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A YANG Data Model for Open IPv6 Transition
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Abstract

During the transition from IPv4 to IPv6, there are many kinds of transition methods and scenarios that have been or are currently being defined in IETF, e.g., DS-Lite, Lw4over6, MAP-E, 4rd, 6rd and etc. Carriers have to select and determine their transition ways among all of these techniques, which brings slow transition to IPv6. Currently, we face two main challenges in IPv6 transition: the legacy equipment does not support multiple IPv6 transition technologies at the same time and there are not enough native IPv6 applications. This document describes an open IPv6 YANG [RFC6020] data model which serves as a framework for configuring and managing an IPv6 service to provide a low-cost and unified way to IPv6 transition.

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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This Internet-Draft will expire on April 24, 2014.

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1. Introduction

Each IPv6 transition technology has its own specific characteristics. In order to support a specific IPv6 transition scheme and not need to upgrade the devices, we propose two elements for OSS to configure the IPv6 service related parameters: the resource template and the flow table template. These two elements together define the so-called open IPv6 data model, which is proposed as a basis for the development of data models for configuration and management of the specific IPv6 transition technology. This data model could accommodate existing and future IPv6 transition schemes.

1.1. Requirements Language

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [RFC2119].

2. Terminology

The following terms are used in this document:

- Resource template: the template for IP pool and port/port set;

- Flow table template: the template for various transition technologies, described by NAT and/or tunnel.

3. Objectives

The initial design of the open IPv6 data model was driven by the following objectives:

- The data model should support the particular technology (any of the v4-v6 transition technology). The resource template and the flow table template should be general templates suitable for all the transition schemes;

- The users/applications should be able to decide for themselves when and how to start the IPv6 transition;

- The data model is generic and protocol-independent for packets and flow-tables interaction between network devices and applications.

- Provides the management functions (e.g.,OSS) for the applications to configure and manage the installed modules in the network devices.

4. The Design of the Open IPv6 Transition Data Model

The open IPv6 transition data model consists of two YANG modules. The first module, "flow table", defines the action (tunnel and NAT) of a specific transiton technology. The other module, "resource", defines the general IP prefix and port set/mapping rules for a specific transition technology. Figure 1 show abridged views of the configuration and operational state data hierarchies.

```
      +--rw ipv6-transition
         +--rw flow table [name]
         |  +--rw name                        string
         |  +--rw description?                string
         |  +--rw enabled?                    boolean
         |  +--rw tunnel
         |  |  +--rw name                     string
         |  |  +--rw description?             string
         |  |  +--rw enabled?                 boolean
         |  |  +--rw type                     identityref
         |  |  +--rw inner-ip-address-src     inet:ip-address
         |  |  +--rw inner-ip-address-dst     inet:ip-address
         |  |  +--rw outer-ip-address-src     inet:ip-address
         |  |  +--rw outer-ip-address-dst     inet:ip-address
         |  +--rw translation
         |     +--rw name                     string
```

```
|     +--rw description?            string
|     +--rw enabled?                boolean
|     +--rw type                    identityref
|     +--rw proto?                  string
|     +--rw inner-ip-address        inet:ip-address
|     +--rw outer-ip-addres         inet:ip-address
|     +--rw inner-port?             inet:port-number
|     +--rw outer-port?             inet:port-number
+--rw resource [name]
  +--rw name
  +--rw description?                string
  +--rw enabled?                    boolean
  +--rw ip prefix                   inet:ip-prefix
  |
  +--rw port set                    inet:port-set
```

Figure 1: Open IPv6 Configuration data hierarchy.

4.1. Flow Table

The flow table element defines the two basic components of a specific IPv6 transition technology: tunnel and translation.

The main attributes of the tunnel are explained as below:

- "inner-ip-address-src": the source ip address of a packet or inner source ip address when the packet type is IP-in-IP tunnel;
- "inner-ip-address-dst":the dstination ip address of a packet or inner dstination ip address when the packet type is IP-in-IP tunnel;
- "outer-ip-address-src": the source ip address of a packet or outer source ip address when the packet type is IP-in-IP tunnel;
- "outer-ip-address-dst": the destination ip address of a packet or outer destination ip address when the packet type is IP-in-IP tunnel.

The IP address could be IPv4 or IPv6 dependending on the technologies.

The main attributes of the translation are explained as below:

- "inner-ip-address": the source ip address of a packet;
- "outer-ip-addresss":the dstination ip address of a packet;

- "inner-port": the source port of a packet;
- "outer-port": the destination port of a packet.

The IP address could be IPv4 or IPv6 depending on the specific technologies.

4.2. Resource

The resource element defines the general IP pool and the port set of the specific transition technology if the ipv4 address sharing mechanism is adopted.

5. Acknowledgements

TBD

6. IANA Considerations

7. Security Considerations

To come.

8. Normative References

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