• Problem to solve
  – There is no status information of DS-Lite tunnel, e.g. tunnel up or down, which brings difficulties for operations and maintenance.
  – It is good to be able to detect failure and failover
  – Tools to resolve this problem: BFD, PCP, PING, …
• BFD for DS-Lite
  
  – Auto configuration
    
    In DS-Lite, B4 has the AFTR address, sufficient to initiate a BFD session, other parameters can be negotiated via signaling or static config, no manual configuration.
  
  – packet rate
    
    Long time period between BFD packets transmission, e.g. 10s or 30s
  
  – Failover
    
    If B4 detect a failure, it will switch to another AFTR
• **BFD for DS-Lite**

  BFD can provide some more functions besides connectivity

  Test

  – **Session state change reason**

  0 -- No Diagnostic
  1 -- Control Detection Time Expired
  2 -- Echo Function Failed
  3 -- Neighbor Signaled Session Down
  4 -- Forwarding Plane Reset
  5 -- Path Down
  6 -- Concatenated Path Down
  7 -- Administratively Down
  8 -- Reverse Concatenated Path Down
• PCP for DS-Lite
  – If PCP is available in DS-Lite deployment...

  – PCP to create a mapping with short lifetime, and update it periodically

  – If the client detect a failure, e.g. NETWORK_FAILURE error code is returned, client will switch to another PCP server or AFTR

  – PCP involve more modules(link, routing, NAT)
    In this sense, PCP encapsulation mode is better than plain mode.
• PING for DS-Lite
  – Common tool, can be sent periodically, or triggered manually when necessary
• Explicit failover VS anycast

1. ECMP for ME upstream; traffic is hashed based on source and destination of IP packet; for example, B4-1 traffic hashed to AFTR1;

2. If there is a PMTU failure, an ICMPv6 failure will be sent from ME to AFTR1;

3. Source and destination of ICMP6 packet is different with B4-1, this packet may be sent to AFTR2; PMTU negotiation will be failure;

ICMP error message problem in anycast
Explicit failover VS anycast

AFTR may use anycast address for receiving packet, and unicast address for sending packets to resolve the ICMP error message problem [section 4.2 of MAP-D]

But there is still a problem, e.g. PING, admin may ping the AFTR by anycast address, but receive response from another address ...