BGP Flow Specification Extensions for Path Scheduling

draft-zzd-idr-flowspec-path-scheduling

Li Zhang, Tianran Zhou, Jie Dong @Huawei

IDR WG IETF 118 Nov 2023

Background

- Tidal Network Use Case.

  - The tidal effect of network traffic leads to low network resource utilization and **high energy consumption** when the traffic is at a low level.

  - When the network traffic is at a low level, the **network can disable some links or nodes** to reduce network power consumption.

  - Due to topology changes, **packets may not be forwarded correctly and lead to packet loss**.
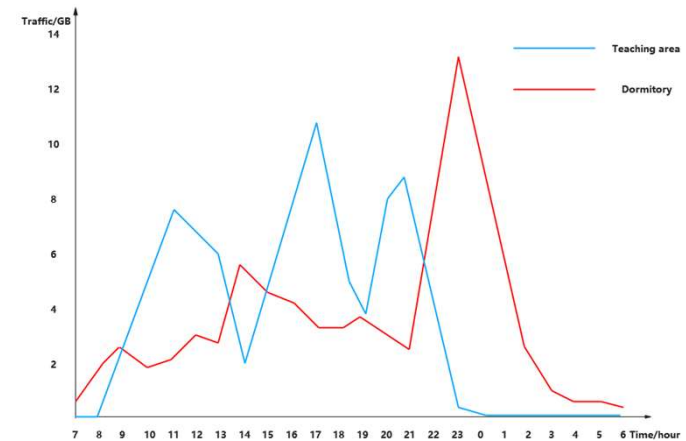
Traffic Curve of Teaching Area and Dormitory in Campus Network

---

Taking the advantage of predictability of change and steer traffic into new paths in advance is an effective way to prevent packet loss.
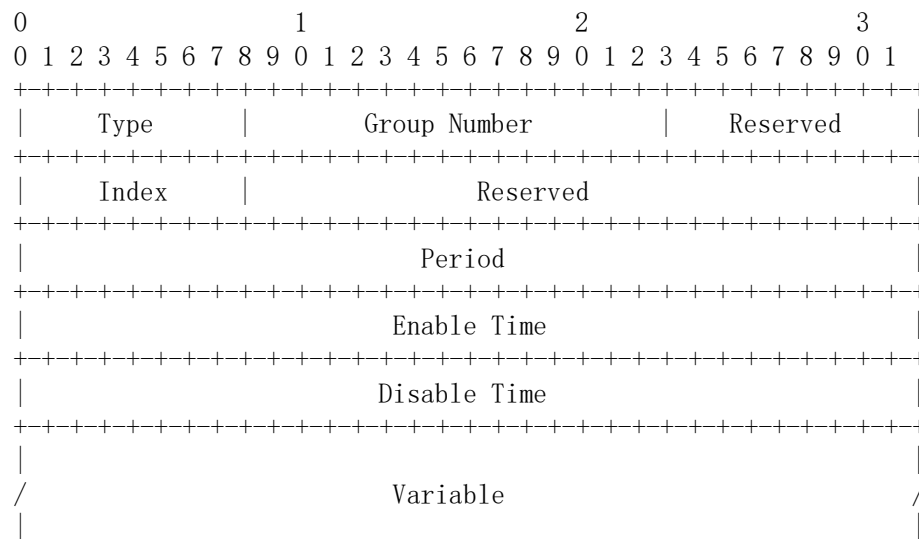
We can do it by FlowSpec!
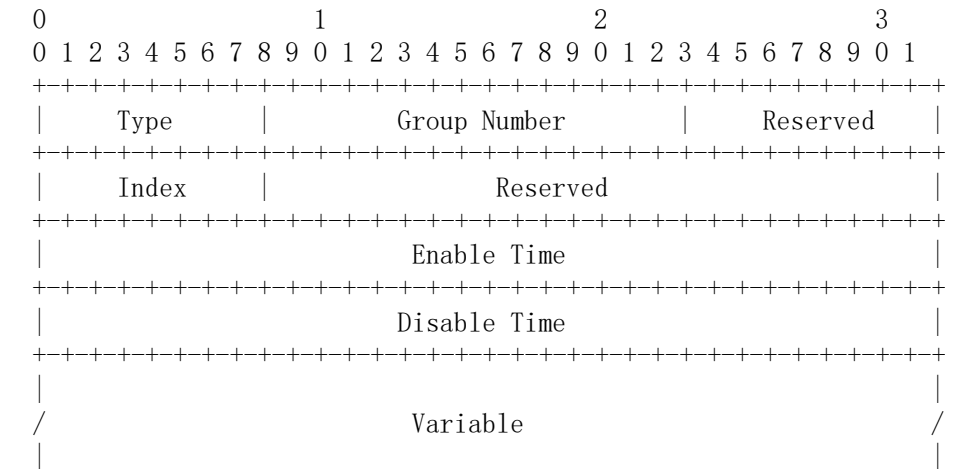
Extension to FlowSpec

New Component : Encoding: <**type** (1 octet), **length** (1 octet), **scheduling time information** (variable)]+>

There are two formats of scheduling time information for periodic and aperiodic scenarios based on the topology change regularity.

Periodic Scheduling Time Information(PSTI)：

```
 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|     Type      |       Group Number    |      Reserved         |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|    Index      |              Reserved                         |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                         Period                                |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                      Enable Time                              |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                      Disable Time                             |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                                                               |
/                       Variable                                /
|                                                               |
```

Aperiodic Scheduling Time Information(ASTI)：

```
 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|     Type      |       Group Number    |      Reserved         |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|    Index      |              Reserved                         |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                      Enable Time                              |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                      Disable Time                             |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                                                               |
/                       Variable                                /
|                                                               |
```

Group Number： indicates the number of information groups, each information group has fields of Index, Flags, Enable Time and Disable Time；
**Index**： the number used to identify specific information group.

Procedures

Controller/Node： Create a FlowSpec with scheduling time information, and advertise it to headend.

Headend：

1. **Parses and stores Flowspec's scheduling time information ,** when received a FlowSpec with scheduling time rules.

2. When a packet arrives**, steer it into an specific Policy, VPN or tunnel based on the arrival time and scheduling time rules in the FlowSpec**.
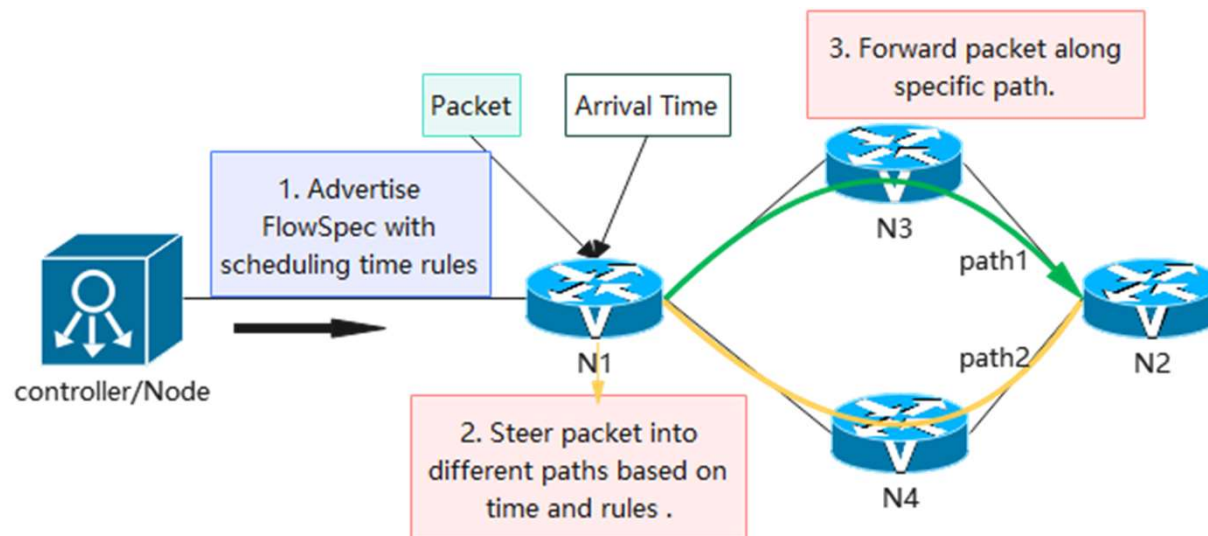
Any comments and opinions are welcome!

Thank You