Firepower Data Path Troubleshooting Phase 8: Network Analysis Policy

Contents

Introduction

This article is part of a series of articles which explain how to systematically troubleshoot the data path on Firepower systems to determine whether components of Firepower may be affecting traffic. Please refer to the Overview article for information about the architecture of Firepower platforms and links to the other Data Path Troubleshooting articles.

This article covers the eighth stage of the Firepower data path troubleshooting, the Network Analysis Policy feature.

Prerequisites

- This article is applicable to all Firepower platforms
  The **trace** feature is only available in software version 6.2.0 and above for the Firepower Threat Defense (FTD) platform only.
- Knowledge of open source Snort is helpful, though not required For information on open source Snort, please visit https://www.snort.org/

Troubleshooting the Network Analysis Policy Feature

The Network Analysis Policy (NAP) contains snort preprocessor settings which perform inspections on traffic, based on the application identified. The preprocessors have the ability to

drop traffic, based on configuration. This article addresses how to verify the NAP configuration and check for preprocessor drops.

> **Note**: Preprocessor rules have a Generator ID (GID) other than '1' or '3' (i.e. 129, 119, 124). More information about the GID to preprocessor mappings can be found in the FMC Configuration Guides.

Using the "trace" Tool to Find Preprocessor Drops (FTD Only)

The **system support trace** tool can be used to detect drops performed at the preprocessor level.

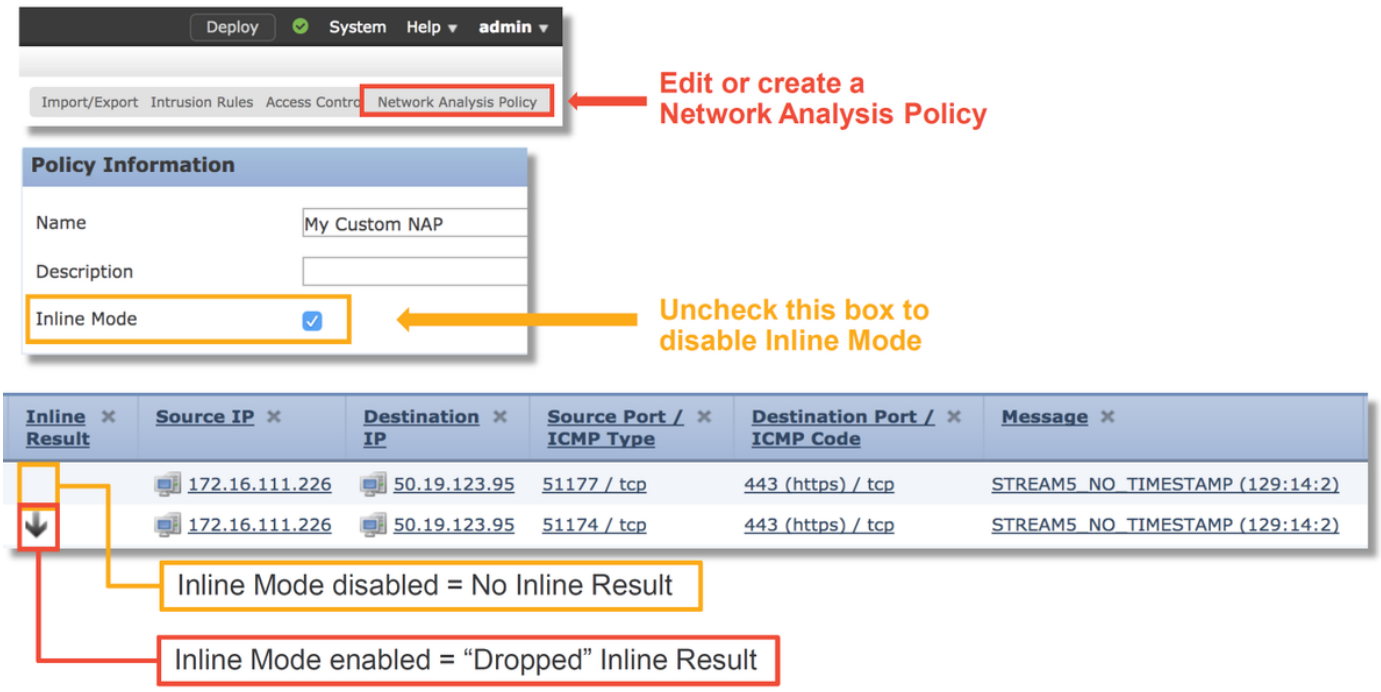
In the example below, the TCP normalization preprocessor detected an anomaly. As a result, the traffic is dropped by rule **129:14**, which looks for missing timestamps within a TCP stream.

```
> system support trace

[omitted for brevity…]

172.16.111.226-51174 - 50.19.123.95-443 6 Packet: TCP, ACK, seq 3849839667, ack 1666843207
172.16.111.226-51174 - 50.19.123.95-443 6 Stream: TCP normalization error in timestamp, window, seq, ack, fin, flags, or
unexpected data, drop
172.16.111.226-51174 - 50.19.123.95-443 6 AppID: service unknown (0), application unknown (0)
172.16.111.226-51174 > 50.19.123.95-443 6 AS 4 I 0 Starting with minimum 3, 'block urls', and SrcZone first with zones -1 -> -1, geo 0 ->
0, vlan 0, inline sgt tag: untagged, ISE sgt id: 0, svc 0, payload 0, client 0, misc 0, user 9999997, icmpType 0, icmpCode 0
172.16.111.226-51174 > 50.19.123.95-443 6 Firewall: starting rule matching, zone -1 -> -1, geo 0 -> 0, vlan 0, sgt 65535, user 9999997,
icmpType 0, icmpCode 0
172.16.111.226-51174 > 50.19.123.95-443 6 AS 4 I 0 pending rule order 3, 'block urls', URL
172.16.111.226-51174 > 50.19.123.95-443 6 Firewall: pending rule-matching, 'block urls', pending URL
172.16.111.226-51174 > 50.19.123.95-443 6 Snort: processed decoder alerts or actions queue, drop
172.16.111.226-51174 > 50.19.123.95-443 6 IPS Event: gid 129, sid 14, drop
172.16.111.226-51174 > 50.19.123.95-443 6 NAP id 1, IPS id 0, Verdict BLOCK
172.16.111.226-51174 > 50.19.123.95-443 6 ===> Blocked by Stream
```

> **Note**: Although the **TCP Stream Configuration** pre-processor drops the traffic, it is able to do so because the **Inline Normalization** preprocessor is also enabled. For more on Inline Normalization, you can read this article.

Verify NAP Configuration

On the Firepower Management Center (FMC) UI, the NAP can be viewed under **Policies > Access Control > Intrusion**. Then, click on the **Network Analysis Policy** option in the top right, after which you can view the NAPs, create new ones and edit existing ones.

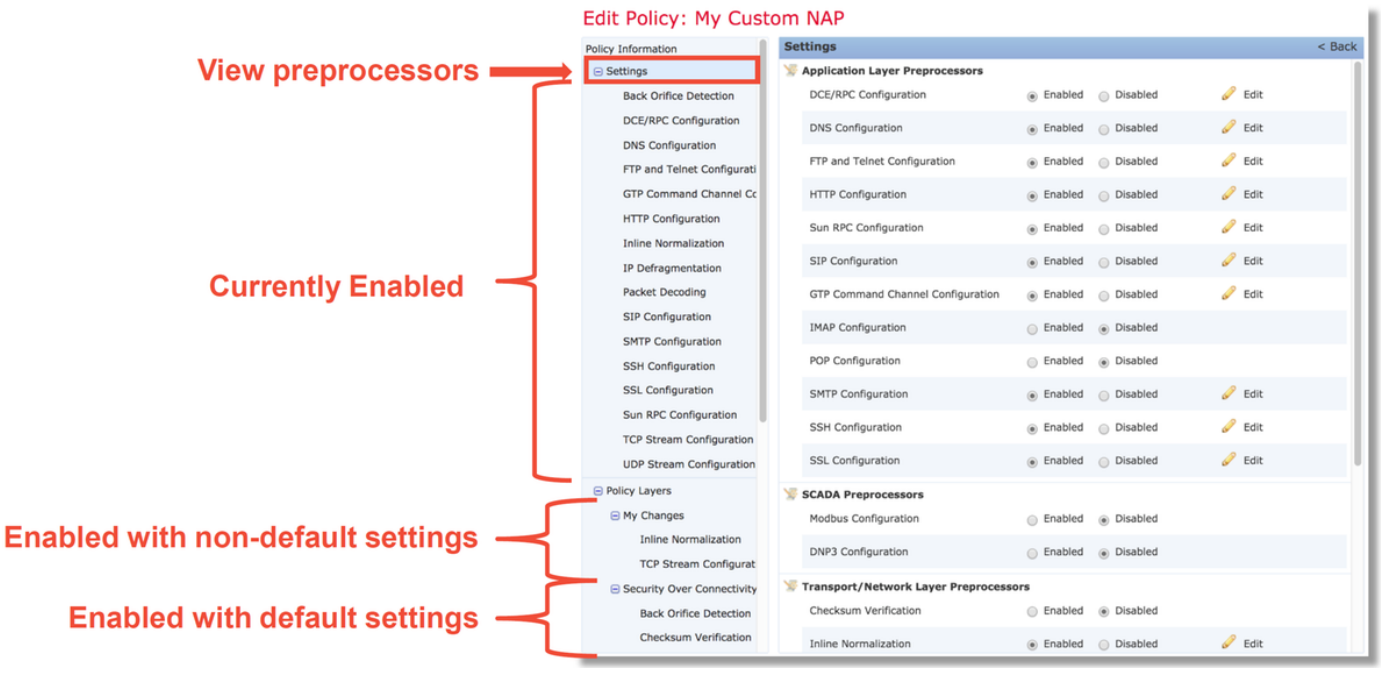


As seen in the illustration above, the NAPs contain an "Inline Mode" feature, which is the equivalent of the "Drop When Inline" option in the Intrusion Policy. A quick mitigation step for preventing the NAP from dropping traffic would be to uncheck **Inline Mode**. The Intrusion Events generated by the NAP don't display anything in the **Inline Result** tab with **Inline Mode** disabled.

View NAP Settings

Within the NAP, you can view the current settings. This includes the total enabled preprocessors, followed by the

preprocessors enabled with non-default settings (ones which were manually tweaked) and ones which are enabled with default settings, as seen in the illustration below.

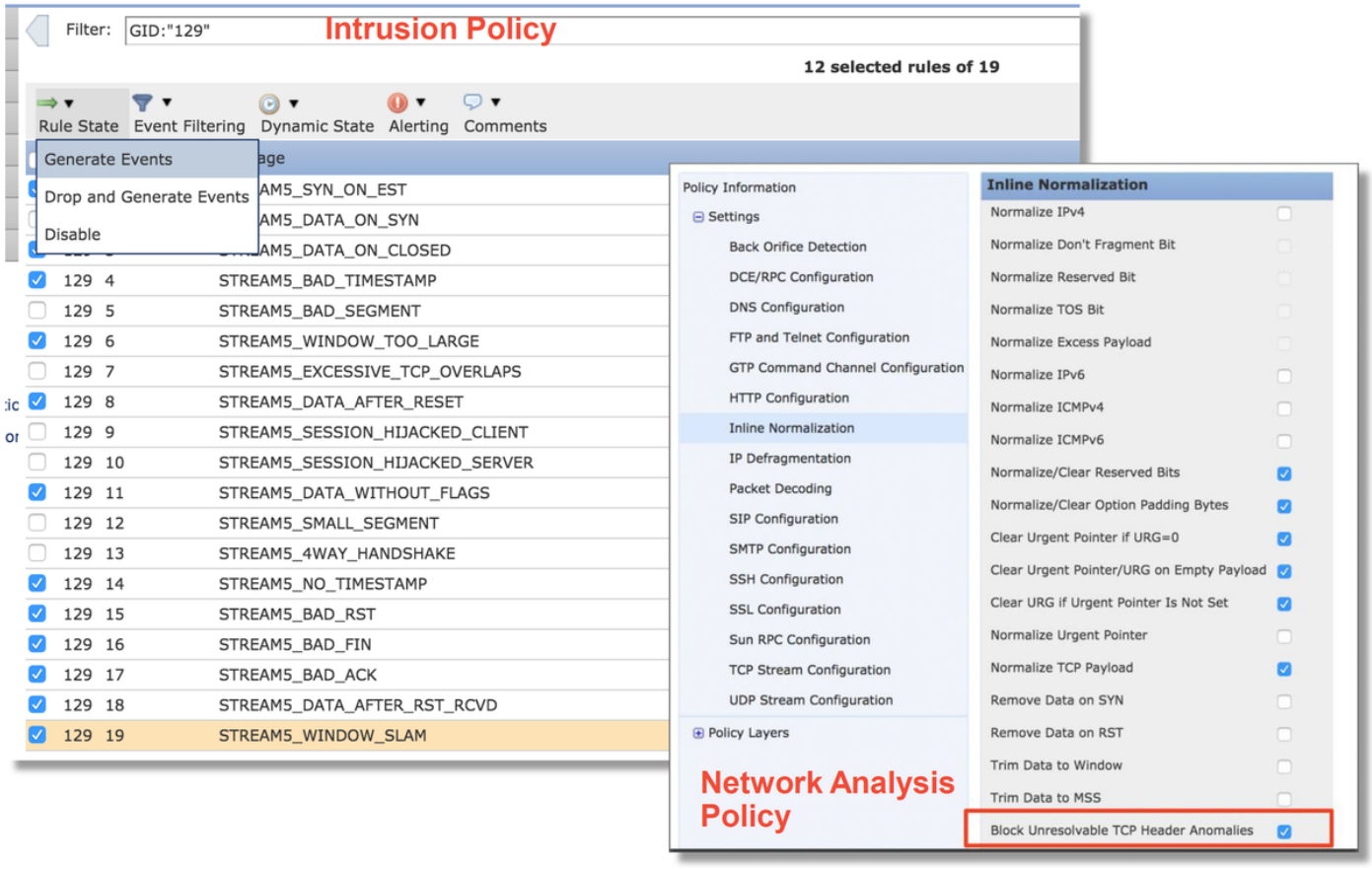


NAP Settings That Can Cause Silent Drops

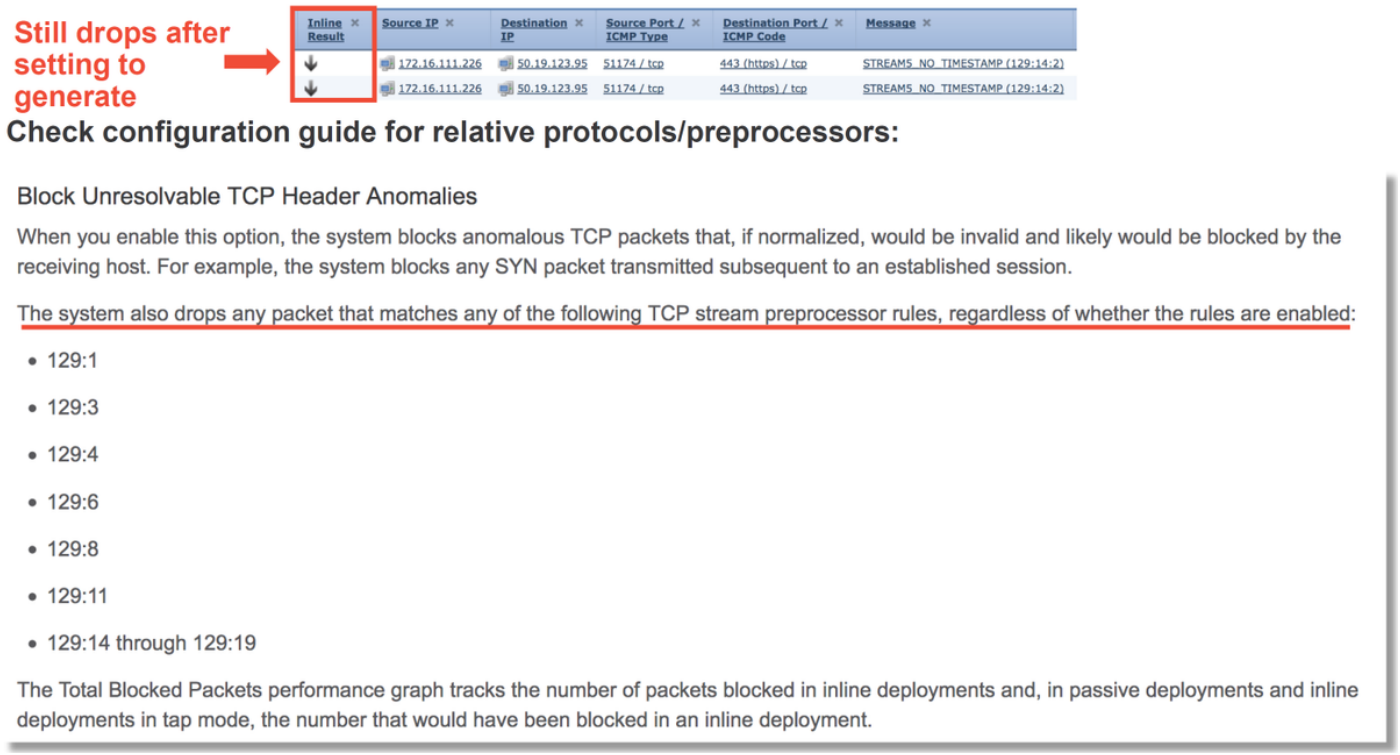
In the example mentioned in the trace section, the rule TCP Stream Configuration rule **129:14** is dropping traffic. This is determined by looking at the **system support trace** output. However, if the said rule is not enabled within the respective Intrusion Policy, no Intrusion Events are sent to the FMC.

The reason why this happens is due to a setting within the **Inline Normalization** preprocessor called **Block Unresolvable TCP Header Anomalies**. This option basically allows Snort to perform a block action when certain GID 129 rules detect anomalies in the TCP stream.

If **Block Unresolvable TCP Header Anomalies** is enabled, it is recommended to turn on the GID 129 rules per the illustration below.



Turning on the GID 129 rules causes Intrusion Events to be sent to the FMC when they take action on the traffic. However, as long as the **Block Unresolvable TCP Header Anomalies** is enabled, it can still drop traffic even if the **Rule State** in the Intrusion Policy is set to only **Generate Events**. This behavior is explained in the FMC Configuration Guides.



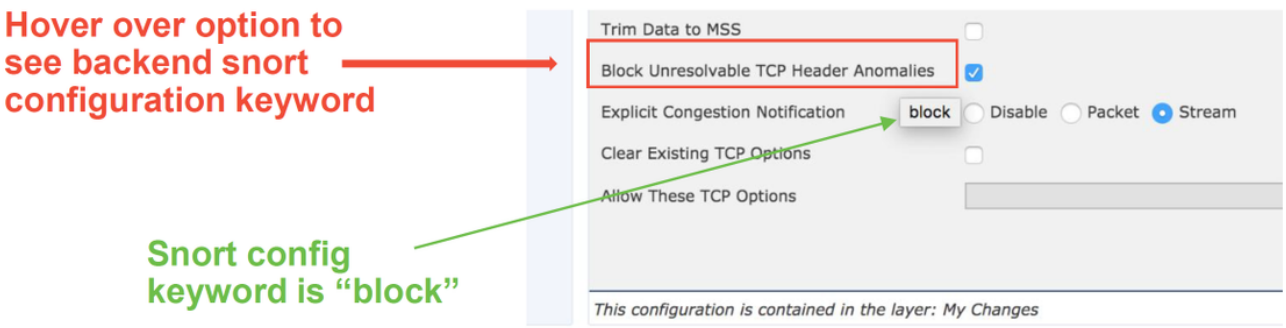
The above documentation can be found in this article (for version 6.4, which is the most recent version at the time of this article posting).

Verify the Backend Configuration

Another layer of complexity is added to the behavior of the preprocessor in that certain settings can be enabled on the backend, without being reflected in the FMC. These are some possible reasons.

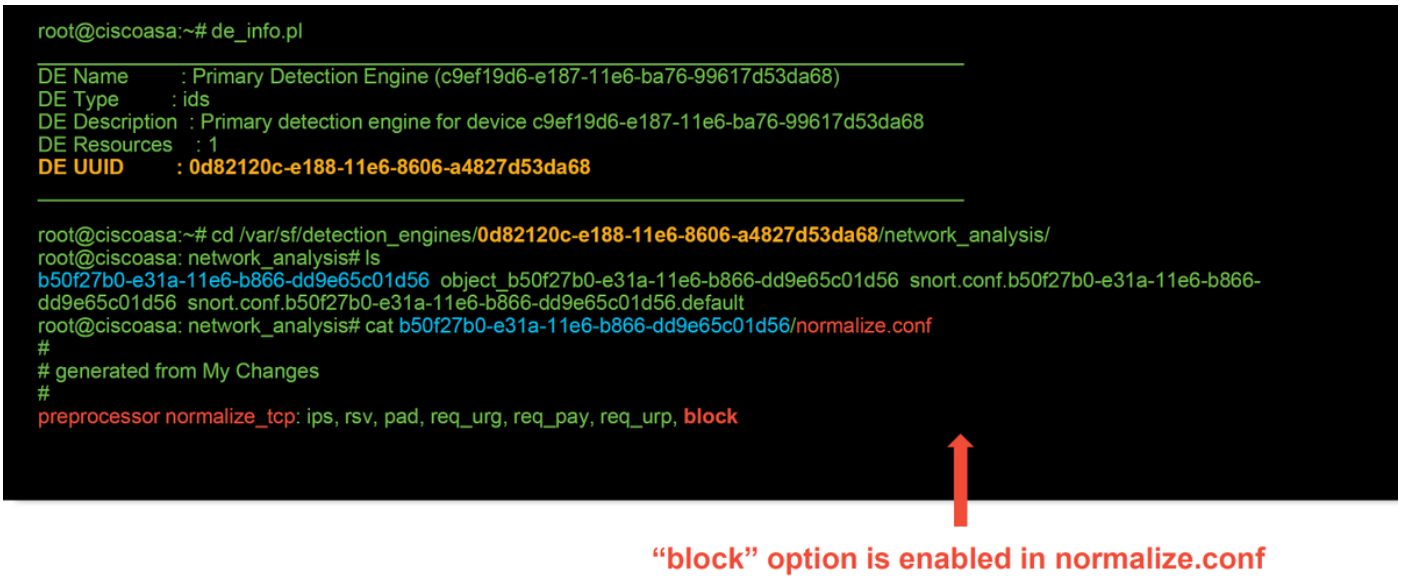
- Other enabled features have the ability to force enable preprocessor settings (the main one being File Policy)
- Some Intrusion Policy rules require certain preprocessor options in order to perform detection
- A defect may cause the behavior We have seen one instance of this: CSCuz50295 - "File policy with Malware block enables TCP normalization with block flag"

Before looking at the backend configuration, note that the Snort keywords, which are used in the backend Snort configuration files, can be seen by hovering over a specific setting within the NAP. Please refer to the illustration below.



The **Block Unresolvable TCP Header Anomalies** option in the NAP tab translates to the **block** keyword on the backend. With that information in mind, the backend configuration can be checked

from the expert shell.

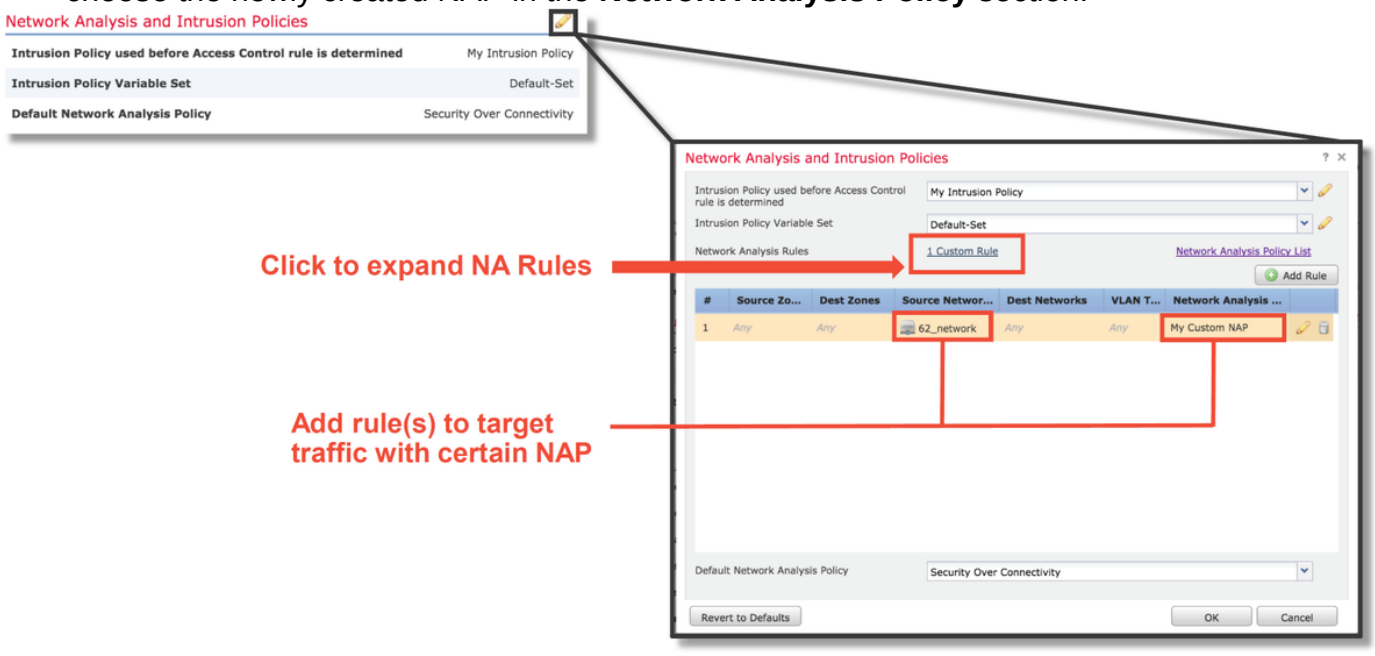


Creating a Targeted NAP

If certain hosts are triggering preprocessor events, a custom NAP can be used to inspect traffic to or from said hosts. Within the custom NAP, the settings which are causing issues can be disabled.

These are the steps for implementing a targeted NAP.

1. Create the NAP per the instructions mentioned in Verify NAP configuration section of this article.
2. In the **Advanced** tab of the Access Control Policy, navigate to the **Network Analysis and Intrusion Policies** section. Click **Add Rule** and create a rule, using the targeted hosts and choose the newly created NAP in the **Network Analysis Policy** section.



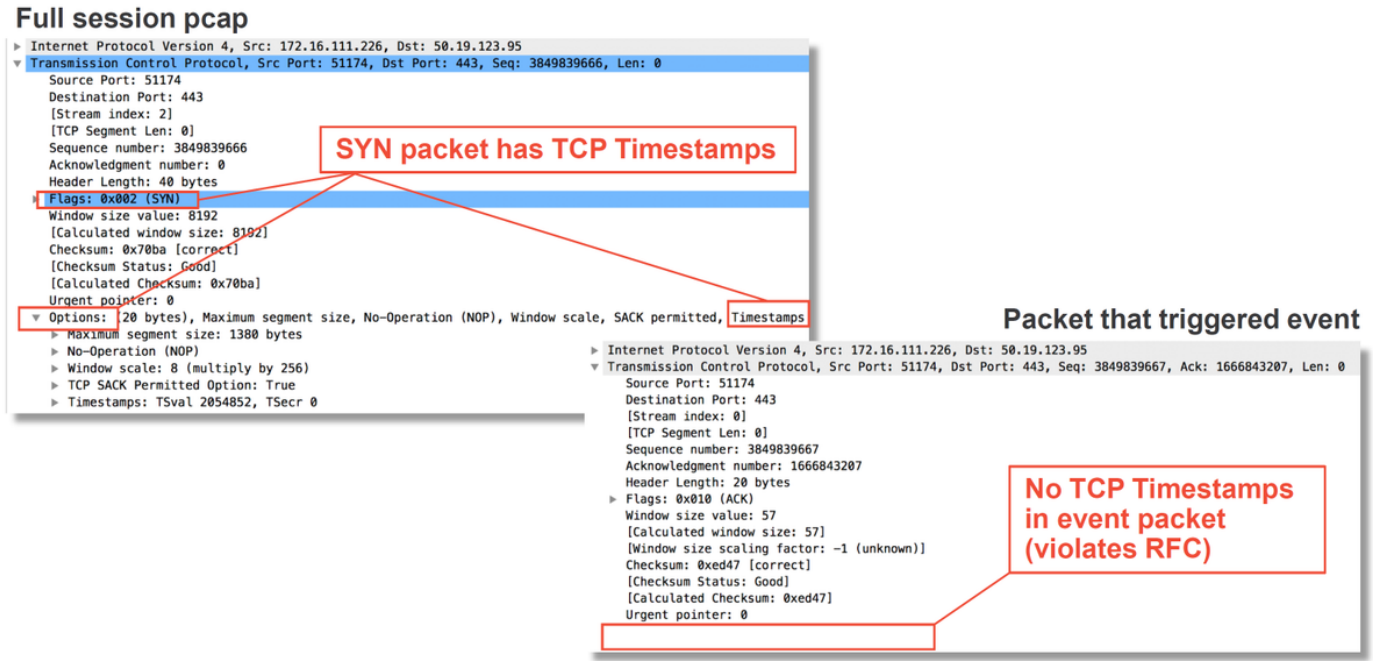
False Positive Analysis

Checking for false positives in Intrusion Events for preprocessor rules is quite different than that of

the Snort rules used for rule evaluation (which contain a GID of 1 and 3).

In order to perform a false positive analysis for preprocessor rule events, a full session capture is necessary to look for anomalies within the TCP stream.

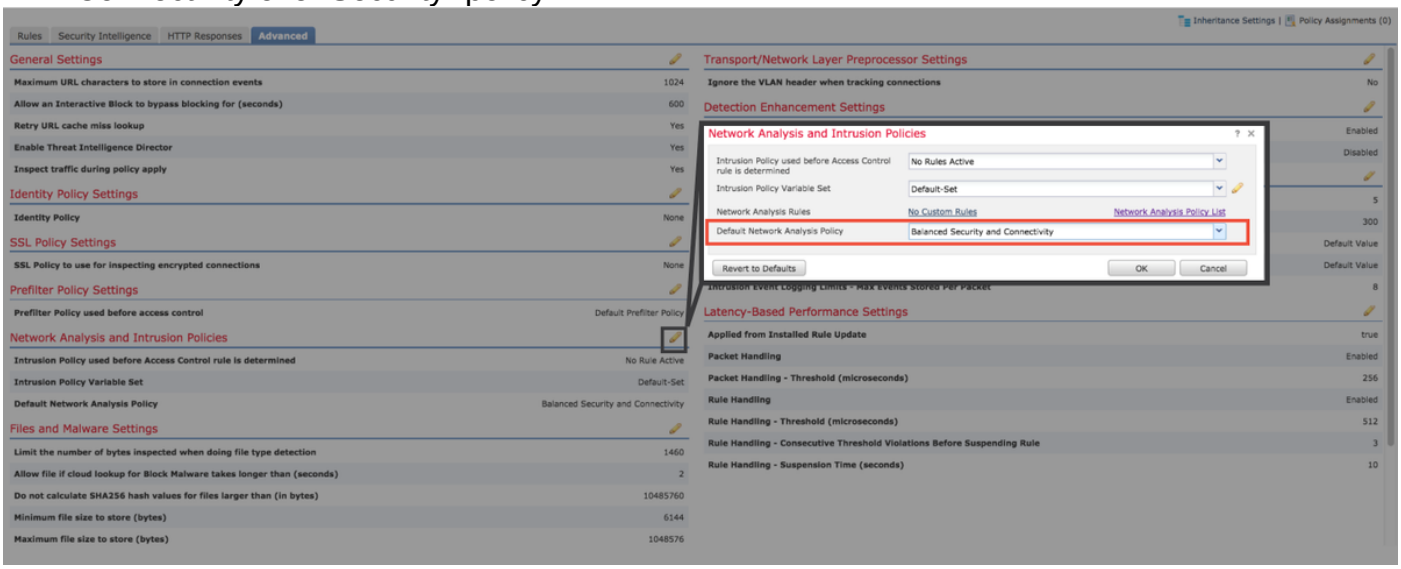
In the example below, false positive analysis is being performed on rule **129:14**, which is shown to be dropping traffic in the examples above. Since **129:14** is looking for TCP streams in which timestamps are missing, you can clearly see why the rule was triggered per the packet capture analysis illustrated below.



Mitigation Steps

To quickly mitigate possible issues with the NAP, the following steps can be performed.

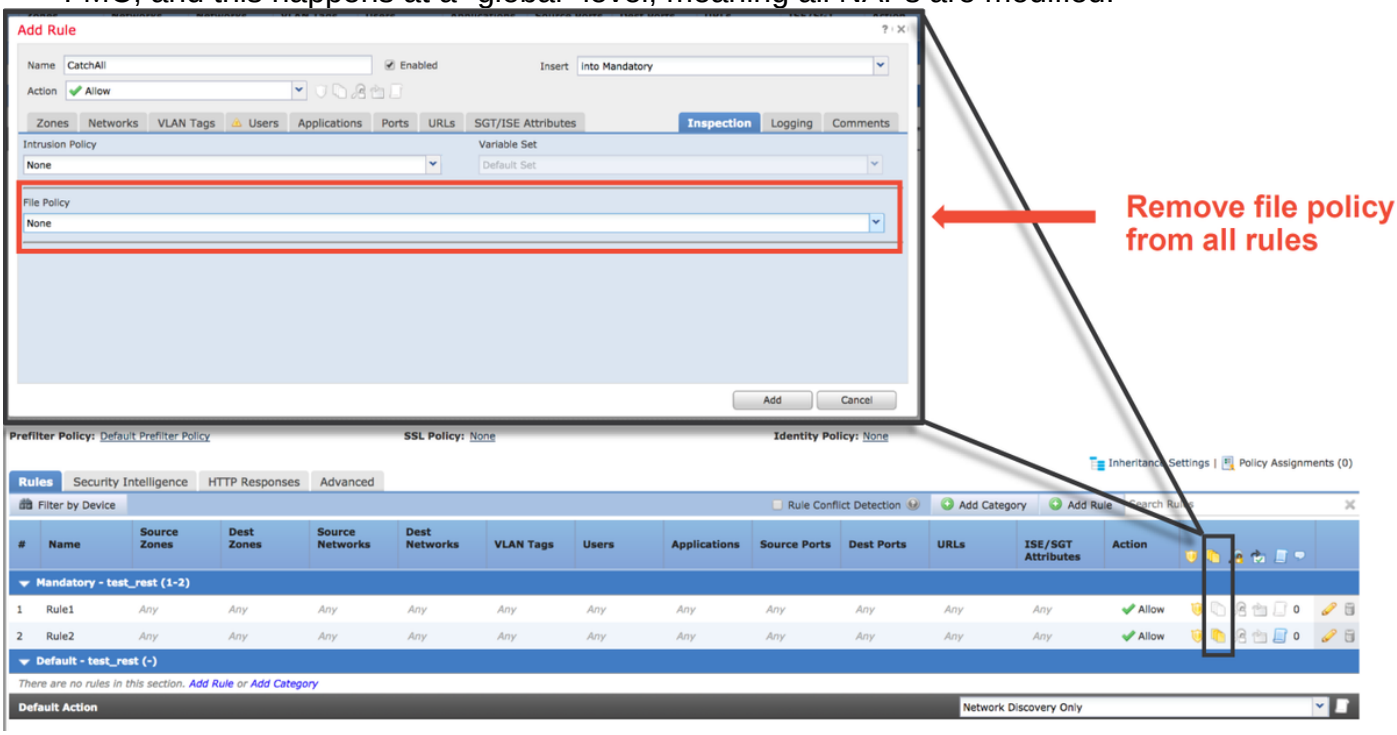
- If a custom NAP is being used and you aren't sure if a NAP setting is dropping traffic but you suspect it might be, you can try replacing it with a "Balanced Security and Connectivity" or "Connectivity over Security" policy.



- If any "Custom Rules" are being used, make sure to set the NAP to one of the defaults

mentioned above

- If any Access Control rules use a File Policy, you may need to try temporarily removing it as a File Policy can enable pre-processor settings on the backend which are not be reflected in the FMC, and this happens at a "global" level, meaning all NAPs are modified.



Each protocol has a different preprocessor and troubleshooting them can be very specific to the preprocessor. This article does not cover all preprocessor settings and troubleshooting methods for each.

You can check the documentation for each preprocessor to get a better idea of what each option does, which is helpful when troubleshooting a specific preprocessor.

Data to Provide to TAC

Data	Instructions
Troubleshoot File from the Firepower Device	http://www.cisco.com/c/en/us/support/docs/security/sourcefire-defense-center/117663-techn
Full Session Packet Capture from the Firepower device	http://www.cisco.com/c/en/us/support/docs/security/sourcefire-firepower-8000-series-applia