Forwarding Actions
draft-kompella-mpls-mspl4fa

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Genesis of draft

• to initiate discussion into the use of the TC/TTL fields to increase the expressiveness of a bSPL (and potentially, eSPL)
• to capture multiple forwarding actions with a single bSPL
• to expand the data fields associated with an SPL from 20 to 31 bits
• to allow for dynamic/policy-based definition of the data fields
• to do this efficiently in today’s forwarding pipelines
Indicators

• A bSPL “indicates” forwarding actions and possible associated data
  • Forwarding actions: router alert, NFFRR
  • Associated data, either in the label stack: ELI, Flow ID, GISS; or after the label stack: EHI, GAL, GDF, OAM
  • New requests for bSPLs are similar (NFFRR, GDF, GISS, Flow ID, EHI, …)

• The FAI proposes to use “indicator flags” instead of an entire label for this purpose
  • to solve the above problems, including …
bSPL scarcity

- Among the topics discussed in the DT
- 8 of 16 bSPLs have been allocated
  - RFC 7274 introduces extended SPLs, but each needs two labels
- Currently, there are requests for 6 bSPLs of the 8 remaining
- The FAI proposal allows a single bSPL to capture 10* actions; with each extension, another 30* actions can be captured for four octets
  - The bSPL scarcity problem can be put to rest
  - We may never need extended SPLs (besides the two already allocated)

* using one bit for extension
Two Tracks for the DT

Extend the MPLS architecture to take into account forwarding requirements and forwarding hardware for the 21st century

• within the label stack (LS)
• after the EoS (payload or PL)

This draft focuses on LS data

• Indicators for PL data are also needed
• One proposal is that PL data be self-describing
  • If so, detailed indicators are not needed in the FAI
-00 version

• Had an “Opaque Data” field, where the semantics of the data was determined by policy (not elaborated in the draft)
  • (some issues to solve; see slide 9)

• Had a “FA Header” for expansion of the flags (not elaborated)

• Both were raised in the DT discussions
-01 version

- Elaborated on the use of the FA header for expansion
- Started rationale for when data should be in the LS vs in the PL
- Moved flags around, made space for “edist”
  - Distance in words to the end of stack, to optimized PL access
- Updated processing of the LS FAD and examples
Discussion Points (1)

• The FAI *must* be processed efficiently in the data path
  • A TLV structure is flexible, but not the most efficient; hence the use of flags
  • Other approaches?

• Should future bSPLs use a similar approach?
  • What this draft proposes may be the first: “FAI-1”
  • Even eSPLs can use this approach

• Rationale of when to put data in LS versus in PL
  • Centers on the use of data and the efficiency of the data plane

• Multiple FAIs in a label stack (e.g., FAI per segment)

• The value of having “edist” vs 4 more indicator flags
  • Label stacks are getting very large, so finding the EoS efficiently is useful
Discussion Points (2)

• The idea of flexible definition of forwarding actions and associated data (using policy or other means) should be debated
  • This allows flags/fields to be programmable and associated actions to be on-demand

• Potential issues are:
  • Efficiency
  • Consistency across the network
  • Multivendor consistency
  • Incremental change of definition

• Standard actions and flexible FAI are not mutually exclusive
  • The Q flag indicates that such data exists