Use of an MPLS LSE as an Ancillary Data Pointer

draft-bryant-mpls-aux-data-pointer-00

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Background / Motivation

Problem Statement

- Certain use cases benefit from ancillary data processed/accessed as part of a forwarding decision
- Problem : How to add information to MPLS packets in a way that is:
  - Suitable for efficient high speed forwarding.
  - Easy for the more modern existing hw to add the feature.
  - Backwards compatible in terms of basic forwarding with legacy hw

Approaches Proposed So Far

- The approaches that have been proposed so far* rely on the forwarder:
  - Finding out if the there is applicable ancillary data below BoS
  - Deducing which of the ancillary data applies to this hop
- Some methods make it easier to deduce if there is data, but not where the data is.
- None of the proposed methods deal well with case of ancillary data that is different at different hops.
- This approach builds on the observation in draft-kompella-mpls-mspl4fa that if an LSE is not ToS the TC and TTL bits are not used.

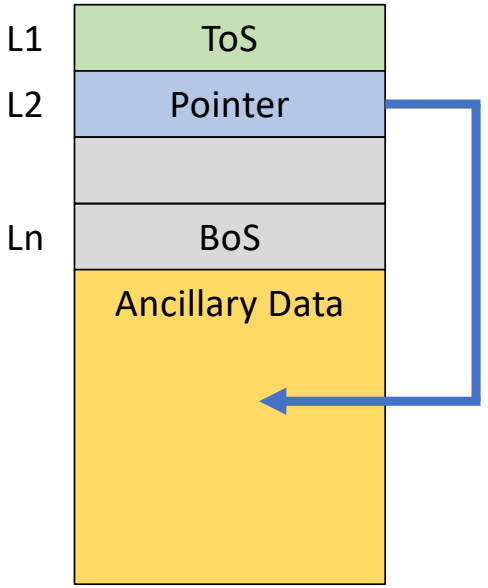
* Except draft-stein-srtsn which puts the information in the stack

Concept / Vision

Basic idea and possible extensions/variations

Core Idea

- Use the “spare” non-ToS fields as a pointer to the ancillary data applicable at this hop.
- Semantic: “Process as described by L1, using the information pointed to by L2”
- Forwards normally when L2 not a pointer or when LSR does not understand the pointer mechanism



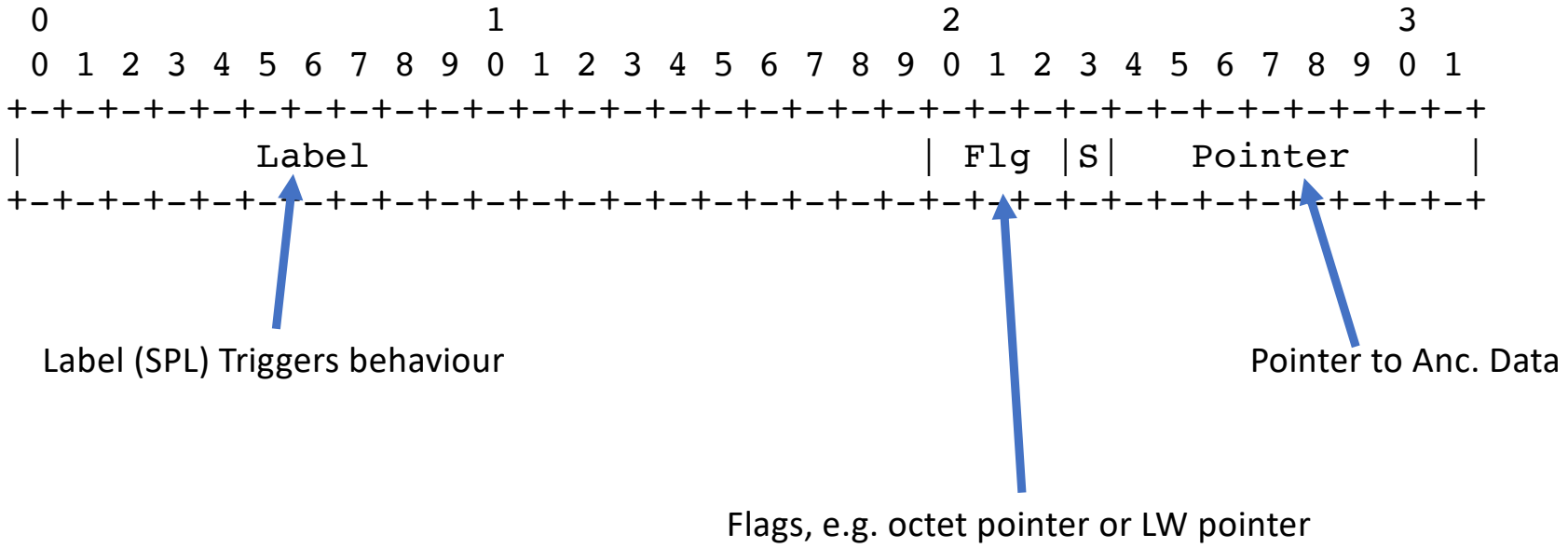
Advantages

- Ability to find the ancillary data without reading the whole of the stack
  - Speculative processing can be expensive
- Ability to specify which ancillary data is applicable applicable to which forwarding label
- Simplifies packet parser as no deduction or discursion needed
- Inherently general and extensible.

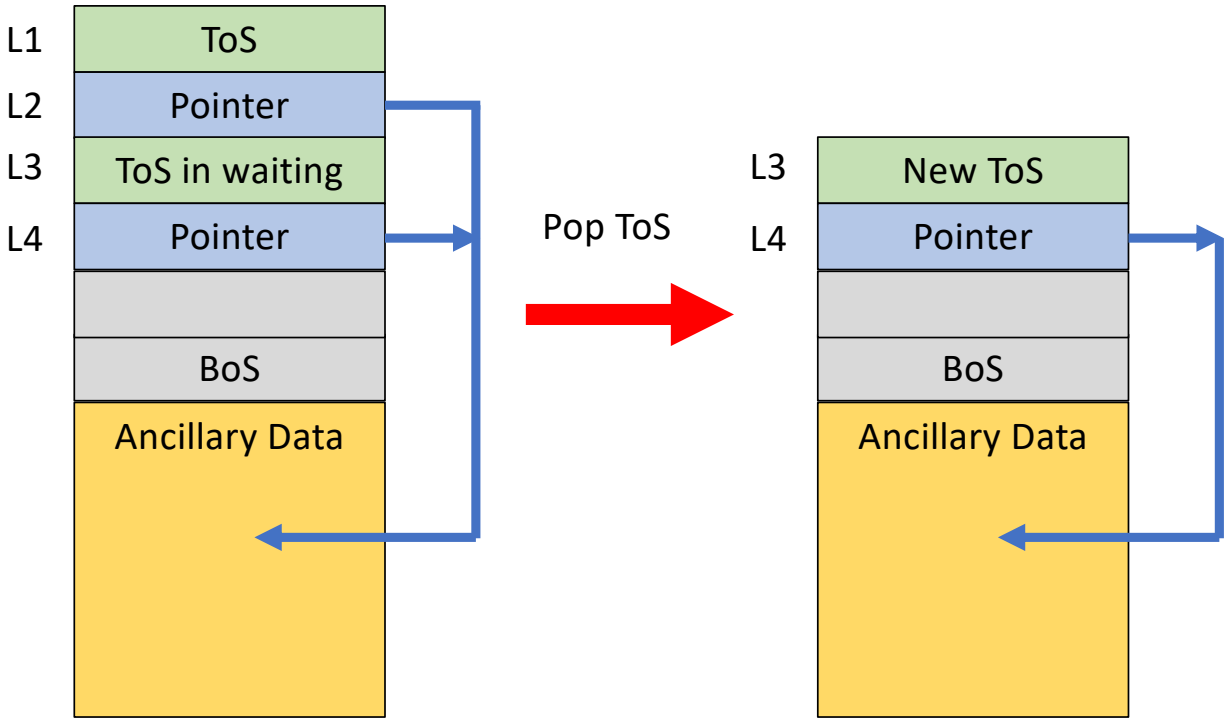
Special Purpose Label

- Assumption: pointer will an SPL of some sort.
- Could make ToS indicate pointer follows, BUT that means
  - We need to change the FEC of the ToS label
  - We no longer have legacy compatibility
  - We will need more labels in the global label table.
    - Increased cost of distribution and management
    - Some LSRs (particularly PE LSRs) are already saturating the global label table.
- We investigate another approach later in draft.

Pointer LSE


0 1 2 3
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
Label
Flg
S
Pointer
Label (SPL) Triggers behaviour
Flags, e.g. octet pointer or LW pointer
Pointer to Anc. Data

Single Pointer From Multiple LSEs

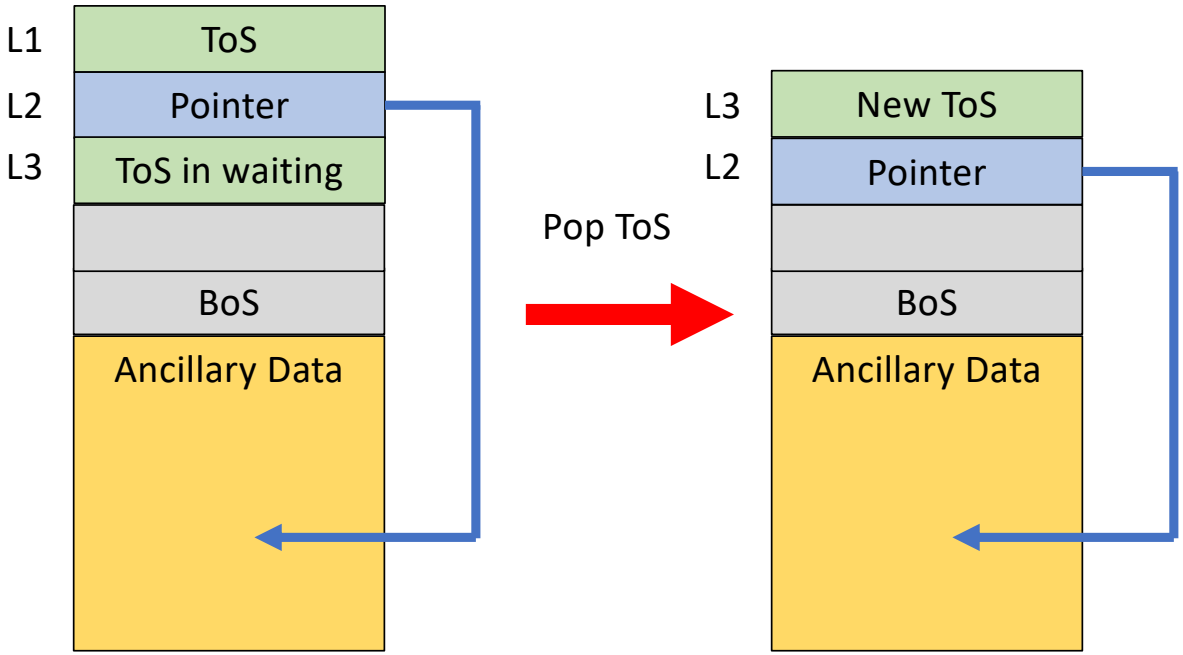


- Applicable to any label stack
- Particularly applicable to SR

BUT

- Not efficient in use of stack space to duplicate pointers

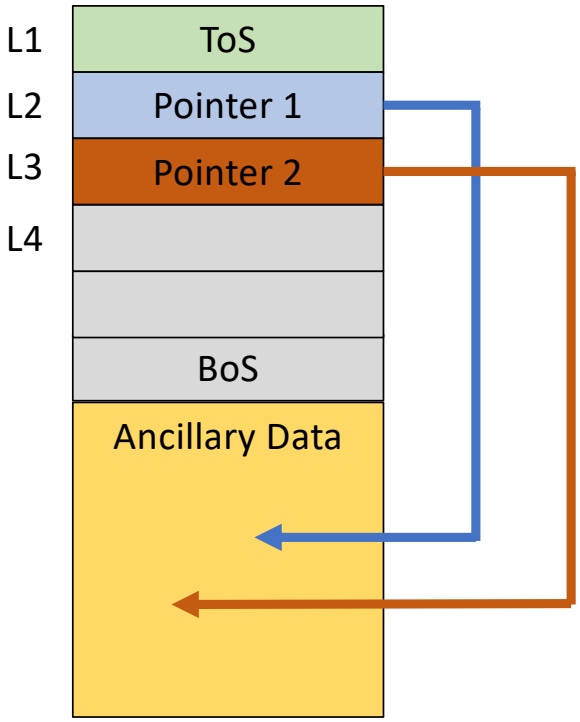
A More Efficient Approach



- Use an in-stack move (swap)
- More efficient in stack space
- More complex than simple Pop
- Need to correct pointer – subtract 4 bytes

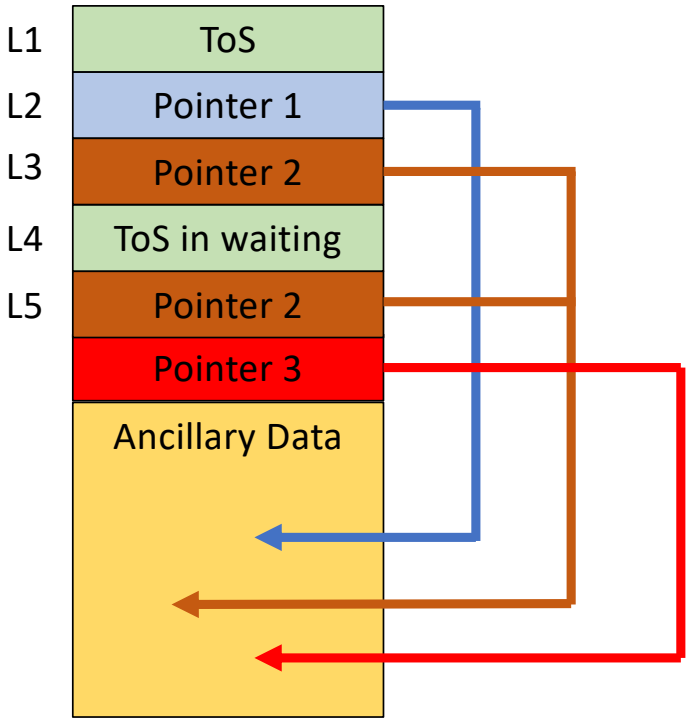
- Problem – how to know when to stop propagating the pointer LSE?
  - “TTL” in pointer ?
  - Bit in L3 ?
  - FEC of L3 ?
  - Pointer pop SPL?

Multiple Pointers



- There are times when multiple pointers are needed, for example iOAM and LBF
- L1, L2 and L3 are a group of pointers for pop and “in-stack swap” operations
- The semantic is “Process as described by L1, using the information pointed to by L2 and L3”

Multiple Pointers cont



- Pointer groups can include pointers to objects in common with other pointer groups and unique pointers.

Details

WIP – Work in Progress

Disposition of Ancillary Data

- Ancillary data needs to be removed before the payload is passed out of the MPLS domain.
- This can be a lot more complicated that just dispose of n bytes.
- Some methods:
  - FEC of BoS LSE (as in PW or MPLS VPN)
  - SPL at BoS
  - BoS LSE can point to ancillary data that describes the disposition. This is a powerful approach.

SPL or Regular Label?

- SPLs are in short supply
- ESPLs need twice the stack space
- Could we use a regular label as a pointer label?
- We are not talking global labels here we are talking of a small number of network wide agreed labels to be specially recognized by the forwarder.
- We do not need a common label block in the normal sense (as needed by SR) since these labels will not appear in the FIB.
- We will have to modify the label manager in LSRs that could have these labels in the FIB to exclude these labels. That is work but should not be “hard”.
- Applicable to pointers and other types of indicator label.

Ancillary vs Auxiliary vs Metadata

- Metadata(sic): data whose purpose is to describe and give information about other data.
  - Not really what is happening
- Auxiliary: Helpful, assistant, affording aid, rendering assistance, giving support or succour(sic).
  - Sounds better suited to our use of the data
- Ancillary: Designating activities and services that provide essential support to the functioning of a central service or industry
  - Sounds like we are doing

Source Oxford English Dictionary

Questions