Infoblox
CONTROL YOUR NETWORK

DEPLOYMENT GUIDE

Infoblox NIOS Integration with Palo Alto Networks Firewall using the Outbound REST API

NIOS version 8.2 | May 2018

Contents

Introduction

The Outbound REST API integration framework from Infoblox provides a mechanism to create updates for both IPAM data (networks, hosts, leases) and DNS threat data into additional ecosystem solutions. Infoblox and Palo Alto Firewall together enable security and incident response teams to leverage the integration of vulnerability scanners and DNS security to enhance visibility, manage assets, ease compliance and automate remediation. Thus, improving your security posture while maximizing your ROI in both products.

Prerequisites

The following are prerequisites for Outbound API notifications:

- Infoblox:
    1. NIOS 8.2 or higher.
    2. Security Ecosystem License.
    3. Outbound API integration templates.
    4. Prerequisites for the templates (e.g. configured and set extensible attributes).
    5. Pre-configured required services: DNS, DHCP, RPZ, Threat Analytics.
    6. NIOS API user with the following permissions (access via API only):
        - AllHost – RW.
        - All IPv4 DHCP Fixed Addresses/Reservations – RW.
        - All IPv4 Networks – RW.

- Palo Alto Firewall:
    1. Installed and configured Palo Alto firewall.
    2. User credentials for the Palo Alto firewall (user requires access to Address and Address group objects).

Known Limitation

The current templates support DNS Firewall(RPZ), Threat Insight (DNS Tunneling), Host IPv4, Fixed address IPv4 and IPv4 Lease events only. Any additional templates created later will be added to the community site.

Best Practice

Outbound API templates are available on the Infoblox community site. After registering an account, (https://community.infoblox.com) you can subscribe to the relevant groups and forums. For production systems it is highly recommended to set the log level for an end point to “Info” or higher (“Warning”, “Error”). Please refer to the NIOS Administration guide about other best practices, limitations and any detailed information on how to develop notification templates.

Workflow

Use the following workflow in order to enable, configure and test outbound notifications:

- Install the Security Ecosystem license if not already installed.
- Check that necessary services DHCP, DNS, RPZ, Threat Analytics are configured.
- Create Extensible Attributes.

- Create or download from the Infoblox community web-site session (PaloAlto_Session.json), login (PaloAlto_Login.json) and logout (PaloAlto_Logout.json)
- Add/upload login,logout and the session template.
- Create or download from the Infoblox community web-site the notification templates (PaloAlto_Assets.json, PaloAlto_Security.json).
- Add/upload the notification templates.
- Add a REST API Endpoint.
- Add Notifications.
- Emulate an event, then check the debug log and/or verify changes on the REST API Endpoint.

Templates on the Infoblox community web-site

Outbound API notifications template is an essential part of the configuration. Templates fully control the integration and steps required to execute the outbound notifications. Detailed information on how to develop templates can be found in the NIOS Administrator guide. Infoblox does not distribute any templates with the NIOS releases (out-of-box). Templates are available on the Infoblox community web site. Templates may require additional extensible attributes to be created, parameters or WAPI credentials defined. The required configuration should be provided with a template. Do not forget to apply changes required by the template before testing a notification.

Extensible Attributes

Name	Description	Type
PaloAlto_Asset_Sync	Serves as toggle to turn on/off sync for Asset events. Enable “Inheritance” in the setup wizard and the external attribute can be inherted from the network settings. Default value can be set true.	List (true,false)
PaloAlto_Security_Sync	Serves as toggle to turn on/off sync for Security events. Enable “Inheritance” in the setup wizard and the external attribute from the network level is inherited and used. Default value can be set true.	List (true,false)
PaloAlto_Security_SyncedAt	Updated with timestamp on a security event. This attribute is created on the specific IP by the WAPI call when not present.	String
PaloAlto_Asset_SyncedAt	Updated with timestamp on an asset event. This attribute is created on the specific IP by the WAPI call when not present.	String

Session variables

Name	Description
PaloAlto_Host_Allow	The address group object which needs to be populated on the firewall for allowed hosts. This should be the same as the address group object created through the Palo Alto configuration. Set a default value (eg: Iblox_Host_Allow).

PaloAlto_Host_Deny	The address group object which needs to be populated on the firewall for denied hosts. This should be the same as the address group object created through the Palo Alto configuration. Set a default value (eg: Iblox_Host_Deny).

Supported Notification

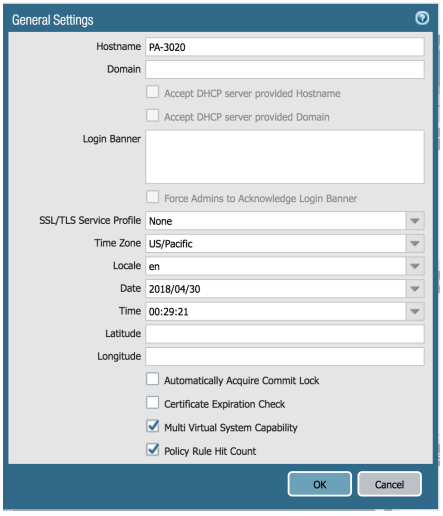
A notification can be considered as a "link" between a template, an endpoint and an event. In the notification properties, you can define the event triggers for the notification, the template to execute and the external endpoint. The Palo Alto templates support a subset of available notifications (refer to the limitations chapter in this guide for more details). In order to simplify the deployment, create required notifications and use the relevant filters. It is highly recommended to configure deduplication for RPZ events and exclude a feed that is automatically populated by Threat Analytics.

Notification	**Description**
DNS RPZ	DNS queries that are Malicious or unwanted.
DNS Tunneling	Data exfiltration that occurs on the network.
Object Change Fixed Address IPv4	Added/Deleted fixed/reserved IPv4 objects.
Object Change Host Address IPv4	Added/Deleted Host IPv4 object.
Lease	Lease events.

Palo Alto Firewall Configuration

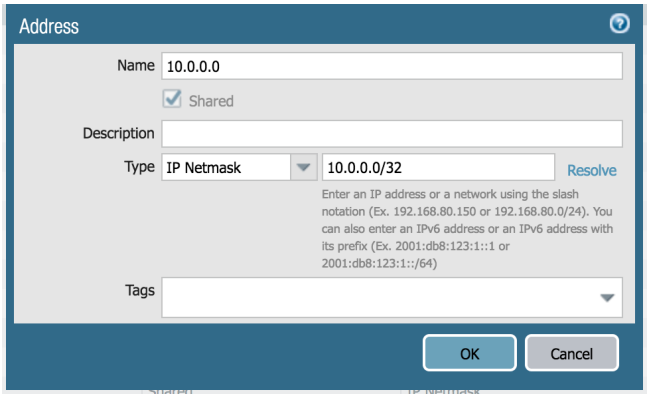
Create appropriate policies in the firewall to allow or deny IP addresses. A policy requires an existing address group object as part of the policy creation process. In turn, an address group object requires at least one IP during creation. To handle this situation, it is suggested to create an address group object with a dummy IP.

1. Ensure that “Multi System Virtual Capability” is checked in Device → Setup → Management. In the General Settings window select the Gear Icon to edit the settings. This is required to create shared objects.

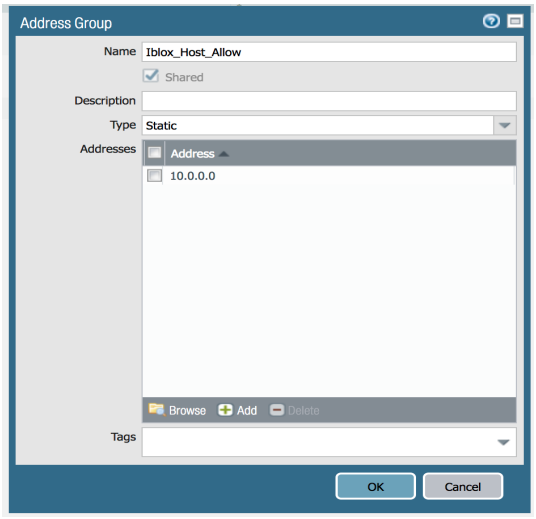


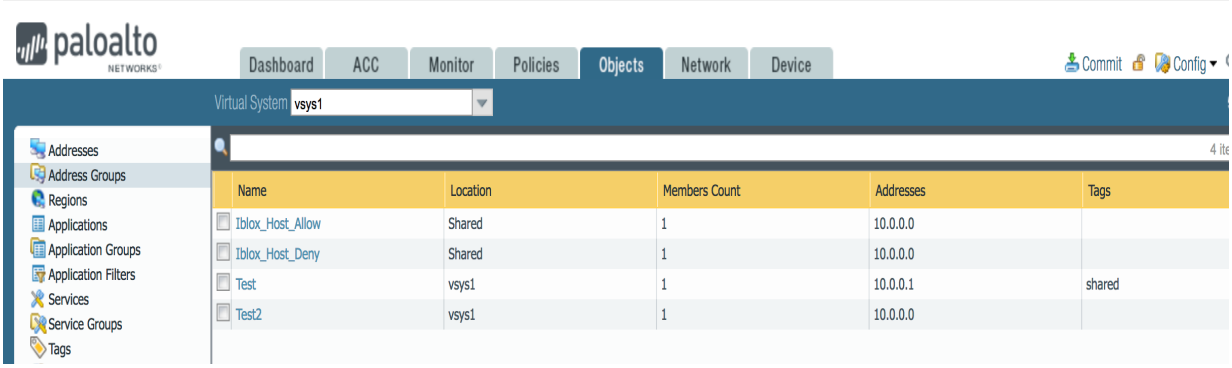
2. Use the Palo Alto credentials created as per the prerequisite section.

3. Navigate to Objects → Addresses and create a dummy address object to add to the address group. Check the “Shared” option.

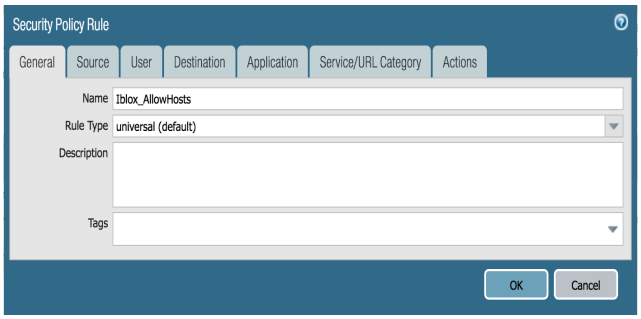


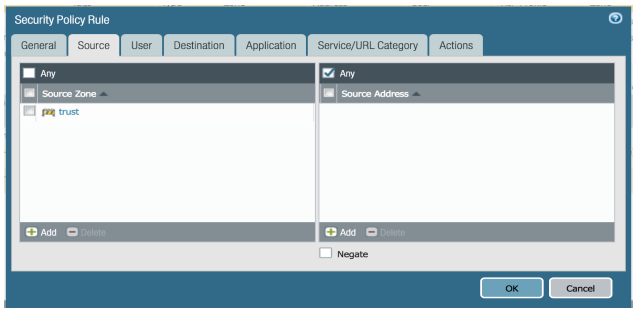
4. Create the address group object containing the address object above by navigating to Objects → Address Groups. The default address group object name is set to Iblox_Host_Allow. Check the “Shared” option.



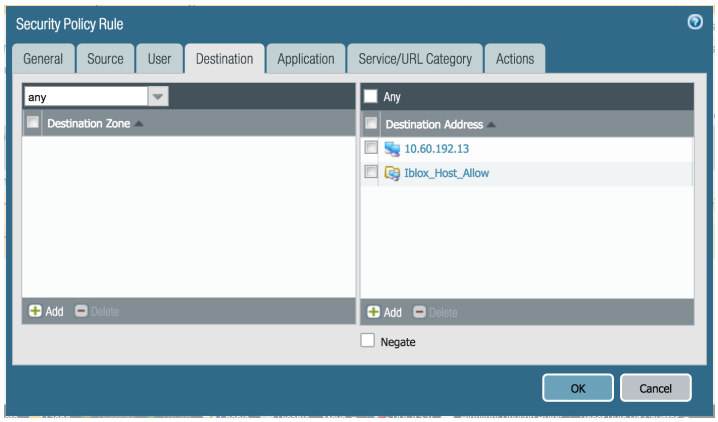


5. Navigate to Policies → Security and create an appropriate policy with allow action for this group following the steps below.

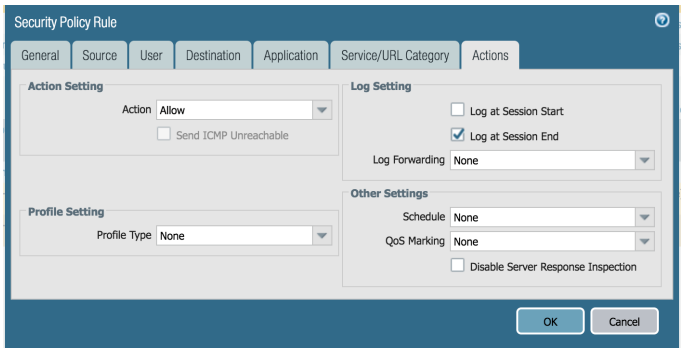




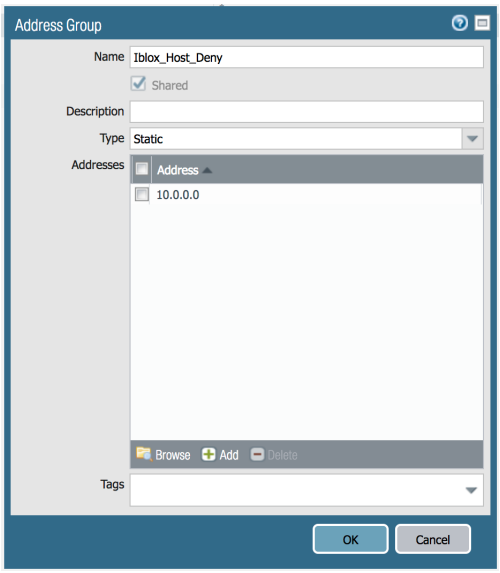
6. Select the Address group created in the step 4.



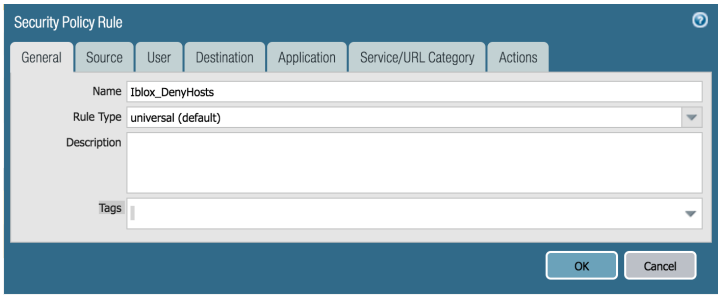
7. Set the action to Allow in the Actions tab of the window.

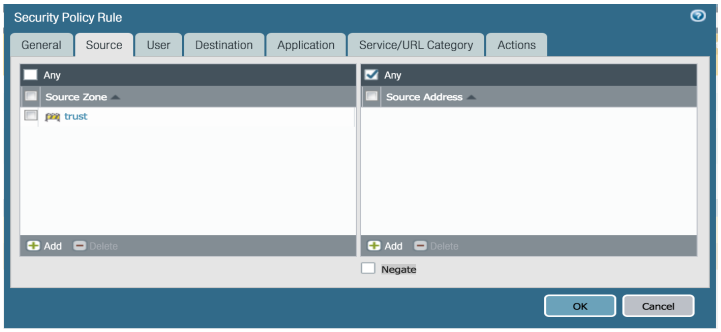


8. Create the second address group object for the deny policy, the same dummy ip address as above can be reused here. Check the “Shared” option.

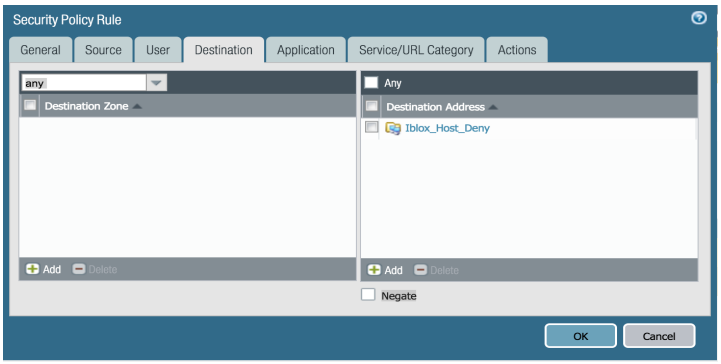


9. Create a second policy with a new name as shown in screenshot below.

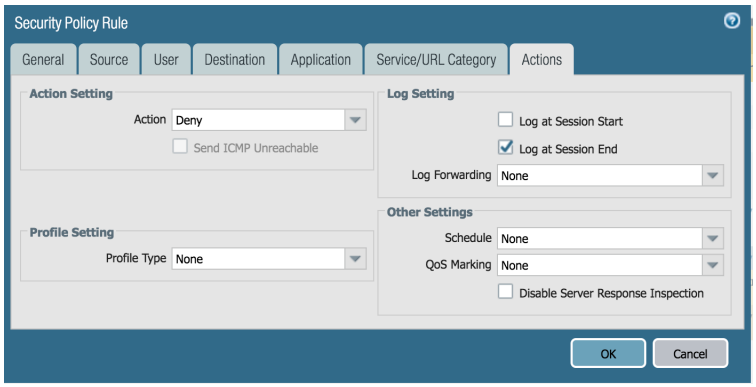




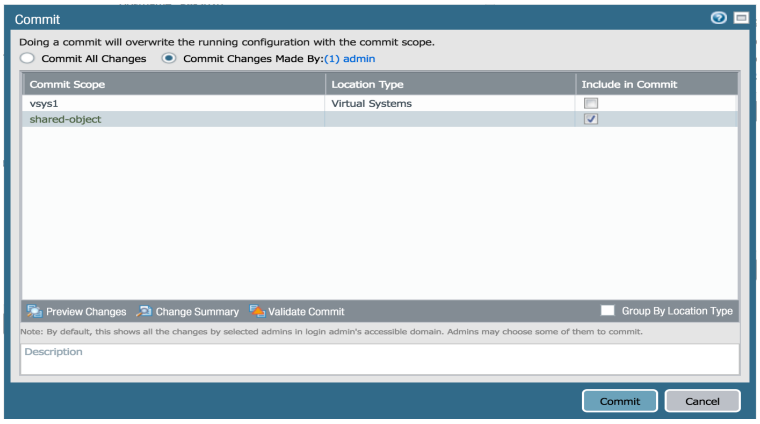
10. Select the second address group object, eg: Iblox_Host_Deny created in step 8.



11. Set the action to Deny in the Actions tab of the window.



12. Commit all the changes as below by selecting the commit button on the top right corner.

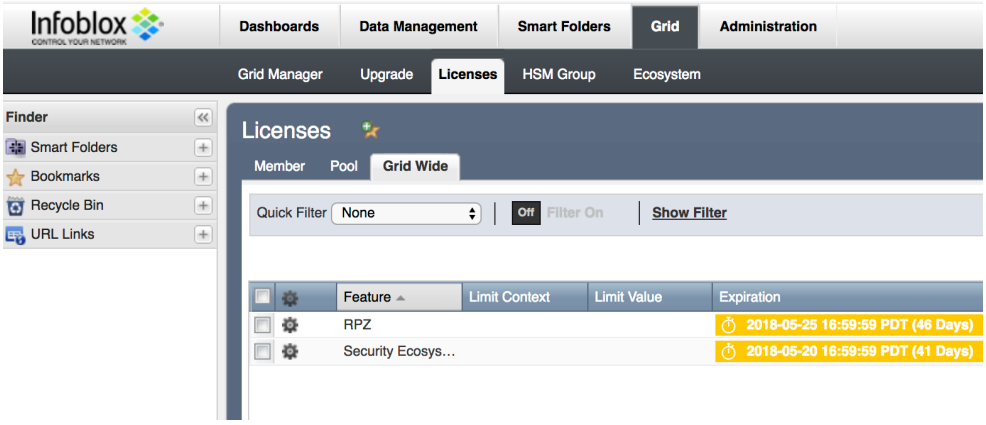


13. Note the URL and the Address Objects of the Palo Alto firewall to use in the NIOS configurations.

Infoblox NIOS Configuration

Check if the Security Ecosystem License is Installed

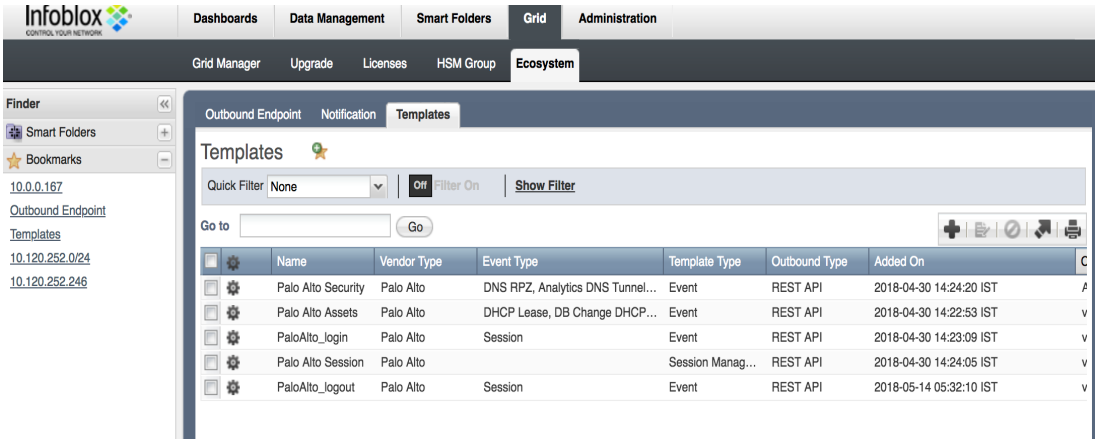
Security Ecosystem license is a Grid Wide license. Grid wide licenses activate services on all appliances in the same Grid.



In order to check if the license was installed go to **Grid →Licenses → Grid Wide**.

Add/Upload Templates

1. In order to upload/add templates go to **Grid → Ecosystem → Templates,** and press "**+**" or **"+ Add Template**" buttons.

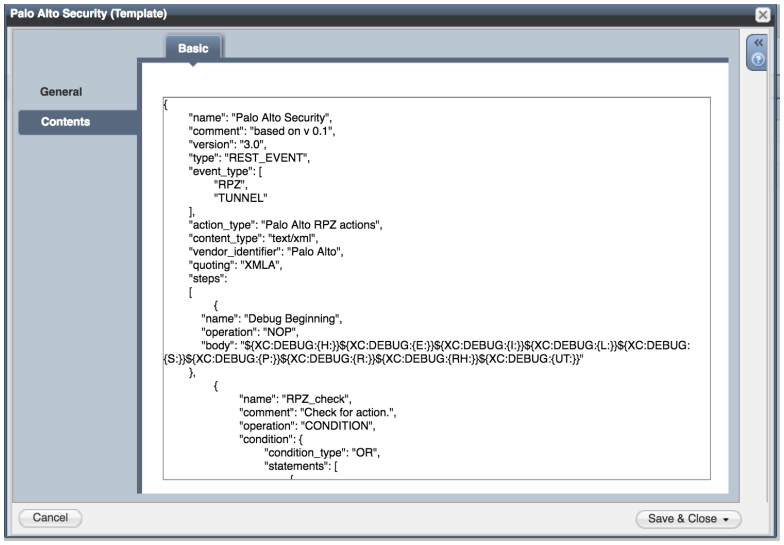


2. In the "Add template" window add the PA_login template followed by the other templates.
3. Press the "Select" button on the "Add template" window.
4. Press the "Select" button on the "Upload" window. The standard file selection dialog will be opened.
5. Select the file and press the "Upload" button on the "Upload" window.

Modifying Templates

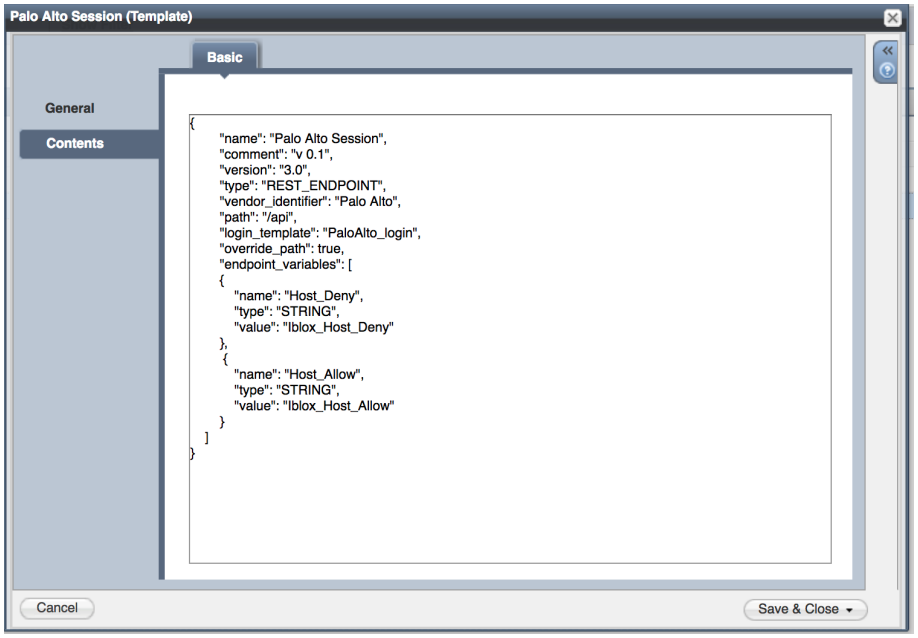
NIOS provides the facility to modify the templates via the web-interface.

1. Navigate to **"Grid" → "Ecosystem" → "Templates"**, and then press the gear icon next to the template you want to modify.
2. Press the **"Edit"** button to open up the **"Template"** window.
3. The template editor is a simple interface for making changes to templates. It is recommended to only use the template editor to make minor changes. You can also edit, cut and paste template snippets from a text editor of your choice. **Note: You cannot delete a template if it is used by an endpoint or by a notification.**



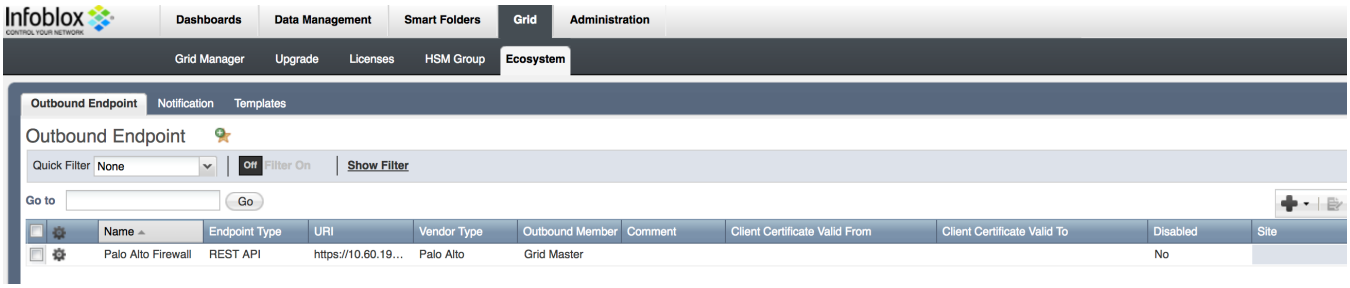
Adding Host_Allow and Host_Deny

1. Navigate to “Grid” → “Ecosystem” → “Templates” and then press the gear icon next to the “PaloAlto_Session.json” template and click edit to modify it.
2. Inside the “PaloAlto_Session.json” template insert the “Host_Allow”, key into the “value” field of the “endpoint_variables” with the value of the address object created in Palo Alto Configuration step.
3. Inside the “PaloAlto_Session.json” template insert the “Host_Deny”, key into the “value” field of the “endpoint_variables” with the value of the address object created in Palo Alto Configuration step.



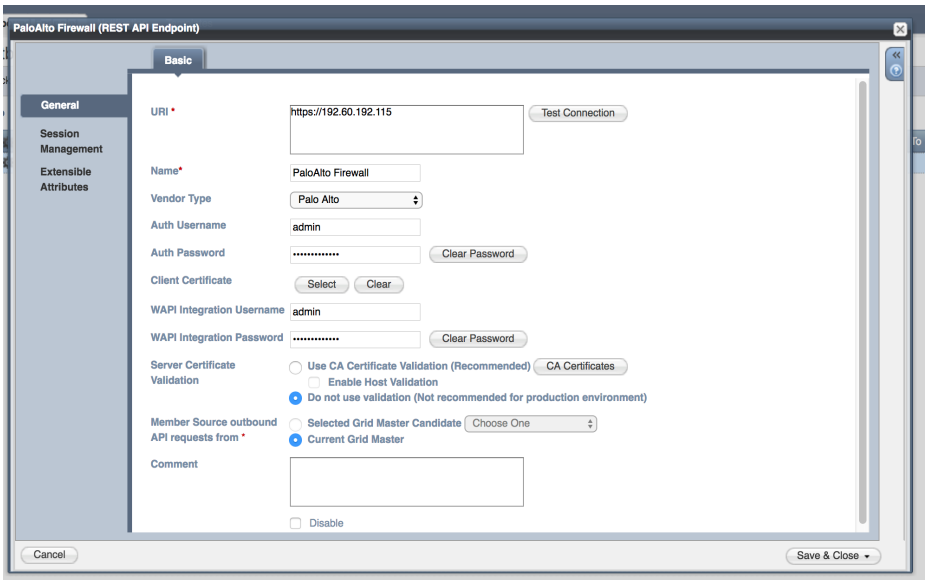
Add a Rest API Endpoint

A REST API Endpoint is basically a remote system, which should receive changes based on a notification and a configured template. A Grid, for example, can not only send notifications, it can also receive the notifications from itself (e.g. for testing purposes).



1. In order to add REST API Endpoints go to **Grid →Ecosystem→ Outbound Endpoint** and press “**+**” or **“+ Add REST API Endpoint**” buttons.
2. The “Add REST API Endpoint Wizard” window will open. The URI and Name are the required fields. Enter the complete URI including http or https (eg: https://10.5.6.12).
3. Enter the credentials for the Rest API endpoint. The permissions required here is a user with shared access as mentioned in step 2 of the Palo Alto configuration.

4. Specify “Auth Username”, “Auth Password” (Palo Alto Firewall credentials), “WAPI Integration Username” and “WAPI Integration Password” (NIOS credentials).
5. Please be aware that “Test Connection” only checks communication (establish TCP connection with a remote system) with the URI. It does not check the authentication/authorization credentials.



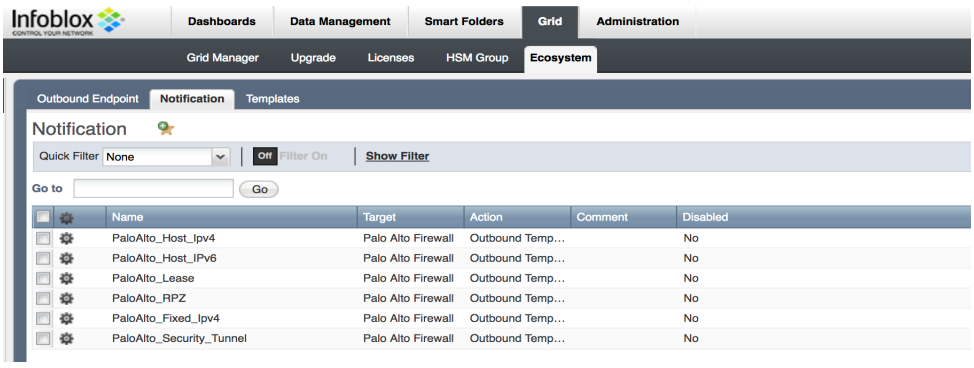
6. For debug purposes (during initial configuration only) set Log Level to “Debug.
7. It is recommended to send notifications from a Grid Master Candidate if there is one available instead of Grid Master.

Add a Notification

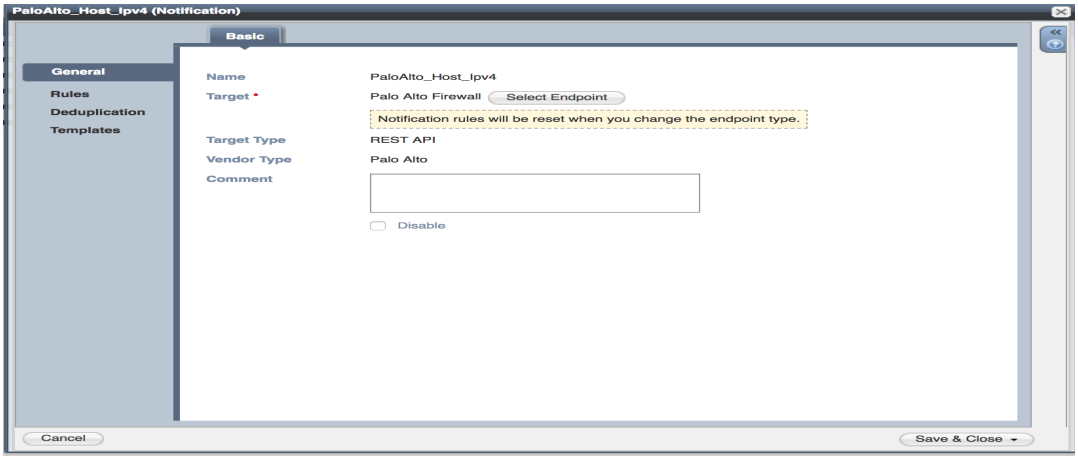
A notification is a link between a template, an endpoint, and an event. In the notification you define the event which triggers the notification, the template which is executed and the API endpoint unto which the Grid will establish a connection. The Palo Alto templates support all available notifications. In order to simplify the deployment create only required notifications and use relevant filters. It is highly recommended to configure deduplication for RPZ events and exclude a feed automatically populated by Threat Analytics.

An endpoint and a template must be added before you can add a notification.

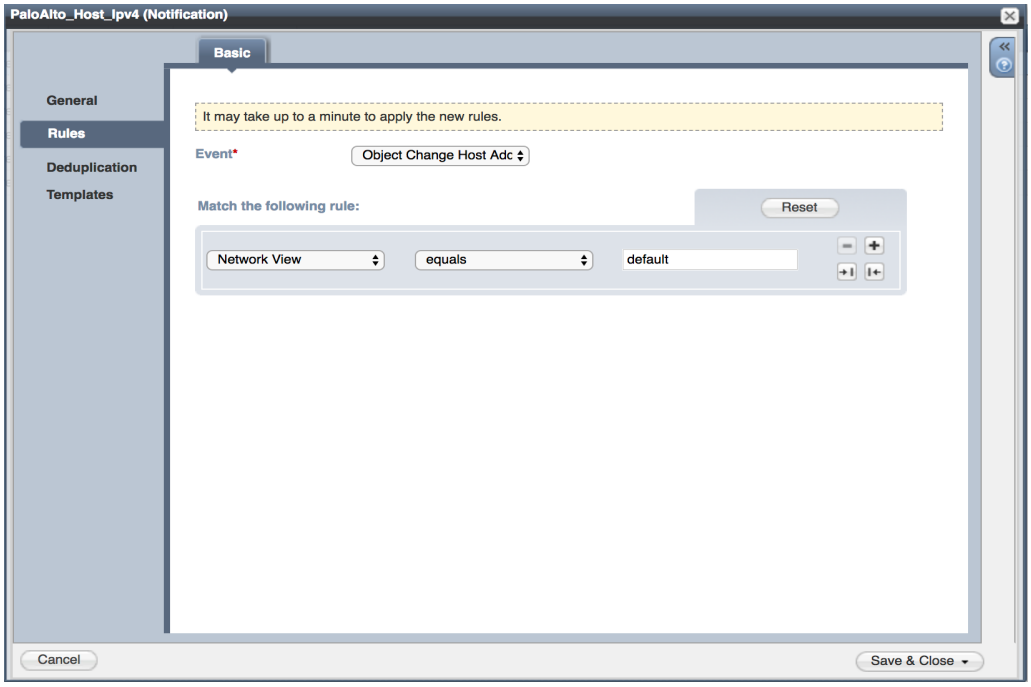
1. Navigate to “Grid →Ecosystem → Notification” and press “+” or “+ Add Notification Rule” then the “Add Notification Wizard” window will open.



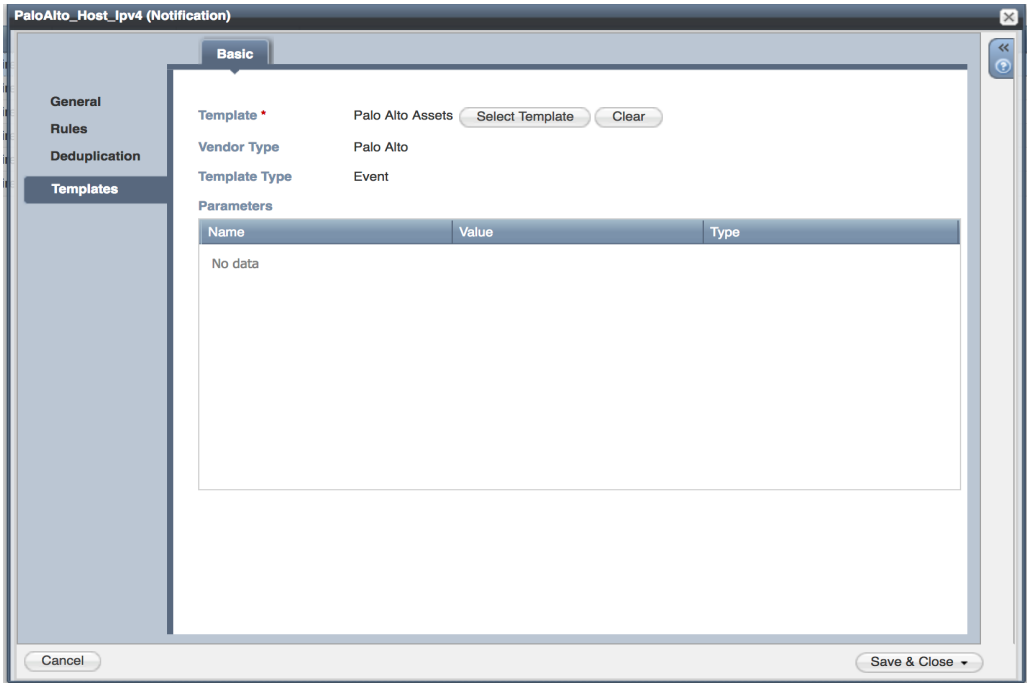
2. Enter a name to identify the notification type and select the target endpoint.



3. Click **"Next"**, select an event type and define the rule. Note: For optimal performance, it is best practice to make the rule filter as narrow as possible.

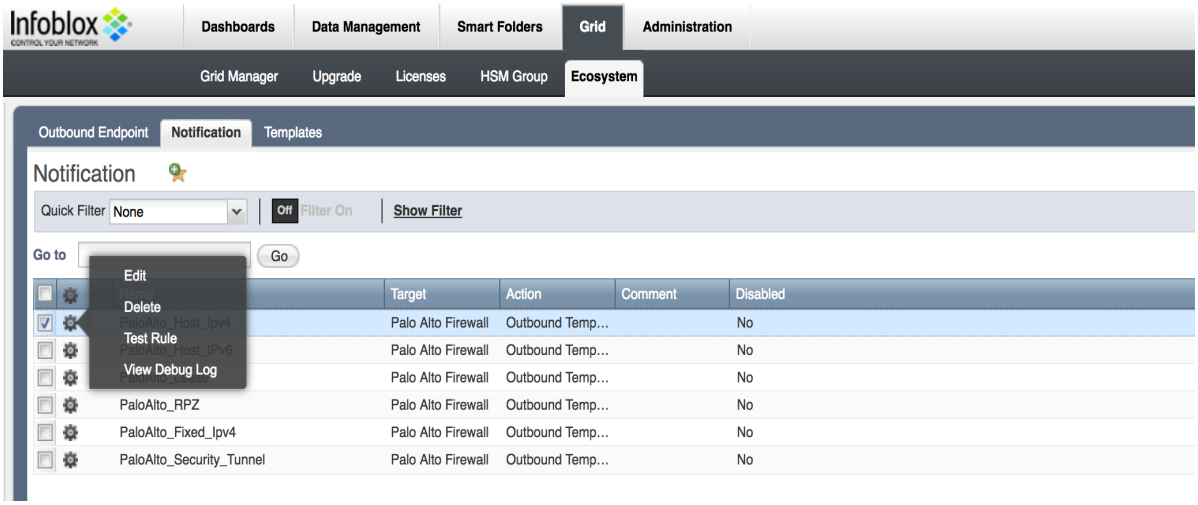


4. Click **"Next"**. Select the relevant template and specify templates parameters if any.



Validate Configuration

You can now emulate an event for which a notification was added (click on a gear icon next to the notification and select “Test Rule”). E.g. create a host record or add a DHCP lease. If you have the debug log enabled, you can check for any problems or errors.



To check a debug log for an endpoint, go to **Grid→Ecosystem→Outbound Endpoints**, click on the gear icon and select “View Debug Log”. Depending on the browser the debug log will be downloaded or opened in a new tab, you may need to check your popup blocker settings.

Appendix

Alternatively curl commands can be used to create the Palo Alto objects:

1. Command to create address object:

   curl -k "https://<firewall-host>/api/?key=<add-key>&type=config&action=set&xpath=/config/shared/address/entry\[@name='10.0.0.0'\]&element=<ip-netmask>10.0.0.0/32</ip-netmask>"

   Replace <firewall-host> and <add-key> with appropriate values.

2. Commands to create the two address group objects:

   curl -k "https://<firewall-host>/api/?key=<add-key>&action=set&xpath=/config/shared/addressgroup/entry\[@name='Iblox_Host_Allow'\]&element=<static><member>10.0.0.0</member></static>"

   curl -k "https://<firewall-host>/api/?key=<add-key>&action=set&xpath=/config/shared/addressgroup/entry\[@name='Iblox_Host_Deny'\]&element=<static><member>10.0.0.0</member></static>"

3. Commit the changes:

   curl -k "https://<firewall-host/api/?key=<add-key>&type=commit&cmd=<commit><partial><shared-object></shared-object></partial></commit>"

References

https://www.paloaltonetworks.com/content/dam/pan/en_US/assets/pdf/technical-documentation/81/pan-os/pan-os-admin/pan-os-admin.pdf