Loop prevention for route import between protocols

https://www.ietf.org/archive/id/draft-li-idr-inter-protocol-anti-loop-00.html

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Problem Statement

Route import causes the loss of the anti-loop attribute of the protocol. As a result, the anti-loop fails.

- RA: RA advertises the routes to the R2. (1)

- RB: RB advertises the routes to RC and RD through an BGP peer. (2)

- RC: OSPF imports BGP routes and advertises the routes to RD. In this case, the anti-loop information is lost. (3)

- RD: BGP imports IGP routes, After selection, advertises the route to RB. (4)

- RB: selects the route from RD, advertises the route update to R3. As a result, a routing loop occurs. (5)
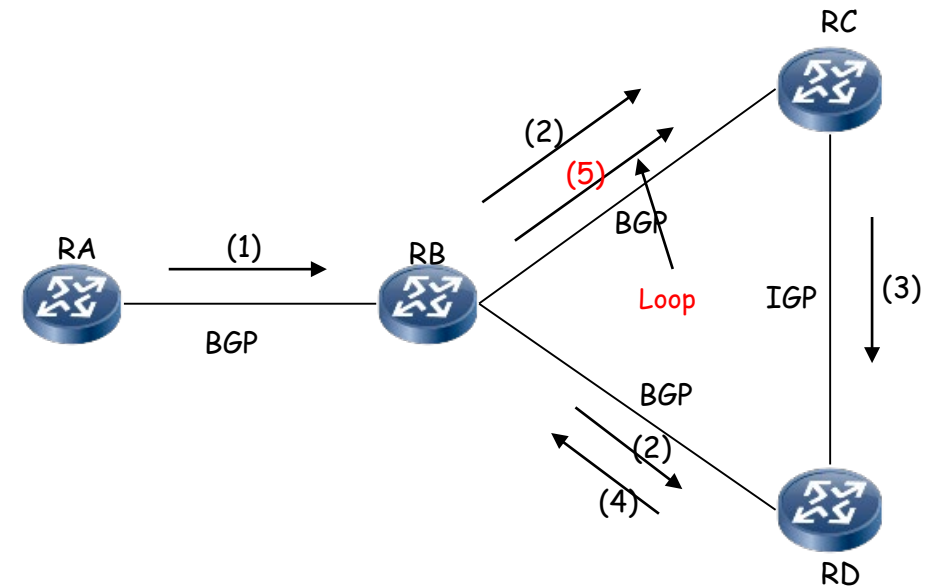
Problem Statement(Cont.)

The same problem exists after the protocol swap.

- RA: RA advertises the routes to the R2. (1)

- RB: RB advertises the routes to RC and RD through an IGP peer. (2)

- RC: BGP imports IGP routes and advertises the routes to RD. In this case, the anti-loop information is lost. (3)

- RD: IGP imports BGP routes, After selection, advertises the route to RB. (4)

- RB: selects the route from RD, advertises the route update to R3. As a result, a routing loop occurs. (5)
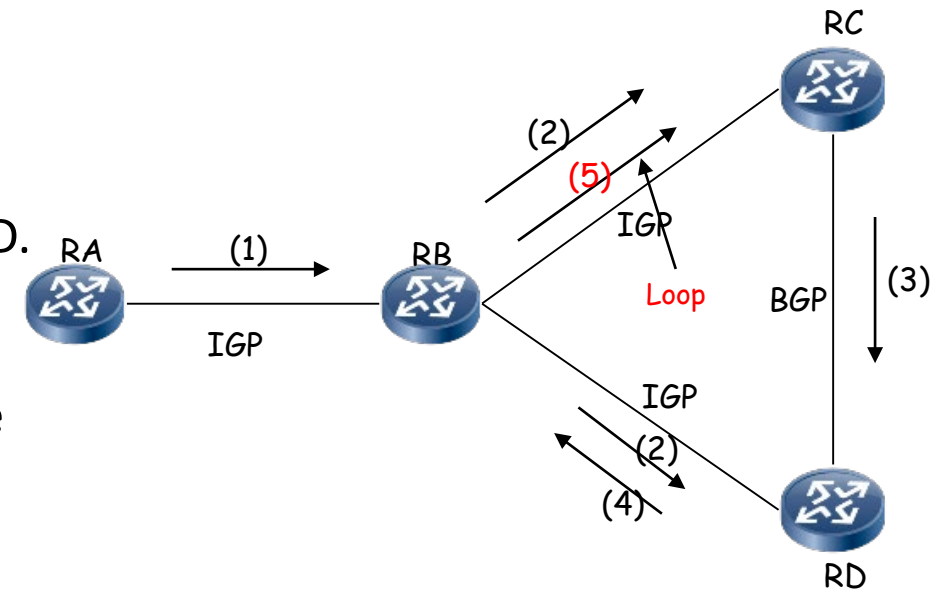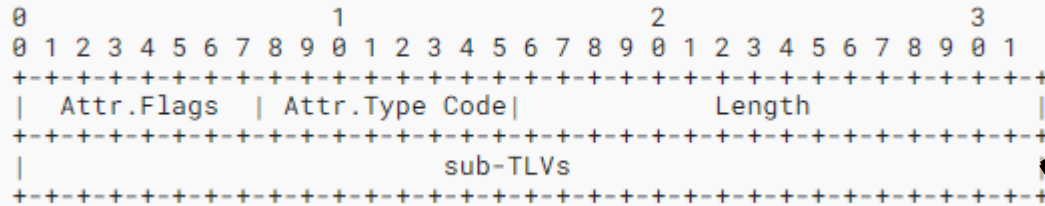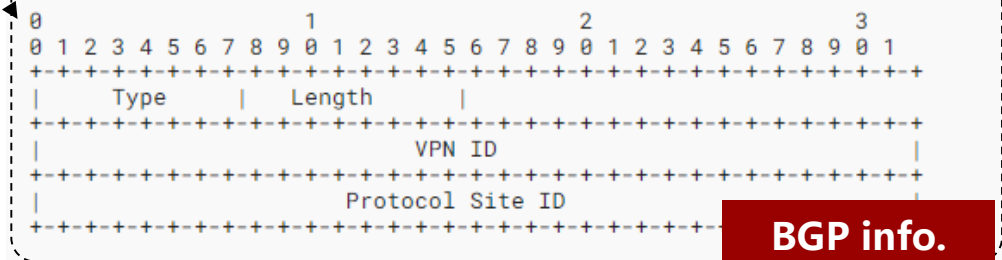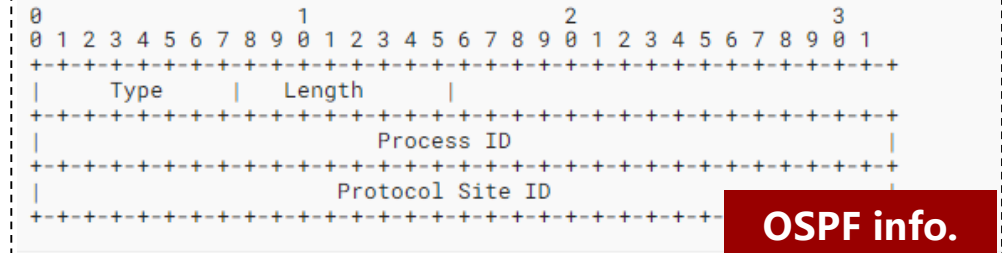
Proposed Extensions to BGP Attribute

Route Origin Site List Attribute Definition

```
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
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|  Attr.Flags   | Attr.Type Code|             Length            |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                            sub-TLVs                           |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

- Optional and Transitive

- Contains one or more sub-TLVs

- Each sub-TLV indicates a site where the route was imported into the BGP or IGP routing-table for the first time

- The route receiver, should use local site information to compare with the attribute contents to determine whether a loop occurs
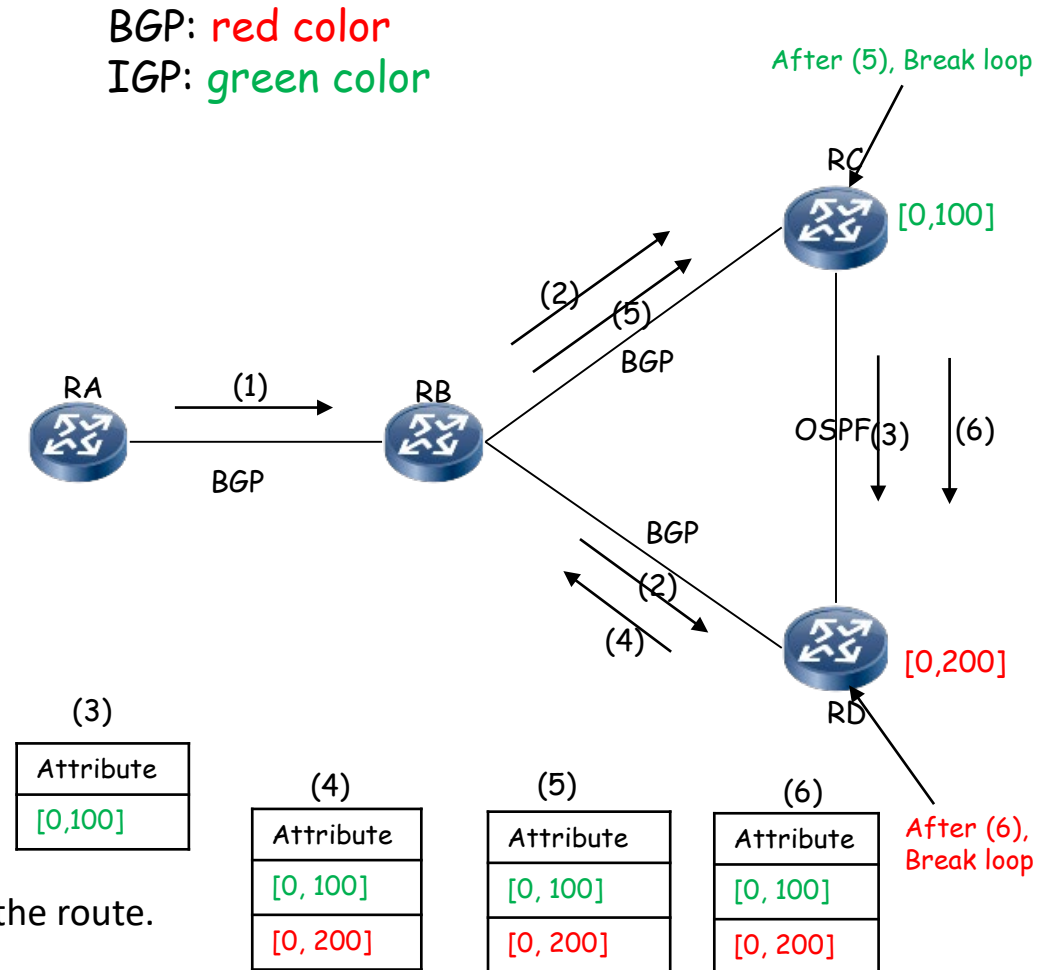
Sub-TLVs:

- **BGP Route Origin Site sub-TLV**

  indicates that the route is imported to BGP from other protocols at the site.

- **OSPF Route Origin Site sub-TLV**

  indicates that the route is imported to BGP from other protocols at the site.

- **To be defined**

```
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      |    Length     |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                          Process ID                          |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                       Protocol Site ID
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```
OSPF info.

```
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      |    Length     |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                            VPN ID                            |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                       Protocol Site ID
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```
BGP info.

Usage

➤ RA: RA advertises the routes to the RB. (1)

➤ RB: RB advertises the routes to RC and RD through an BGP peer. (2)

➤ RC: OSPF imports BGP routes and advertises the routes to RD. (3)
• Route Attributes: {[0, 100]}. 100 is protocol site ID.
• [0, 100] is added by OSPF

➤ RD: BGP imports OSPF routes and advertises the route to RB. (4)
• imports routes that carry {[0, 100]} attribute.
• Advertises to RB. Route Attributes: { [0, 200], [0, 100]},
• [0, 200] is added by BGP.

➤ RB: advertises the route update to RC.(5)
• Route Attributes: carrying {[0, 200], [0, 100]}

➤ RC receives the route, OSPF imports BGP routes.
• imports routes that carry { [0, 200], [0, 100]} attribute
• OSPF compares [0,100] with { [0, 200], [0, 100]}, and finds that a loop occurs in the route.

➤ If there are no other route on RC. After RC advertises route to RD, BGP finds that a loop occurs in the route and reduce the Route selection priority.(6)

BGP: red color
IGP: green color

After (5), Break loop

RC
[0,100]

(2)
(5)
BGP

RA   (1)   RB

BGP

OSPF(3) (6)

BGP

(2)
(4)

[0,200]
RD

After (6),
Break loop

(3)

Attribute
[0,100]

(4)

Attribute
[0, 100]
[0, 200]

(5)

Attribute
[0, 100]
[0, 200]

(6)

Attribute
[0, 100]
[0, 200]

5

Next steps

- Welcome more comments and discussion

Thank you!