

ZABBIX

– Beyond the Norm?

Bio

- Name: Aidan Venn 
- Zabbix irc & Forum: avenn
- Experience: 17 years in IT - networking
- Company: ObservIT Ltd & MV Digital Ltd

Unique? site facts

- 7 R & D sites x Various sensors & actuators
- Unique In house designed Chinese Components
- Concept works
- Soon to come out of Beta stage v23.4

Background – Energy Costs

“The cost total has **more than doubled** over the last 10 years. Energy price rises have been proportionately higher for industry and have **direct impacts** on costs and **competitiveness...**”

“There is little prospect of a sustained reversal in these trends. It is more likely that price **increases will continue** into the medium term at least.”

Key Issues for the New **Parliament** 2010, Paul Bolton

Background – Reduce Travel

- In parallel with this was the desire to **reduce/eliminate** the need to reboot remote/local devices that had “frozen” with out **travelling “for hours”** to site.
- In particular “frozen” remote routers with the obvious question - How do we reboot if the internet connection is gone?

Overall Aims

- To save energy
- To save time

To save Money

General Objectives

- Scalable - **Zabbix**
 - 1000s of sensors and sites
- Central control as much as possible
- As Plug 'n' Play as possible – **less site time**
- Minimal Overhead
 - Network
 - Processing – contradictory in certain contexts
- Cost Effective – **Zabbix**
- Resilient – **Zabbix proxy**
- **Proof Of Concept** – saves time & money

Initial Results

- **Devices & Zabbix** gave time savings for remote unmanned sites as in reboot frozen device of 99%
- Temperature monitoring allowed boilers at various sites to be adjusted – come on later turn off earlier – saving energy consumption and money

Research

- A few off the shelf products
- Developing own to reduce long term costs, gain **U**nique **S**elling **P**oint and tailor to our and customer needs. Points to Note:
 - Initial significant higher costs
 - Challenging – time consuming
 - Rewarding knowledge
 - Correct decision in the medium to long term

Brainstorm

- Brainstorming led to the following devices:
- **Server** – Store, View and Process data
- **Remote Hub** – Collate data, send to sever
- **Sensors** – Acquire environmental data
- **Actuators** – Remotely switch devices on/off

Why **ZABBIX** ?

- Proven Track record
- Continual development
- Scalable, Flexible, Reliable
- Professional & community support
- Our previous experience

Pi-Fi Hub

Pi-Fi
Hub



www.mvdigital.co.uk

- Raspberry Pi model B v2
- Zabbix 2.x Proxy & Agent
- 12v or Solar Power
- Encrypted Serial RF up to 2km*



Sensor - PiFiMon

PiMon

- 3.3v, solar or 2 year lithium bat*
- Encrypted Serial RF up to 2km*
 - temperature, humidity, light
 - tilt, vibration, contact
 - analog and digital reading etc.



www.mvdigital.co.uk

Sleep/Active/Sleep profile



Actuator - PiFiKontrol

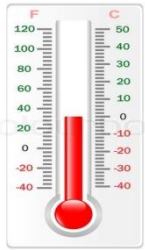
Pi-FiKon

- 5v or Solar
- Switch 12v power
- Encrypted Serial RF up to 2km*
- Awake/Passive profile



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Example Site



PiMon

PiMon

Serial RF

3G/SMS/Tweet

Pi-Fi
Hub

OpenVPN

ZABBIX
SERVER

Pi-Fikon

Serial RF

Pi-Fikon



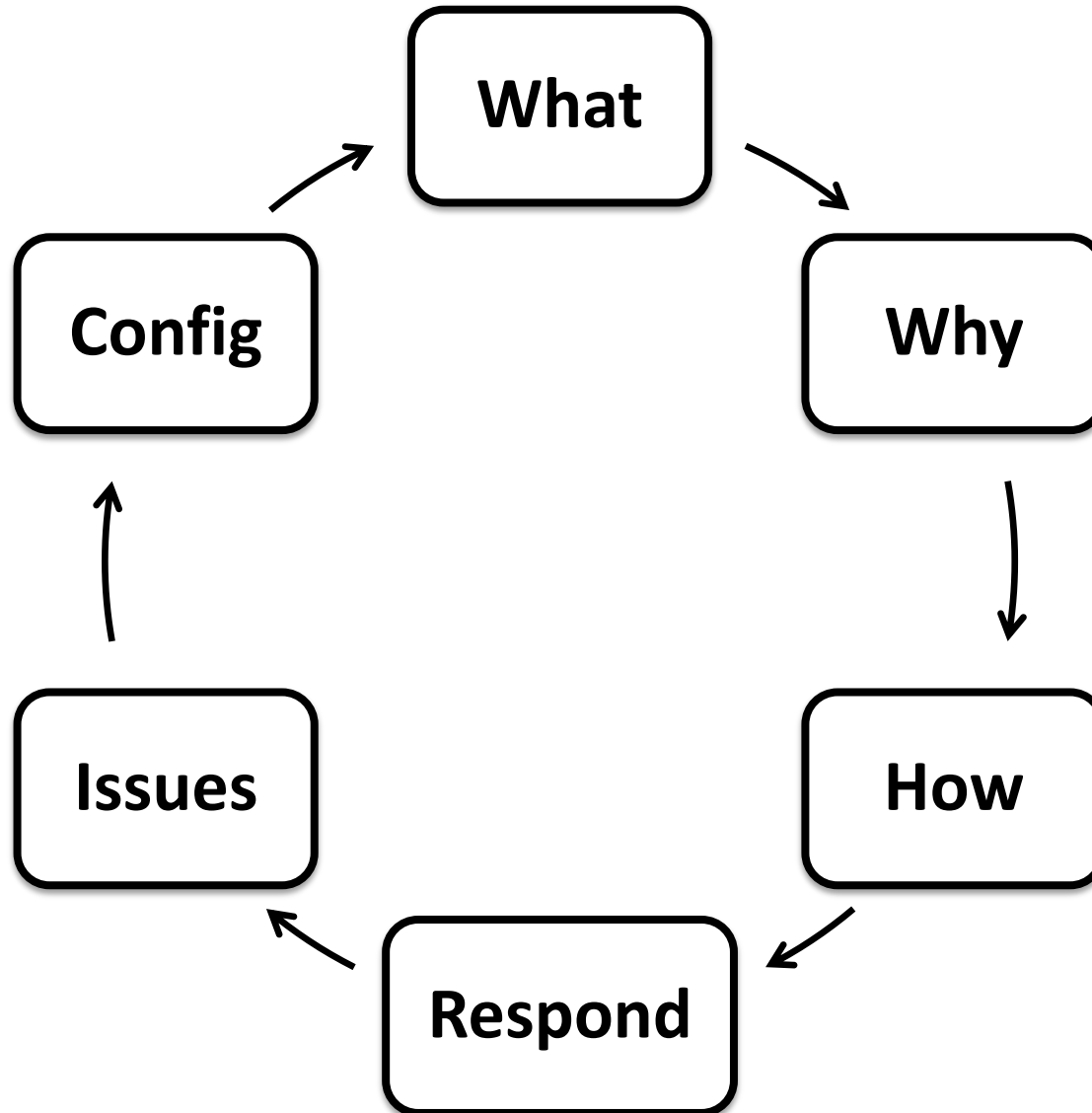


Very Early
Example

Monitoring

- During the journey it became apparent that Zabbix monitoring would be in three areas:
 - Research and design
 - Infrastructure
 - Sensors & Actuators
- 30 mins to briefly discuss each one
- One challenge from each and how we are *currently* tackling/overcoming them.

General Approach



Research & Design

R & D Example

- To aid R & D we needed to record various operational events including:
- Receiving values from sensors (PiMon)
- Sending commands to actuators (PiKontrol)
- Simple reliability test example:
 - Send switch OFF command
 - TEST : Successful Coms or/and command execution

R & D - Actuator

1. Switch OFF command sent

Zabbix sender – command sent – **count key** = **sendOFF**

2. ACK as Expected - yes or no?

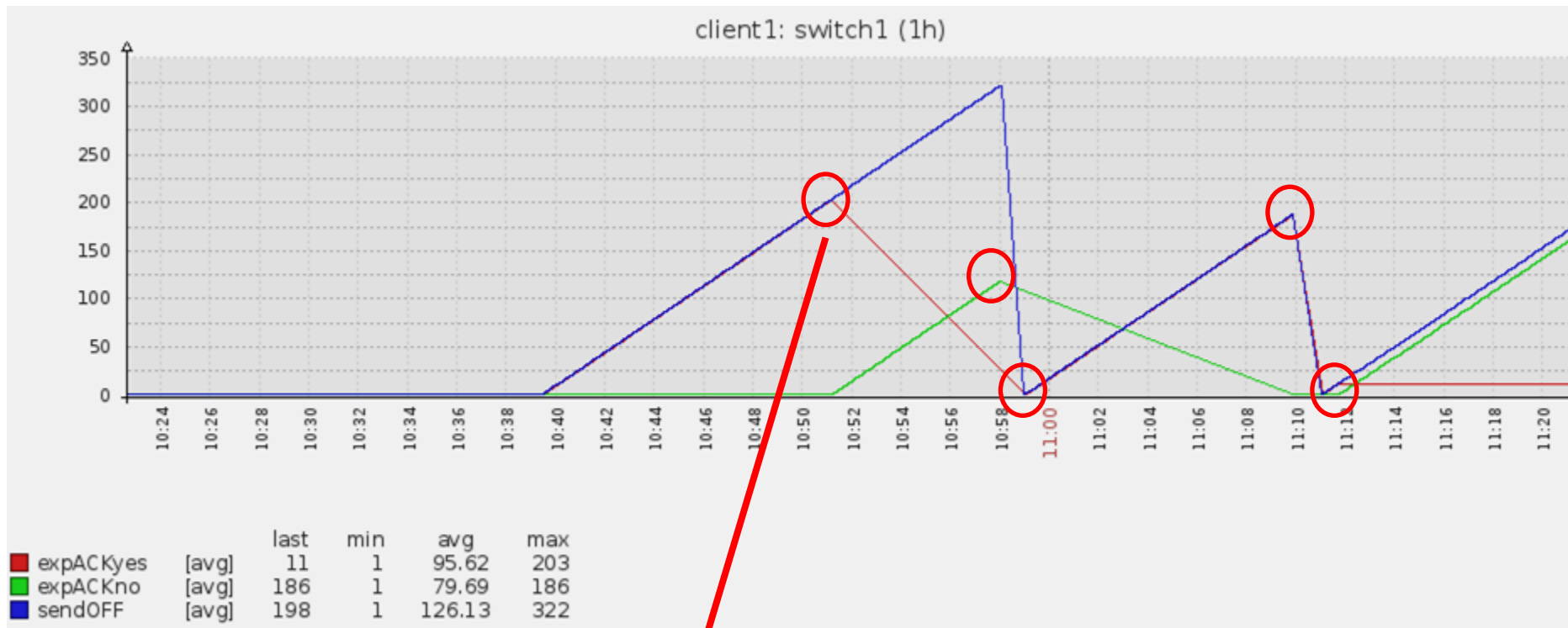
Zabbix sender – expACK = yes – **count key** = **expACKyes**

Zabbix sender – expACK = no – **count key** = **expACKno**

Aim for and expect **sendOFF count = expACKyes** count

= COMMS AND STATUS *APPEARS* OK

R & D - Actuator



Traceback (most recent call last):

File "writeSERIALnewD.py", line 120, in <module>

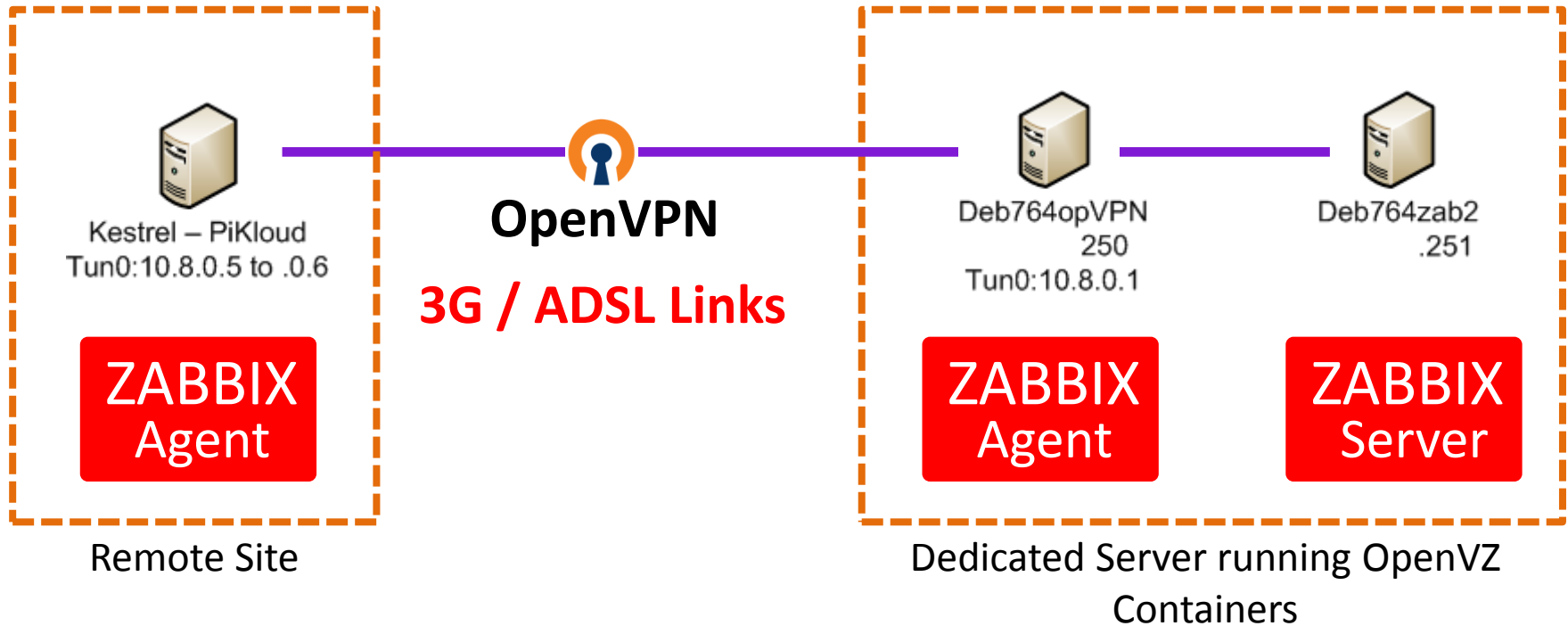
Ser.write(ans[0:9] + "O")

NameError: name 'Ser' is not defined

Infrastructure

Infrastructure Example - OpenVPN

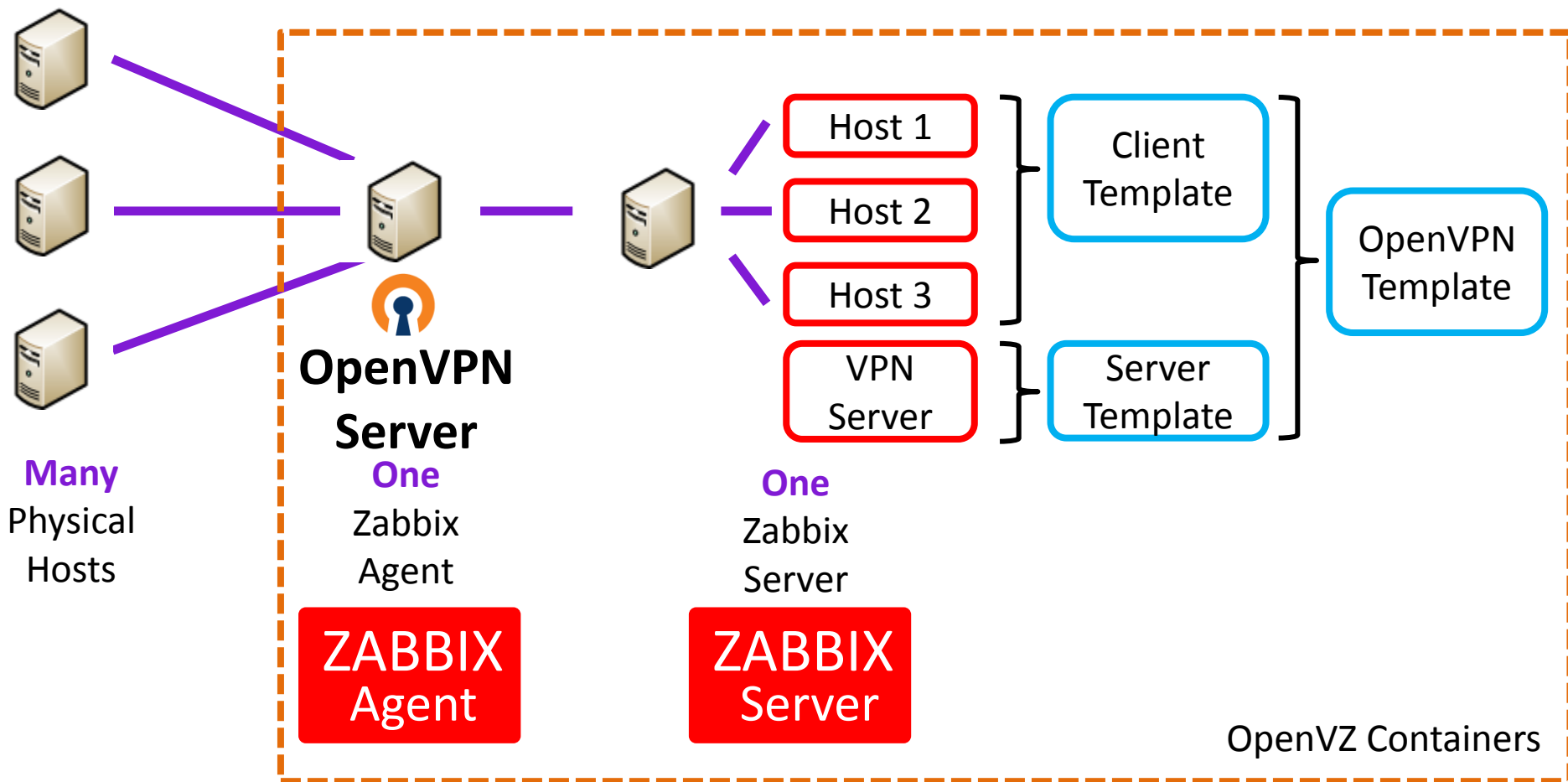
Use ObservIT OpenVPN setup for example of how we monitor parts of the virtual infrastructure.



OpenVPN

- Separate Templates for Client, Server & Overall
- Parse Log Files for keywords –“reset” etc
- Scripts – ps aux – extract – RSS & VSZ
- Zabbix Sender
- Telnet! – OpenVPN Management Interface
 - Use Common Names (CN) and commands such as “status”


OpenVPN – Challenge 1



Many Physical Hosts to One Agent to Many Hosts to Many Templates

OpenVPN – Challenge 1

Server Template

Name 	Key
Memory_RSS	psperf["RSS openvpn nobody"]
Memory_VSZ	psperf["VSZ openvpn nobody"]
OpVPNmanC1BR	OpVPNman["BytesRec client1 5.9.173.251"]
OpVPNmanC1BS	OpVPNman["BytesSent client1 5.9.173.251"]
OpVPNmanC2BR	OpVPNman["BytesRec client2 5.9.173.251"]
OpVPNmanC2BS	OpVPNman["BytesSent client2 5.9.173.251"]

ClientTemplate

Name 	Key
Template_OpenVPN_Client: BytesRec	BytesRec
Template_OpenVPN_Client: BytesSent	BytesSent

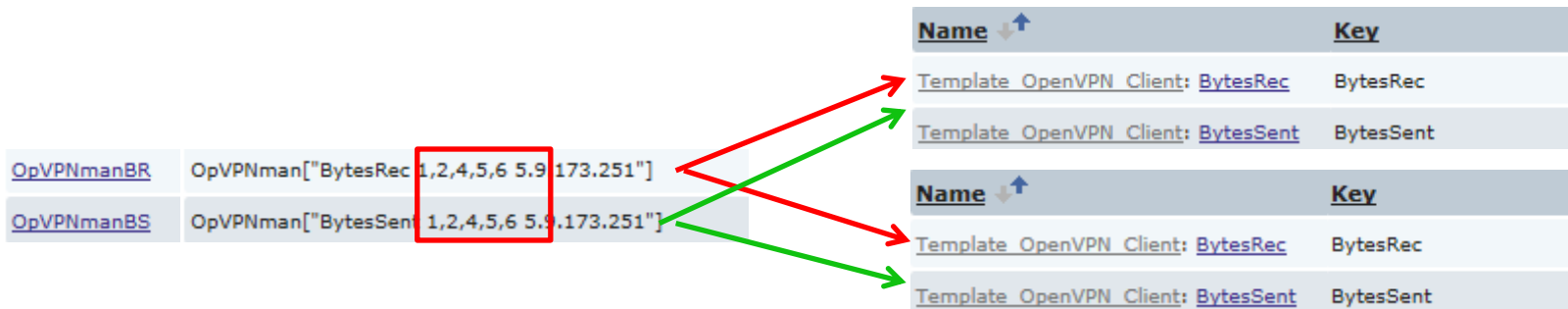
Name 	Key
Template_OpenVPN_Client: BytesRec	BytesRec
Template_OpenVPN_Client: BytesSent	BytesSent

Double the number of items for needed values

<https://www.zabbix.com/forum/showthread.php?t=42265>

OpenVPN – Challenge 1

A More suitable Solution:

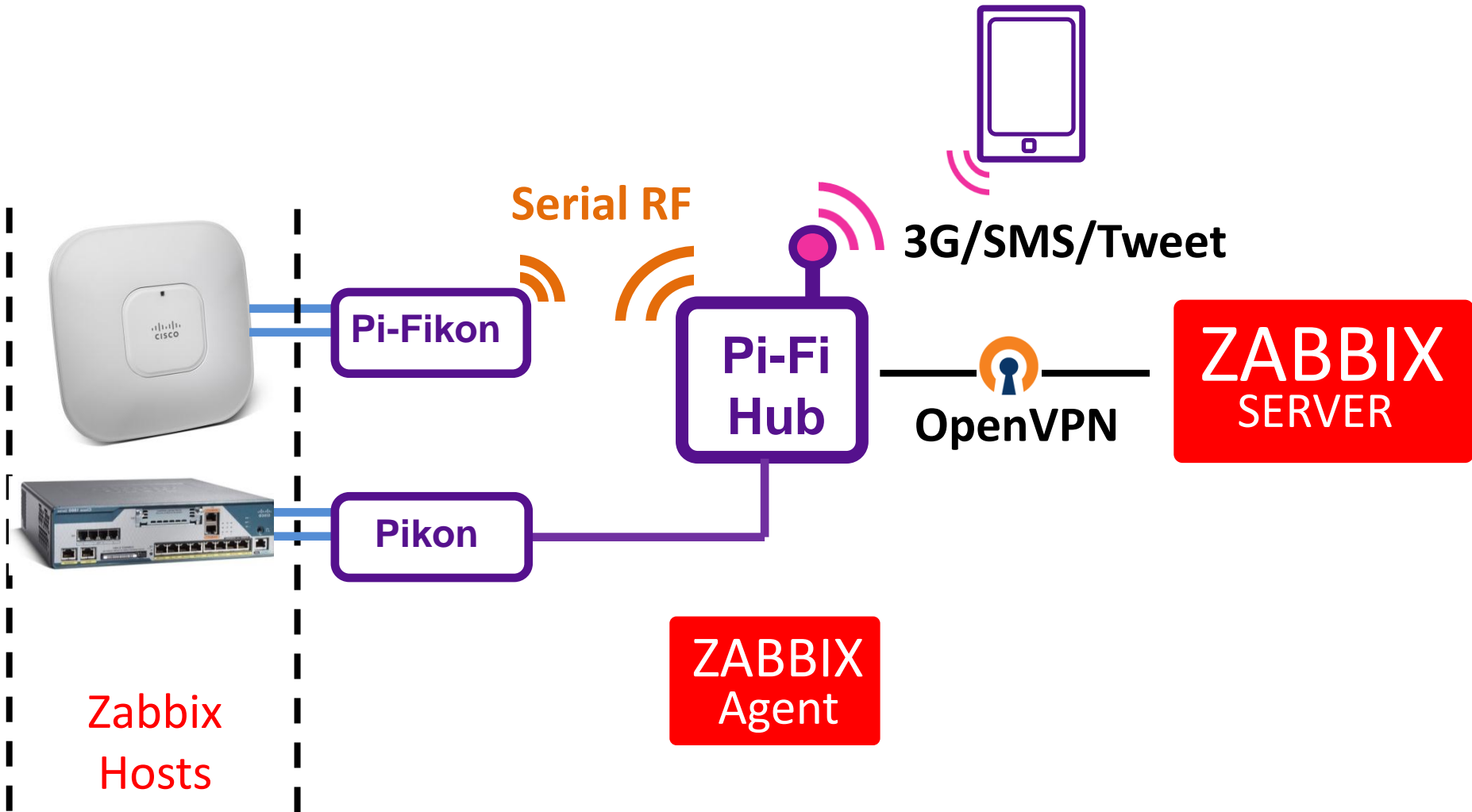


Pass a list of clients (denoted as numbers) that we want values for rather than one pass per client.

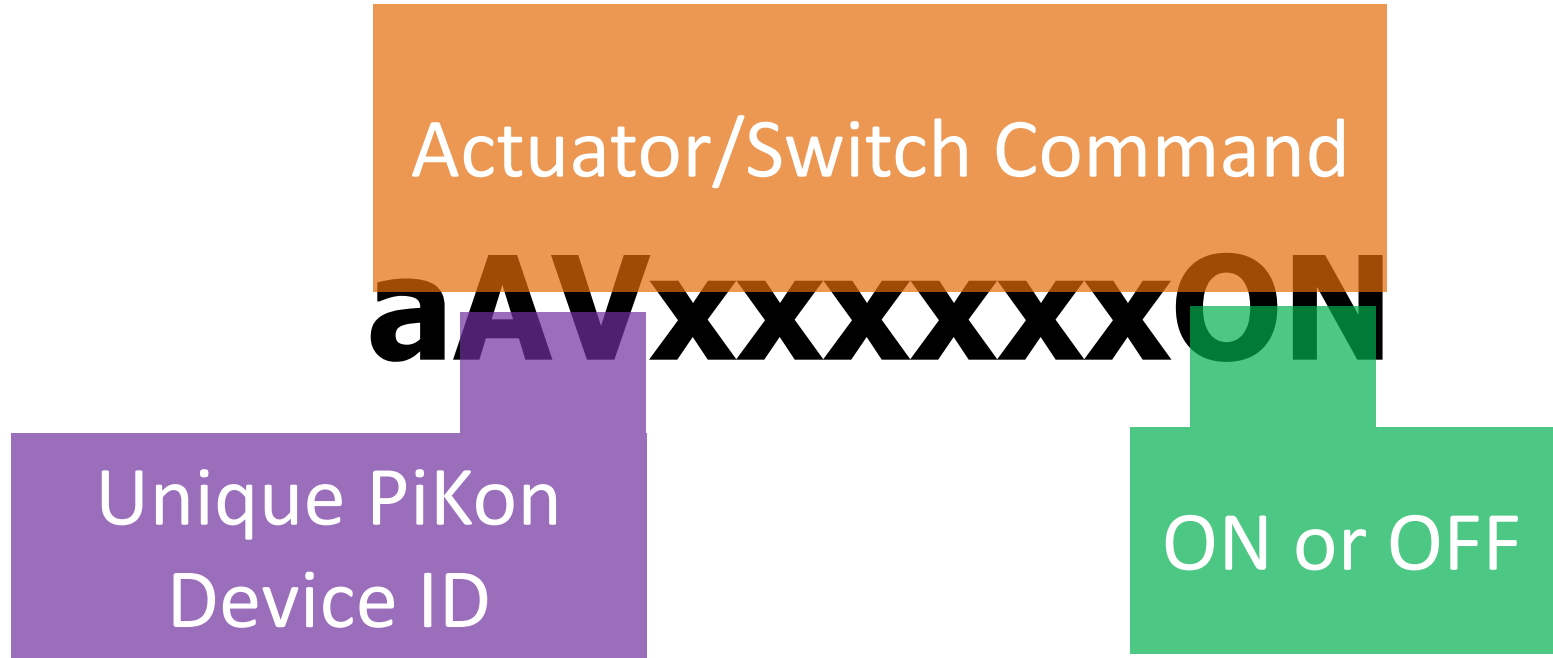
Back to a one to many situation

Actuators – PiKon & Sensors - PiMon

Actuators - PiKon

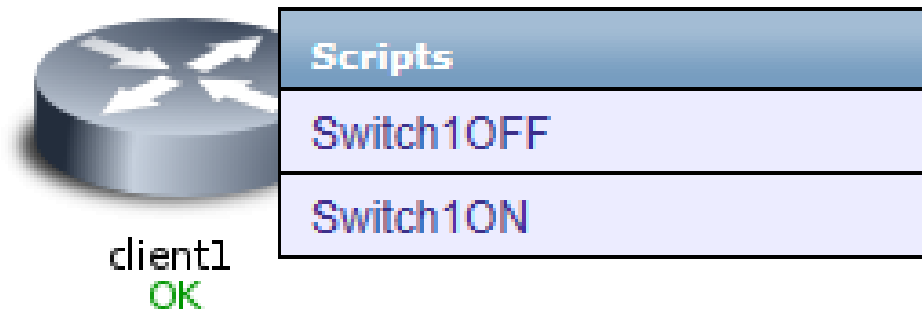


Actuator - Serial RF Command



Actuators - PiKon

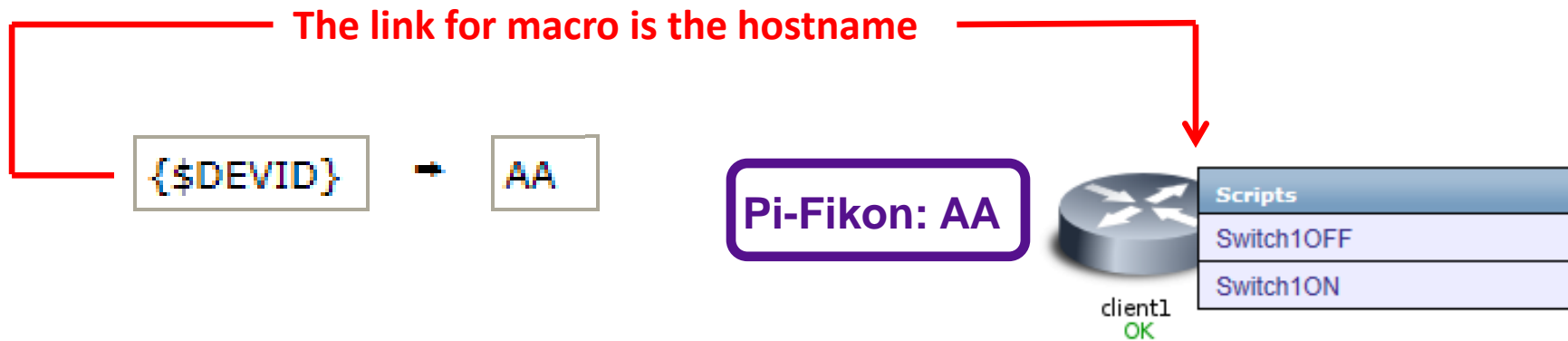
- Agent on PiFiHub – **Remote Command Script** – allowing the sending of serial RF actuator/switch command to PiKon - on/off of **CONNECTED** host
 - Can be automated if no response in 5mins etc the send SMS etc to reboot.



Challenge 2

- Each site may use many and different PiKon device ids in commands.
- To reduce duplication we wanted to reuse actuator switch script by passing appropriate device id host level macro.
- Client 1 Example:
 - **{ \$DEVID }** = AA
 - /externalscripts/writeSERIAL.py **{DEVID} ON**

Challenge 2



`/externalscripts/writeSERIAL.py {DEVID} ON`

Challenge 2

- At present it appears that the passing of host level macros to the script is not possible.
- HOWEVER... all is not lost... Look what Zabbix 2.2 will do:

“Starting with **Zabbix 2.2**, user macros are supported in script commands.”

- https://www.zabbix.com/documentation/2.2/manual/web_interface/frontend_sections/administration/scripts

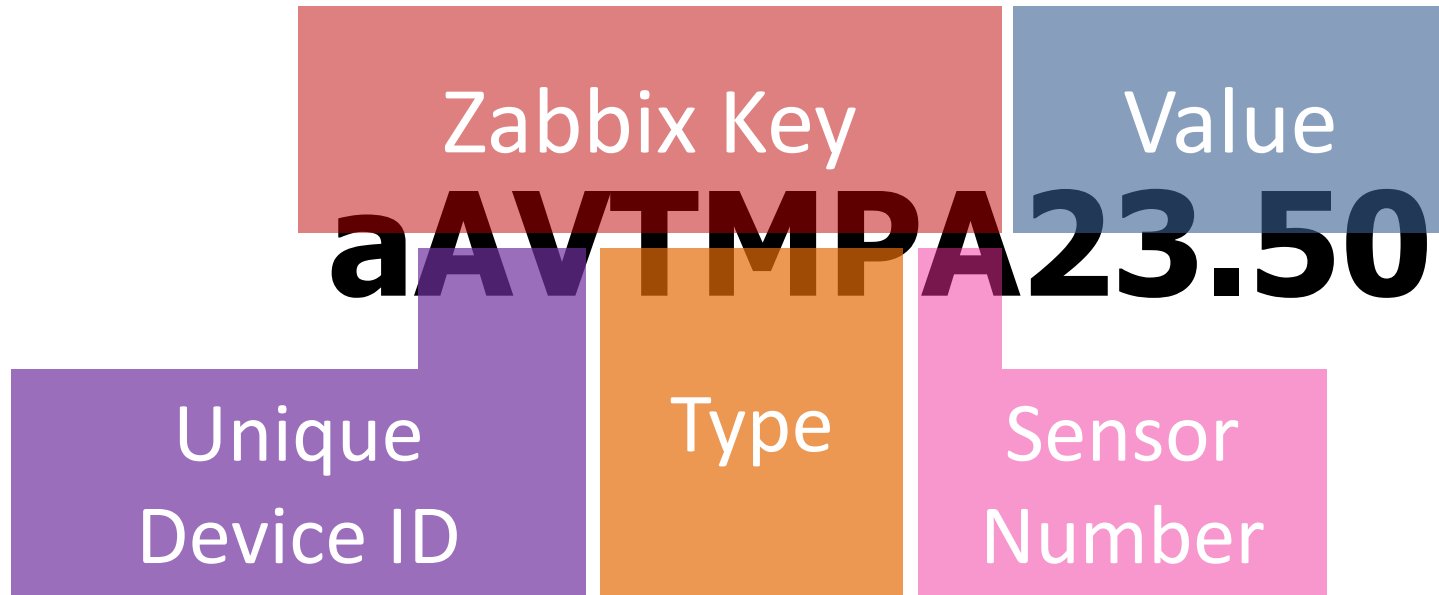
Challenge 2

- At present we store (in a text file) the unique site commands at the PiFiHub (Zabbix Agent) and have “standard” script commands with parameters Example:

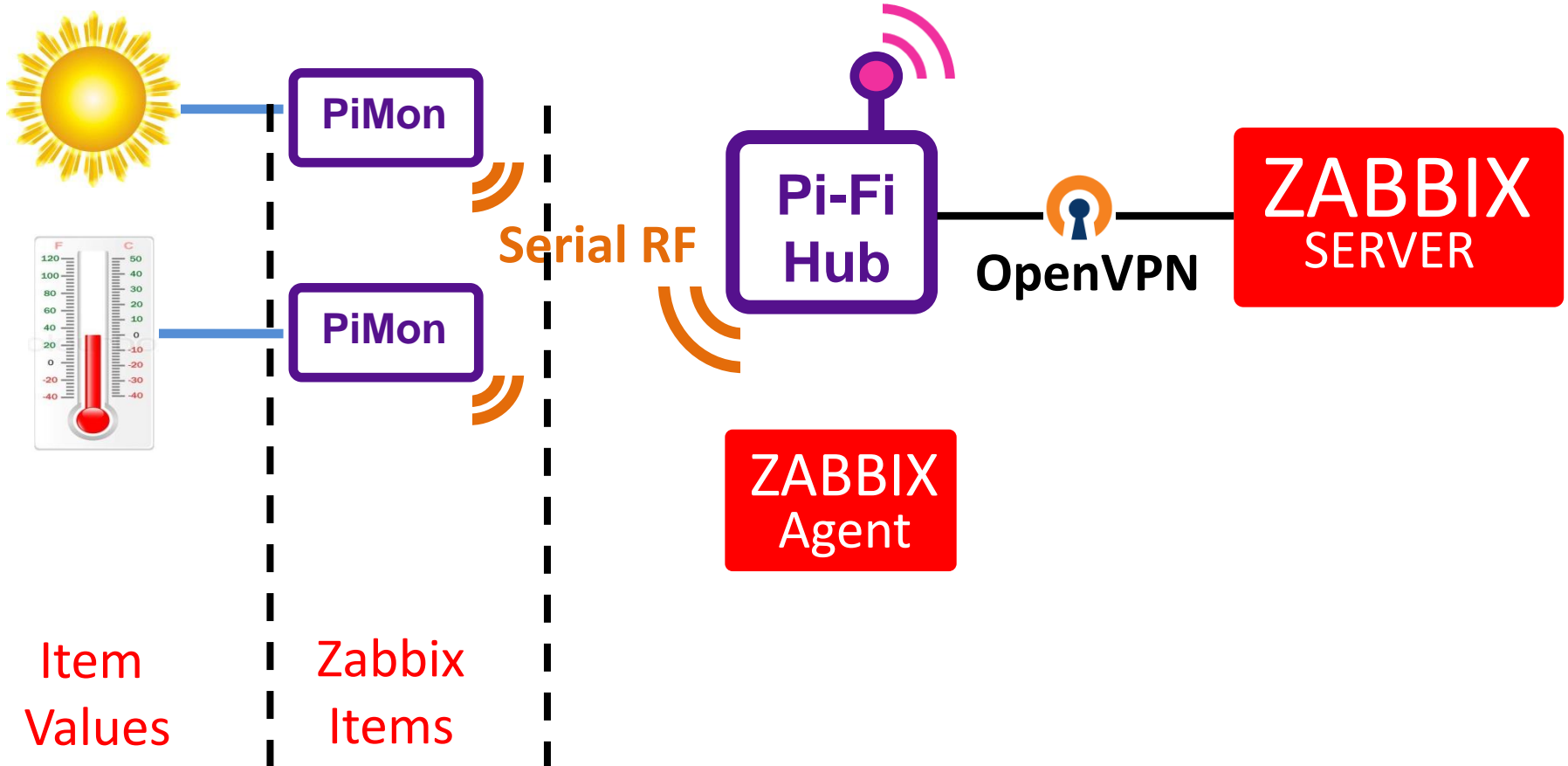
Script/Remote Command	Line Number	Line Content
externalscripts/writeSERIAL.py 1 ON	1	AA
externalscripts/writeSERIAL.py 1 OFF	1	AA
externalscripts/writeSERIAL.py 3 ON	3	AB
externalscripts/writeSERIAL.py 4 OFF	4	Etc....

- Issue: All scripts available for all host group – Which One to pick etc.

Sensor - Serial RF Value



Sensors - PiMon



Sensors - PiMon

- PiMon wakes up at programmed intervals and sends back values to PiFiHub
- Script on PiFiHub reads every second Serial Coms and parses for **keys & values**
- Zabbix Sender sends keys and values back to the server.

Challenge 3


- Wanted to use host macros for:
 - Device ID
 - Type
 - Sensor
- Then apply to PiMon/sensor template as keys for zabbix trapper items.
- However:

"user macros (variables) are supported in item key parameters, not as replacement for item keys themselves"

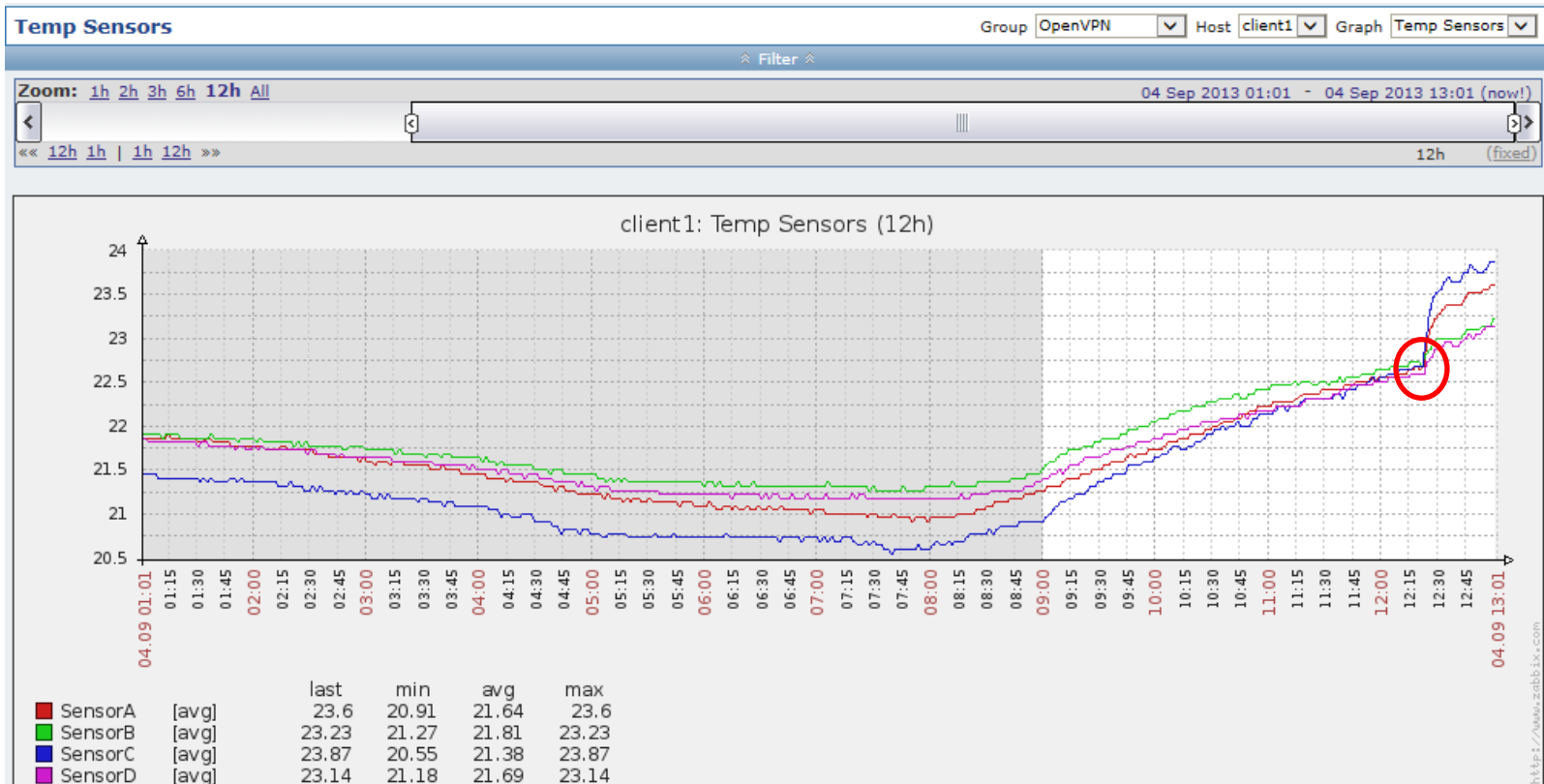
<https://www.zabbix.com/forum/showthread.php?t=42239&highlight=macros+keys>

Challenge 3

- In this instance we didn't look for a workaround as time was pressing so we added each item individually.

<u>Name</u> 	<u>Key</u>	<u>Type</u>
<u>SensorA</u>	aATTMPA	Zabbix trapper
<u>SensorB</u>	aBTTMPA	Zabbix trapper
<u>SensorC</u>	aCTTMPA	Zabbix trapper
<u>SensorD</u>	aDTTMPA	Zabbix trapper
<u>SensorE</u>	aETTMPA	Zabbix trapper
<u>SensorF</u>	aFTTMPA	Zabbix trapper

Challenge 3



Any ideas?



Future Paths

- Research API

Wishlist

- Macros as keys

Speak Later

- If you need to speak to me after I look like this:



References

- Bolton, P. (2010) **Energy price rises and fuel poverty** [Internet]. House of Commons Library Research. Available from:
<http://www.parliament.uk/documents/commons/lib/research/key_issues/Key%20Issues%20Energy%20price%20rises%20and%20fuel%20poverty.pdf> [Accessed 3rd June 2012].
- <http://openvpn.net/index.php/open-source/documentation/miscellaneous/79-management-interface.html>
- <http://blog.zabbix.com/multiple-servers-for-active-agent-sure/858/>
- <https://www.zabbix.com/documentation/2.0/manual/config/macros/usermacros>
- https://www.zabbix.com/documentation/2.2/manual/web_interface/frontend_sections/administration/scripts