Supporting BIER in non-MPLS IPv6 Networks

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IPv6 is Nothing Special to BIER

• Existing procedures defined for IPv4 non-MPLS networks apply to IPv6 with no need for any changes or enhancements
  • BIER header follows L2/tunnel header as L2/tunnel payload
    • Do need a new “next header” type defined for BIER in case of native IPv4/v6 tunnel

• IPv4/IPv6 tunneling/encap, if used, is just a transport means to BIER
  • Just like any other means, e.g. MPLS/GRE/whatever
  • Between BFRs not directly connected
    • BIER header is the beginning part of IP payload
    • IP encapsulation not needed between directly connected BFRs
  • IPv4/IPv6 and BIER are independent of each other
BIERin6

• draft-zhang-bier-bierin6 reflects the concepts in previous slide
• IPv6 encapsulation needed only between BFRs not directly connected
  • BIER header follows L2 header directly between directly connected BFRs
• It does *optionally* use IPv6 encapsulation even between directly connected BFRs
  • To allow certain platforms that does not yet support BIER Ethertype
  • To allow software-based BIER forwarding in certain deployment scenarios
• Purposes of this draft:
  • Specify the above *optional* feature
  • Explain how existing BIER procedures can work for IPv6 networks
BIERV6

- draft-xie-bier-ipv6-encapsulation
- BIER header is encoded in IPv6 Destination Options Header (DOH)
  - BFIR->BFER IPv6 encapsulation end-to-end
  - SRv6-style handling, with special overlay (MVPN/EVPN) procedures
- WG requested to have a requirements draft first
  - To justify this additional solution
  - Multiple solutions allowed *if there are significant advantages*
Requirements for Supporting BIER in IPv6

- draft-ietf-bier-ipv6-requirements

- Mandatory Requirements
  - Basically, support BIER architecture

- Optional Requirements
  - Fragmentation
  - IPsec ESP

- *Nothing IPv6 specific*
BIERin6 Satisfies All Listed Requirements

• Optional fragmentation/ESP requirements can be met by one of two methods

1. IPv6 encapsulation with fragmentation/ESP, then treated as BIER payload
   • L2/tunnel header + BIER header + IPv6 header
   • IPv6 encapsulation and BIER are independent of each other

2. Generic fragmentation/ESP (no IP encapsulation), then treated as BIER payload
   • L2/tunnel header + BIER header + Generic fragmentation/ESP header
   • No IP encapsulation and its overhead
   • draft-zzhang-.tsvwg-generic-transport-functions
     • Generically applicable to MPLS/BIER or any layer (even Ethernet if IEEE so desires)
BIERv6 Not Needed

• BIERin6, which is consistent with existing IPv4 solution, satisfies all requirements
  • No IPv6 overhead with BIERin6
    • Saves minimum 40 bytes compared to BIERv6
    • Use that 40 bytes for BitString – accommodates 320 more BFERs
• No need for BIERv6 as an additional solution
  • IPv6 encapsulation overhead with no obvious benefits
    • Why bother with BFIR->BFER IPv6 encapsulation
  • Complexities with handling BIER header encoding in DOH
    • Discussed separately
  • SRv6-style handling not needed but leads to complexities (e.g. MVPN procedures)
    • Hop-by-hop BIER forwarding does not need SRv6
    • BFIR/ BFER do not need SRv6 based network programming
Suggested Next Steps

• Adopt BIERin6 as WG document
• Discuss BIERv6 further