Stateless Best Effort Multicast

draft-lx-msr6-rgb-segment-03
draft-chen-pim-be-mrh-00

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MSR6 BoF IETF 114

Brief Description

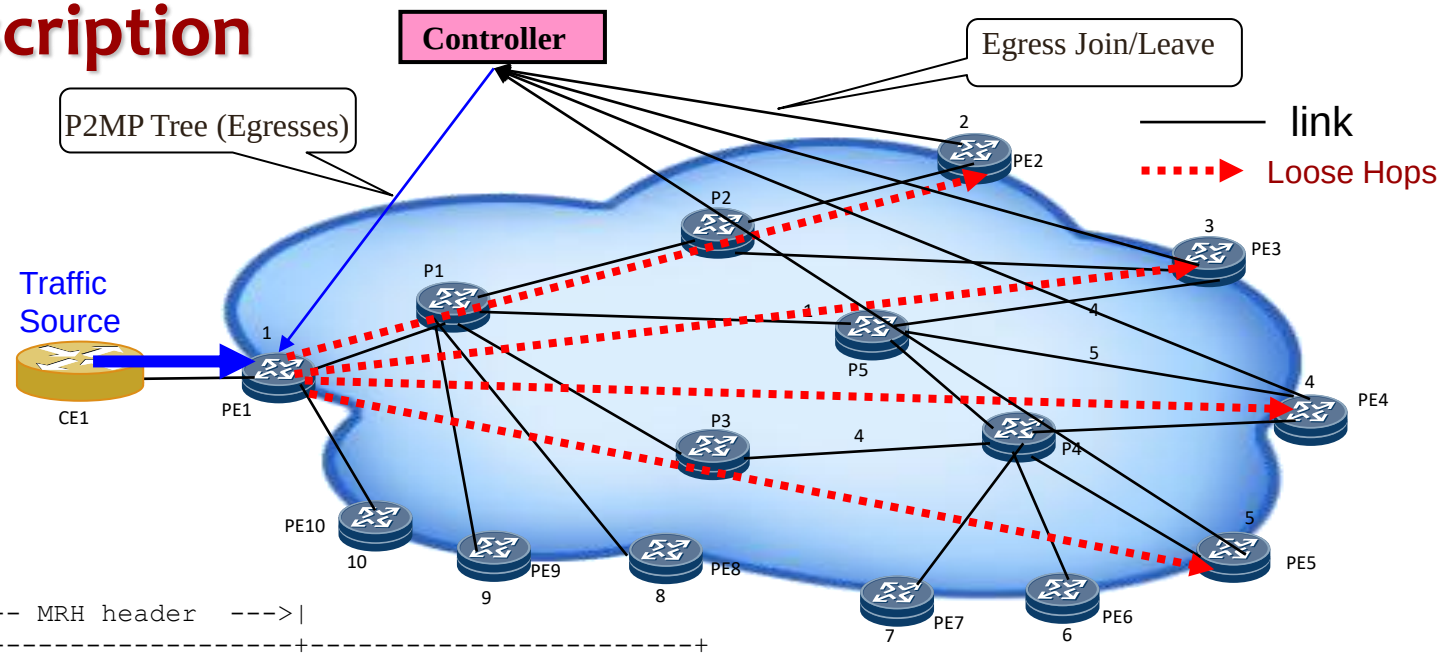
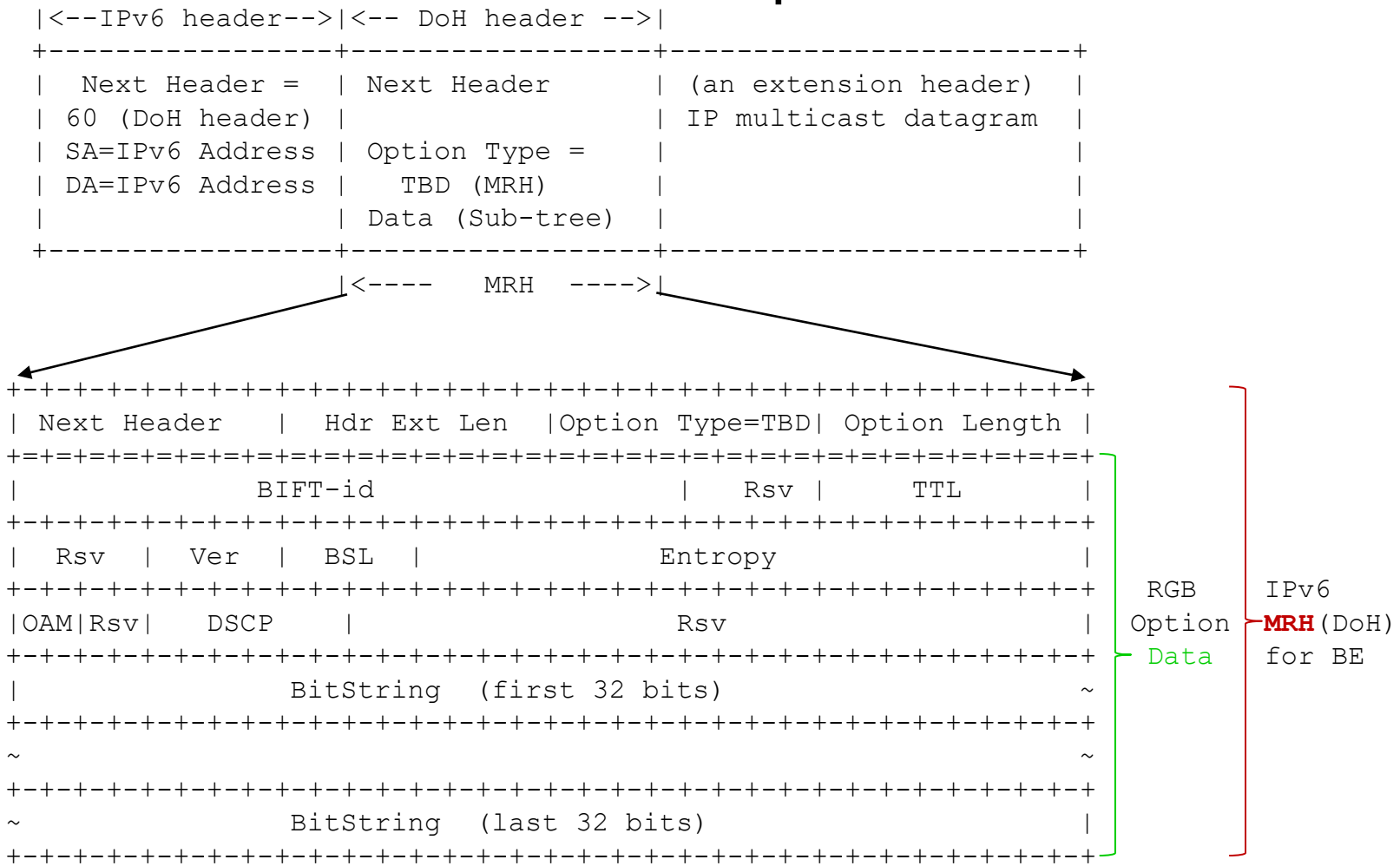


Figure 1. Tree from PE1 towards PE2 to PE5

```
|<--IPv6 header-->|<--- MRH header  --->|
+-----------------+---------------------+-----------------------+
|  Next Header =  | Next Header         | (an extension header) |
|60(DoH) or 43(RT)|                     | IP multicast datagram |
| SA=IPv6 Address |   Type = TBD (MRH)  |                       |
| DA=IPv6 Address |Data(Subtree/Egresses|                       |
+-----------------+---------------------+-----------------------+
                  |<------- MRH ------->|
 +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
 | Next Header   |  Hdr Ext Len  |    Type = TBD |     . . .     |
 +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+               +
 |                                                               ~
 +=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+
 |           Tree/Sub-tree (i.e., egresses) encoded              |
 :                                                               :
 +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

- Ingress (e.g., PE1) encapsulates the packet in a MRH with tree (i.e., egresses of tree)
- The packet is transmitted along the shortest IGP pathes to the egresses.
- Egress (e.g., PE2) decapsulates the packet in a MRH and sends it to next header process

Solution 1 Specials: DoH



Solution 1 Specials: Forwarding Procedure

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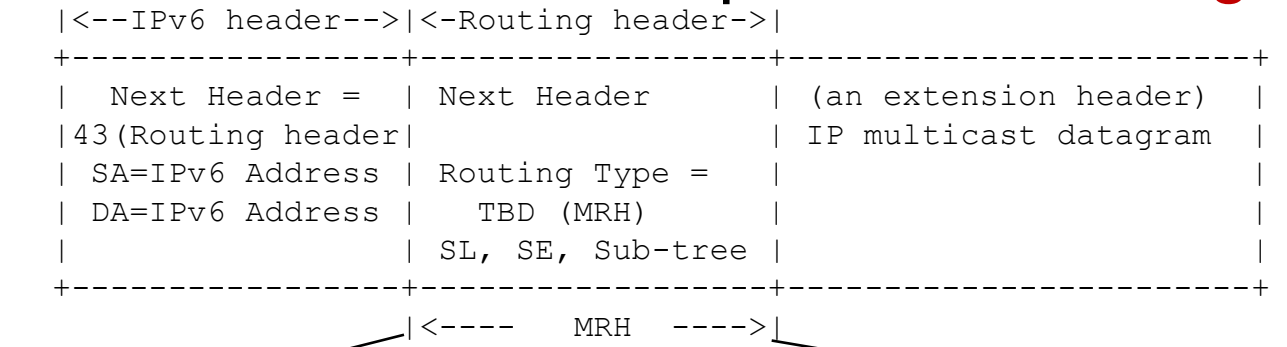
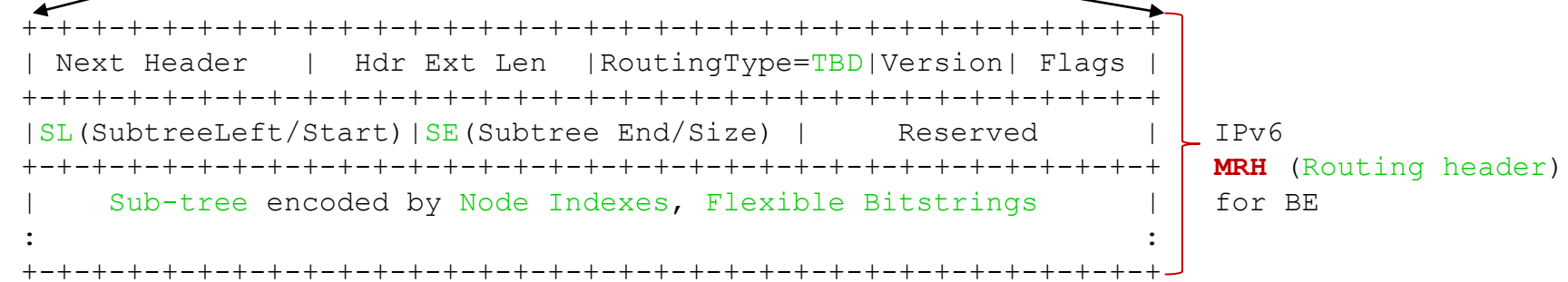
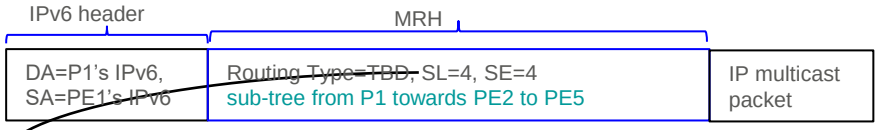
1. IF (There is DoH as an IPv6 Extension header and one of the options type is RGB
2.    Lookup BIFT based on the bitstring inside the RGB Option Data
3.    Forward the packet via the matched entry in the BIFT
4. ELSE IF NH=ICMPv6 or (NH=RGB Extension Header Type and NH of Extension Header=ICMPv6)
5.    Send to CPU.
6. ELSE  ;Ref
7.    Drop the packet.

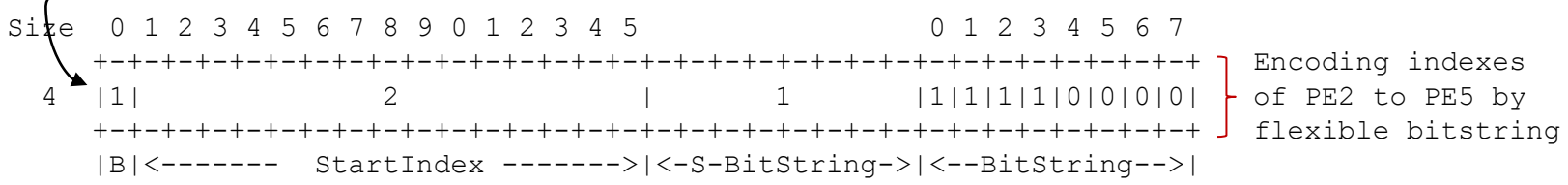
Ref: An ICMPv6 packet using End.RGB as destination address.
```

Solution 2 Specials: Routing Header









IPv6 packet with one bitstring sent to P1

Solution 2 Specials: Flexible Bitstring and NodeIndex

A flexible bitstring has four fields:

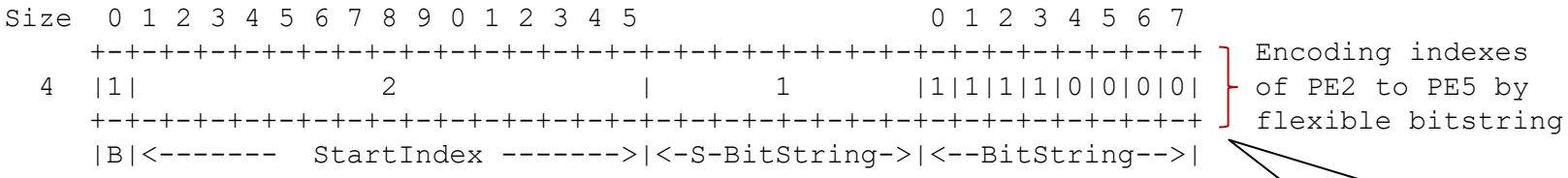
1). B flag with value 1, 2). start index (StartIndex), 3). size of bitstring (S-BitString) in bytes and

4). bitstring (BitString), where each bit with value1 indicates a node index equal to StartIndex plus the bit number. Note that the bit number is counted from right to left and from 0.

For example, the indexes of egresses PE2 to PE5 (i.e., PE2, PE3, PE4 and PE5) are encoded by a flexible bitstring (suppose their indexes are 2, 3, 4 and 5 respectively):

B = 1, StartIndex = 2, S-BitString = 1, BitString = 0b11110000 indicating four node indexes 2, 3, 4 and 5.

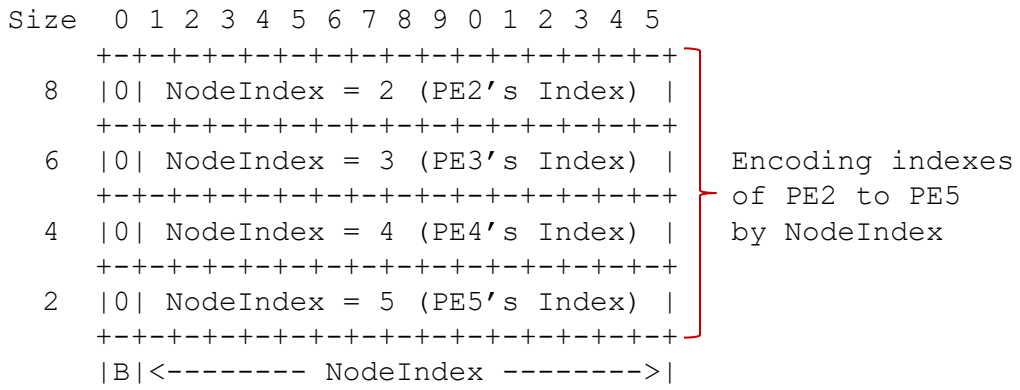
BitString's first bit (bit 0) with value 1 indicates the first node index 2 equal to 2 + 0; the BitString's second bit (bit 1) with value 1 indicates the second node index 3 equal to 2 + 1, and so on.



Indexes of PE2 to PE5 by string:
4 bytes, operations on 8 bits

A NodeIndex field with B = 0 represents a node index directly.

For example, the indexes of egresses PE2 to PE5 are represented by NodeIndex.



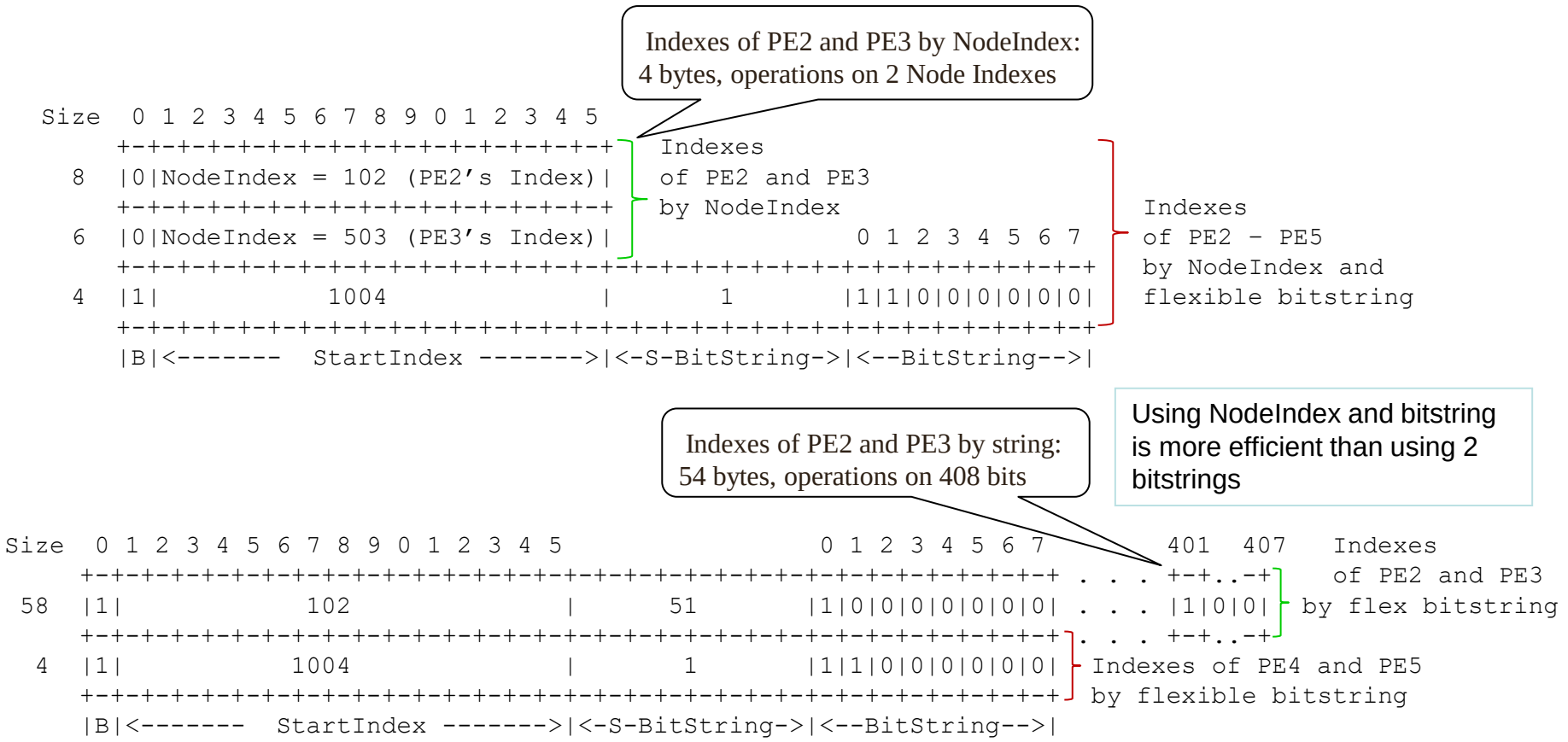
Indexes of PE2 to PE5 by NodeIndex:
8 bytes, operations on 4 Node Indexes

Using bitstring is more efficient than using NodeIndex

Solution 2 Specials: More Efficient Encoding

For a tree (i.e., egress nodes of tree), optimal or more efficient encoding is selected and used in MRH wrt space and processing time.

For example, for a tree from PE1 to PE2 – PE5,
if PE1 – PE5 have their indexes 2 – 5 respectively, encoding by flexible bitstring is selected;
If PE1 – PE5 have their indexes 102, 503, 1004 and 1005 respectively, encoding by NodeIndex and flexible bitstring is selected.



Next

Comments