MNA ISD Limitation Analysis

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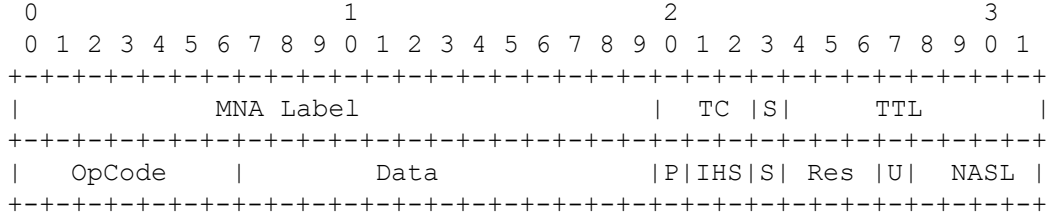
Size Limitation of ISD

- The purpose of ISD
  - Making the MNA information close to the top of label stack, so that legacy devices can parse and process it.
  - It is also to create an MNA that is readily accessible for all the network nodes
  - This means the size of ISD should be small (e.g. 3 LSEs or less), otherwise it should be encapsulated as PSD
- Thus legacy hardware's capability in label stack parsing & processing needs to be considered
  - The typical number is from 5 to 7 labels (more input on this is welcome)
  - Two or more labels are used as tunnel labels, service label, etc.
- Then the length of ISD would be limited to 3 to 5 LSEs
  - This include the MNA label followed by a format B LSE
  - Leaves only 1 to 3 LSEs for additional opcodes and data

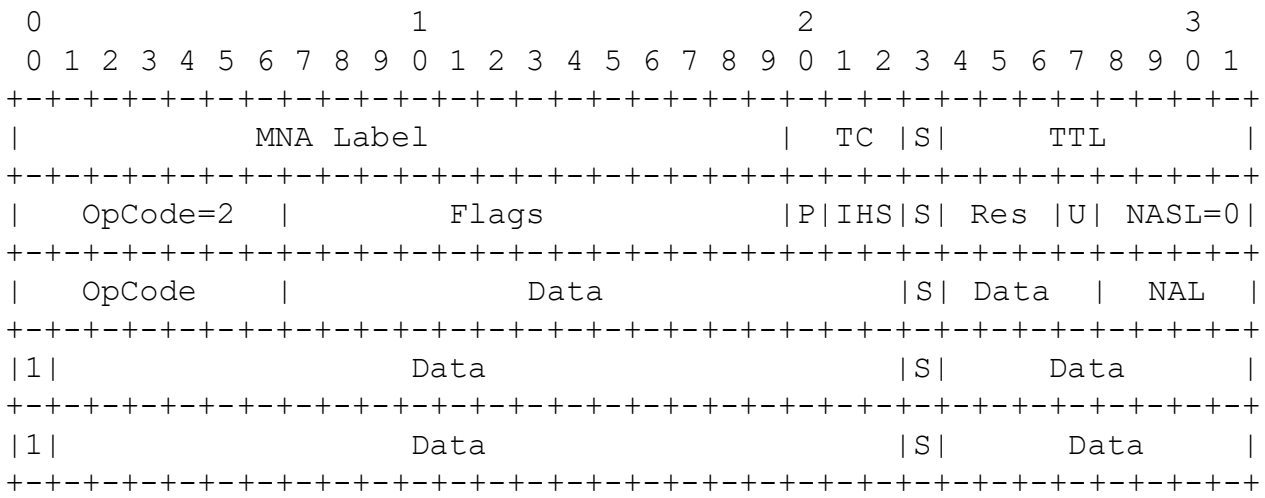
Minimal NAS



- When multiple copies of ISD need to be carried in the label stack
  - Need to consider the number of LSEs the ingress node is capable to impose

Encoding Limitation of ISD

- The encoding of ISD data is based on Opcodes



- The action flags and data are carried in separate opcodes
  - Opcode 3 (Flag based NAIs with AD) has been removed
  - For applications which needs both flag and data, the encoding would not be quite efficient
- For a specific opcode, the data format is constrained by the position of the S bit and other fields
  - Is variable length data allowed for one opcode? Or multiple opcodes for the same application may be needed?
  - Is TLV format supported in the opcode?
  - How to accommodate the application data whose format is independent from the transport data plane?

Processing Limitation of ISD

- To avoid the impact to traffic flow forwarding, the first 20 bits (the label field) of every LSE in the ISD MUST NOT be changed
  - The room available for writable data is limited to
    - 0 bits for LSE format B;
    - 7 bits for LSE format C;
    - 11 bits for LSE format D;
- Modification to LSEs which are not at the top of the label stack is a new behavior to MPLS implementation
  - Need investigation in both the availability and performance
  - One typical use case is NFFRR
- When multiple copies of ISDs are carried in the label stack, a node is only able to reach and write in some of the ISDs
  - Which would result in out of sync among the replicated ISDs

Conclusions

- ISD is useful for (legacy) devices to support some of the MNA functionalities
  - Easy to reach in the packet
- There are limitations of MNA ISD which may impact its applicability in some use cases
  - Data size
  - Data encoding
  - Data processing
- These limitations needs to be understood and documented
- For applications which require to break these limitations, PSD would be needed
  - IOAM: data size and encoding
  - Detnet: data size and processing
  - NFFRR: data processing

WG Chair Questions

1. Are there sufficient use cases to motivate PSD?
   - If yes, can the use cases be solved with ISD?

Yes, IOAM and Detnet are two use cases which would need PSD due to the data size.

2. Is the PSD use case / solution compellingly less complex than ISD?

It is not about complexity, it is about the capability and ISD limitations

3. Do some use cases for ISD prohibitively increase the stack depth?

For IOAM, the stack depth will be increased.

4. Are the use cases motivating PSD such that PSD solutions are required urgently/immediately? What is the time window to target?

PSD is needed to solve the limitations of ISD as mentioned.

5. Are there compatibility issues with PSD? What are they and what is the impact?

The order between PSD and other post stack information needs to be specified.

Thank You