APPLICATION NOTE

APNUS036 How to Configure Alarms and Events on Acksys Router

December 2023

1 Content

1. ALARM and Events Glossary and Term

Event -. Notification generated by the system during normal running which need to be sent to Users

Alarm - Notification generated when the system detect a configured event

SNMP - Simple Network Management Protocol, an Internet Standard protocol for collecting and organizing information about managed devices on IP networks.

Trap – a SNMP trap/notification sent when an event occurred.

WaveManager - A monitoring server for monitor, troubleshoot and manage ACKSYS hardware network deployments locally or remotely.

SIM - Subscriber Identity Module.

LTE- Long Term Evolution

PLC- Programmable Logic Controllers

IO- Input Output

GUI: A graphical user interface is a digital interface in which a user interacts with graphical components

2. Introduction

An alarm is a critical part of any process, system or machinery, etc. It can prevent you from an incident and provide information about what is happening.

Traps/Notifications can be used to alerts the user when a specific event occurs (signal strength changes, SIM switch occurs, mobile data limit is reached, etc.).

In this application note, we will learn how to create an Alarm and Event with basics example of configuration.

3.   Alarms and Events Architecture

In this application note, we will explain in detail the basic steps required to configure Alarm and receive Notification on Acksys Router.

Example of alarms/events usage:
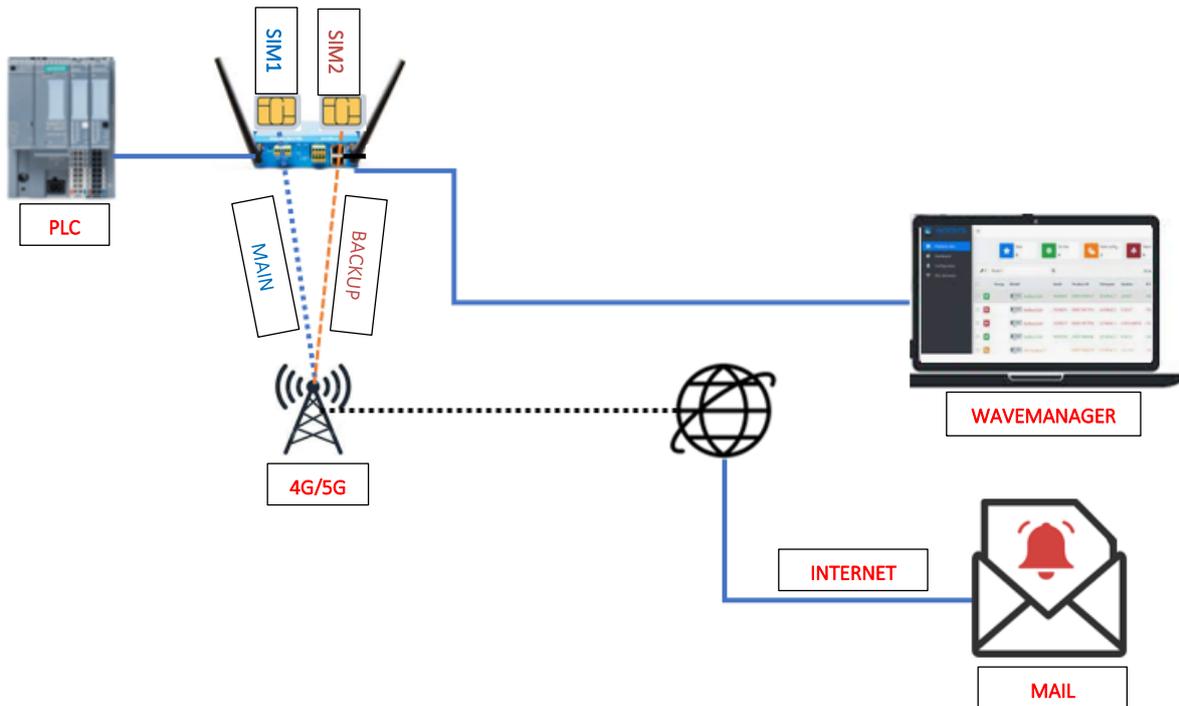
Before we begin, let's overview the configuration that we are attempting to achieve and the prerequisites that make it possible in this application note :

- Any type of Acksys Router
- A WaveManager Server
- Laptop to configure the router on which Mib Browser is installed

4. **Alarms & Events parameters**

WaveOs software includes several predefined alarm conditions that are available immediately after you set up. The conditions under which alarms are generated, the actions automatically taken by the system to cope with or recover from the failure, and the maintenance actions appropriate in each situation are discussed for each alarm condition.

The following table described alarm conditions predefined in WaveOs:

4.1 Predefined Alarm Conditions in WaveOs

List of event	Description
Ethernet link	The state is up when the link is up on the physical interface.
Wireless link (AP mode)	The state is up when one client is connected on any of the access points running on the product.
Wireless link (Client mode)	The state is up when the bridge is connected to one Access point.
Cellular Link	The state is up when the cellular link is established
Wireless client assoc	The event can be linked only with the SNMP trap action. It sends a notification when a client associates or dissociates with one access point.
Digital input	The state is 1 when the digital input is active. Some products, such as the Airbox, have several Digital Input.
Input Power	The state is on, when the input power is powered.
Temperature limit	The event is triggered when the temperature exceeds the trigger.
VRRP state change	The event is triggered when VRRP state enters or leaves the given value.
DFS state change	The event is triggered when the DFS status changed
Cold start	The event is triggered when the product has finished booting
Ping Failure	An ICMP ECHO Request (ping) is periodically sent to a remote host. If no ICMP ECHO Response is received for several consecutive periods, the event is triggered.
GNSS state	The event is triggered when the GNSS position stabilizes and can be queried. It deactivates when the position fixing is lost.
SNMP trigger	The event is triggered by the following SNMP OIDs: ▪ adminEventEnable enables action for the named alarm ▪ adminEventDisable disable action for the named alarm ▪ adminEventTrigger execute action for the named one-shot alarm
Security alert	This event is intended to notify the user when the product firmware detects a security threat. Currently only Rogue AP detection service is implemented. This event doesn't need to be disabled; it is fired as often as necessary.
RSSI weak signal	The event is triggered when the Performs when signal strength value (RSSI in dBm) falls below a specified threshold
Mobile data limit	The event is triggered when switch when the SIM card reaches the specified data limit for the designated period
No Network	The event is triggered when the SIM card cannot find an operator to connect to
Network denied	The event is triggered when the when access to a network is denied (usually

	by an operator).
Roaming	The event is triggered when the roaming conditions are detected (i.e., when the SIM card connects to a foreign operator).
Data connection	The event is triggered when the router doesn't receive an ICMP echo from a specified host address

4.2 Types Of Alarm Reactions

There are different type of Alarm reactions available in WaveOs for a specific automated action that happen as a result of an Alarm Reaction described in the following table.

List of event	Description
Alarm output	This action only exists in some products. Some products, such as the Airbox, have several digital outputs that can be programmed as alarms. When triggered, the alarm contact will be activated as specified in the product
SNMP trap	The SNMP Trap action, when triggered, will send the relevant trap to the specified manager address using the specified community
Wlan shutdown	the Wlan shutdown action, when triggered, will shut down the associated radio interface
Layer 3 network switching	switch the specified network up or down
Alter VRRP	This action allows priority of a VRRP group to be changed, by applying the offset parameter to the current priority of the VRRP group, and then can be used to causes a switch over from the MASTER to the BACKUP. It is in principle triggered by an SNMP trigger
SIM Switch	This action allows to switch the SIM card in use to the secondary SIM card when the event trigger is reached

5. Alarm & Events Configuration scenarios

In this Application note, we will provide some Alarms/Event usage examples configuration in the hopes of helping you finding an example that you can use.

5.1 Configuring Alarms via Web GUI

WaveOs software includes several predefined alarm conditions that are available immediately after you set up. The conditions under which alarms are generated, the actions automatically taken by the system to cope with or recover from the failure, and the maintenance actions appropriate in each situation are discussed for each alarm condition

5.2 Configuring Temperatures limit and Reaction

In this example, we will monitor the Router temperature with alarms by integrating the data in SNMP Trap MIB Browser.

- Log in to GUI.
  - o **Setup** > **Service** > **Alarm/Events**
  - o Navigate to the Action parameters syntax and click Temperature limit in order to check the syntax
  - o Navigate to the Events trigger syntax and click "**SNMP trap**" in order to check the syntax
  - o Enter the following information for the new Event:

a. Enter the symbolic name for your event (alphanumeric string, no spaces allowed) : Temperature_limit
b. Click on add to Make sure that reaction created
c. From the **Event Type** drop-down list, select **SNMP Trigger**.
d. From the **Events Trigger configure the expected temperature to send the trap: 20 in our example.**
e. From the **Actions Type** drop-down list, select **SNMP Trap**
f. Configure the Extra Parameters **: 192.168.0.220,public**
g. Click on save and apply to enable this Event

To transmit the content of an alarm message to an SNMP-compliant third-party NMS, the Management Layer converts that information into an SNMP trap.MIB Browser.

EVENTS SETTINGS

The keywords appearing in the parameters are not case sensitive.

Events trigger syntax

| Ethernet link | Wireless link | Wireless client assoc. | Digital input | Input power | Temperature limit | VRRP state change | DFS state change | Cold start | Ping failure |

| SNMP trigger | Security alert |

Lan link

Syntax:
    <up or down>,<LAN1 or LAN2>
Example:
    down, LAN1

Action parameters syntax

| Alarm output | SNMP trap | Wlan shutdown | L3 network toggle | Alter VRRP |

Alarm output

The alarm output stays open (active) while any attached event is active.

Parameter #1:
    Alarm number to act upon.

NAMES	EVENTS	EVENTS TRIGGER	ON DELAY	OFF DELAY	ACTIONS	PARAM.#1	PARAM.#2	EXTRA PARAMS	
Temperature_limit	Temperature limit	20	0	0	SNMP trap			192.168.0.220,public	✖

> NOTE: Note that you must have SNMP functionality in your environment to monitor SNMP variables.

Temperature events are for products supporting this feature.

Notification: Temperature Limit Alarms via SNMP Trap

We will use The IReasoning MIB browser to check SNMP requests to retrieve SNMP agents' data, or make changes to agents but in this test, we will use Trap Receiver for Alarm notification.
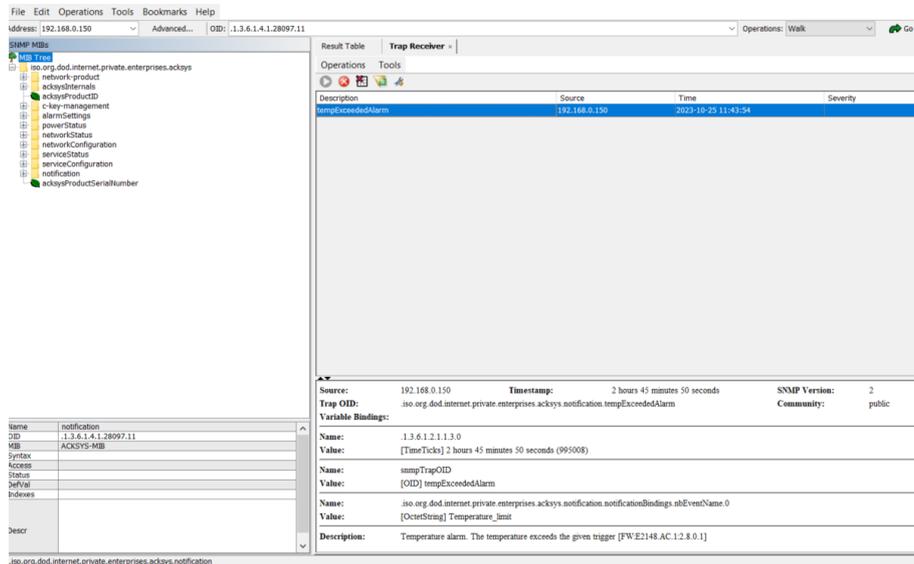
5.3   Configuring Wireless client association, disconnection Alarms and Reaction

In this example, we will configure the router in Client role to send a Trap notification when a client associates or dissociates with an access point.

- Log in to GUI if required.
- **Setup** > **Service** > **Alarm/Events**
- Navigate to the Action parameters syntax and click Wireless client association in order to check the syntax
- Navigate to the Events trigger syntax and click "**SNMP trap**" in order to check the syntax
- Enter the following information for the new Event:

a. Enter the symbolic name for your event (alphanumeric string, no spaces allowed) : Wireless_client_association
b. Click on add to Make sure that reaction created
c. From the **Event Type** drop-down list, select **Wireless client association** .
d. From the **Events Trigger: Connect**
e. From the **Actions Type** drop-down list, select **SNMP Trap**
f. Configure the Extra Parameters **: 192.168.0.220,public**
g. Click on save and apply to enable this Event

To transmit the content of an alarm message to an SNMP-compliant third-party NMS, the Management Layer converts that information into an SNMP trap.MIB Browser.

NOTE: Note that you must have SNMP functionality in your environment to monitor SNMP variables.

We will use The iReasoning MIB browser to check SNMP requests to retrieve SNMP agents' data, or make changes to agents but in this test, we will use Traper Receiver for Alarm notification.

5.4   Configuring Alarm for RSSI Weak Signal alert

In this test, an Airbox Cellular Router is configured with all the necessary information to receive a good RSSI signal. We will check if we receive Notification from SNMP Manager as trap if the signal strength value (RSSI in dBm) falls below a specified threshold with a fail delay.

First of all let monitoring the Cellular RSSI status in **Status → Cellular**

As seen on the screenshot above, the Cellular RSSI is -97dBm before performing our notification test after for the Event WEAK RSSI.

The **Create alert** on RSSI weak available for SIM switch for router in dual SIM Card , in this example, let connect in GUI in (**Tools → Services → Alarms /Event → Services → RSSI**.

Field	Syntax Value	Description
On RSSI weak signal	<fail delay>, <limit> Ex: 6,-104	<fail delay>: Fail delay in seconds before siwtching, <limit>:Minimum signal limit in dBm

NOTE: The Router Cellular configuration is not part of this application note and the RSSI Weak alarm feature is only available on WaveOS 4.22.0.X release.

Notification: RSSI Weak via SNMP Trap

The SNMP service acts as an internal alarm listener and sends traps (or notifications) to any registered SNMP trap **listener**.

The SNMP Trap action when triggered, , the SNMP managed devices actively notify the NMS (Network Management System: MIB Browser , IReasoning in this Test), instead of waiting for the polling of NMS.

To Simulate a weak RSSI, in this test we pull out the Cellular Main antenna on the router to obtain an RSSI limit. As soon as the limit is reached, let check if a trap is sent to MIB browser as notification in cellMetricsAlarm.

NOTE: These traps are automatically generated by the SNMP agent when certain predefined conditions occur (if the agent is enabled).

5.5 Creating Ethernet Link alert

In this test, we will configure The router in AP role to ping 172.24.4.1 and 172.24.4.17 every second. If there is no response for 5 consecutive pings (i.e. 5 seconds with no responses), the AP sends an SNMP trap to 172.20.2.129.

This will allow you to be notified very quickly on both sides when a problem arises.

The **Create alert** on Ethernet Link to be notify when the link is up on the physical interface. let connect in GUI in (**Tools → Services → Alarms /Event → Ethernet Link** and respect the instruction provided below in our test.

Field	Syntax Value	Description
Ethernet Link	<up or Down>, <LAN1 or LAN2> Ex: Down,LAN1	Monitor LAN1 or LAN2 physical Interface by performing a ping

5.6 Creating Wireless Association alert

In this test, we will configure The router in AP role to ping 172.24.4.1 and 172.24.4.17 every second. If there is no response for 5 consecutive pings (i.e. 5 seconds with no responses), the AP sends an SNMP trap to 172.20.2.129.

This will allow you to be notified very quickly on both sides when a problem arises.

The **Create alert** on Ethernet Link to be notify when the link is up on the physical interface. let connect in GUI in (**Tools → Services → Alarms /Event → Wireless Association** and respect the instruction provided below in our test.

5.7 Digital alert

These alarms are triggered when the associated digital input changes state.

You can configure the alarm to be active when the digital input is on or off, depending on the alarm's purpose.

For example, if you used a digital input to monitor a breaker that is always supposed to be on, you would set the alarm to be active when the breaker has tripped.

> NOTE: To stop a digital alarm from being displayed, set the alarm priority to Info Only. Disabling the digital alarm will disable all alarming functions of the associated digital input.

You must configure nominal voltage for these alarms to function.

The Threshold setup register in the Transient module defines what voltage disturbance magnitude should be considered as transient activity. Threshold is interpreted as a percentage of the nominal system voltage, plus 100. For example, if you want transients recorded when voltage deviates from nominal by 20%, enter 120 into the Threshold setup register.

6. Managing Alarms via SNMP

The purpose of using SNMP Traps for alerting alarms is that they trigger automatically rather than waiting for a status request from the manager.

The table below lists the available ACKSYS SNMP traps under the OID .1.3.6.1.4.1.28097.11 (notification).

Event name	Notification name	OID
LAN link	linkAlarm	.1.3.6.1.4.1.28097.11.1
Wireless link	linkAlarm	.1.3.6.1.4.1.28097.11.1
Input power	powerAlarm	.1.3.6.1.4.1.28097.11.3
Digital input	digitalInput	.1.3.6.1.4.1.28097.11.4
Temperature limit	tempExceededAlarm	.1.3.6.1.4.1.28097.11.5
Wireless client assoc.	clientLinkAlarm	.1.3.6.1.4.1.28097.11.6
VRRP state change	vrrpAlarm	.1.3.6.1.4.1.28097.11.7
SIM Switch	CellMetricAlarm	.1.3.6.1.4.1.28097.

7. Predefined Alarms in WaveManager

WaveManager Server includes several predefined alarm conditions that are available immediately for pro-active monitoring. These alarms are not generated by the router but by policies defined in the WaveManager:

List of Alarm	Description
Not Reachable	The alarm will be triggered when a product is no longer accessible for a time greater than the defined value
High or Low threshold	This alarm is only applicable to devices in client mode, and is triggered when the signal level goes above or below the predefined threshold.
Configuration change	Triggered following a modification of the configuration of a product
Firmware change	Triggered when the version of WaveOS installed on a product has changed
New product	Triggered upon detection of a new product
Telemetry down	This alarm is triggered when a product has not sent telemetry messages for a time greater than the value defined
Roaming	This alarm is triggered when a product has not roamed to another AP

7.1 Configuring Alarms via WaveManager

- Log in to WaveManager if required
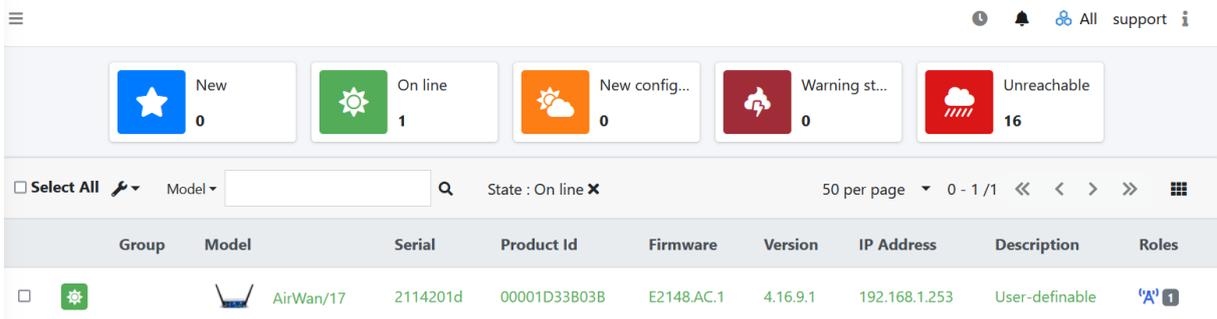
- **Setting** > **Alarm** > **Create**
  - o Redirection to Section " Create a new alarm setting"
  - o Enter the following information for the new Alarm:

    a. From the **Applied to Type** drop-down list, select **A product**
    b. From the **Product Id :** drop-down list, select .**192.168.1.253 -AirWan**
    c. From the **Actions Type** drop-down list, select **Not reachable**
    d. Configure Unreachable time for: **0**
    e. Click on save and apply to enable this Event
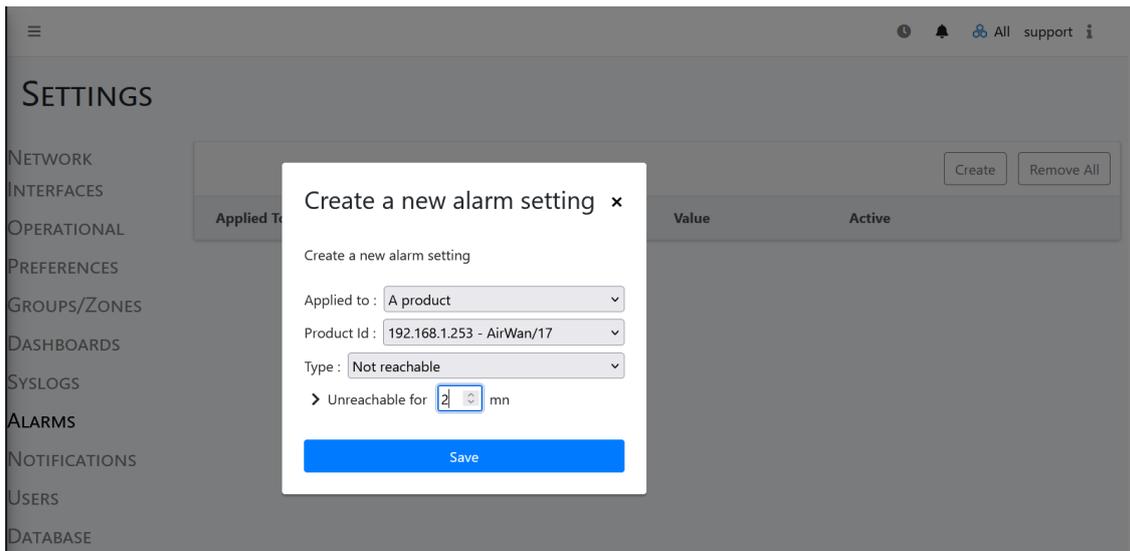
A Popup to confirm the success of the creation
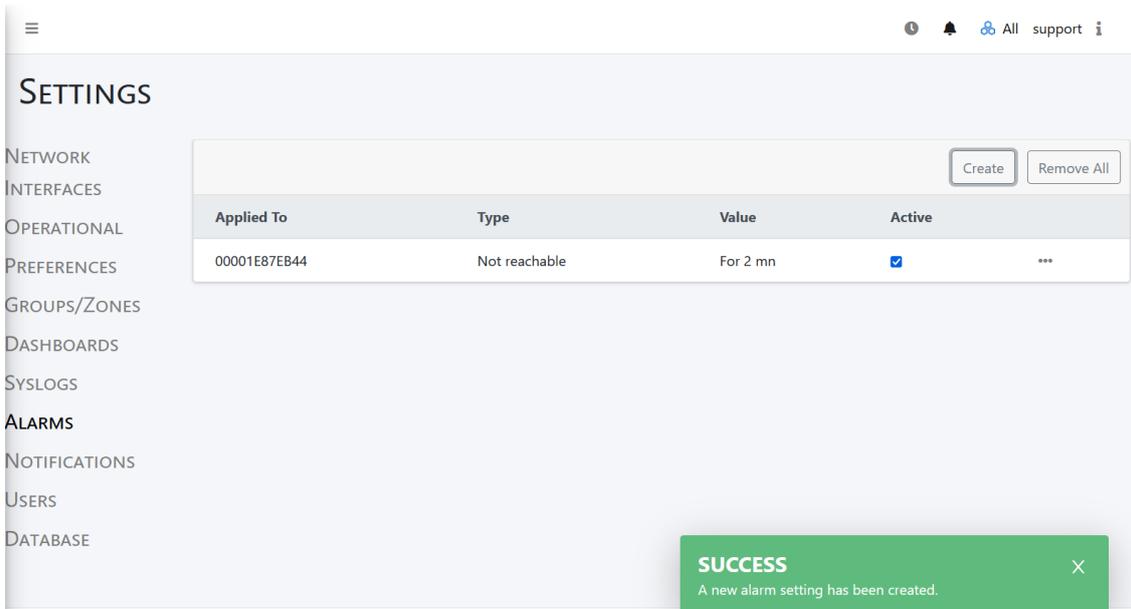
7.2   Alarm Notification (Popup)

To perform the test, let disconnect the Router AirWan (**192.168.1.253**) on which the Alarm is configured in order to check if there is any event during 2mn.

- Disconnect Ethernet Wire on the AirWan connect to WaveManager Server
- Wait for 2 Mn
- Reconnect Ethernet Wire on the AirWan connect to WaveManager Server
- Click on Alarm Icone Wait for 2 Mn

After 2Mn disconnection, a Pop-up is shown for the Alarm create and a new notification is shown on the Alarm icone 🔔¹
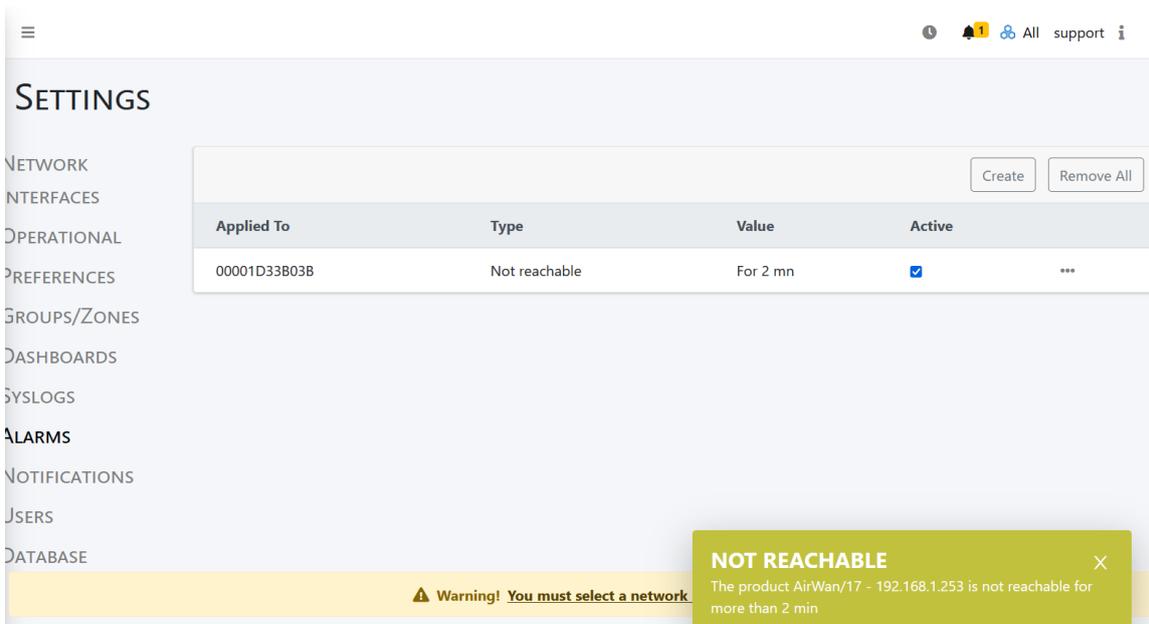
7.3   Notification Reports

In WaveManager, **Click on Alarm Icon** on the Main products view page to be redirected to the Notification Report page. This page help you to manage notifications if any alarm trigger is raised.

The same notification could be sent to via Email by SMTP (SNMP configuration is not part of this application):

To receive Alarm notification Via Email, please follow this step to perform the SMTP configuration:
For this configuration, let connect on WaveManager in GUI after authentication in Setting →Notification-→Enable receipt of email alarm notifications → Fill the necessary information with your custom Mail server → Click Save

- **Setting** > **Notification > Alarm** Notifications
- Click on "Enable receipt of email alarm notifications"
- Enter your custom Mail Server complete following information :
- Click Save

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