

# MVPN Explicit Tracking and S-PMSI Wildcards

- RFCs 6513/6514 provide *explicit tracking* mechanism, to be optionally used when sending S-PMSI A-D routes
- RFC 6625 allows *wildcards* to be used in the S-PMSI A-D route flow specifiers
- Some issues:
  1. Rules for explicit tracking never updated to handle wild cards
  2. Rules for explicit tracking at tunnel segmentation points (ABRs/ASBRs) never clearly specified
  3. For some tunnel types (e.g., BIER), explicit tracking procedures very inefficient, could benefit from wildcard-specific optimization.
- Draft-dolganow-bess-expl-track addresses these issues
  - (Thanks to original authors for raising 1 and 2 as issues!)

# MVPN Explicit Tracking Mechanism

- RFCs 6513/6514 provide an optional mechanism to allow the ingress node for a flow to discover the egress nodes
  - Send S-PMSI A-D route identifying flow
  - Set **LIR** bit (aka **L** bit) in PMSI Tunnel attribute
  - Egress nodes respond with Leaf A-D routes identifying flow
- S-PMSI A-D route usually identifies tunnel on which flow is to be transmitted
  - Use of **LIR** is mandatory for certain kinds of tunnel type, optional for others
- Option to send S-PMSI A-D route without tunnel info, in order to get explicit tracking information

# Wild Cards

- Before wildcards, finding *selective tunnel* on which to expect (S,G) traffic was primarily a matter of finding an (S,G) S-PMSI route from the ingress (*match for reception*)
- With wildcards, there can be more than one match:
  - e.g., (S,G) flow matches (S,G) S-PMSI and (\*,\*) S-PMSI
  - Some matches are *more specific* than others
- Fix to RFC6625: match for reception is not simply the most specific match, it is the most specific match that specifies a tunnel!

# Wild Cards and Explicit Tracking

- Need to introduce notion of *match for tracking*:
- May be more specific than *match for reception*. E.g.:
  - (\*,\*) S-PMSI specifies tunnel
  - (S1,G1) S-PMSI does not specify tunnel, but sets **LIR**
  - No (S2,G2) S-PMSI
  - Then (S1,G1) and (S2,G2) travel on (\*,\*) tunnel, but only (S1,G1) is tracked
- More specific match for reception may block tracking:
  - (\*,\*) S-PMSI specifies tunnel and sets **LIR**
  - (S1,G1) S-PMSI specifies tunnel and does not set **LIR**
  - Then (S1,G1) is not tracked.
  - (\*,\*) gets tracked, but not at per-flow granularity

# Inter-domain Explicit Tracking without Tunnel Specification

- (See draft for details, no time now 😊)

# Explicit Tracking for BIER

- In BIER, every packet carries the list of its egress nodes (within a domain), one bit per node
- To specify that BIER is being used, send (\*,\*) S-PMSI with PMSI Tunnel attribute specifying “BIER tunnel”.
- But for optimal forwarding, need explicit tracking for each flow!
- MVPN-BIER draft now says:
  - Send (\*,\*) S-PMSI (as above), and also
  - Send (S,G) S-PMSI for each flow, setting **LIR** but omitting tunnel
  - Shouldn't it be possible to do this with less signaling?

# Optimized Explicit Tracking (for BIER)

- Define new flag in PMSI Tunnel Attribute:
  - **LIR-pF** (**L**eam **I**nfo **R**equired per **F**low)
  - Set it in (\*,\*) S-PMSI that specifies BIER tunnel
  - Egress nodes respond with Leaf A-D routes that specify **not** (\*,\*) **but** (S,G)
  - Therefore: single message from ingress triggers per-flow explicit tracking
  - Leaf A-D construction rules modified to indicate that the Leaf A-D routes were triggered by **LIR-pF** rather than **LIR**