x on CHR

```
# /snmp set enabled=yes engine-id=[/system license get system-id]
```



API

- Prefer REST API over old API
- SNMP is more efficient than API





REST API Configuration

1

Name	Port	Available From	VRF	Certificate	TLS Ver...
api	8728		main		
api-ssl	8729		main	none	any
ftp	21				
ssh	22		main		
telnet	23		main		
winbox	8291		main		
www	80		main		
www-ssl	443		main	API	

2

Name	Issuer	Common Na...	Subject Alt. ...	Key Size	Days Valid	Trusted	SCEP URL	CA
KAT	API	API		2048	3650	yes		

3

Name	Group	Allowed Address	Last Logged In
system default user			
admin	full		
apitest	read		

4

Name	Policies	Skin
apiread	read rest-api	default
full	local telnet ssh ftp reboot read write policy test winbox...	default
read	local telnet ssh reboot read test winbox password web ...	default
write	local telnet ssh reboot read write test winbox passwor...	default

Certificates API

General

Name: API

Issuer:

Country:

State:

Locality:

Organization:

Unit:

Common Name: API

Subject Alt. Name: +

Key Type: RSA

Key Size: 2048

Days Valid: 3650

Trusted:



Test REST API with Postman

1 GET https://10.10.0.168/rest/interface Send 3

2 Auth

Basic Auth

Username apitest

Password apitest

200 OK 649 ms 5.37 KB Save Response

4

```
1 {
2   ".id": "*2",
3   "actual-mtu": "1500",
4   "default-name": "ether1",
5   "disabled": "false",
6   "fp-rx-byte": "8708294",
7   "fp-rx-packet": "33976",
8   "fp-tx-byte": "0",
9   "fp-tx-packet": "0",
10  "l2mtu": "1598",
11  "last-link-up-time": "2025-02-18 10:35:20",
12  "link-downs": "0",
13  "mac-address": "E4:8D:8C:38:BF:86",
14  "max-l2mtu": "4074",
15 }
```



POSTMAN

<https://www.postman.com/>



TR069

- CWMP (CPE WAN Management Protocol)
 - Monitoring and configuration of TR069 attributes
 - Firmware upgrades
- Extra package is needed
- Data model without 802.11ax
- No ACS server from DHCP43 option
 - Use a script to achieve this behavior





TR069 Configuration

Package List	
	Name
<input type="checkbox"/>	routeros
<input type="checkbox"/>	tr069-client

TR069 Client

disabled

Enabled

ACS URL

Username

Password

Periodic Inform Enabled

Periodic Inform Interval

Connection Request Username

Connection Request Password

Provisioning Code

Client Certificate

Last Session Error

Retry Count

DHCP Client

ether1

Status: bound

DISABLED INVALID DYNAMIC

Enabled

Comment

Interface

Use Peer DNS

Use Peer NTP

Add Default Route

DHCP Options

- hostname
- clientid

Default Route Distance

Script

```
:if ($bound=1) do={
  :local LOVendorSpecific ($"lease-options" → "43");
  :log info "Lease Option 43 (Vendor-Specific) is $LOVendorSpecific";
  :if ([[:len $LOVendorSpecific] > 0]) do={
    /tr069-client set acs-url=$LOVendorSpecific;
    /tr069-client set enable=yes
  }
  :log info "TR-069 ACS URL updated to: $LOVendorSpecific";
} else={
  :log warning "No ACS URL found in DHCP Option 43.";
}
}
```

Actions

- Release
- Renew



MikroTik's TR069 Data Model

Device.IP.	- IP object that contains the Interface, ActivePort, and Diagnostics objects.	6.39
InterfaceNumberOfEntries Device.IP.InterfaceNumberOfEntries	- The number of entries in the <i>Interface</i> table. <i>type:</i> uint32	6.39
Device.IP.Interface.{i}.	W IP interface table (a stackable interface object as described in [TR-181i2]). This table models the layer 3 IP interface.	
Enable Device.IP.Interface.{i}.Enable	W Enables or disables the interface (regardless of <i>IPv4Enable</i> and <i>IPv6Enable</i>). This parameter is based on "ifAdminStatus" from [RFC2863]. <i>type:</i> bool , <i>default:</i> "false"	6.39
Status Device.IP.Interface.{i}.Status	- The current operational state of the interface (see [TR-181i2]). This parameter is based on "ifOperStatus" from [RFC2863]. <ul style="list-style-type: none">• Up• Down• Unknown• Dormant• NotPresent• LowerLayerDown• Error	6.39



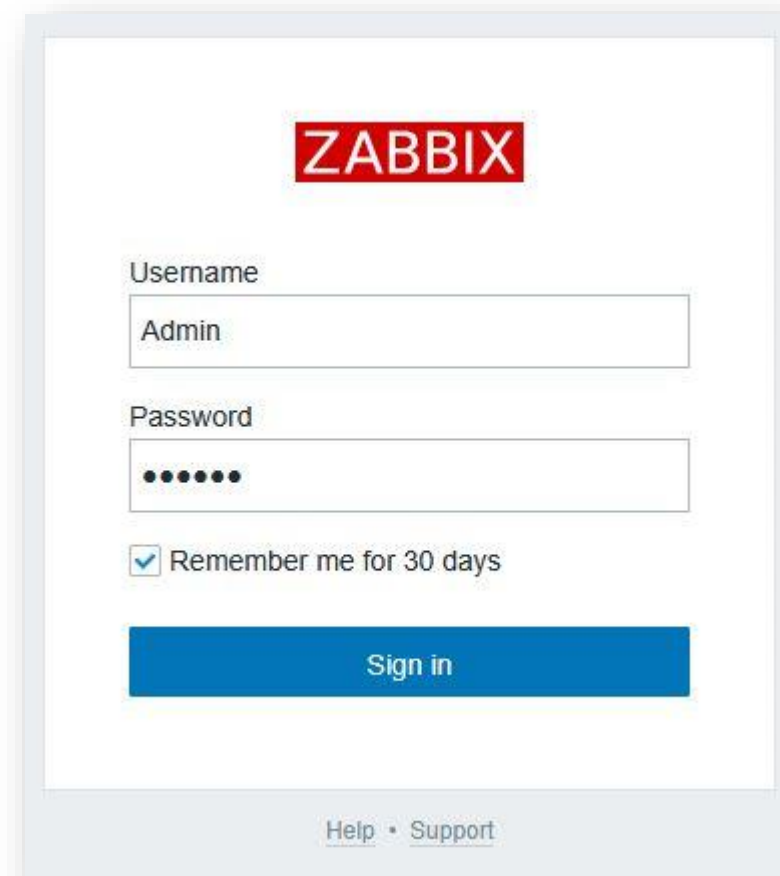
NMS

Dude	LibreNMS	Zabbix
easy to setup visualisation	easy to setup	good MikroTik support
extended MikroTik support	good MikroTik support	good visualisation features
old fashioned	limited visualisation	powerful dashboards
slow development	limited dashboards	great REST API integration
not made for long term statistics		excellent configuration options
no dashboards		steep learning curve
		can be overwhelming



Zabbix Installation

- Straight forward, well documented
- www.zabbix.com

A screenshot of the Zabbix web interface login page. At the top center, the word 'ZABBIX' is displayed in white capital letters on a red rectangular background. Below this, there are two input fields: 'Username' with the text 'Admin' entered, and 'Password' with six black dots representing a masked password. Underneath the password field is a checked checkbox followed by the text 'Remember me for 30 days'. A large blue button with the text 'Sign in' is positioned below the checkbox. At the bottom of the page, there are two links: 'Help' and 'Support', separated by a small dot.



ACS

- Purpose of an ACS
- Compatible ACS

<https://help.mikrotik.com/docs/spaces/ROS/pages/9863195/TR-069>

- GenieACS

Queued: 1 Pending: 0 Fault: 0 Stale: 0

Overview Devices **Faults**

Listing devices

Filter

<input type="checkbox"/>	Serial number •	Product class •	Software version •	IP •	MAC •
<input type="checkbox"/>	W.000000	BM632w	V100R001IRQC56B017	172.3.89.141	20:2B:C1:E0:06:67
<input checked="" type="checkbox"/>	W.000001	BM632w	V100R001IRQC56B017	172.3.89.140	20:2B:C1:E0:06:66
<input type="checkbox"/>	W.000002	BM632w	V100R001IRQC56B017	172.3.89.140	20:2B:C1:E0:06:65
<input type="checkbox"/>	W.000003	BM632w	V100R001IRQC56B017	172.3.89.140	20:2B:C1:E0:06:65
<input type="checkbox"/>	W.000004	BM632w	V100R001IRQC56B017	172.3.89.140	20:2B:C1:E0:06:65
<input type="checkbox"/>	W.000005	BM632w	V100R001IRQC56B017	172.3.89.140	20:2B:C1:E0:06:65
<input type="checkbox"/>	W.000006	BM632w	V100R001IRQC56B017	172.3.89.140	20:2B:C1:E0:06:65
<input type="checkbox"/>	W.000007	BM632w	V100R001IRQC56B017	172.3.89.140	20:2B:C1:E0:06:65
<input type="checkbox"/>	W.000008	BM632w	V100R001IRQC56B017	172.3.89.140	20:2B:C1:E0:06:65
<input type="checkbox"/>	W.000009	BM632w	V100R001IRQC56B017	172.3.89.140	20:2B:C1:E0:06:65

10/27 More [Download](#)

[Reboot](#) [Reset](#) [Delete](#) [Tag](#) [Untag](#)



Examples – What will it do for me?

Enhance your MikroTik experience



CAPsMAN Dashboard

Visualise your WIFI Controller



CAPsMAN Dashboard

- Most competing vendors offer graphical UI
- Make the CEO happy ;-)
- Fast overview for first level support
- In depth information to debug and optimize an existing WIFI network
- Tools: SNMP, REST, NMS





Elements

- Number of clients
 - Total
 - Per SSID
 - Per WIFI standard
 - Per frequency
 - Per access point
- Optimization
 - worst clients
 - worst access points
 - max. user/ap
 - max. bandwidth/ap
- Bandwidth
 - Total
 - Per SSID
 - Per access point



Zabbix and MikroTik

- Limited SNMP information (especially for CAPsMAN)
- REST integration is mandatory
- Just basic examples during the presentation
- Important to employ advanced features to avoid time consuming manual processes, bad NMS performance and high load on the CAPsMAN



Creating Manual Items

ZABBIX Zabbix-Test-02

Hosts

<input type="checkbox"/>	Name ▲	Items	Triggers	Graphs	Discovery	Web	Interface
<input type="checkbox"/>	RB2011 Zabbix Lab	Items 7	Triggers 3	Graphs	Discovery	Web	10.10.0.163:161
<input type="checkbox"/>	Zabbix server	Items 140	Triggers 77	Graphs 14	Discovery 6	Web	127.0.0.1:10050

ZABBIX Zabbix-Test-02

Items

All hosts **RB2011 Zabbix Lab** Enabled SNMP Items 7 Triggers 3 Graphs Discovery rules Web scenarios Filter

<input type="checkbox"/>	Name ▲	Triggers	Key	Interval	History	Trends	Type	Status	Tags	Info
<input type="checkbox"/>	... ICMP Ping: ICMP loss	Triggers 1	icmppingloss	1m	31d	365d	Simple check	Enabled	component: health component: network	
<input type="checkbox"/>	... ICMP Ping: ICMP ping	Triggers 1	icmpping	1m	31d	365d	Simple check	Enabled	component: health component: network	
<input type="checkbox"/>	... ICMP Ping: ICMP response time	Triggers 1	icmppingsec	1m	31d	365d	Simple check	Enabled	component: health component: network	
<input type="checkbox"/>	... Mikrotik RouterOS Resource		routeros.resource	1m	31d		HTTP agent	Enabled		
<input type="checkbox"/>	... Mikrotik RouterOS Resource Version		routeros.version	1m	31d		HTTP agent	Enabled		
<input type="checkbox"/>	... SystemIdentity (SNMP, manuell)		SystemIdentity	1m	31d		SNMP agent	Enabled		
<input type="checkbox"/>	... Mikrotik RouterOS Resource: Version		routeros.resource.version		31d		Dependent item	Enabled		

Displaying 7 of 7 found



Creating Manual Item for REST API

Item

Item Tags Preprocessing 2

* Name Mikrotik RouterOS Resource Version

Type HTTP agent

* Key routersos.version

Type of information Character

* URL http://10.10.0.163/rest/system/resource

[...]

Required status codes 200

Follow redirects

Retrieve mode Body Headers Body and headers

Convert to JSON

HTTP proxy [protocol://][user[:password]@]proxy.example.com[:port]

HTTP authentication Basic

User name apitest

Password apitest

Body Cookies Headers (7) Test Results

Pretty Raw Preview Visualize JSON

```
1
2  "architecture-name": "mipsbe",
3  "bad-blocks": "0",
4  "board-name": "RB2011UiAS-2HnD",
5  "build-time": "Nov/17/2023 11:38:45",
6  "cpu": "MIPS 74Kc V4.12",
7  "cpu-count": "1",
8  "cpu-frequency": "600",
9  "cpu-load": "2",
10 "factory-software": "6.34.1",
11 "free-hdd-space": "115838976",
12 "free-memory": "87654400",
13 "platform": "MikroTik",
14 "total-hdd-space": "134217728",
15 "total-memory": "134217728",
16 "uptime": "6h52m54s",
17 "version": "7.12.1 (stable)",
18 "write-sect-since-reboot": "56",
19 "write-sect-total": "63877"
20
```



Use Preprocessing

Item ? ×

Item Tags Preprocessing 2

Preprocessing steps ?	Name	Parameters	Custom on fail	Actions
1:	JSONPath	<input type="text" value="\$..[\" version\"]"=""/>	<input type="checkbox"/>	Test Remove
2:	Trim	<input \"]"="" type="text" value="[\"/>	<input type="checkbox"/>	Test Remove

[Add](#)

Type of information

[Update](#) [Clone](#) [Execute now](#) [Test](#) [Clear history and trends](#) [Delete](#) [Cancel](#)



Test Item

Test item ? ×

Get value from host

Host address Port

Test with **Server** Proxy

Value

Not supported Error

Time

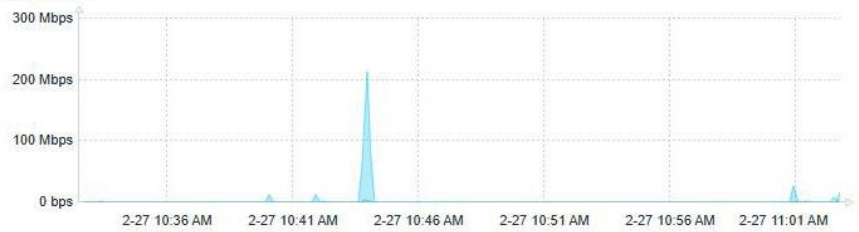
Previous value Prev. time

End of line sequence **LF** CRLF

Preprocessing steps	
Name	Result
1: JSONPath	["7.12.1 (stable)"]
2: Trim	7.12.1 (stable)

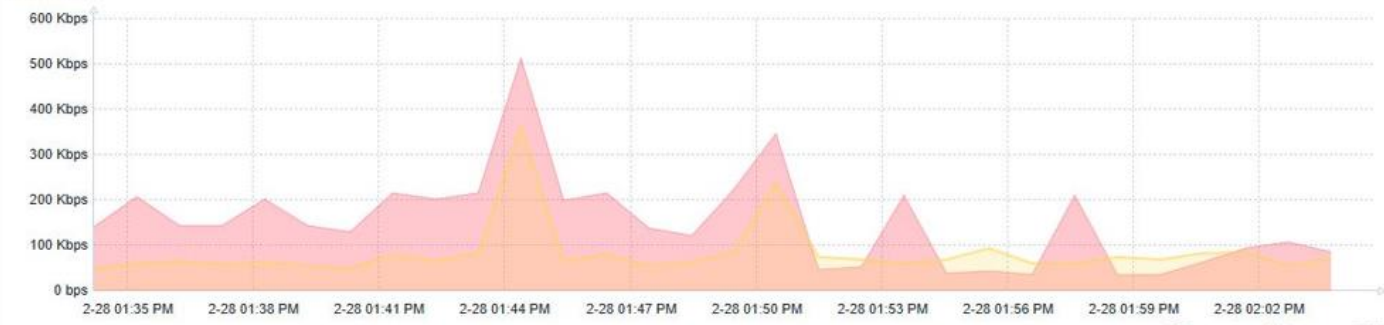
Result 7.12.1 (stable)

Traffic WAN



	min	avg	max
server_cap_dhcp: Interface ether1 RX Speed	97.11 Kbps	2.8 Mbps	214.88 Mbps
server_cap_dhcp: Interface ether1 TX Speed	53.5 Kbps	749.37 Kbps	8.61 Mbps

Traffic AP



	min	avg	max
Summ Wi-Fi RX	37.6 Kbps	154.13 Kbps	513.92 Kbps
Summ Wi-Fi TX	51.2 Kbps	85.56 Kbps	365.28 Kbps

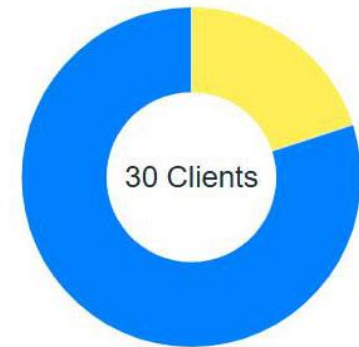
CAPsMAN Information

- # AP: **3**
- # Clients (all SSID): **30**
- # Wi-Fi Interface: **6**

Clients per SSID

- # Clients (SSID Guest): **12**
- # Clients (SSID IoT): **No Clients (0)**
- # Clients (SSID VIP): **18**

Clients per Band



Value
6 Clients
24 Clients

Clients for 2GHz



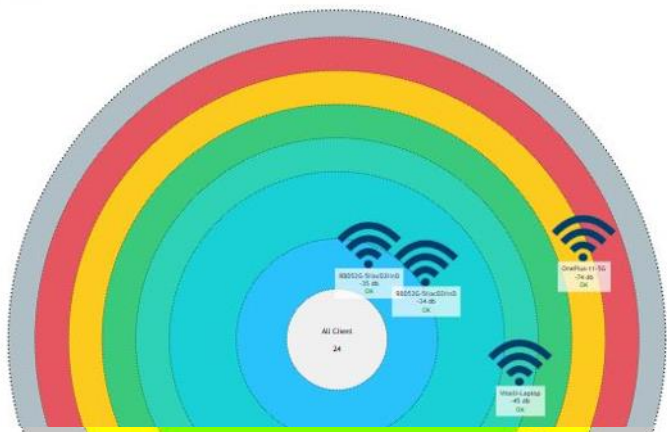
Clients for 5GHz



AVG Signal per Clients

- AVG Signal 2GHz: **-45.4 db**
- AVG Signal 5GHz: **-45.4 db**

Map



Access points with the worst average client signal quality

CAP Interface	Signal AVG	Mix Signal 12Hour
5GHz-hAP_AX2-V	-75 db	-79 db
2GHz-hAP_AX2-V	-46 db	-57 db
2GHz-hAP_AX2-V2	-35 db	-37 db

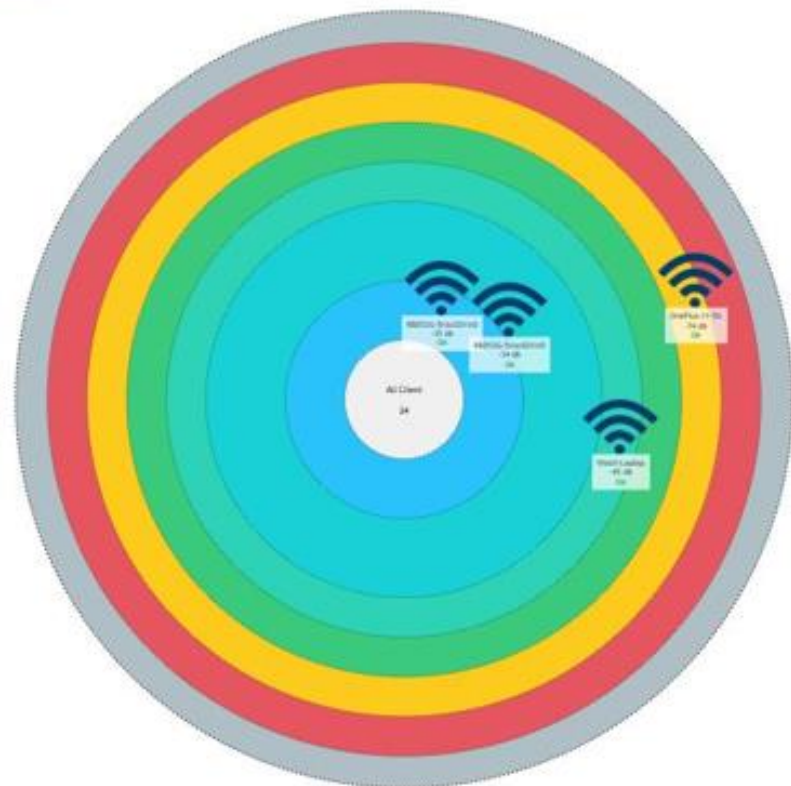
Access points with the most clients

CAP Interface	Count Clients	Max Count 12Hour
2GHz-hAP_AX2-V	6	6
2GHz-hAP_AX2-V2	6	6
5GHz-hAP_AX2	6	6

Traffic per Wi-Fi Clients

Host Name	Client Mac	RX	TX	Rx consumed	Tx consumed	AP Interface
RBD52G-5HacD2HnD	74:4D:28:CF:1D:6C	9 Kbps	0 bps	3 MB	15.07 MB	2GHz-hAP_AX2-V2
RBD52G-5HacD2HnD	74:4D:28:CF:1D:6D	7 Kbps	0 bps	3 MB	7.57 MB	5GHz-hAP_AX2
Vitalii-Laptop	74:E5:F9:97:B7:F1	2 Kbps	0 bps	14 MB	1.63 MB	2GHz-hAP_AX2-V

Map



Access points with the worst average client signal quality

CAP Interface	Signal AVG	Mix Signal 12Hour
5GHz-hAP_AX2-V	-75 db	-79 db
2GHz-hAP_AX2-V	-46 db	-57 db
2GHz-hAP_AX2-V2	-35 db	-37 db

Access points with the most clients

CAP Interface	Count Clients	Max Count 12Hour
2GHz-hAP_AX2-V	6	6
2GHz-hAP_AX2-V2	6	6
5GHz-hAP_AX2	6	6

Traffic per Wi-Fi Clients

Host Name	Client Mac	RX	TX	Rx consumed	Tx consumed	AP Interface
RBD52G-5HacD2HnD	74:4D:28:CF:1D:6C	9 Kbps	0 bps	3 MB	15.07 MB	2GHz-hAP_AX2-V2
RBD52G-5HacD2HnD	74:4D:28:CF:1D:6D	7 Kbps	0 bps	3 MB	7.57 MB	5GHz-hAP_AX2
Vitalii-Laptop	74:E5:F9:97:B7:F1	2 Kbps	0 bps	14 MB	1.63 MB	2GHz-hAP_AX2-V
OnePlus-11-5G	5E:EE:2B:30:54:0A	0 bps	0 bps	10 MB	77.64 MB	5GHz-hAP_AX2-V

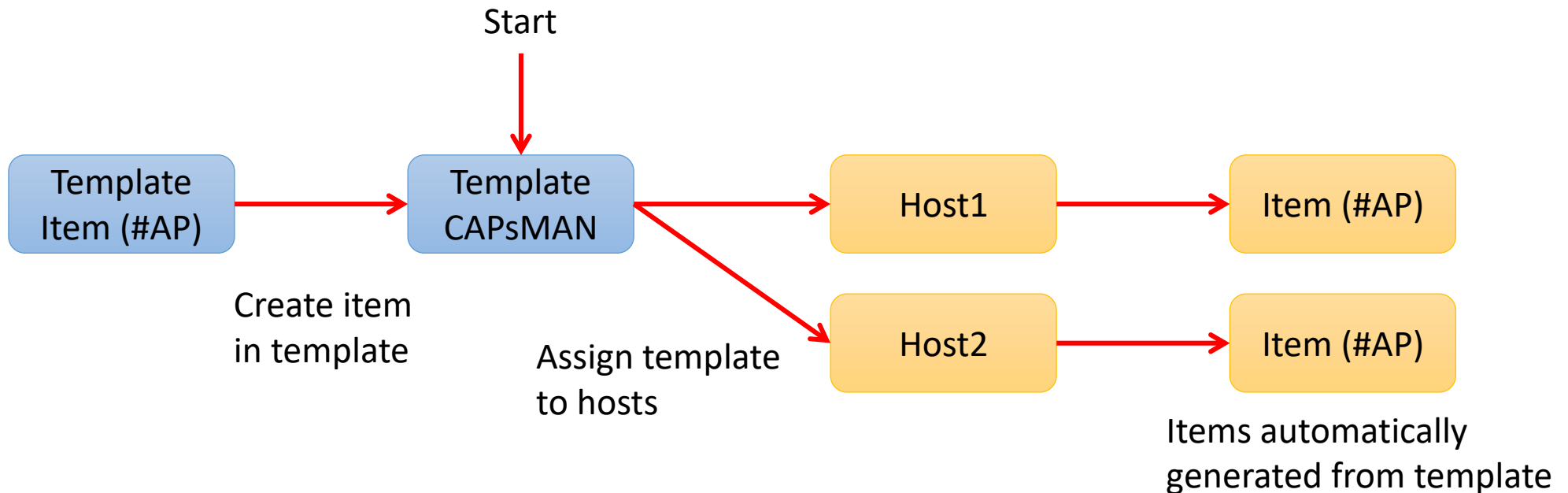
Worst customer signal quality

Host Name	Client Mac	Signal db	Mix Signal 12Hour	AP Interface
OnePlus-11-5G	5E:EE:2B:30:54:0A	-74 db	-89 db	5GHz-hAP_AX2-V
Vitalii-Laptop	74:E5:F9:97:B7:F1	-45 db	-58 db	2GHz-hAP_AX2-V
RBD52G-5HacD2HnD	74:4D:28:CF:1D:6C	-35 db	-37 db	2GHz-hAP_AX2-V2
RBD52G-5HacD2HnD	74:4D:28:CF:1D:6D	-34 db	-35 db	5GHz-hAP_AX2



Get Number of Access Points by using a Template

- Source: /caps-man/remote-cap/print count-only
- Not available by SNMP
- REST Call





Get Number of Access Points by using a Template

Item

Item Tags Preprocessing 2

* Name

Type

* Key

Type of information

* URL

Query fields

Name	Value
<input type="text" value="name"/>	<input type="text" value="value"/>

Request type

Request body type

Request body

HTTP authentication

User name

Password

http://{HOST.IP}:{\$HOST.PORT}/rest/interface/...
Standard macro / user defined macro

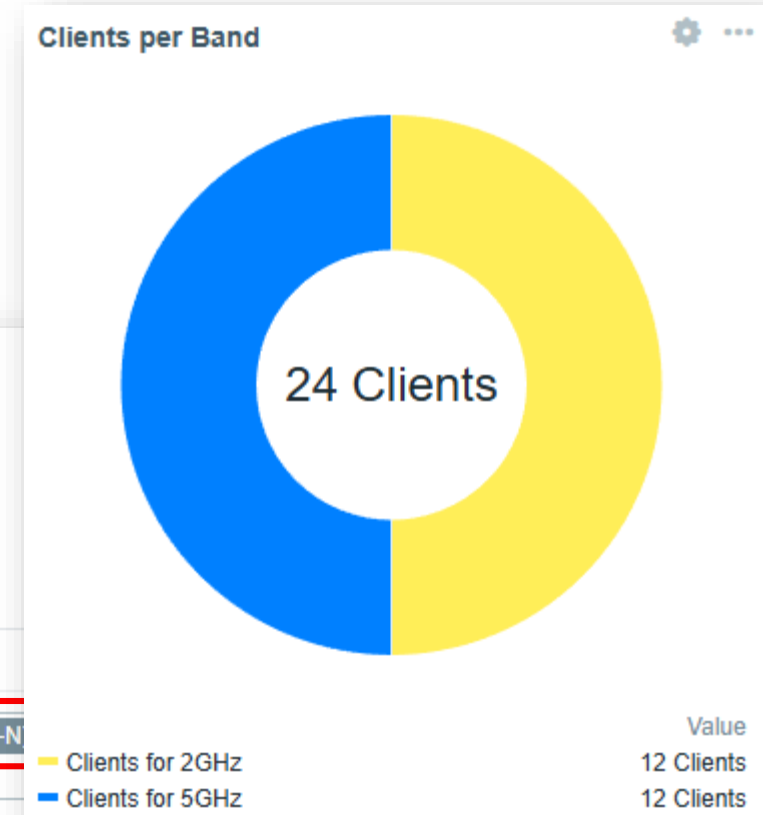
Request body for „count-only“

Using macros for credentials:
{ \$USER.ROUTER }
{ \$PASS.ROUTER }



Get Number of Clients per Frequency Band

- Source: /caps-man/remote-cap/print count-only
- Multiple items per data set



Edit widget

Type: Pie chart
Name: Clients per Band
Refresh interval: Default (1 minute)

Data set 2 | Displaying options | Time period | Legend

Clients for 2GHz (Yellow)

- server_cap_dhcp × host patterns | Select | # Clients (2GHz-AX) × # Clients (2HGz-N) × Item patterns
- Aggregation function: last
- Data set aggregation: sum
- Data set label: Clients for 2GHz

Clients for 5GHz (Blue)

- server_cap_dhcp × | Select | # Clients (5GHz-AC) × # Clients (5GHz-AX) × | Select



Get Number of Clients per SSID

- Could be done the same way
- Would require manual creation of an item per new SSID

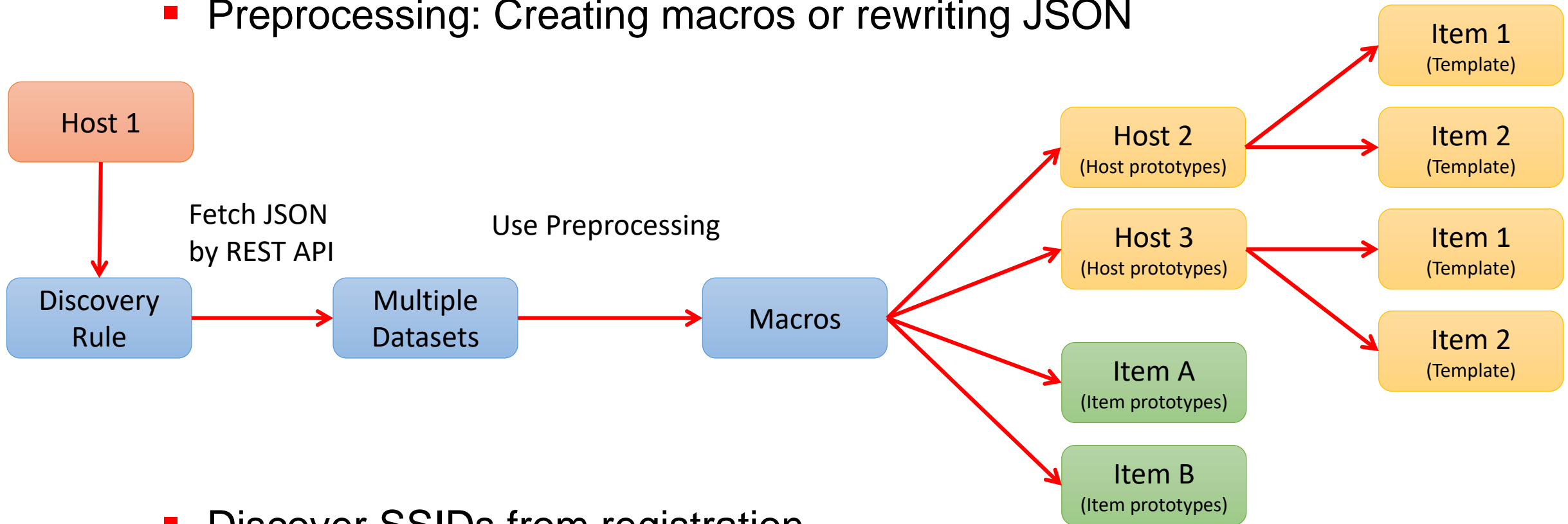
- Here comes some Zabbix Magic
 - Discovery rules
 - Script based preprocessing
 - Item prototypes
 - Host prototypes





Discovery and Prototypes

- Discovery & prototypes: One item/host per JSON dataset
- Preprocessing: Creating macros or rewriting JSON



- Discover SSIDs from registration
- Create “count-only” items per SSID from prototype (on registration)



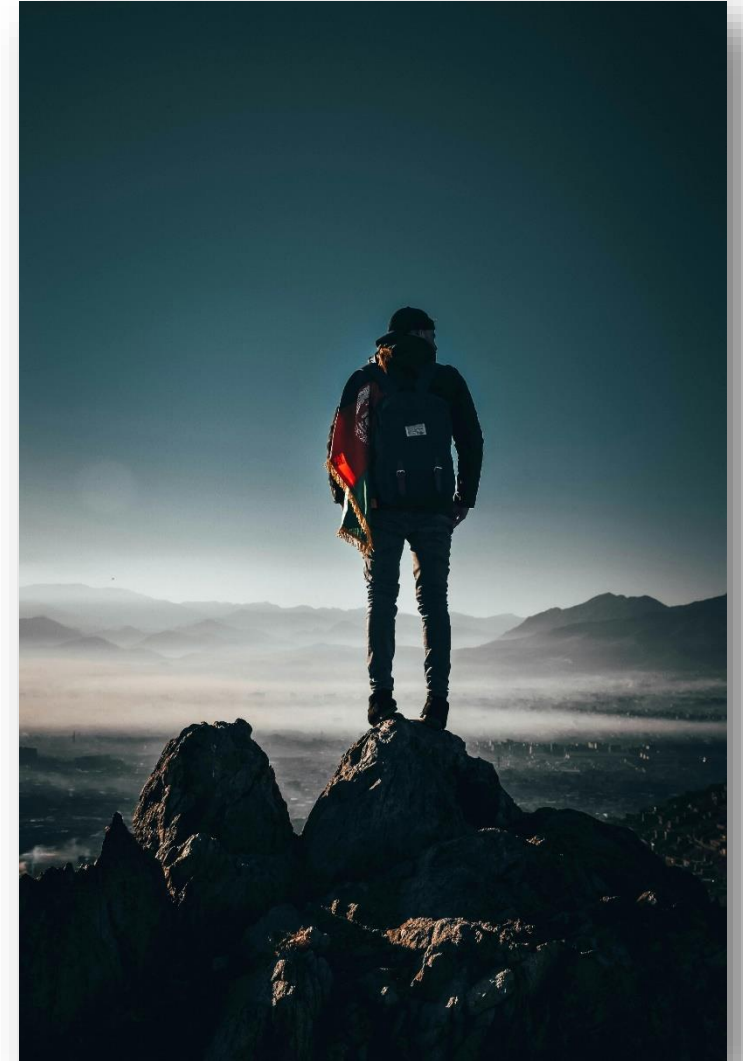
Automatic Monitoring and Visualisation

P2P Access with MikroTik Switches



Objectives

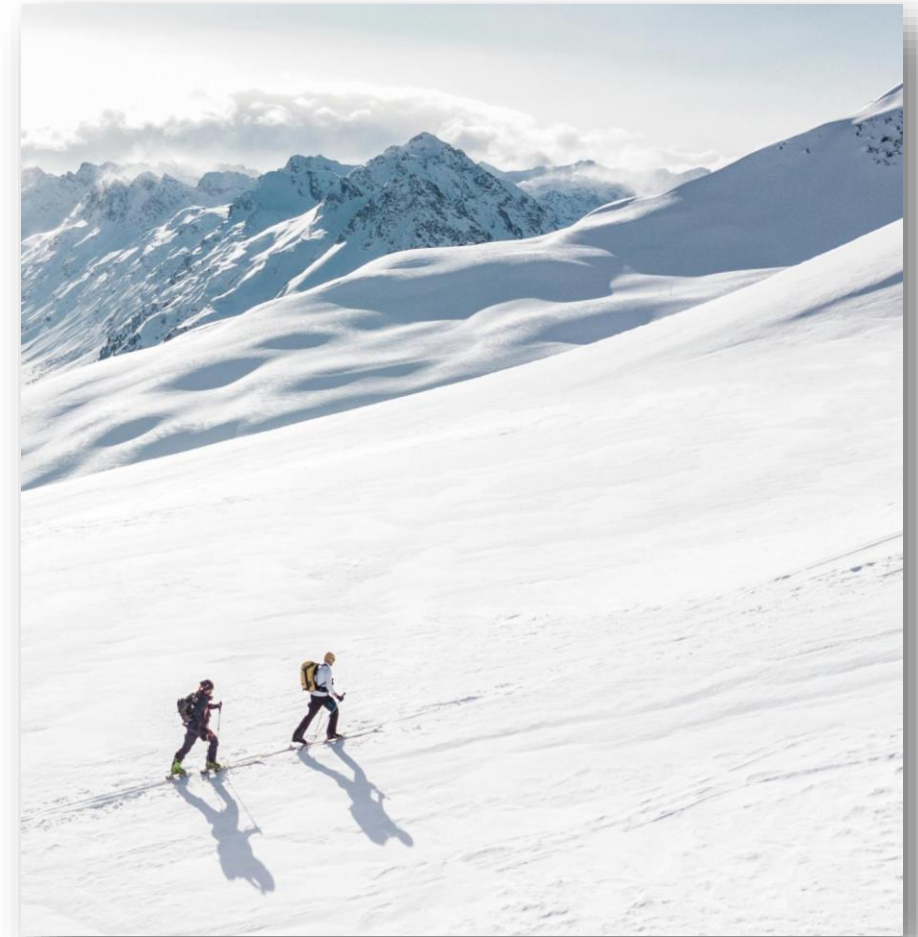
- Know the switch and port ISP clients (CPEs) are connected to
- Automatically provide suitable monitoring for each CPE after first connect
- Automatically provide network maps of the access network including visualization of switch and port a CPE is connected to





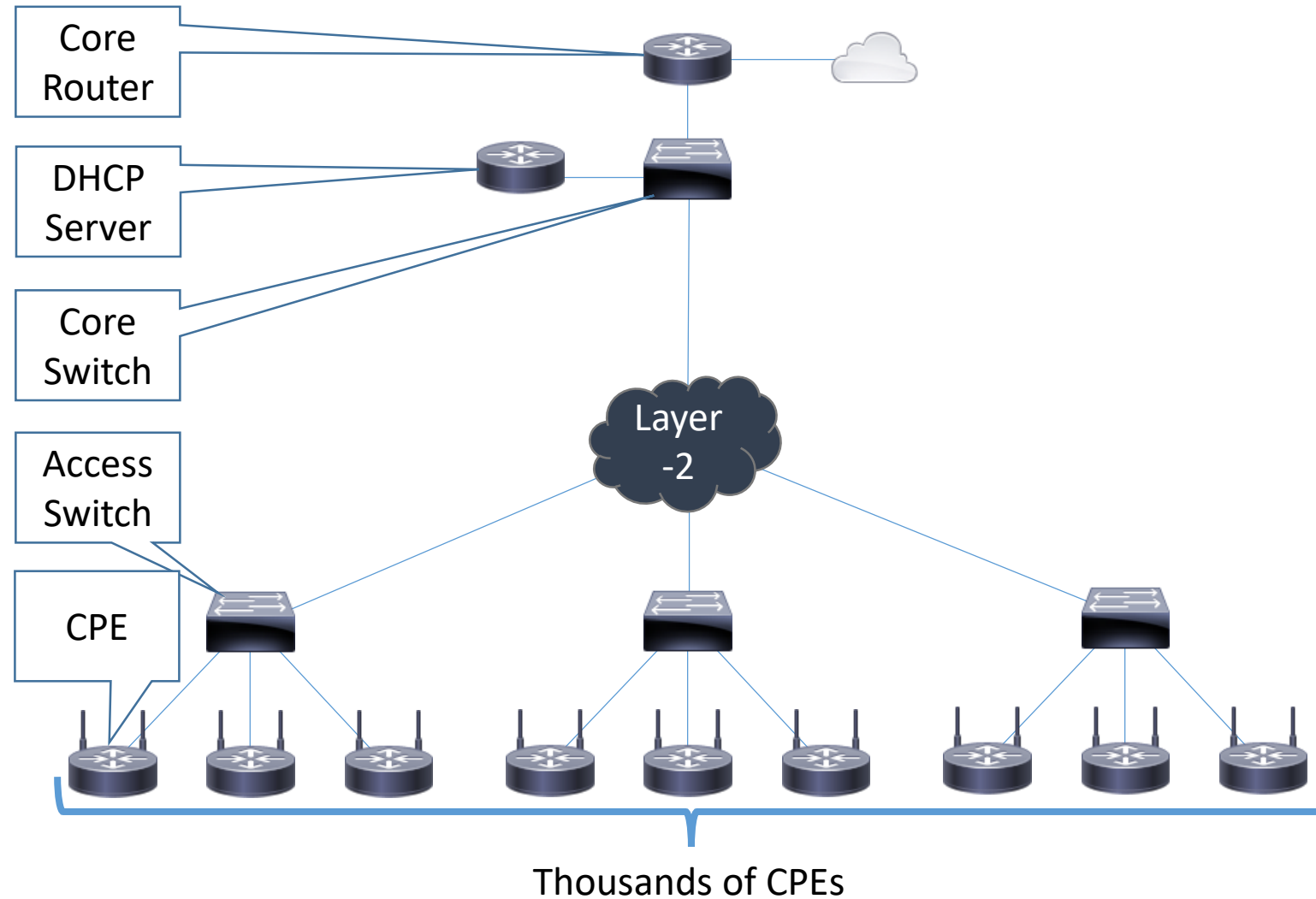
Steps to Take

- Determine switch and port for each CPE
- Make information accessible for NMS
- Create hosts and items to monitor
- Create visualisation



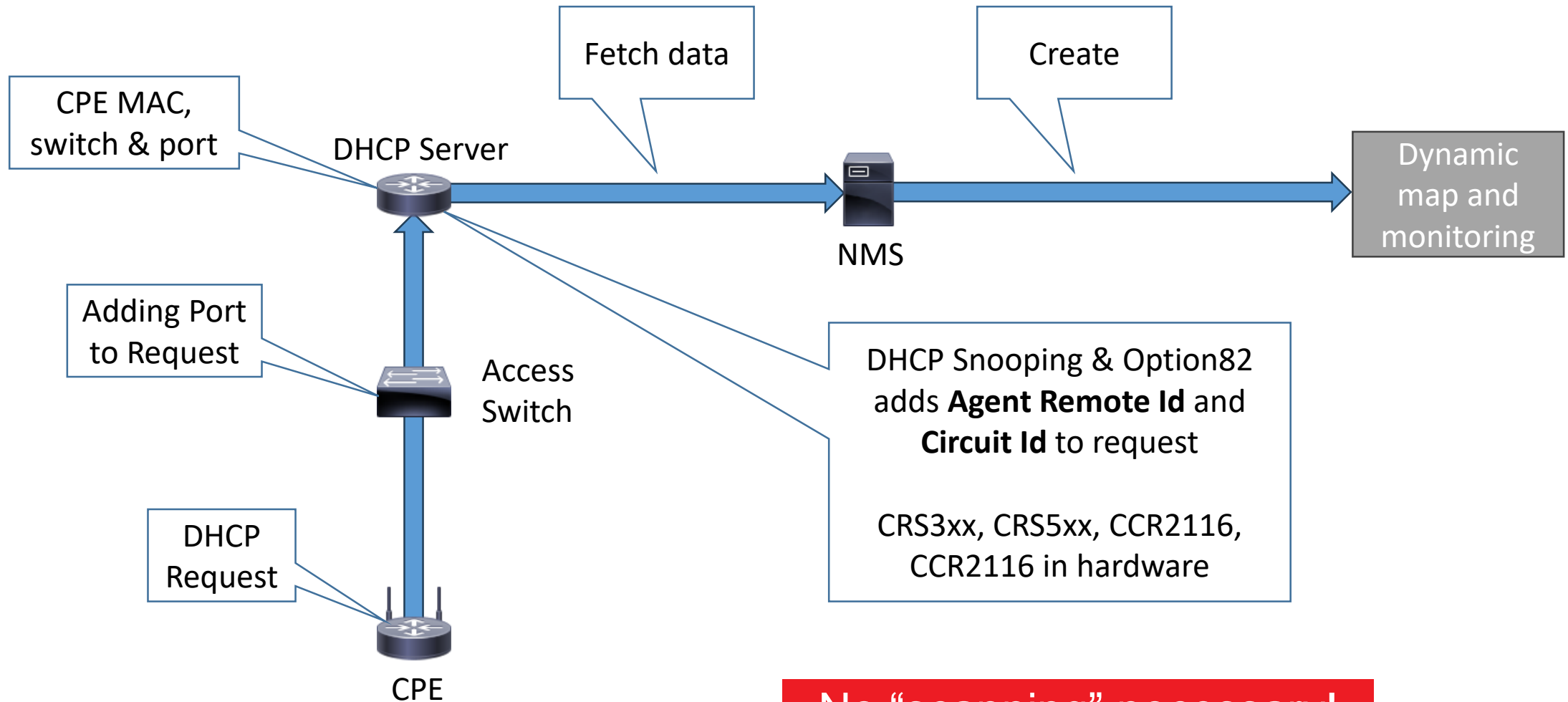


ISP P2P Access – Network Overview





General Approach



No "scanning" necessary!



Switch: Snooping and Option 82

The screenshot displays three overlapping configuration windows in a network management system:

- Bridge Configuration (bridge1):** Shows the bridge is enabled and running. Under the "General" tab, "IGMP Snooping" is disabled, while "DHCP Snooping" and "Add DHCP Option 82" are both checked. A red box highlights these three options, with a red circle containing the number "1" next to it.
- Port Configuration (ether2 and ether4):** Both windows show the "Trusted" checkbox for DHCP Snooping is unchecked. Red boxes highlight these checkboxes, with red circles containing the number "2" next to them.
- Port Configuration (ether3):** Shows the "Trusted" checkbox for DHCP Snooping is checked. A red box highlights this checkbox, with a red circle containing the number "3" next to it.

- 1 Bridge
- 2 Access ports
- 3 Up-/downstream ports



Server & Client: DHCP Options

Option 61

Option 12

Option 82

	MAC Address	Active Address	Active MAC Address	Active Client ID	Active Host Name	Agent Circuit Id	Agent Remote Id
<input type="checkbox"/>	D 08:00:27:90:70:15	10.10.0.255	08:00:27:90:70:15	ff:0:0:0:3:0:3:0:1:8:0:27:5b:b7:13	CHR-1-Client	CHR-2-Access-Switch eth 0/3	ether2
<input type="checkbox"/>	D 08:00:27:5D:AC:14	10.10.0.252	08:00:27:5D:AC:14	1:8:0:27:5d:ac:14	CHR-4-Client	CHR-2-Access-Switch eth 0/6	ether4

Advanced DHCP Options

- hostname
- clientid_duid

Advanced DHCP Options

- hostname
- clientid

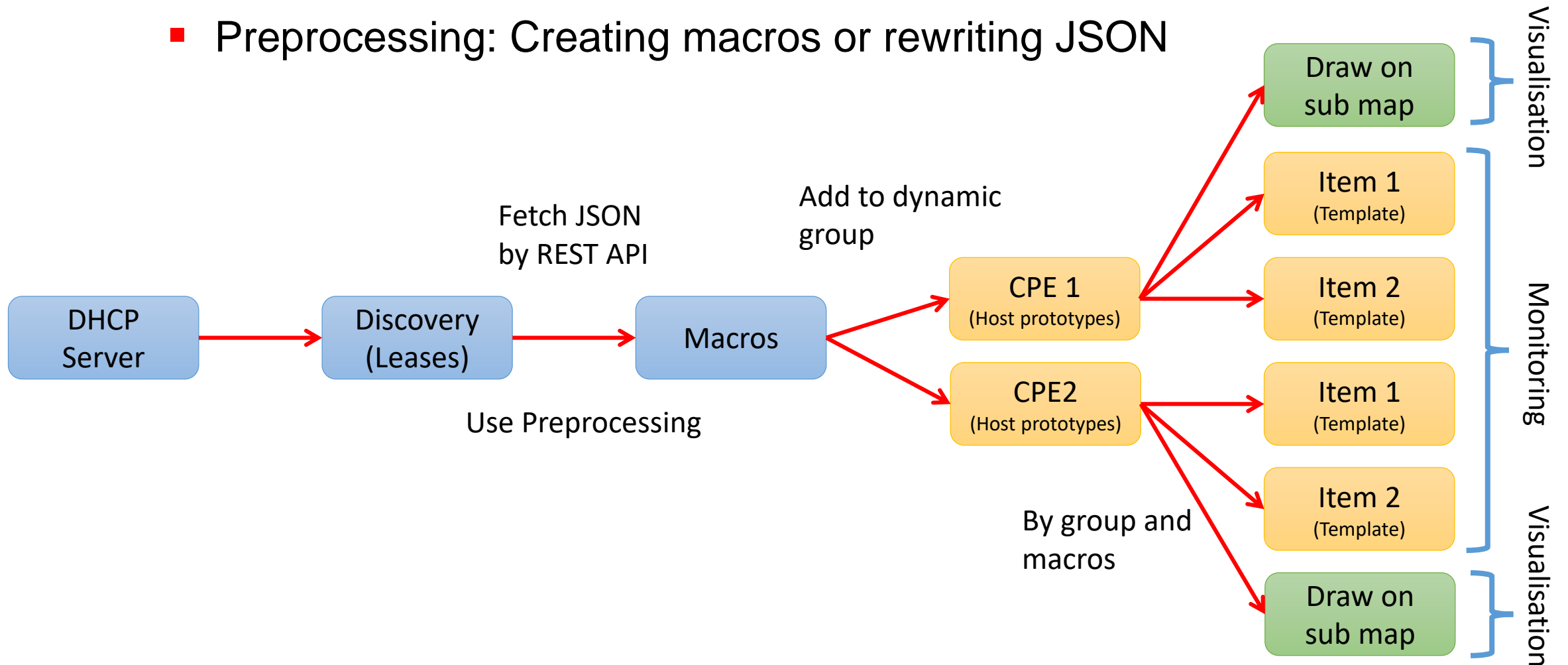
System Identity of access switch

Access switch port number this client is connected to



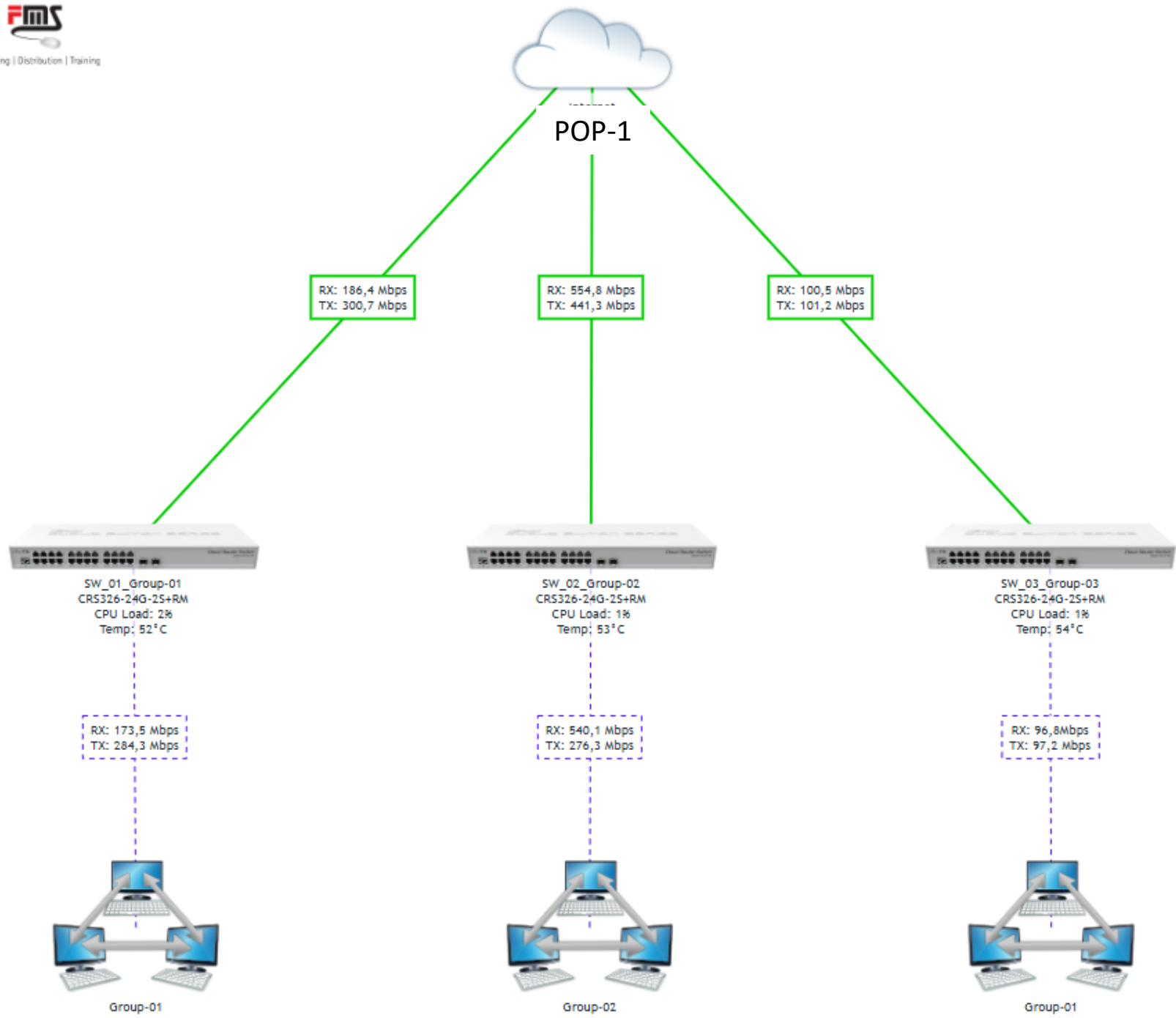
Process

- Discovery & host prototypes: One host per JSON dataset
- Preprocessing: Creating macros or rewriting JSON



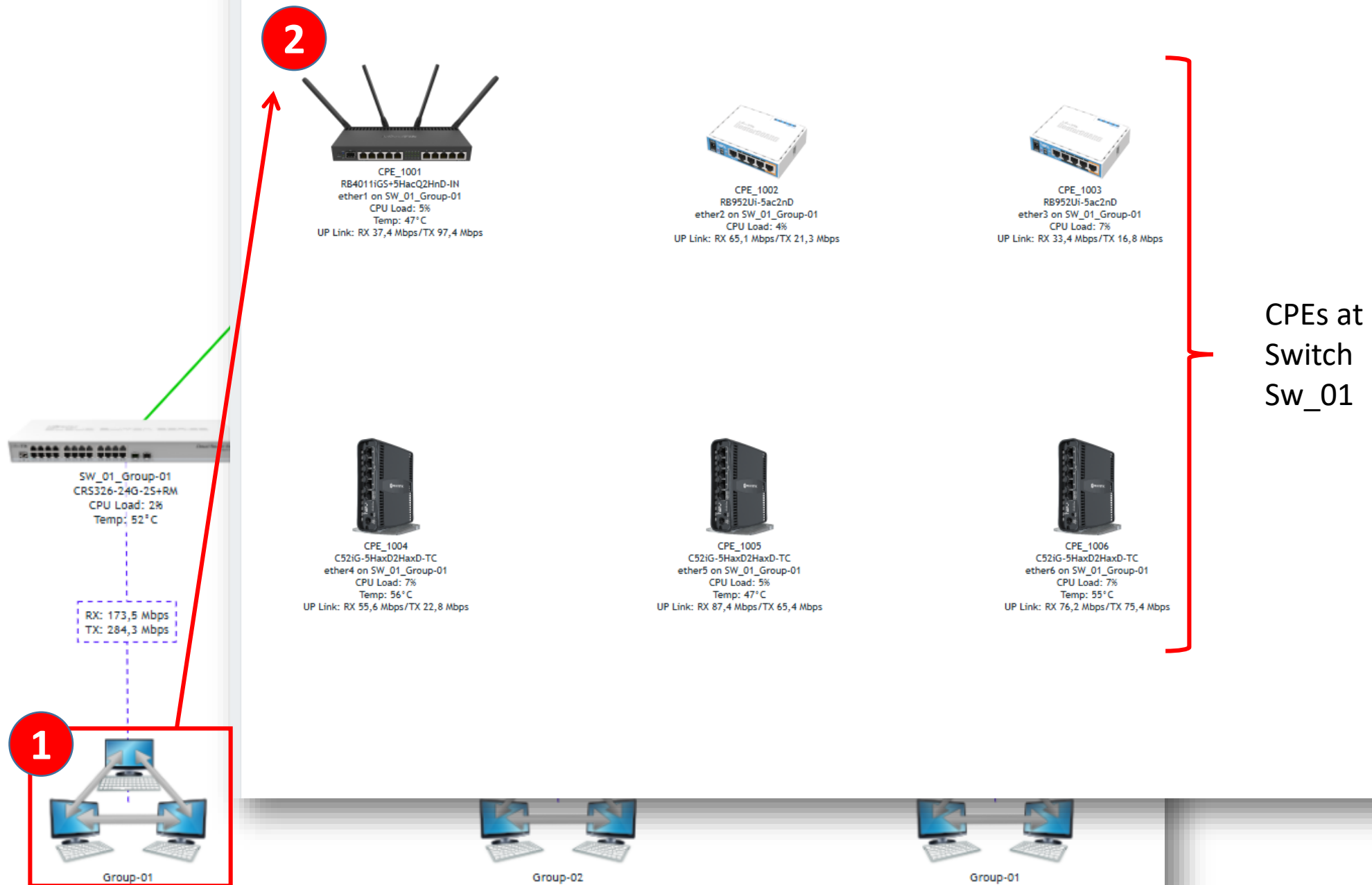


- Dashboards
- Monitoring
- Problems
- Hosts
- Latest data
- Maps
- Discovery
- Services
- Inventory
- Reports
- Data collection
- Alerts
- Users
- Administration
- Support
- Integrations



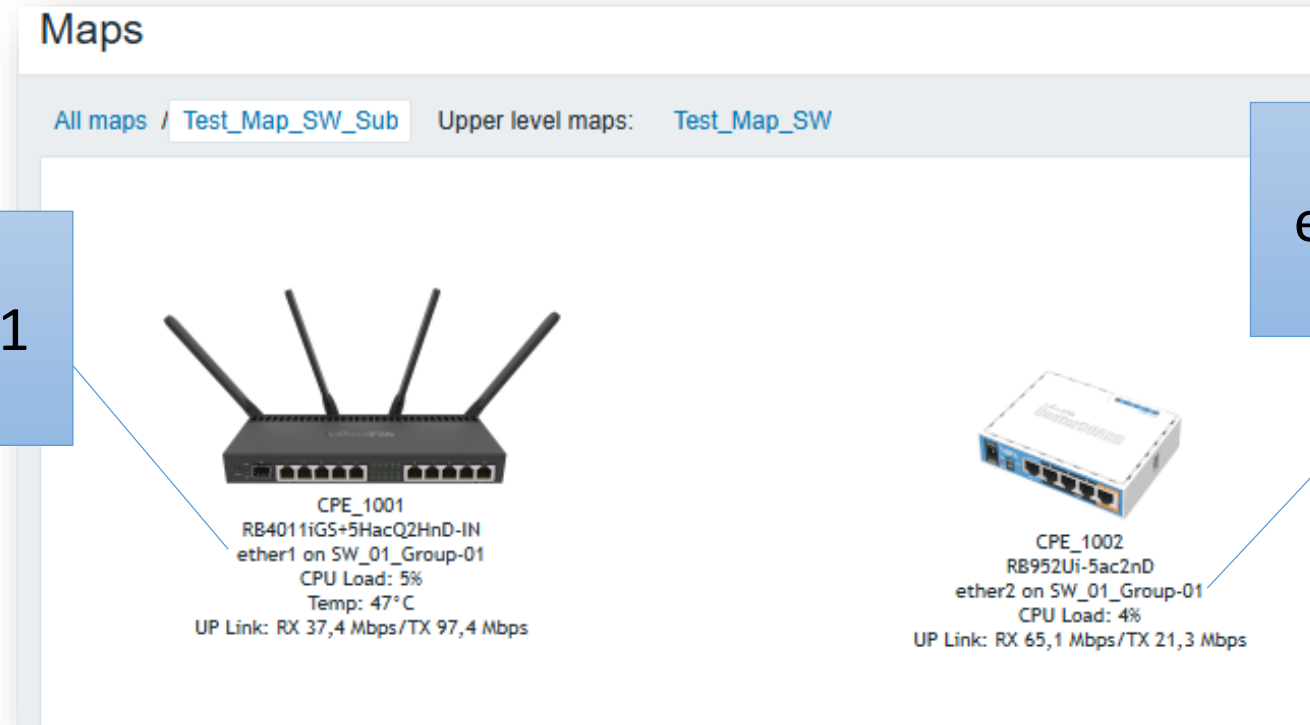
Maps

All maps / Test_Map_SW_Sub Upper level maps: Test_Map_SW





Enlarged Submap



ether1 on SW_01

ether2 on SW_01



Automatic PPPoE Provisioning

Of MikroTik CPE with ACS



ACS Inventory



v1.2.13+240606fc80

admin Lo

Overview

Devices

Faults

Admin

Listing devices

Filter

<input type="checkbox"/>	Serial number	Product class	Software version	IP	SSID	Last inform	Tags
<input type="checkbox"/>	B8E00BD9556D	RB4011iGS+5HacQ2HnD				3.3.2025, 12:00:01 ● Past 24 hours	PPPoE_Configured Provisioned Show
<input type="checkbox"/>	BEEB0ABF0AA7	hAP ac ²				3.3.2025, 12:02:41 ● Online now	PPPoE_Configured Provisioned Show
<input type="checkbox"/>	HG709R5DT27	mAP				3.3.2025, 12:04:59 ● Online now	PPPoE_Configured Provisioned Show

3/3 More [Download](#)

Reboot Reset Push file Delete Tag Untag



ACS Inventory

The screenshot shows the genieacs interface with the following elements:

- Header: genieacs logo, version v1.2.13+240606fc80, navigation tabs (Overview, Devices, Admin), and user info (admin Log out).
- Device ID: E48D8C-RB4011iGS+5HacQ2HnD-B8E00BD9556D
- Tags: PPPoE_Configured, Provisioned, and a plus sign.
- Status: Pinging 10.11.12.1: 0 ms
- Last inform: 3.3.2025, 12:00:01, Past 24 hours, Summon button
- Serial number: B8E00BD9556D
- Product class: RB4011iGS+5HacQ2HnD
- OUI: E48D8C
- Manufacturer: MikroTik
- Faults section: No faults
- All parameters section: Search parameters, Download link, and a table of parameters.

Parameter	Value	Action
DeviceID.ProductClass	RB4011iGS+5HacQ2HnD	Refresh
DeviceID.SerialNumber	B8E00BD9556D	Refresh
Events.0_BOOTSTRAP	3.3.2025, 10:53:19	Refresh
Events.1_BOOT	3.3.2025, 10:53:19	Refresh
Events.Inform	3.3.2025, 12:00:01	Refresh

DeviceID.ProductClass
=
RB4011iGS+5HacQ2HnD



ACS Administration

genieacs
v1.2.13+240606fc80

Overview Devices Faults Admin

Presets

Provisions

Virtual Parameters

Files

Config

Permissions

Users

Listing presets

Filter

<input type="checkbox"/>	Name	Channel	Weight	Schedule	Events	Precondition	Provision
<input type="checkbox"/>	New AVM		1000		0 BOOTSTRAP	DeviceID.Manufacturer = "AVM111"	New AVM
<input type="checkbox"/>	PPPoE		1000		0 BOOTSTRAP	DeviceID.Manufacturer = "MikroTik"	PPPoE
<input type="checkbox"/>	bootstrap	bootstrap	0		0 BOOTSTRAP		bootstrap
<input type="checkbox"/>	default	default	0		4 INFORM		default
<input type="checkbox"/>	inform	inform	0			Tags.Fertig = true	inform
<input type="checkbox"/>	test		1000			DeviceID.Manufacturer = "AVM"	test

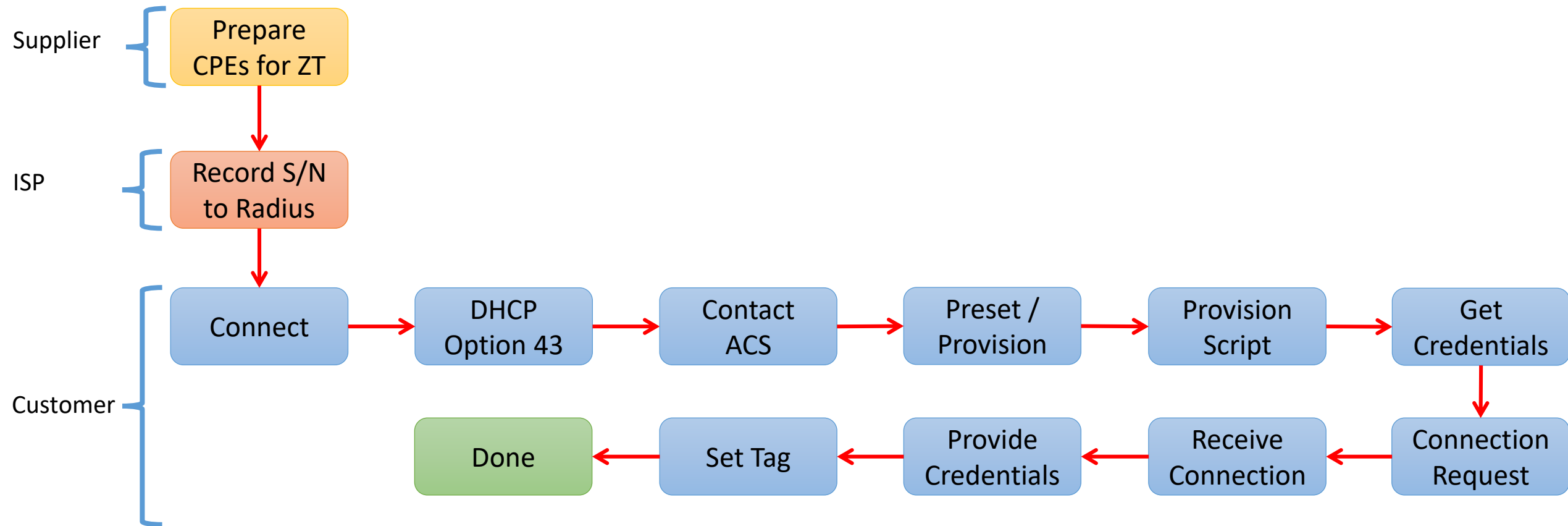
6/6 More [Download](#)

[New](#) [Delete](#)

- Preset: Rules (conditions and weight)
- Provisions: Tasks to complete (scripts)



PPPoE Autoconfiguration Process



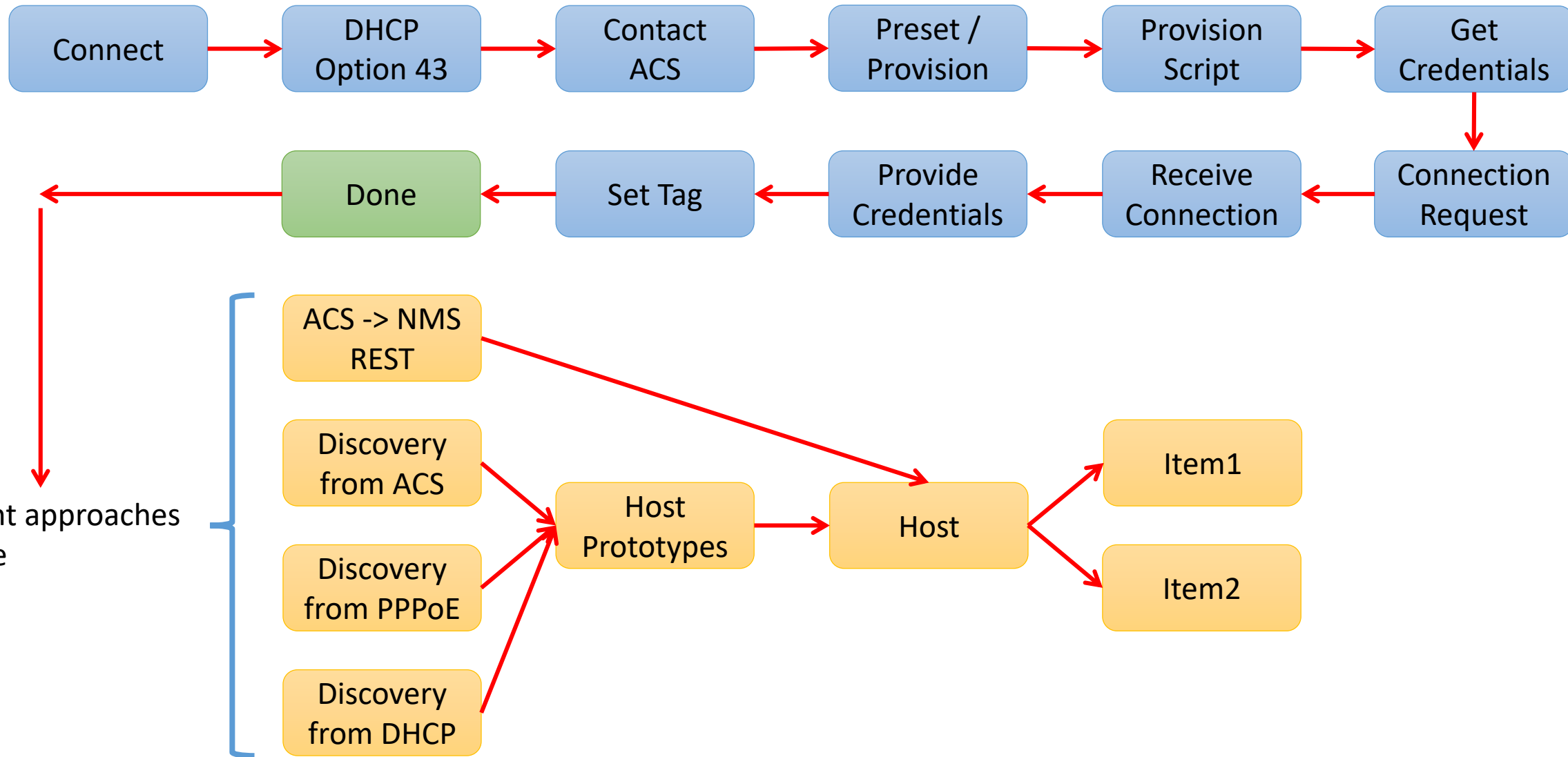


Automatic Monitoring and Visualisation

Of MikroTik ACS clients



Automatic Monitoring Process





Thank You



Send an inquiry



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www.fmsweb.de | www.mikrotik-shop.de

