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       The Capability Interface for Monitoring Network Security Functions (NSF)
                                in I2NSF
            draft-zhou-i2nsf-capability-interface-monitoring-00

Abstract

   This document focuses on the monitoring aspects of the flow-based
   Network Security Functions (NSFs). The NSF Capability interface
   between the Service Provider's management system (or Security
   Controller) and the NSFs is meant to enforce the required monitoring
   capability.

Status of This Memo

   This Internet-Draft is submitted in full conformance with the
   provisions of BCP 78 and BCP 79.

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   material or to cite them other than as "work in progress."

   This Internet-Draft will expire on April 21, 2016.

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1. Introduction

   Rising security problems bring challenges for the security
   enterprises and organizations. There are already some software and
   hardware devices deployed for these problems, e.g., antivirus,
   firewall, intrusion detection systems (IDS), Web security gateway,
   and DPI, which build up many safety lines accordingly. However, one
   individual safety line only defenses the security threats of only one
   aspect. And more seriously, these safety defense devices are
   generating large amount of logs and events in the operating
   procedure, which makes a lot of "information island". With large
   quantity and isolated security information, it brings low efficiency
   for the security managers who operate on their own control platform
   and warning window of various devices.

   The network security mechanism would be more efficient if the
   Security Controller defined in [I-D.merged-i2nsf-framework] could
   monitor, analyze and investigate the abnormal events and finally
   produce security reports to the security administrators. The
   security controller should also be able to collect the traffic and
   session information from the NSF, in order to steer the suspected
   attack source or victim traffic to the cleaning center.

   The data mining use case defined in [I-D.xia-dots-extended-use-cases]
   has provided a good example for distributed denial-of-service (DDoS)
   attack monitoring report. [I-D.reddy-dots-info-model] also describes
   the information model of flow monitoring to help identify DDOS

attacks in a network. This document aims to cover more cases and
more attack types in the network, e.g., botnets, spam, and spyware.

This document describes how to use the capability interface to
collect the security information from the NSFs and which security
information will be reported using this interface. The protocol and
information model will be described for the monitoring aspects of the
Capability Interface.

2. Terminology

3. The Capability Interface for Monitoring

3.1. Overview

The capability interface should be able to provide unified event
format for the logs and warning information of the overall network,
to facilitate the failure discovery and failure locating timely and
accurately. With the unified event format, the security managers
could run easily and quickly through various security events which
guarantees the availability of service information system and service
continuity. To achieve this, the Security Controller needs to
collect the detailed information of the network status and traffic
information from the NSF to make intelligent security decision and to
dynamically adjust the sampling and steering policy.

```
                  +--------------------+
                  | Security Controller |
                  +-----+---------+----+
                        ^         |
            Capability  |1.Traffic |2.Policy
            Interface for | report  |Enforcement
             monitoring  |         |
                         |         v
          +--------------+--------------------+
          |                                   |
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     +------+                            +------+
     + NSF-1+ -------  ...       --------- + NSF-n+
     +------+                            +------+
```
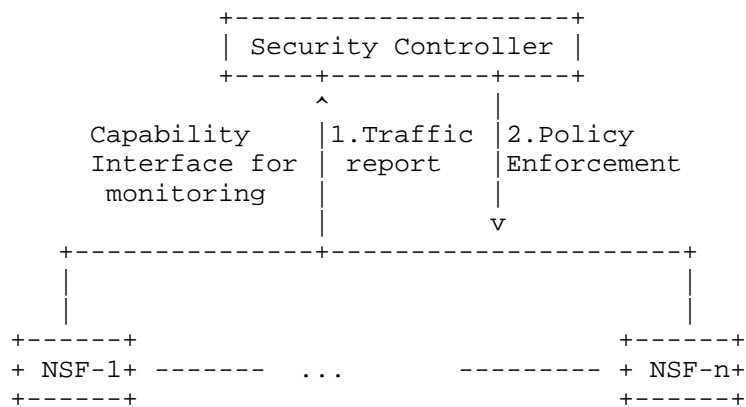
Figure 1: Monitoring Interface

As described in Figure 1, the traffic monitoring procedure involves
two network elements: Security Controller (SC) and NSF. The NSF
reports the monitoring information to the SC, which provides the
specific traffic information, e.g., abnormal flows, security logs,
statistics or the suspicious attack sources or destinations. The SC
is responsible for monitoring and collecting traffic information from
NSFs. Based on the input from the NSF, the SC could make policy
enforcement for the specific flows, e.g., traffic steering or
adjusting the flow sampling policies.

3.2. Traffic Report

The traffic reported from the NSF may contain the information of IP
addresses, security logs, statistics, warnings, and etc. The syslog
protocol [RFC5424] could be used to send event notification messages
to the SC for traffic collection. The IP Flow Information Export
(IPFIX) protocol [RFC5101] may also be adopted for the flow sampling
information collection. There are mainly three types of information
reported using the capability interface:

o Traffic Statistics:

   * Normal traffic statistics based on the source and destination
      address, including byte per second (bps) and packet per second
      (pps).

   * Abnormal traffic statistics based on the source and destination
      address, including bps and pps.

   * Traffic statistics based on the network address range
      (including port usage), including bps and pps.

o Session Statistics:

   * Concurrent session statistics based on the source and
      destination address.

   * New session statistics based on the source and destination
      address.

   * Abnormal session statistics based on the source and destination
      address, including null link, retransmission session and slow-
      start link.

o Abnormal/Attack Event: analysis results of the relevant abnormal/
   attack event, e.g., time, type, level, detail description,
   threshold, source IP address and destination IP address.

The NSF could report the accurate source and destination of the attack to the security controller for which to make traffic steering policy, e.g., steering the bad "botnet" traffic to the cleaning center. The type, size and proportion of the abnormal traffic could also be reported to assist the security controller to determine the steering priority, e.g., priority traction, large flow cleaning.

3.3. Policy Enforcement

The Security Controller is responsible for making policy decisions after getting the security information from the NSF (and, typically, other instructions from the operator). It will provide the attack mitigation and defense strategy with the acquired sampling traffic information for attack detection by the way of dynamically adjusting the flow sampling policy, e.g., flow information, sampling ratio, sampling encapsulation method and/or sampling point information. The policies may include: traffic cleaning and sampling adjustment.

o Traffic cleaning: with the suspicious result of the analyzed sampling traffic, the security controller dynamically sends the steering policy to the related NSF or sends the flow blocking policy to the NSF which is nearest to the attack point, to block the attack traffic from the source. The traffic cleaning policy may include the following three ones:

   * Access Control List (ACL), to block the attack traffic.

   * Packet hash digest to block the attack traffic.

   * Traffic steering policy to clean the traffic.

o Flow sampling adjustment: after filtering the abnormal object of the sampling traffic, the security controller could dynamically adjust the sampling policy to improve the sampling rate of the TOPN abnormal object, in order to make more accurate attack detection. The abnormal object may include: Top N network address range of the abnormal session, Top N IP address of the abnormal session and the Top N of abnormal sessions.

4. Security Considerations

5. IANA Considerations

This document has no actions for IANA.

6. References

6.1. Normative References

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6.2. Informative References

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