Revision Letter

I2NSF Consumer-Facing Interface YANG Data Model

- **Old Draft Name: draft-ietf-i2nsf-consumer-facing-interface-dm-07**
- **New Draft Name: draft-ietf-i2nsf-consumer-facing-interface-dm-08**

Jaehoon Paul Jeong

March 11, 2020

Dear Jan Lindblad,

I sincerely appreciate your valuable comments on the Consumer-Facing Interface Data Model document. Your comments use a bold font, and my answers use a regular font with the prefix [PAUL].

Document: draft-ietf-i2nsf-consumer-facing-interface-dm-07

Reviewer: Jan Lindblad

Review Date: November 12, 2019

Review Type: Working Group Last Call

Intended Status: Standards Track

1. Network access control principles

1.1 The current model relies on the alphabetical sorting of names rules for the ordering.

=> [PAUL] We inserted “ordered-by user;” according to your comments.

NEW:

```
list rule {
  key "rule-name";
  ordered-by user;
  leaf rule-name {
    type string;
    mandatory true;
    description
      "This represents the name for the rule.";
  }
```

1.2 Nothing is said about what the system should do in case policies conflict.

=> [PAUL] We followed the “Information Model of NSFs Capabilities (by L. Xia et al.)” draft (i.e., draft-ietf-i2nsf-capability-05) to handle the cases of policies conflict or not matching any of the polices. The contents are as follows:

> Conflicts theoretically compromise the correct functioning of devices (as happened for routers several year ago). However, NSFs have been designed to cope with these issues. Since conflicts are originated by simultaneously matching rules, an additional process decides the action to be applied, e.g., among the ones the matching rule would have enforced. This process is described by means of a resolution strategy.
>
> On the other hand, it may happen that, if an event is caught, none of the policy rules matches. As a simple case, no rules may match a packet arriving at border firewall. In this case, the packet is usually dropped, that is, the firewall has a default behavior to manage cases that are not covered by specific rules.
>
> Therefore, we introduce another security capability that serves to characterize valid policies for an NSF that solve conflicts with resolution strategies and enforce default actions if no rules match:
>
> o RSc is the set of Resolution Strategy that can be used to specify how to resolve conflicts that occur between the actions of the same or different policy rules that are matched and contained in this particular NSF;
>
> o Dc defines the notion of a Default action. This action can be either an explicit action that has been chosen {a}, or a set of actions {F}, where F is a dummy symbol (i.e., a placeholder value) that can be used to indicate that the default action can be freely selected by the policy editor. This is denoted as {F} U {a}.

NEW: Section 4. Information Model for Policy

> Note that in the case of policy conflicts, the resolution of the conflicted policies conforms to the guidelines of "Information Model of NSFs Capabilities" [i2nsf-capability-im].

1.3 In the cases where there are leafrefs to NACM groups when dealing with network access rather than management access, don't use NACM groups.

=> [PAUL] We deleted “NACM groups” for network access, and changed to “endpoint-group” instead.

OLD:

```
leaf src-target {
  type leafref {
    path /nacm:nacm/nacm:groups/nacm:group/nacm:user-name;
  }
```

NEW:

```
leaf source {
  type leafref {
    path "/i2nsf-cfi-policy/endpoint-groups/user-group/name";
  }
```

Also, we changed the destination cases in the YANG module in the same way.

2. Management access control principles

2.1 I expect the intent is that any user listed in a NACM group mentioned in the owners list would get full CRUD privileges for the contents of the rule the owners leaf sits on. That is never spelled out anywhere, however.

=> [PAUL] We modified owners' description according to your comments.

OLD:

```
grouping owners-ref {
  description
    "This grouping is for owners reference using Network configuration Acces
s Control Model (NACM).";
  leaf-list owners {
    type leafref {
      path /nacm:nacm/nacm:groups/nacm:group/nacm:name;
    }
    description
      "This leaf-list names the owner groups of the
      list instace it sits on. Only the owners and
      super users are authorized to modify the contents.";
  }
}
```

NEW:

```
grouping owners-ref {
  description
    "This grouping is for owners reference using Network
    configuration Access Control Model (NACM).";
  leaf-list owners {
    type leafref {
      path "/nacm:nacm/nacm:groups/nacm:group/nacm:name";
    }
    description
      "This leaf-list names the owner groups of the
      list instance it sits on. Only the owners listed
      in a NACM group are authorized to get full CRUD
      privileges for the contents.
      If this is not set, it cannot support who has
      the prvilege of the contents";
  }
}
```

2.2 It is a little less clear how leaf-list owners on policy objects should be handled.

=> [PAUL] owners-ref of leaf policy-name represents multiple groups owning as owners, having full CRUD privileges by defaults.

NEW:

```
4.  Information Model for Policy

   A Policy object represents a mechanism to express a Security Policy
   by Security Administrator (i.e., I2NSF User) using Consumer-Facing
   Interface toward Security Controller; the policy would be enforced on
   an NSF.  Figure 2 shows the YANG tree of the Policy object.  The
   Policy object SHALL have the following information:

      Name:  This field identifies the name of this object.

      Owners:  This field contains the owners of the policy.  For
               example, the owners who created it, and can modify it.
               This field represents multiple groups owning as owners,
               having full CRUD privileges by default.  Note that it is
               assumed that a factory-default owner (e.g., root) is
               defined and preconfigured in Security Controller in order
               to create new policy objects at first.
```

2.3 Who is allowed to create new policy objects? Should users that are not owners get read access to all the policies and rules?

=> [PAUL] We assume that a factory-default owner (e.g., root) is defined and preconfigured in Security Controller in order to create new policy objects at first.

NEW:

```
4.  Information Model for Policy

   A Policy object represents a mechanism to express a Security Policy
   by Security Administrator (i.e., I2NSF User) using Consumer-Facing
   Interface toward Security Controller; the policy would be enforced on
   an NSF.  Figure 2 shows the YANG tree of the Policy object.  The
   Policy object SHALL have the following information:

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      Owners:  This field contains the owners of the policy.  For
               example, the owners who created it, and can modify it.
               This field represents multiple groups owning as owners,
               having full CRUD privileges by default.  Note that it is
               assumed that a factory-default owner (e.g., root) is
               defined and preconfigured in Security Controller in order
               to create new policy objects at first.
```

2.4 Finally, there is an "owner " leaf ~~ This makes me think this may be a remnant from bygone times and should be removed from the YANG.

=> [PAUL] We removed “owner” leaf and “owners-ref” so that it can specify the owners of the rule optionally.

OLD:

```
+--rw rule* [rule-name]
   +--rw rule-name
   +--rw event
   +--rw (condition)?
   +--rw action
   +--rw ipsec-method
   +--rw owner
```

NEW:

```
+--rw rules* [rule-name]
   +--rw rule-name
   |  uses owners-ref
   +--rw event
   +--rw (condition)?
   +--rw action
   +--rw ipsec-method
```

3. leafrefs crosspointing between policy instances

3.1 There are six leafrefs ~~ None of them restrict what can be pointed to so that only names within the current policy are valid.

=> [PAUL] We modified six leafrefs paths according to your comments by replacing “src-target” with “source” for a clearer source.

OLD:

```
leaf-list src-target {
  type leafref {
  path "/i2nsf-cfi-policy/endpoint-group/device-group/name";
  }
```

NEW:

```
leaf-list source {
  type leafref {
    path "/i2nsf-cfi-policy/endpoint-groups/device-group/name";
  }
```

4. Mandatory to implement all events, conditions, actions

4.1 Is the intent that all of these options should be mandatory to implement?

=> [PAUL] We think the intent that all of ECA options should not necessarily be mandatory, and they are left for implementation purposes. Therefore, we deleted each ECA’s mandatory statement.

5. Optional and mandatory elements

5.1 In this revision of the module, 8 leafs have been marked mandatory. ~~ A few others are skipped in the XML examples at the end of the NSF document, which makes me believe they might not really be mandatory after all .

=> [PAUL] We deleted 6 leafs mandatory statement, and now only two leafs (policy-name and rule-name) are marked mandatory in the XML examples.

5.2 Three leafs have a default, but most leafs are left optional without any default. ~~ Either add a default to make it clear, make them mandatory if they should be, or explain in the leaf description what happens if not set.

=> [PAUL] We added a default, or explained in the leaf description to explain what happens if not set for the rest of leafs.

6. Indentation

6.1 The YANG indentation is mostly wrong.

=> [PAUL] We corrected wrong indentations.

7. YANG element naming

7.1 The YANG convention is to not have lists on the top level in the YANG module, but to surround lists with a container. The surrounding container often has a name in the plural and the list in singular.

=> [PAUL] We revised that the surrounding container has a name in plural and the list in singular.

OLD:

```
container rule{
  description
  "This container is for rules.";
  nacm:default-deny-write;
  list rule {
```

NEW:

```
container rules{
  description
    "This container is for rules.";
  nacm:default-deny-write;
  list rule {
```

Also, we changed others container naming such as “conditions”, “actions”, “endpoint-groups”, and “threat-preventions”, and revised the corresponding examples.

7.2 Finally, it is customary to not repeat the names of parent object in the names of elements.

=> [PAUL] We revised leafs names to not repeat the name of the parent object according to your comments.

OLD:

```
grouping threat-feed-info {
  description
  "This is the grouping for the threat-feed-list";

  leaf feed-name {
    type identityref {
      base threat-feed-type;
    }
    description
    "This represents the name of the a threat-feed.";
  }
  leaf feed-server-ipv4 {
    type inet:ipv4-address;
```

NEW:

```
grouping threat-feed-info {
  description
    "This is the grouping for the threat-feed-list";
  leaf name {
    type identityref {
      base threat-feed-type;
    }
    description
      "This represents the name of the a threat-feed.";
  }
  leaf server-ipv4 {
    type inet:ipv4-address;
```

Also, we changed not only the Data Model but also the corresponding parts. However, we left some confusing names such as “rule-name” and “policy-name” without any change.

7.3 The condition choice has many containers with a single leaf inside (e.g. ddos-source). Their purpose is rather unclear to me. Remove?

=> [PAUL] We removed a condition choice's unnecessary containers according to your comments.

OLD:

```
container firewall-source {
  description
  "This represents the source.";
  leaf src-target {
    type leafref {
      path /nacm:nacm/nacm:groups/nacm:group/nacm:user-name;
    }
    mandatory true;
    description
    "This describes the paths to
    the source reference.";
  }
}
container firewall-destination {
  description
  "This represents the destination.";
  leaf-list dest-target {
    type leafref {
      path /nacm:nacm/nacm:groups/nacm:group/nacm:user-name;
    }
  description
  "This describes the paths to the
  destination target reference.";
  }
}
```

NEW:

```
leaf source {
  type leafref {
    path "/i2nsf-cfi-policy/endpoint-groups/user-group/name";
  }
  description
    "This describes the paths to the source reference.";
}
leaf-list dest-target {
  type leafref {
    path "/i2nsf-cfi-policy/endpoint-groups/user-group/name";
  }
description
  "This describes the paths to the destination
  target reference.";
}
```

Also, we changed other unnecessary containers in condition choice, and revised corresponding examples.

7.4 Also, I find the name "src-target" rather confusing. How about "source"?

=> [PAUL] We replace the names “src-target” and “source-target” with “source”.

OLD:

```
leaf src-target {
  type leafref {
    path /nacm:nacm/nacm:groups/nacm:group/nacm:user-name;
  }
  mandatory true;
  description
  "This describes the paths to
  the source reference.";
}
```

NEW:

```
leaf source {
  type leafref {
    path "/i2nsf-cfi-policy/endpoint-groups/user-group/name";
  }
  description
    "This describes the paths to the source reference.";
}
```

Also, we revised the corresponding examples.

8. No date leaf

8.1 The draft text near fig 2 talks about a date leaf. There is no date object in this revision of the YANG.

=> [PAUL] We deleted a date leaf near Fig 2 because it is no longer used in this part. We include owners-ref to denote the owners of the policy.

NEW:

```
+--rw i2nsf-cfi-policy* [policy-name]
   +--rw policy-name          string
   |  uses owners-ref
   |  +--rw rules* [rule-name]
   +--rw endpoint-groups
   +--rw threat-prevention
```

Figure 2: Policy YANG Data Tree

9. leaf owner

9.1 Near fig.3 leaf Owner is mentioned. Is this leaf still current?

=> [PAUL] We deleted an owner leaf near Fig 3 because it has no longer used in this part. Instead of it, we include owners-ref to denote the owners of the policy.

NEW:

```
+--rw rules* [rule-name]
   +--rw rule-name                          string
   |  uses owners-ref
   +--rw event
   +--rw (condition)?
   +--rw action
   +--rw ipsec-method
```

Figure 3: Rule YANG Data Tree

10. leaf packet-per-second

10.1 This is now modeled as uint16. Is this future proof ? Many packet flows on the internet exceed 64k pps.

=> [PAUL] “packet-per-second” is updated with uint32 to accommodate a higher packet flow rate. It is renamed as packet-threshold-per-second to address the rate limit.

OLD:

```
leaf packet-per-second {
  type uint16;
  description
  "The rate-limit limits the amount of incoming packets.";
}
```

NEW:

```
container rate-limit {
  description
    "This describes the rate-limit.";
  leaf packet-threshold-per-second{
    type uint32;
    description
      "This is a trigger value for the condition.";
  }
}
```

11. container custon-source

11.1 Misspelled . Should be custom-source

=> [PAUL] We changed misspelled “custon” to “custom”.

12. identity ddos

12.1 Is ddos a malware file-type ? This is not exactly in line with my intuition.

=> [PAUL] We deleted a malware-file-type for identity ddos because ddos is not a malware file-type, but a flood attack.

13. identity protocol-type

13.1 There are other modules that already define protocol-types. Would it be worth reusing one of them?

=> [PAUL] We added references to refer other modules that have already been well-defined for protocol-types.

NEW:

```
identity ssh {
  base protocol-type;
  description
    "The identity for ssh protocol.";
  reference
    "RFC 4250: The Secure Shell (SSH) Protocol";
}
```

Also, we added other references to refer corresponding protocol types.

14. identity palo-alto

14.1 Is it a good IETF practice to list vendor names in modules? Can we consider this a protocol name? Is there perhaps an RFC/specification name for it that we could reference instead?

=> [PAUL] We think it is not a good IETF practice to list some specific vendor names in modules, so we deleted them, and left only identity threat-feed-type.

15. grouping ipsec-based-method

15.1 This grouping contains a list which allows listing none of, either of or both of ipsecike and ikeless. Are all valid configurations ?

=> [PAUL] We followed the guidelines of the draft for Software-Defined Networking (SDN)-based IPsec Flow Protection (i.e., draft-ietf-i2nsf-sdn-ipsec-flow-protection-07), so we added this reference.

NEW:

```
grouping ipsec-based-method {
  description
    "This represents the ipsec-based method.";
  list ipsec-method {
    key "method";
    description
      "This represents the list of IPsec method types.";
    leaf method {
      type identityref {
        base i2nsf-ipsec;
      }
      description
        "This represents IPsec IKE and IPsec IKEless cases.

         If this is not set, it cannot support IPsec IKE or IPsec IKEless."

      reference
        "draft-ietf-i2nsf-sdn-ipsec-flow-protection-07";
    }
  }
}
```

16. leaf feed-name

16.1 This leaf is the key in a list, which makes it possible to have at most one feed of each type. If it would make sense to configure more than one feed of the same type, the YANG needs to be updated here.

=> [PAUL] We think list type of threat-feed-list can be configured more than one feed of the same type

NEW:

```
list threat-feed-list {
  key "name";
  description
    "There can be a single or multiple number of threat-feeds.";
  uses threat-feed-info;
```

17. leaf-list content

17.1 This leaf-list is of type string. What is the format of this string? Does the name refer to something?

=> [PAUL] This content leaf-list contains the payload of a packet to analyze a threat. Due to the types of threats, the type of the content is defined as string to accommodate any kind of a payload type such as HTTP, HTTPS, and SIP.

NEW:

```
leaf-list content {
  type string;
  description
    "This represents the string of the payload contents.
    This content leaf-list contains the payload of a packet
    to analyze a threat. Due to the types of threats, the
    type of the content is defined as string to accommodate
    any kind of a payload type such as HTTP, HTTPS, and SIP.
    If this is not set, it cannot support the payload contents
    invovled in a security attack as strings";
}
```

18. Event types

18.1 container event has a choice between enforce-admin and time alternatives. Each of those choices have a leaf that allows the operator to configure an identityref to an enforce-type value. What does that mean? What would it mean if an operator configured admin == 'time' (or enforce-time == 'admin')?

=> [PAUL] We changed event types for both of them. A leaf admin uses string type, and a leaf enforce-time uses yang:date-and-time type to avoid configuring admin == ‘time’ or enforce-time == ‘admin’. Also, we added description not to allow the operator to configure them in a wrong way.

NEW:

```
choice enforce-type {
  description
    "There are two different enforcement types;
    admin, and time.
    It cannot be allowed to configure
    admin=='time' or enforce-time=='admin'.";
```

19. leaf begin-time, end-time

19.1 Currently they are modeled as yang:date-and-time, which means they are a concrete time a specific day, e.g. 2019-11-11T16:07. This needs to be changed in order to be what the modeler intended.

=> [PAUL] We added typedef for date-and-time in order to refer to “ietf-yang-types.yang”.

NEW:

```
/*
* Typedefs
*/
  typedef date-and-time {
    type string {
      pattern '\d{4}-\d{2}-\d{2}T\d{2}:\d{2}:\d{2}(\.\d+)?'
        + '(Z|[\+\-]\d{2}:\d{2})';
    }
    reference
     "RFC 3339: Date and Time on the Internet: Timestamps
      RFC 2579: Textual Conventions for SMIv2
      XSD-TYPES: XML Schema Part 2: Datatypes Second Edition";
  }
```

20. leaf frequency

20.1 This leaf is now modeled properly from a YANG perspective. But what does it mean? If this leaf is set to 'once-only' , what exactly will happen only once? Please write a description that explains this.

=> [PAUL] ‘only-once’ means that the rule is enforced only one time immediately and not repeated. We added a description about it.

NEW:

```
enum only-once {
  description
    "This represents the rule is enforced
    only once immediately and not
    repeated.";
}
```

21. Example in Fig.17

21.1 The example contains XML that refers to "endpoint-group/user-group". There is no such element in the YANG.

=> [PAUL] We modified the YANG module so that the element of “endpoint-groups/user-group” can exist

NEW:

```
container endpoint-groups {
  description
    "A logical entity in their business
    environment, where a security policy
    is to be applied.";
  list user-group{
    uses user-group;
```

21.2 Furthermore, there is nothing called range-ip-address, start-ip-address, end-ip-address. They are called range-ipv4-address, start-ipv4-address, end-ipv4-address.

=> [PAUL] We revised them according to your comments.

21.3 Finally, there must not be any xmlns attribute on a closing XML tag.

=> [PAUL] We changed “</endpoint-group xmlns="urn:ietf:params:xml:ns:yang:ietf-i2nsf-cfi-policy">” to “</endpoint-groups>” according to your comments.

NEW:

```
<?xml version="1.0" encoding="UTF-8" ?>
<endpoint-groups xmlns="urn:ietf:params:xml:ns:yang:ietf-i2nsf-cfi-policy">
  <user-group>
    <name>employees</name>
    <range-ipv4-address>
      <start-ipv4-address>221.159.112.1</start-ipv4-address>
      <end-ipv4-address>221.159.112.90</end-ipv4-address>
    </range-ipv4-address>
  </user-group>
  <device-group>
    <name>webservers</name>
    <range-ipv4-address>
      <start-ipv4-address>221.159.112.91</start-ipv4-address>
      <end-ipv4-address>221.159.112.97</end-ipv4-address>
    </range-ipv4-address>
    <protocol>http</protocol>
    <protocol>https</protocol>
  </device-group>
</endpoint-groups>
```

=> [PAUL] Also, we changed other examples in the same way.

22. Example in Fig.18

22.1 There is no element called policy anymore . It's now i2nsf-cfi-policy.

=> [PAUL] We changed “policy” to “i2nsf-cfi-policy” according to your comments.

22.2 The rules are modeled in a container and list, both by the name rule. So, there needs to be two <rule> tags .

=> [PAUL] We added a container “rules” before list “rule” in Figure 18.

NEW:

```
container rules{
  description
    "This container is for rules.";
  nacm:default-deny-write;
  list rule {
```

22.3 The security-event element is marked mandatory in the YANG, but missing in the example.

=> [PAUL] We deleted “mandatory” statement for security-event element since it is not used.

22.4 The times given below may be what is intended, but do not match the date format.

=> [PAUL] We modified them according to your comments.

NEW:

```
<time-information>
  <begin-time>2020-03-11T09:00:00.00Z</begin-time>
  <end-time>2020-03-11T18:00:00.00Z</end-time>
</time-information>
```

22.5 Since the example is not mentioning leaf frequency, it will have the value 'once-only' . Maybe explain what that means in the context of the example?

=> [PAUL] We added a leaf frequency with “only-once”. It means that this Time-based Firewall policy is applied only-once (not repetition) with an example’s ECA.

22.6 The condition/firewall-condition says the src-target is mandatory and dest-target optional, exactly like below.

=> [PAUL] We deleted the corresponding mandatory statements.

22.7 The current YANG model does not allow setting both a firewall-condition and custom-condition.

=> [PAUL] We changed the choice statement to a container-leaf statement so that it can allow both a firewall-condition and custom-condition to be set.

OLD:

```
choice condition {
  description
  "This choice condition is for general firewall.";
  case firewall-condition {
    description
    "The general firewall condition.";
```

NEW:

```
container firewall-condition {
  description
    "The general firewall condition.";
```

22.8 This example leaves out the mandatory leaf owner .

=> [PAUL] We deleted the corresponding mandatory statements.

NEW:

23. Example in Fig.19

23.1 This example lists a firewall-condition with no src-target, which is mandatory .

=> [PAUL] We deleted the corresponding mandatory statements.

```
<?xml version="1.0" encoding="UTF-8" ?>
<i2nsf-cfi-policy xmlns="urn:ietf:params:xml:ns:yang:ietf-i2nsf-cfi-policy">
  <policy-name>security_policy_for_blocking_sns</policy-name>
  <rules>
    <rule>
      <rule-name>block_access_to_sns_during_office_hours</rule-name>
      <event>
        <time-information>
          <begin-time>2020-03-11T09:00:00.00Z</begin-time>
          <end-time>2020-03-11T18:00:00.00Z</end-time>
        </time-information>
        <frequency>only-once</frequency>
      </event>
      <conditions>
        <firewall-condition>
          <source>employees</source>
        </firewall-condition>
        <custom-condition>
          <dest-target>sns-websites</dest-target>
        </custom-condition>
      </conditions>
      <actions>
        <primary-action>drop</primary-action>
      </actions>
      <ipsec-method>
        <method>ipsec-ike</method>
      </ipsec-method>
    </rule>
  </rules>
</i2nsf-cfi-policy>
```

Figure 18: An XML Example for Time-based Firewall

23.2 Under condition, there is a container rate-limit with a leaf packet-per-second . Is this a trigger value for the condition, or is it an actual limit that the system is expected to enforce? If it's a trigger, it may be good to find a clearer name. If it's enforced, it's placement under condition is deceiving.

=> [PAUL] “packet-per-second” is a trigger value for rate limit. Its name is replaced with “packet-threshold-per-second”. Its type is updated with uint32 to accommodate a higher packet flow rate.

OLD:

```
container rate-limit {
  description "This describes the rate-limit.";
  leaf packet-per-second {
    type uint16;
    description
    "The rate-limit limits the amount of incoming packets.";
  }
}
```

NEW:

```
container rate-limit {
  description
    "This describes the rate-limit.";
  leaf packet-threshold-per-second{
    type uint32;
    description
      "This is a trigger value for the condition.";
  }
}
```

24. Security Considerations

24.1 Section 10 in the NSF document under review is the Security Considerations. I think it would make sense to mention something about the management access control mechanism here, and its relation to NACM .

=> [PAUL] We added a statement about the management access control mechanism, and its relation to NACM.

NEW:

```
10.  Security Considerations

   The data model for the I2NSF Consumer-Facing Interface is based on
   the I2NSF framework [RFC8329], so the same security considerations
   with the I2NSF framework should be included in this document.  The
   data model needs a secure communication channel to protect the
   Consumer-Facing Interface between the I2NSF User and Security
   Controller.  Also, the data model's management access control is
   based on Network Configuration Access Control Model(NACM) mechanisms
   [RFC8341].
```

Thanks for your intensive and detailed comments to improve our draft.

Best Regards,

Paul

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