



Using Zabbix to Monitor Xetawave Radio Networks

This application note describes how to install and configure Zabbix on an Ubuntu operating system to monitor a Xetawave radio network.

Introduction

Zabbix is an open source network level management utility that can be used for monitoring any Ethernet enabled device. As this is an open source project, it is entirely free. This is great as Zabbix is incredibly powerful and similar products cost in the thousands of dollars. The downside to Zabbix also comes from the fact that it is free to use. Service and support will cost money, and might not always be available. However, Zabbix does have quite a bit of documentation online, and there are videos on Youtube for more support. With these facts in mind, Zabbix provides a great way to monitor a Xetawave radio network (as well as other Ethernet devices) for almost no cost.

Installation of Zabbix

This guide will be directed at installing Zabbix on a Debian/Ubuntu operating system from the command line. Zabbix will also work on Windows, Red Hat, OSX and other operating systems. If you are attempting to use an operating system other than Debian, or need more assistance with the installation please refer to the site below for installation reference.

<http://www.zabbix.com/>

In order to install Zabbix you will need root access. The easiest way to do this is by typing `sudo su` from the command line. Once done you should be logged in as “root”. This will give you super user access.

Step 1) The first thing we need to do is edit the sources list.

Type the following

- `pico /etc/apt/sources.list`

Step 2) Add the following items to the sources file. Do this at the end of the file.

Type the following

- `# Zabbix Application PPA`
- `deb http://ppa.launchpad.net/tbfr/zabbix/ubuntu precise main`
- `deb-src http://ppa.launchpad.net/tbfr/zabbix/ubuntu precise main`

Step 3) Save and exit the file.



Step 4) Add the PPA key so the apt-get will trust the file source.

Type the following to retrieve the key

- `apt-key adv --keyserver keyserver.ubuntu.com --recv-keys C407E17D5F76A32B`

Step 5) Update and install the Zabbix server and its packages. During the install, you will be prompted to enter a password for the mysql server. Remember this password as it will be needed in subsequent steps.

Type the following

- `apt-get update`
- `apt-get install zabbix-server-mysql php5-mysql zabbix-frontend-php`

Step 6) Edit the Zabbix configuration

Type the following

- `pico /etc/zabbix/zabbix_server.conf`

Step 7) Once in the `zabbix_server.conf` file adjust the following values. In pico use “ctrl+w” to search.

- `DBName=zabbix`
- `DBUser=zabbix`
- `DBPassword=your_chosen_password_here`

Step 8) You may need to unzip the file if it is not already done. If it is already done, don't worry about the error message.

Type the following to unzip the files

- `cd /usr/share/zabbix-server-mysql/`
- `gunzip *.gz`

Step 9) Login to mysql. You will need your password to login.

Type the following to login

- `mysql -u root -p`

Step 10) Create a user for Zabbix (and a database) that matches the information we entered `zabbix_server.conf` file.

To do so type the following

- `create user 'zabbix'@'localhost' identified by 'your_chosen_password_here';`
- `create database zabbix;`
- `grant all privileges on zabbix.* to 'zabbix'@'localhost'; flush privileges;`
- `exit;`



Step 11) Next we'll import the schemas into the newly created database.

Type the following to import the schemas

- `cd /usr/share/zabbix-server-mysql/`
- `mysql -u zabbix -p zabbix < schema.sql`
- `mysql -u zabbix -p zabbix < images.sql`
- `mysql -u zabbix -p zabbix < data.sql`

Step 12) We must now edit a few PHP settings by modifying the `php.ini` file.

To edit the file type the following

- `pico /etc/php5/apache2/php.ini`

Once in the file search for the following items and modify them as follows. If they are not present, add them. You may also have to uncomment the time zone. To do this, remove the `#` symbol.

- `post_max_size = 16M`
- `max_execution_time = 300`
- `max_input_time = 300`
- `date.timezone = "America/Denver"`

Step 13) We must copy the example config to `/etc/zabbix` directory.

Type the following to copy the example configuration.

- `cp /usr/share/doc/zabbix-frontend-php/examples/zabbix.conf.php.example /etc/zabbix/zabbix.conf.php`

Step 14) We must now edit the configuration file.

To enter the file type the following

- `pico /etc/zabbix/zabbix.conf.php`

Once in the file edit the following values

- `$DB['DATABASE'] = 'zabbix';`
- `$DB['USER'] = 'zabbix';`
- `$DB['PASSWORD'] = 'your_chosen_password_here'`

Step 15) Now we need to copy the zabbix apache configuration into the proper directory.

Type the following

- `cp /usr/share/doc/zabbix-frontend-php/examples/apache.conf /etc/apache2/conf-available/zabbix.conf`
- `a2enconf zabbix.conf`
- `a2enmod alias`
- `service apache2 restart`



Step 16) We must now edit one more parameter so that the server is running by default.

To do this type the following

- `pico /etc/default/zabbix-server`

Once in the file, change the following value

Go to the bottom and adjust the "START" property to read "yes":

- `START=yes`

Step 17) Restart the server.

- `service zabbix-server start`

Step 18) Type the IP address of the instance that Zabbix was installed with a /zabbix after the ip address on into a browser like chrome. It should look similar to the following.

<http://172.31.36.182/zabbix>

The screenshot shows the Zabbix web interface at the URL 172.31.36.182/zabbix. The interface includes a sidebar with navigation options for graphs, screens, maps, and favourites. The main content area displays several monitoring dashboards:

- Status of Zabbix:** A table showing the server's operational status and various metrics.
- System status:** A table showing the status of different host groups.
- Host status:** A table showing the status of individual hosts.
- Last 20 issues:** A table showing the most recent issues found.
- Web monitoring:** A table showing the status of web scenarios.

Parameter	Value	Details
Zabbix server is running	Yes	localhost:10051
Number of hosts (monitored/not monitored/templates)	41	2 / 1 / 38
Number of items (monitored/disabled/not supported)	9	9 / 0 / 0
Number of triggers (enabled/disabled) [problem/ok]	0	0 / 0 [0 / 0]
Number of users (online)	2	1
Required server performance, new values per second	0.19	-

Host group	Disaster	High	Average	Warning	Information	Not classified
Linux_900	0	0	0	0	0	0
vTasker_900	0	0	0	0	0	0

Host group	Without problems	With problems	Total
Linux_900	1	0	1
vTasker_900	1	0	1

Host	Issue	Last change	Age	Info	Ack	Actions
No events found.						

Host group	Ok	Failed	Unknown
No web scenarios found.			



Configuring Zabbix to Monitor

Xetawave Linux Radios

While Zabbix is capable of monitoring many different values such as ICMP, HTTP, HTTPS, SNMP, and many more, this guide will focus on SNMP.

Monitoring SNMP:

The first thing we must do is create a host group. In this example we have created a group called Linux 900 MHz.

Step 1) Create a Host Group.

- Go to configuration, Host Groups.
- On the Top right, there is a button titled “create host group”. Click on this and create a group. This group should contain a network of radios, and it is best if the name reflects that group.
- Once you have created the group, click on the “hosts” button under that group. It should look like the image below.

The screenshot shows the Zabbix web interface for configuring host groups. The breadcrumb trail is: Dashboard » Latest data » History » Dashboard » Configuration of host groups. The page title is "CONFIGURATION OF HOST GROUPS". Below the title, it says "host groups" and "isplaying 1 to 8 of 8 found". A table lists the host groups with columns for Name, #, and Members.

Name	#	Members
Discovered hosts	Templates (0) Hosts (0)	-
Hypervisors	Templates (0) Hosts (0)	-
Linux 900	Templates (0) Hosts (1)	Linux 9E Master
Linux servers	Templates (0) Hosts (0)	-
Templates	Templates (38) Hosts (0)	Template OS Linux, Template App Zabbix Server, Template App Zabbix Proxy, Template App Zabbix Agent, Template SNMP Interface, IPMI Intel SR1630, Template App MySQL, Template OS OpenBSD, Template OS FreeBSD, Template OS AIX, Template OS HP-UX, Template App FTP Service, Template App HTTP Service, Template App HTTPS Service, Template App IMAP Service, Template App LFPing

Step 2) Create a Host and Application.

- Under hosts of the newly created host group, there will be a create host button in the same spot as the create host group button. Click on this and create the new host.
- Move the host group that you just created to the in-groups.
- You will want the “Host name” and “Visible name” to be similar and reflect the node that you want to monitor. Add the IP interface that you want to monitor under agent and SNMP interfaces.



- After the host information has been added, save it and return to the host group with the new host.
- Click on the applications tab and create a new application called “SNMP” or a name that will reflect the application that is going to be monitored.
- After saving the application exit out and click on items.

Step 3) Create an Item. Items are what we will monitor using Zabbix. In this case they will reflect the OID values of the SNMP MIB.

Below are the settings that should be used to monitor each value of the Linux SNMP MIB. Each value will require a new item.

General Values:

Name	Device Name	Firmware Version	Device Model	Serial Number
Type	SNMP v1/v2/v3	SNMP v1/v2/v3	SNMP v1/v2/v3	SNMP v1/v2/v3
Key	deviceName	deviceFirmwareVersion	deviceModel	deviceSerialNumber
Host Interface	IP address : 161	IP address : 161	IP address : 161	IP address : 161
SNMP OID	1.3.6.1.4.1.41413.1.1.0	1.3.6.1.4.1.41413.1.4.0	1.3.6.1.4.1.41413.1.2.0	1.3.6.1.4.1.41413.1.3.0
SNMP community	Entered In Radio GUI	Entered In Radio GUI	Entered in Radio GUI	Entered in Radio GUI
Port	161	161	161	161
Type of Information	Text	Text	Text	Text
Update Interval	3000	3000	3000	3000
History Period	90 days	90 days	90 days	90 days
Application	SNMP	SNMP	SNMP	SNMP
Enabled	YES	YES	YES	YES

Radio 1 Values:

Name	Radio Index	Radio Temperature	Radio PA Temp	Radio PA Current
Type	SNMP v1/v2/v3	SNMP v1/v2/v3	SNMP v1/v2/v3	SNMP v1/v2/v3
Key	radiIndex	radioTemp	radioPATemp	radioPAcurr
Host Interface	IP address : 161	IP address : 161	IP address : 161	IP address : 161
SNMP OID	1.3.6.1.4.1.41413.10.3.4.1.1.1	1.3.6.1.4.1.41413.10.3.4.1.2.1	1.3.6.1.4.1.41413.10.3.4.1.3.1	1.3.6.1.4.1.41413.10.3.4.1.4.1
SNMP community	Entered In Radio GUI	Entered In Radio GUI	Entered in Radio GUI	Entered in Radio GUI
Port	161	161	161	161
Type of Information	Numeric (unsigned)	Numeric (unsigned)	Numeric (unsigned)	Numeric (unsigned)
Data Type	Decimal	Decimal	Decimal	Decimal
Units		Degrees C	Degrees C	mA
Update Interval	600 s (recommended)	600 s (recommended)	600 s (recommended)	600 s (recommended)
History Period	90 days	90 days	90 days	90 days
Application	SNMP	SNMP	SNMP	SNMP
Enabled	YES	YES	YES	YES



Name	Radio Bytes Transmitted	Radio Bytes Received	Radio Transmit Rate	Radio Receive Rate
Type	SNMP v1/v2/v3	SNMP v1/v2/v3	SNMP v1/v2/v3	SNMP v1/v2/v3
Key	radioBytesTX	radioBytesRX	radioTXrate	radioRXrate
Host Interface	IP address : 161	IP address : 161	IP address : 161	IP address : 161
SNMP OID	1.3.6.1.4.1.41413.10.3.4.1.5.1	1.3.6.1.4.1.41413.10.3.4.1.6.1	1.3.6.1.4.1.41413.10.3.4.1.7.1	1.3.6.1.4.1.41413.10.3.4.1.8.1
SNMP community	Entered In Radio GUI	Entered In Radio GUI	Entered in Radio GUI	Entered in Radio GUI
Port	161	161	161	161
Type of Information	Numeric (unsigned)	Numeric (unsigned)	Numeric (unsigned)	Numeric (unsigned)
Data Type	Decimal	Decimal	Decimal	Decimal
Units	Bytes	Bytes	Bits/s	Bits/s
Update Interval	600 s (recommended)	600 s (recommended)	600 s (recommended)	600 s (recommended)
History Period	90 days	90 days	90 days	90 days
Application	SNMP	SNMP	SNMP	SNMP
Enabled	YES	YES	YES	YES

Radio 1 Values Continued:

Name	Radio Current Success	Radio Supply Voltage
Type	SNMP v1/v2/v3	SNMP v1/v2/v3
Key	radioCurrSuccess	radioSupplyVoltage
Host Interface	IP address : 161	IP address : 161
SNMP OID	1.3.6.1.4.1.41413.10.3.4.1.9.1	1.3.6.1.4.1.41413.10.3.4.1.10.1
SNMP community	Entered in Radio GUI	Entered in Radio GUI
Port	161	161
Type of Information	Numeric (unsigned)	Numeric (unsigned)
Data Type	Decimal	Decimal
Units	Percent	Volts
Update Interval	600 s (recommended)	600 s (recommended)
History Period	90 days	90 days
Application	SNMP	SNMP
Enabled	YES	YES

Radio 2 Values:

In order to monitor radio 2, the only change will be the .1 at the end of each OID value. This will be changed to a .2 and it will monitor the second radio.

Viewing Data:

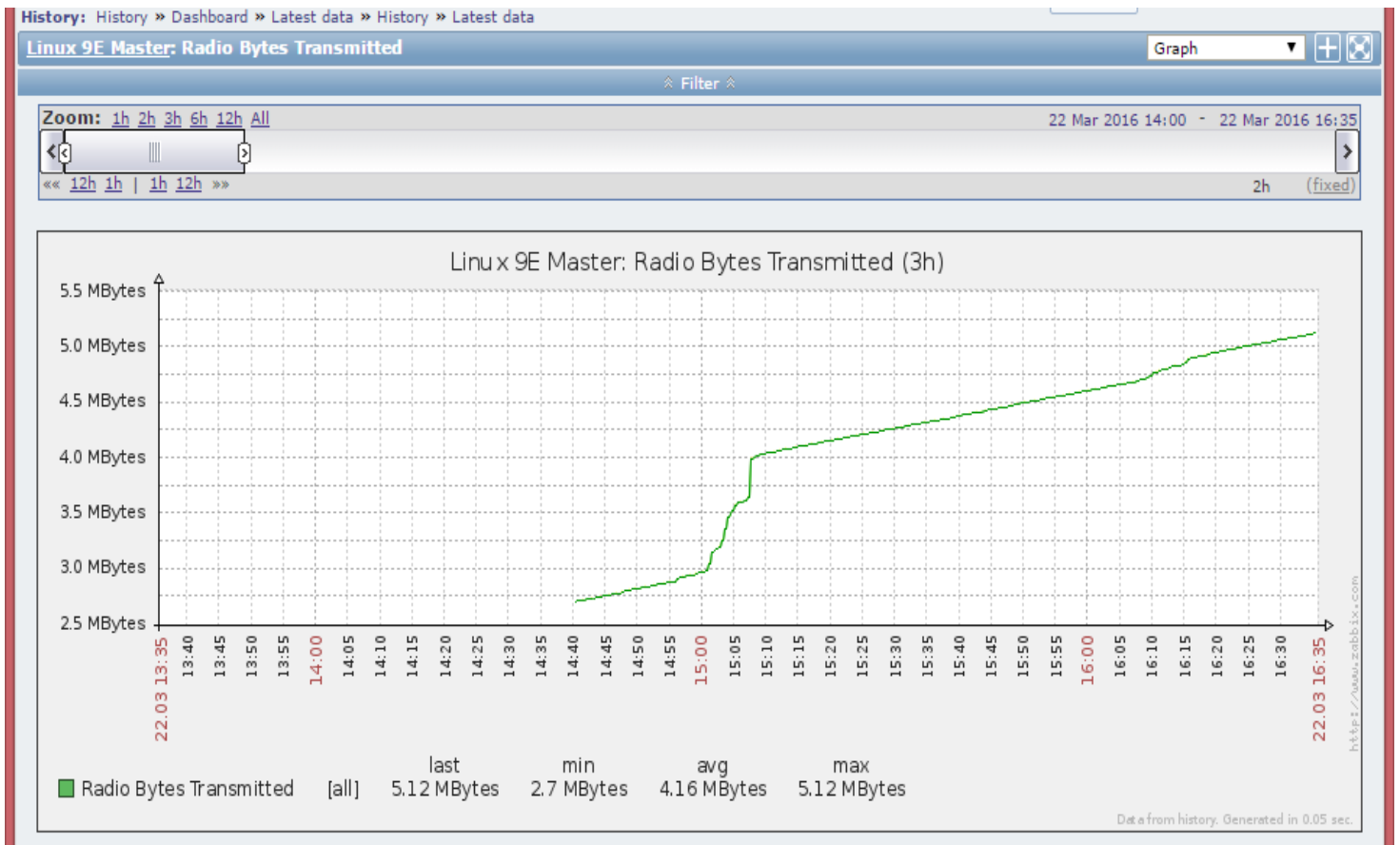
To view the data collected from each Item, click on “monitoring” and then “latest data”. On this page



you will see the last recorded value, along with a graph of all collected data. It should look like the images below.

Linux 9E Master					
SNMP (4 Items)					
Device Name	23 Mar 2016 08:29:08	Access Point 21	-		History
Firmware Version	23 Mar 2016 08:24:37	xw9-EBA.5.2.11d.RC1	-		History
Radio 1 Current Success	23 Mar 2016 08:29:08	99	-		Graph
Radio Bytes Transmitted	23 Mar 2016 08:29:09	16.15 MBytes	+7.65 KBytes		Graph

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Configuring Zabbix to Monitor

Xetawave uTasker Radios

Monitoring SNMP on uTasker:

Step 1) Follow steps one and two in the previous section regarding SNMP on Linux radios. Once you have created a host group and a host, we can begin to create items for that host.

Step 2) Creating an item for uTasker radios is very much like it was for Linux, but some of the “item” definitions will be different. uTasker radios will only support SNMP v1 and v2c, so keep this in mind when setting up the Zabbix agent.

General Values:

Name	Device Name	Device Model	Serial Number	Firmware Version
Type	SNMP v1/v2c	SNMP v1/v2c	SNMP v1/v2c	SNMP v1/v2c
Key	deviceName	deviceModel	deviceSerialNumber	deviceFirmwareVersion
Host Interface	IP address: 161	IP address: 161	IP address: 161	IP address: 161
SNMP OID	1.3.6.1.4.1.41413.1.1	1.3.6.1.4.1.41413.1.2	1.3.6.1.4.1.41413.1.3	1.3.6.1.4.1.41413.1.4
Community	Enter in Radio GUI	Enter in Radio GUI	Enter in Radio GUI	Enter in Radio GUI
Port	161	161	161	161
Type	Text	Text	Text	Text
Data Type	N/A	N/A	N/A	N/A
Units	N/A	N/A	N/A	N/A
Update Interval	3600 seconds	3600 seconds	3600 seconds	3600 seconds
History Period	90 days	90 days	90 days	90 days
Application	SNMP	SNMP	SNMP	SNMP
Enabled	YES	YES	YES	YES



General Values Continued:

Name	Device Latitude	Device Longitude	Device Voltage	DI Level
Type	SNMP v1/v2c	SNMP v1/v2c	SNMP v1/v2c	SNMP v1/v2c
Key	deviceLatitude	deviceLongitude	deviceVoltage	deviceDI1Level
Host Interface	IP address: 161	IP address: 161	IP address: 161	IP address: 161
SNMP OID	1.3.6.1.4.1.41413.1.10	1.3.6.1.4.1.41413.1.11	1.3.6.1.4.1.41413.1.12	1.3.6.1.4.1.41413.1.13
Community	Enter in Radio GUI	Enter in Radio GUI	Enter in Radio GUI	Enter in Radio GUI
Port	161	161	161	161
Type	Text	Text	Text	Numeric (unsigned)
Data Type	N/A	N/A	N/A	Decimal
Units	N/A	N/A	N/A	DI State
Update Interval	3600 seconds	3600 seconds	3600 seconds	3600 seconds
History Period	90 days	90 days	90 days	90 days
Application	SNMP	SNMP	SNMP	SNMP
Enabled	YES	YES	YES	YES

Zoom: [1h](#) [2h](#) [3h](#) [6h](#) [12h](#) [1d](#) [All](#)

<

<< [1d](#) [12h](#) [1h](#) | [1h](#) [12h](#) [1d](#) >>

Timestamp	Value
2016.Mar.24 08:39:29	Xeta9.snmp.20160311.1
2016.Mar.24 08:34:29	Xeta9.snmp.20160311.1
2016.Mar.24 08:29:29	Xeta9.snmp.20160311.1
2016.Mar.24 08:24:29	Xeta9.snmp.20160311.1
2016.Mar.24 08:19:29	Xeta9.snmp.20160311.1
2016.Mar.24 08:14:29	Xeta9.snmp.20160311.1
2016.Mar.24 08:09:29	Xeta9.snmp.20160311.1
2016.Mar.24 08:04:29	Xeta9.snmp.20160311.1
2016.Mar.24 07:59:29	Xeta9.snmp.20160311.1
2016.Mar.24 07:54:29	Xeta9.snmp.20160311.1
2016.Mar.24 07:49:29	Xeta9.snmp.20160311.1
2016.Mar.24 07:44:29	Xeta9.snmp.20160311.1

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Radio Values:

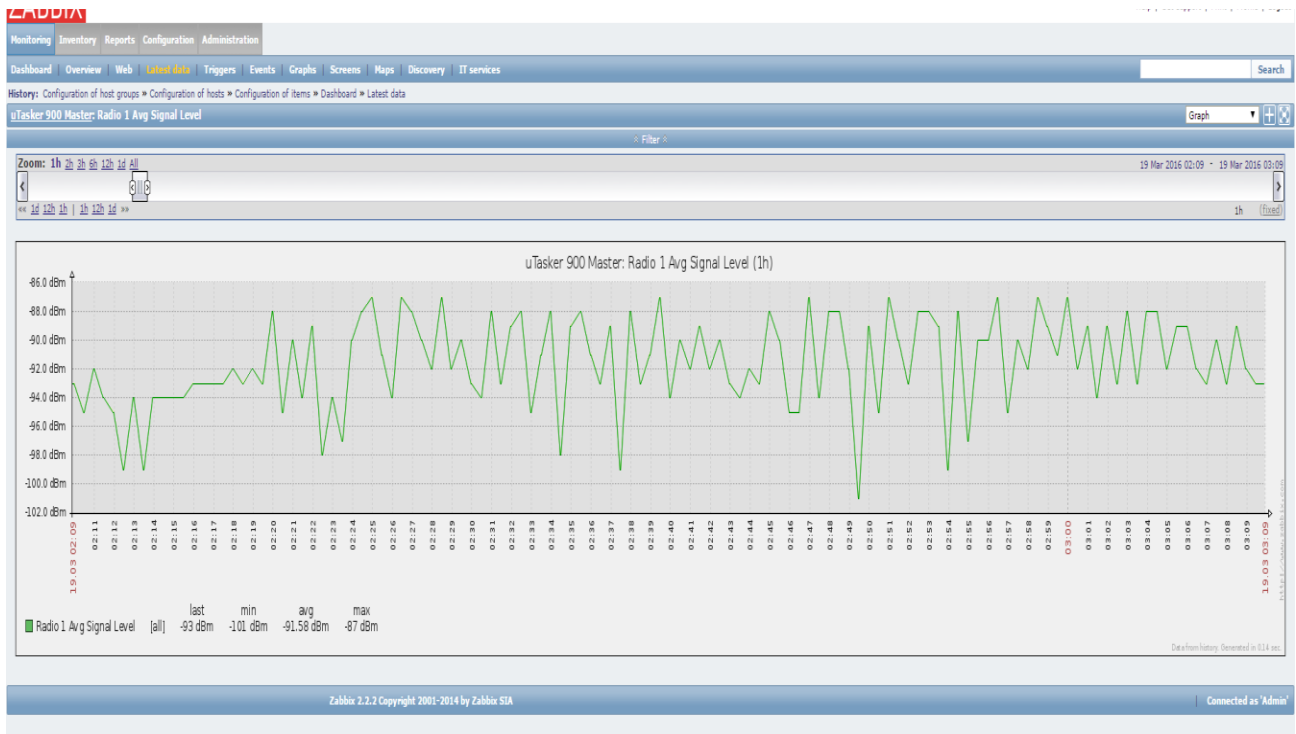
Name	Radio Index	Radio Temp	Radio PA Temp	Radio PA Current
Type	SNMP v1/v2c	SNMP v1/v2c	SNMP v1/v2c	SNMP v1/v2c
Key	radiIndex	radioTemp	radioPATemp	radioPACurr
Host Interface	IP address: 161	IP address: 161	IP address: 161	IP address: 161
SNMP OID	1.3.6.1.4.1.41413.20.3.4.1.1	1.3.6.1.4.1.41413.20.3.4.1.2	1.3.6.1.4.1.41413.20.3.4.1.3	1.3.6.1.4.1.41413.20.3.4.1.4
Ccommunity	Enter in Radio GUI	Enter in Radio GUI	Enter in Radio GUI	Enter in Radio GUI
Port	161	161	161	161
Type	Numeric (Unsigned)	Numeric (Unsigned)	Numeric (Unsigned)	Numeric (Unsigned)
Data Type	Decimal	Decimal	Decimal	Decimal
Units		Deg C	Deg C	mA
Update Interval	User Choice	User Choice	User Choice	User Choice
History Period	90 days	90 days	90 days	90 days
Application	SNMP	SNMP	SNMP	SNMP
Enabled	YES	YES	YES	YES

Name	Radio Bytes Tx	Radio Bytes Rx	Radio Tx Rate	Radio Rx Rate
Type	SNMP v1/v2c	SNMP v1/v2c	SNMP v1/v2c	SNMP v1/v2c
Key	radioBytesTX	radioBytesRX	radioTXTate	radioRXRate
Host Interface	IP address: 161	IP address: 161	IP address: 161	IP address: 161
SNMP OID	1.3.6.1.4.1.41413.20.3.4.1.5	1.3.6.1.4.1.41413.20.3.4.1.6	1.3.6.1.4.1.41413.20.3.4.1.7	1.3.6.1.4.1.41413.20.3.4.1.8
Ccommunity	Enter in Radio GUI	Enter in Radio GUI	Enter in Radio GUI	Enter in Radio GUI
Port	161	161	161	161
Type	Numeric (Unsigned)	Numeric (Unsigned)	Numeric (Unsigned)	Numeric (Unsigned)
Data Type	Decimal	Decimal	Decimal	Decimal
Units	Bytes	Bytes	Bits/s	Bits/s
Update Interval	User Choice	User Choice	User Choice	User Choice
History Period	90 days	90 days	90 days	90 days
Application	SNMP	SNMP	SNMP	SNMP
Enabled	YES	YES	YES	YES



Radio Values Continued:

Name	Radio Current Success	Radio Supply Voltage	Radio Signal Average	Radio Noise Average
Type	SNMP v1/v2c	SNMP v1/v2c	SNMP v1/v2c	SNMP v1/v2c
Key	radioCurrSuccess	radioSupplyVoltage	raadioSignalAverage	radioNoiseAverage
Host Interface	IP address: 161	IP address: 161	IP address: 161	IP address: 161
SNMP OID	1.3.6.1.4.1.41413.20.3.4.1.9	1.3.6.1.4.1.41413.20.3.4.1.10	1.3.6.1.4.1.41413.20.3.4.1.11	1.3.6.1.4.1.41413.20.3.4.1.12
Ccommunity	Enter in Radio GUI	Enter in Radio GUI	Enter in Radio GUI	Enter in Radio GUI
Port	161	161	161	161
Type	Numeric (Unsigned)		Numeric (Float)	Numeric (Float)
Data Type	Decimal			
Units	Percent		dBm	dBm
Update Interval	User Choice	User Choice	User Choice	User Choice
History Period	90 days	90 days	90 days	90 days
Application	SNMP	SNMP	SNMP	SNMP
Enabled	YES	YES	YES	YES





**Configuring Zabbix to Monitor
SNMP traps from Xetawave Linux radios**

Coming Soon!