

# Intracom Telecom

## Java SE / EE Workshop

Challenges and techniques for handling multiple device type and tens of thousands of network elements simultaneously

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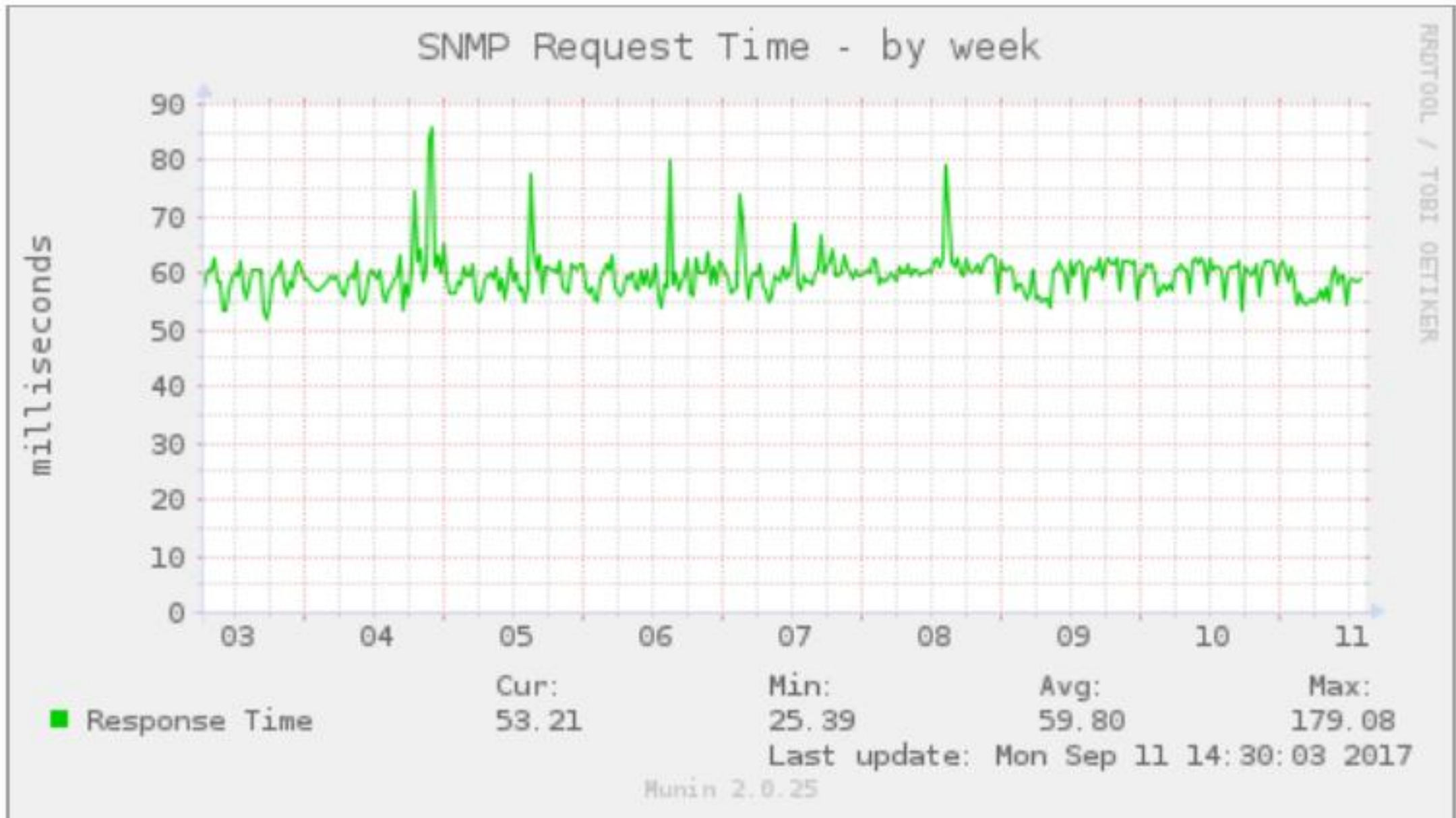
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We need to answer questions like these -

- How many network elements can the NMS manage?
- What are the H/W requirements?
- How much bandwidth is required for network management traffic?

How do we find the answers?

- Simulation of the network in the lab with software (SNMP MIMIC)
- Monitoring tools capturing system measurements (munin)
- Let's look at 2 reports
  - uni|MS Dimensioning Report
  - munin report



- The NMS collects up to 0,5 million measurements every 15 minutes
- It uses SNMP and the latency in the field is about 60ms
- So we would need ~8 hours for collection
- How do we solve this problem?

- Collect performance in parallel rather than sequentially.
- In Java we can use the Thread class for this.
- So would we create 0,5 million thread objects?

Performance Collection Pool	
Schedule	Status
Performance - Ethernet Port	SCHEDULED
Performance - G.826	NOT_ADDED
Performance - Hub Availability	NOT_ADDED
Performance - ISR Ethernet Payload Status	NOT_ADDED
Performance - Radio Link	RUNNING
Performance - Radio Utilization	RUNNING
Performance - Single Ended ETH-LM Test	NOT_ADDED
Performance - Two Way ETH-DM Test	NOT_ADDED
Performance - WiBAS-C BER Test	NOT_ADDED
Performance - ptp600	NOT_ADDED
Performance - ptp600 Traffic Statistics	NOT_ADDED

Max  
Threads :

200

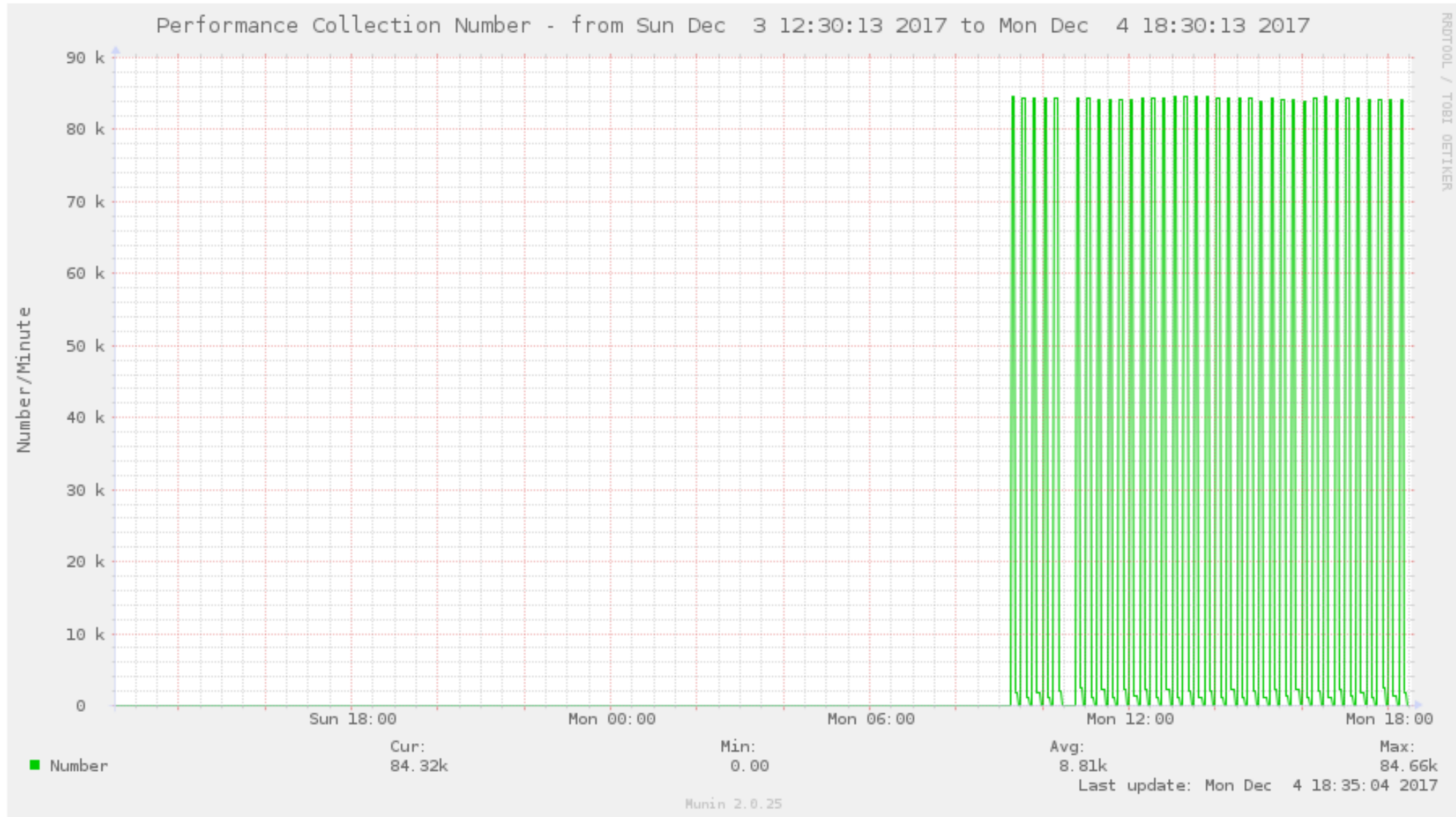
Pending  
Jobs :

177170

Jobs in  
Progress :

200

# Efficient Collection of Performance Measurements





- With multithreading
  - 80.000 collections take 1 minute
- Without multithreading
  - 80.000 collections take  $(80k * 60ms)$  80 minutes

- Elements send SNMP traps (notifications) to the NMS
- Trap examples are (ETH Link down, Temperature high)
- The trap rate can be unpredictable
- How can we protect the NMS from trap flooding?

1. Place traps in a queue and monitor the queue size
  - A lightweight thread that places traps evenly in a queue
  - A heavyweight trap processing thread is on the other side of each queue
  - When the queue size exceeds the limit, trap processing stops
2. Block problematic sources
  - Keep a count of traps per source per hour
  - When a source exceeds the limit, it is blocked

# Trap Anti Flooding Mechanisms

## Global Trap Anti-flooding

Stop Trap  
Processing when  
queue exceeds :

Restart Trap Processing on next

- ☐ Synchronize Alarms Schedule  
☒ Full Synchronize Schedule  
☐ None (Manual Restart Only)

## Trap Processing Status

Port	Status
8088	Running

## Trap Statistics

Running Time :   
Received Traps :   
Processed Traps :   
Dropped Traps :   
Traps in Queue :

## Problematic Source Trap Anti-flooding

Sampling Period (hour) :

Activate anti-flooding when traps exceed :

Deactivate anti-flooding when traps below :

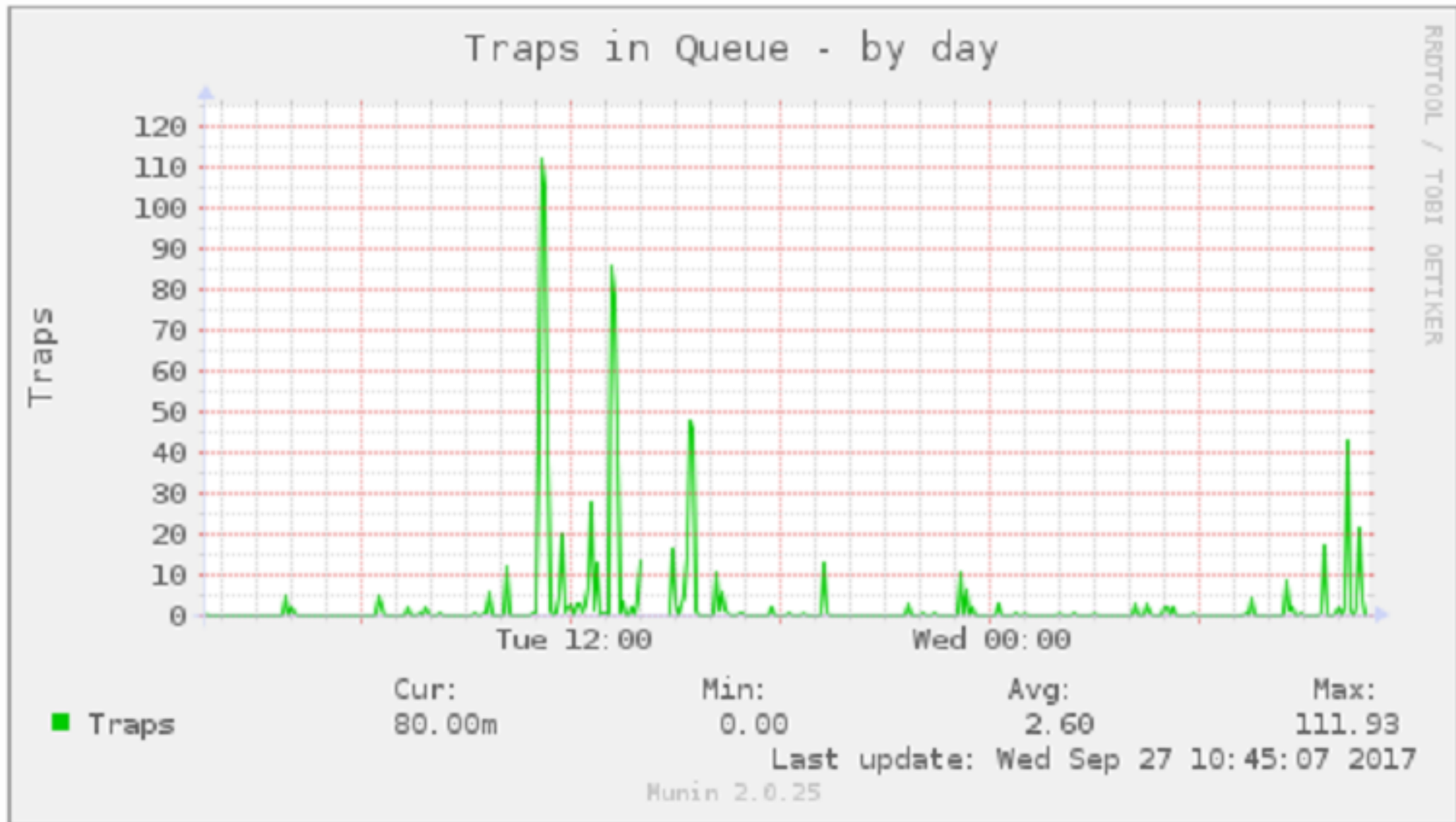
Show the top trap oids :  ^ v

Show the top trap ips :  ^ v

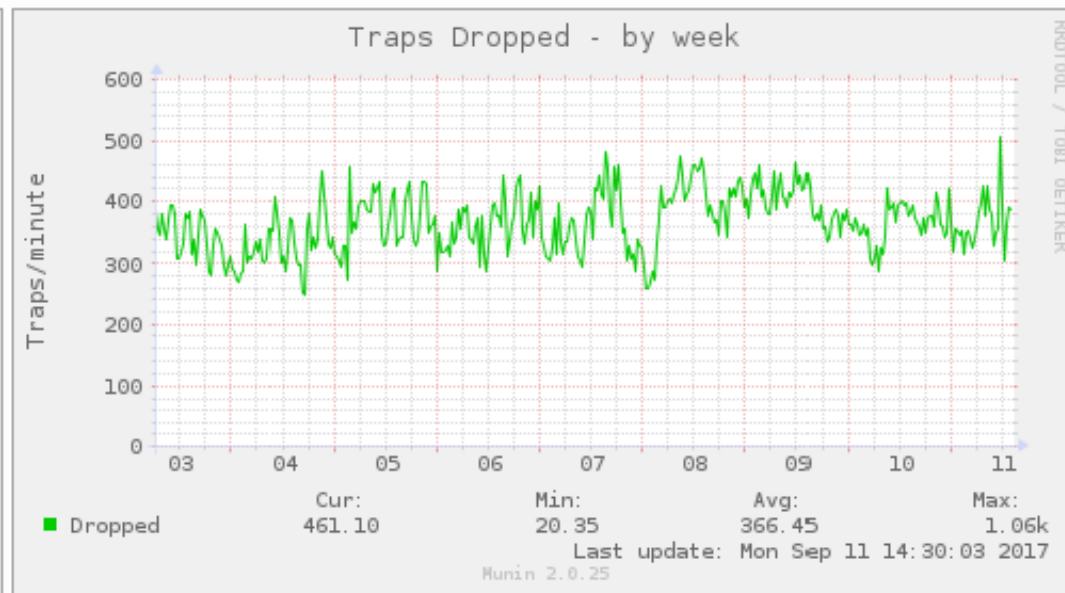
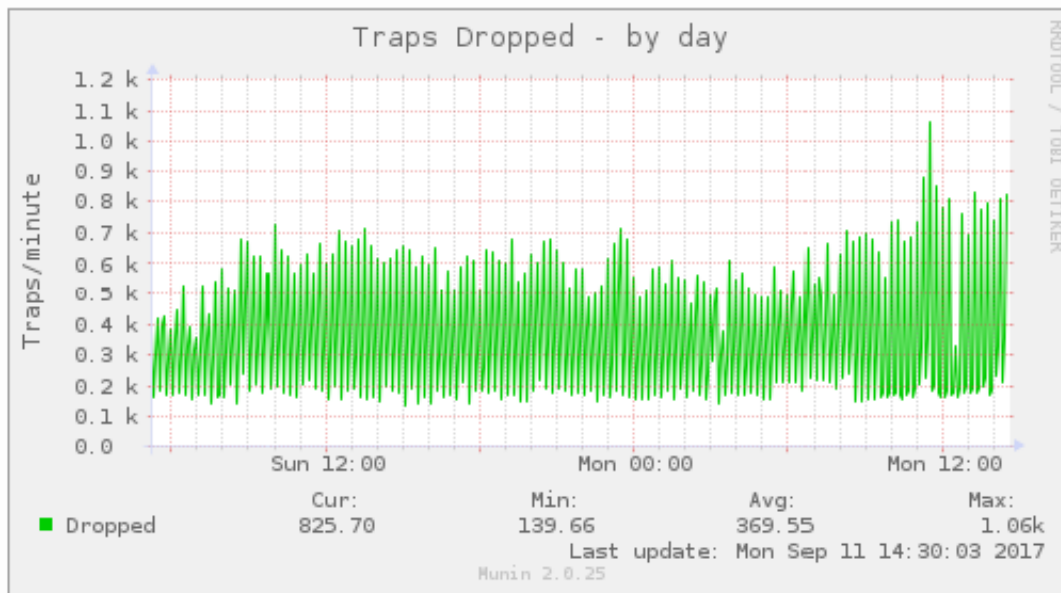
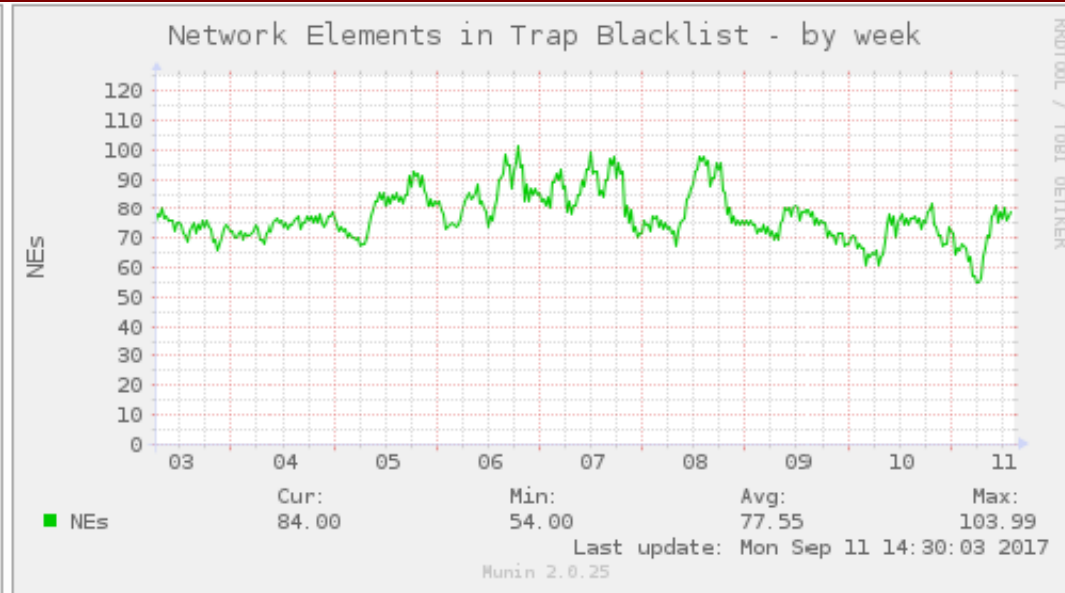
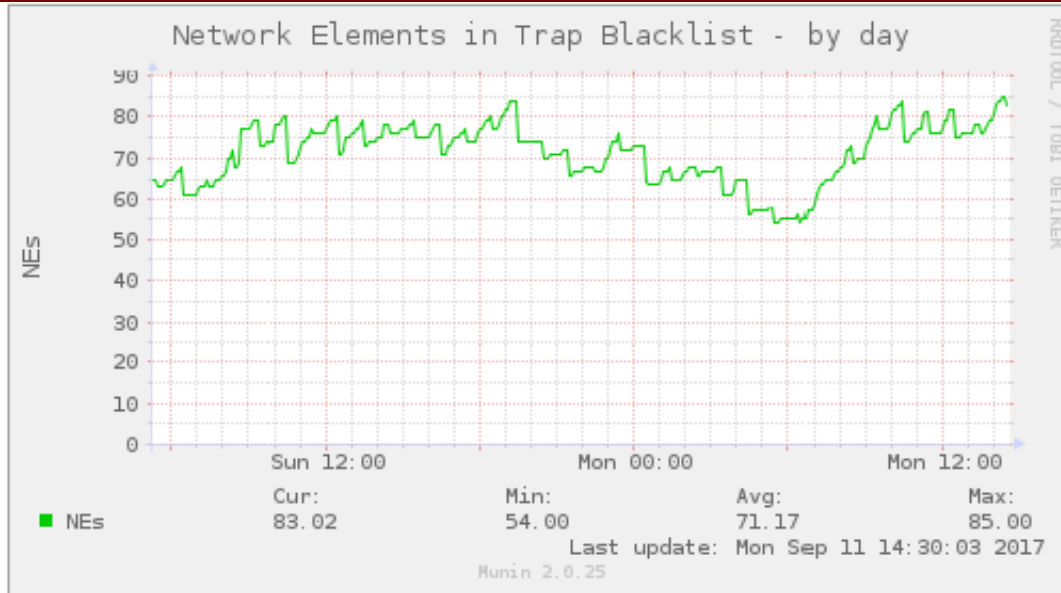
## Blocked Elements

No Blocked Elements

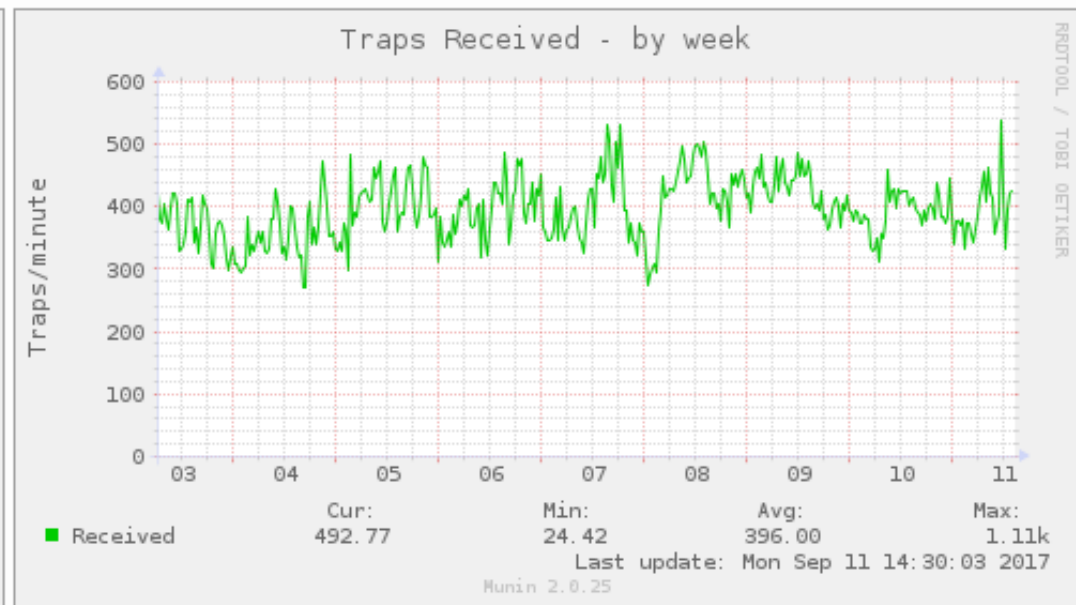
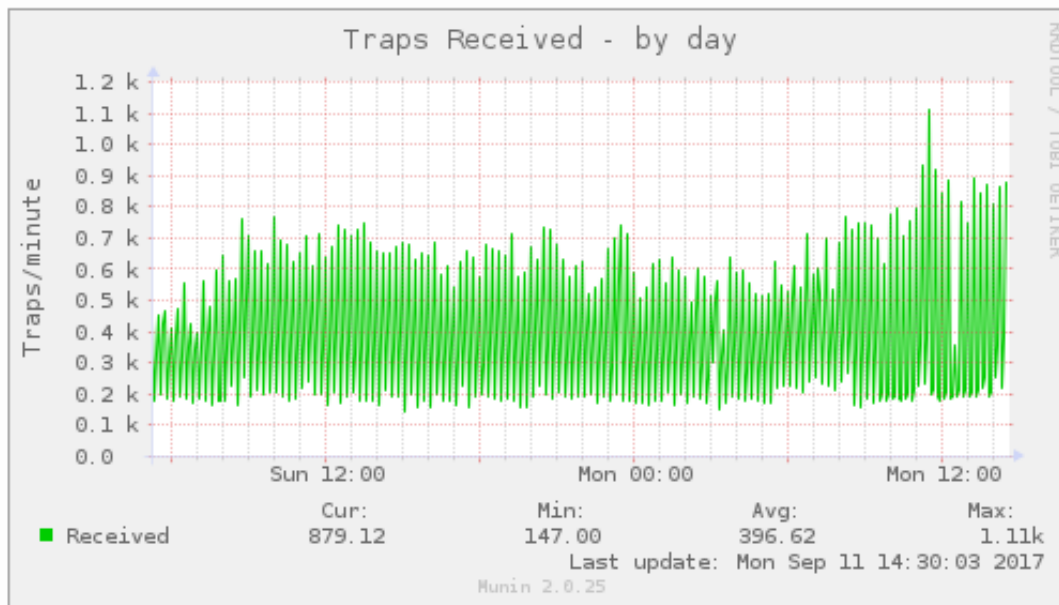
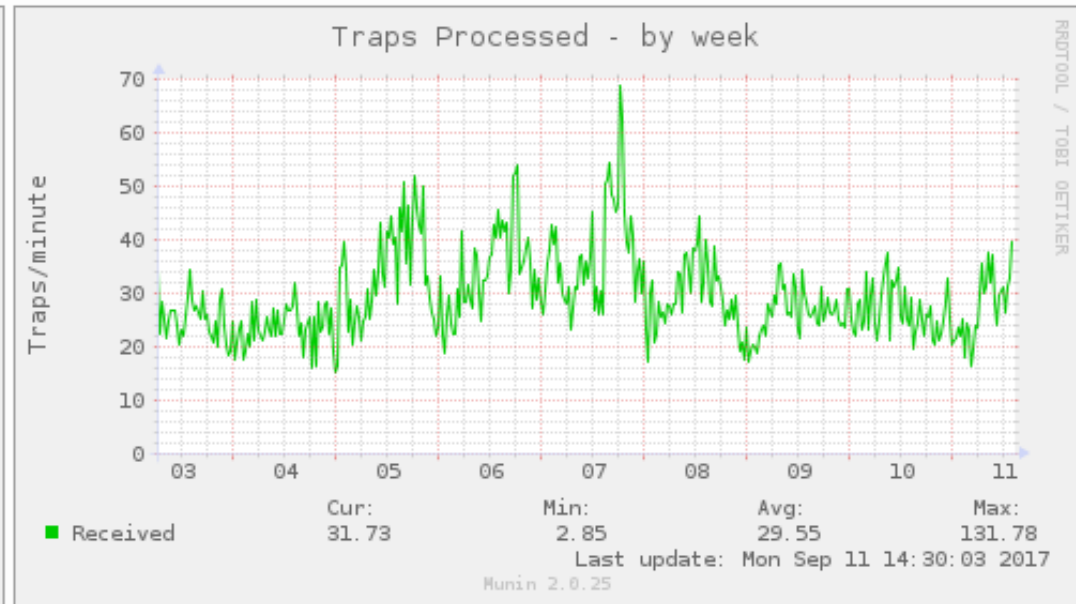
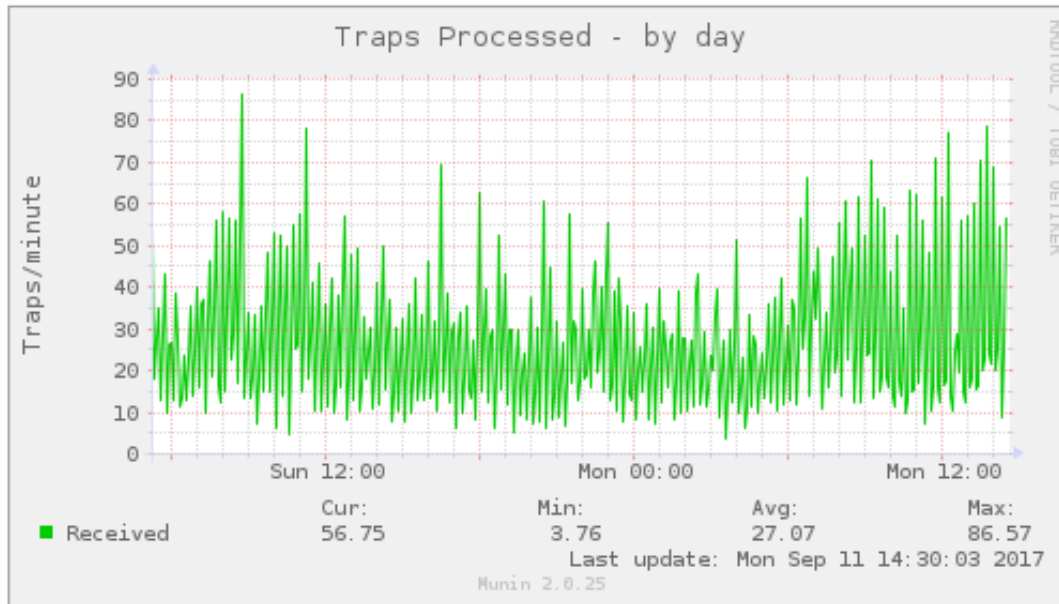
# Trap Anti Flooding Queues



# Trap Anti Flooding Blocked Network Elements



# Trap Anti Flooding Traps Received/Processed



1% of Network Elements produce 99% of the traps



# thank you

For more information, visit  
[www.intracom-telecom.com](http://www.intracom-telecom.com)



**INTRACOM**  
TELECOM



- We manage 40.000 Network Elements
- We collect performance measurements from
  - about 3 Modems per NE
  - about 4 Ethernet Ports per NE
- We collect performance measurements every 15 minutes
- $40.000 * (3 + 4) = 480.000$  performance collections evry 15 minutes
- The protocol is SNMP and the average latency time for a request is 60ms
- $480.000 * 60\text{ms} = 480$  minutes (in the best case scenario 1 SNMP operation per measurement)
- During this 480 minutes is time the CPU is idle waiting for the SNMP request to complete
- What can we do about it?