BIER Slicing & Traffic Differentiation

draft-zzhang-bier-slicing-and-differentiation

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BIER, IETF112

Slicing Background

- From draft-ietf-teas-ietf-network-slices:
  - An IETF Network Slice is a logical network topology
  - Traffic associated with an IETF network slice is identified with a slice identifier
- From draft-bestbar-teas-ns-packet:
  - A Slice Aggregate (SA) “comprises of one of more IETF network slice traffic streams”
    - An SA gets SA-specific Per-Hop forwarding Behavior (S-PHB)
      - nexthop, queuing, etc..
    - An SA could be any of the following:
      - An entire slice
      - A set of entire slices (that share the same logical topology)
      - Some flows in a particular slice

Some BIER Background

- One or more BIER sub-domains map to a topology (N:1)
- Each sub-domain corresponds to a BIRT (1:1)
  - Calculated according to the topology
  - A BIRT maps to a set of BIFTs
    - Each BIFT corresponds to a (sub-domain, bitstring-len, set-id)
    - Each BIFT is identified by an opaque 20-bit number (BIFT-ID) in BIER packets
- BIER forwarding is based on BIFTs (derived from the BIRT)
  - In a particular sub-domain, all packets to a particular BFER are forwarded to the same (set of ECMP) nexthop BFR according to the BIRT
    - Other forwarding behaviors like queuing can be determined based on TC/DSCP bits

BIER with Slicing

- When an SA is a slice or a set of slices
  - It can map to a sub-domain
    - Up to 256 SAs can be supported
  - It can map to a BIRT
    - Now a BIRT 1:1 maps to <sub-domain, SA> instead of just a sub-domain
      - Because BIRT is calculated on a topology and the SA has a corresponding topology, this extension is reasonable
    - Up to 2^20 SAs can be supported in theory
    - This is desired even when there are fewer than 256 SAs
      - Less sub-domain related provisioning (e.g. BFR-IDs)
    - Corresponding IGP/BGP signaling extensions needed
  - An SA Selector (SS) maps to one or more BIFT-IDs

BIER with Fine Granularity Traffic Differentiation

- When a SA is for some flows in a slice
  - The SS maps to some TC/DSCP bits
  - If there are not enough bits, BIER extension header can be used
    - A “Proto” codepoint in BIER header indicates BIER extension headers follow
      - One of the extension headers carry the SS (if the <BIFT-id, TC/DSCP bits> tuple is not enough to identify an SA that is for some flows in a slice

BIER Extension Header

- draft-zzhang-intarea-generic-delivery-functions-02
- Still a developing idea for generic functions at different layers
  - Generic functions: fragmentation/reassembly, ESP/AH, In-situ OAM, traffic differentiation
  - Applicable to different layers: IPv6, BIER, MPLS, whatever
- Try to align MPLS/BIER extension header with IPv6 extension header structure
  - BIER extension header will be discussed in BIER

Next Steps

- Provide more signaling details
- Discuss BIER Extension Headers in BIER WG
  - For this and other purposes
- Comments appreciated!