RPR Frame Transmission Proposal Overview

Marc Holness, Nortel Networks

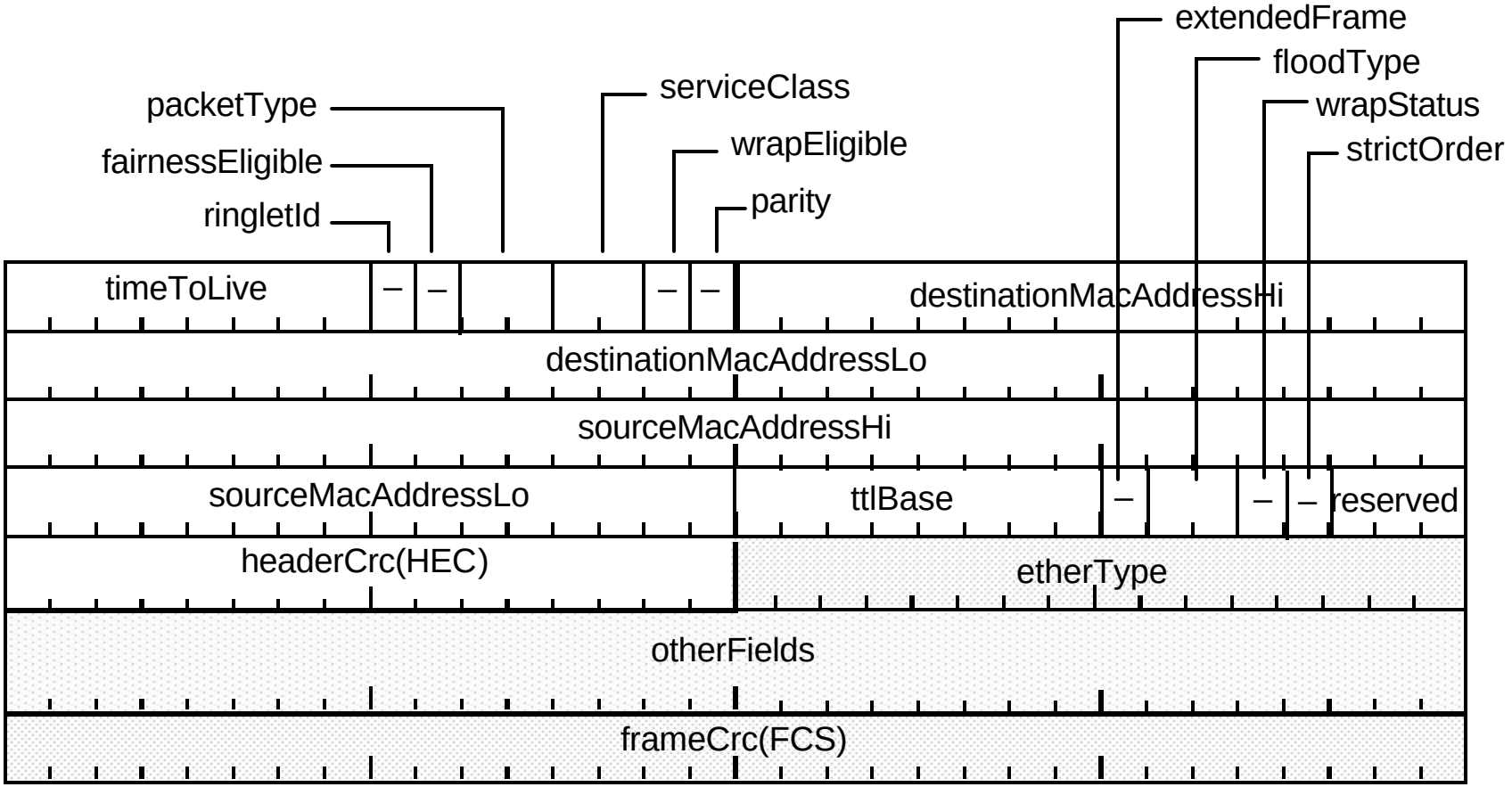
Objective

- Provide overview of frame transmission technique outlined in contribution text mh_frame_transmission_01.pdf
- Demonstrate adherence to 802.1 MAC service requirements (i.e., frame reorder prevention, duplication prevention, loss permitted)

Frame transmission types

1. Strict: Adheres to 802.1 frame reorder, duplication, and loss requirements
   - There is no guarantee that Service Data Units (SDUs) are delivered
   - Reordering of frames with a given user priority for a given combination of SA and DA is not permitted
   - Duplication of user data frames is not permitted
2. Relaxed: Adheres to 802.1 requirements under “normal” ring operation
   - In the advent of a protection event, an minimal amount of reorder and/or duplication can be encountered, however with a greater chance of frame delivery

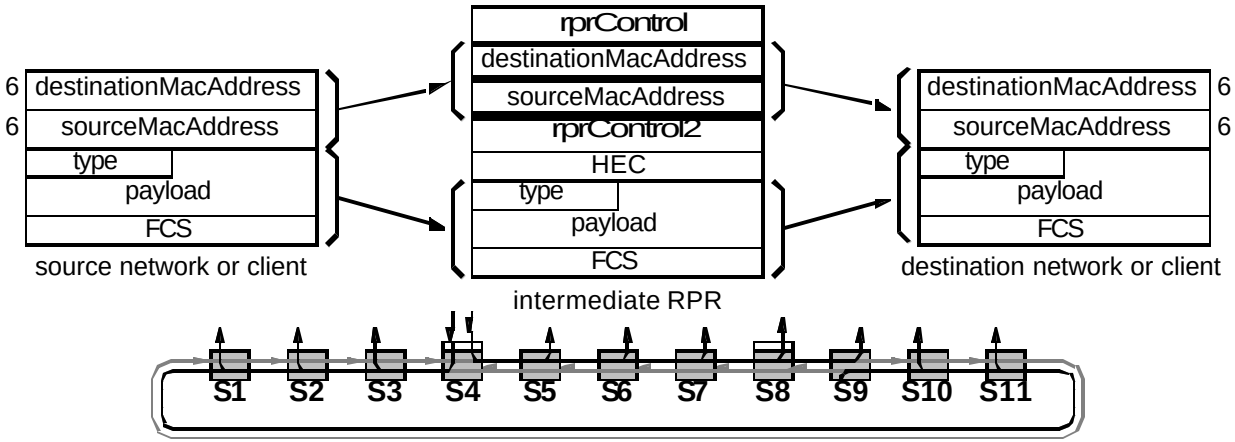
Frame structure



Local frame transmissions - Frame usage

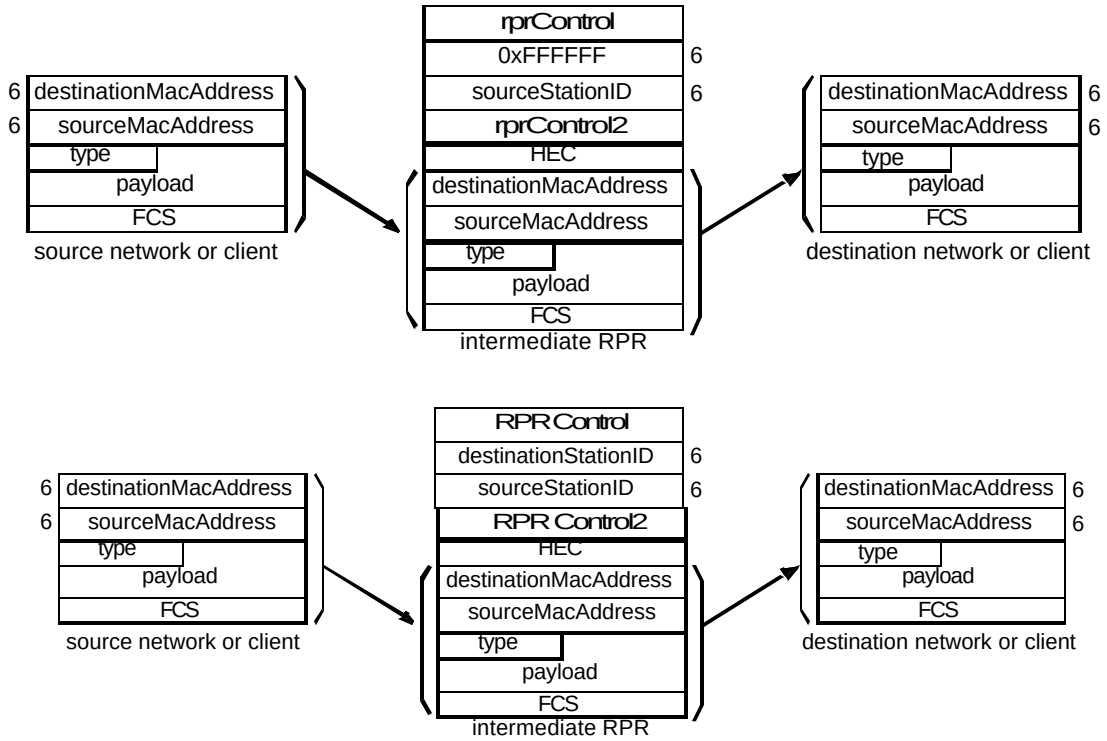
- Single uniform (non-extended) frame structure supports local
  - Unicast,
  - Multicast,
  - Broadcast, and
  - Unknown unicast

strict transmissions for both unidirectional and bidirectional flooding



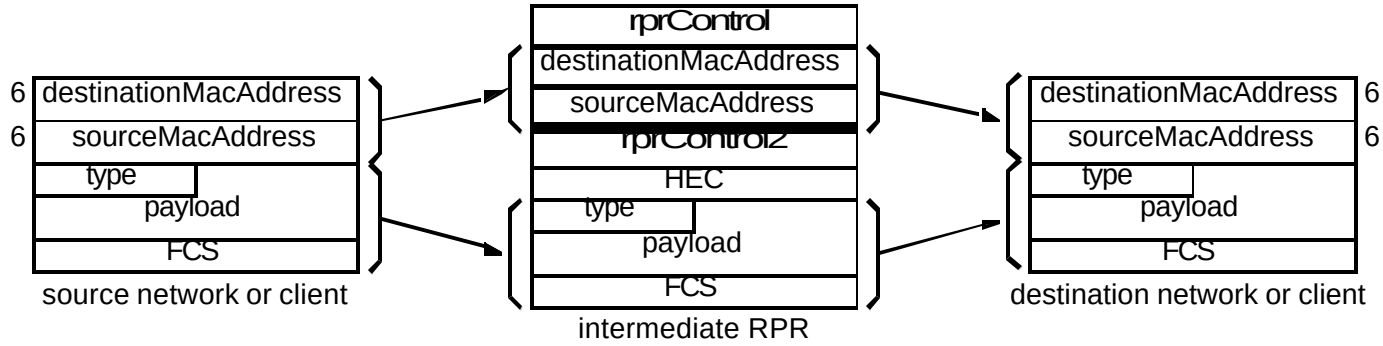
Remote frame transmissions - Frame usage

- Frame structure (extended) supports ***strict*** remote frame transmissions for basic bridging clients as well as enhanced bridging clients



Remote frame transmissions - Frame usage

- Frame structure (non-extended) supports ***relaxed*** remote frame transmissions for basic bridging clients (using *timeToLive* and *floodType* fields)



Reorder and duplication prevention mechanisms

Strict transmissions use the following mechanisms to adhere to the 802.1 MAC service requirements

1. Source consistency checking rule
   - Supports passthru while preventing reorder and duplication
2. Context containment (a.k.a., purging)
   - Prevents frame reorder for both steering and wrapping systems
3. Wrap and return wrapping rules
   - Prevents frame duplication and reorder

Benefits (1)

- Straight forward frame encoding scheme and field semantics
- Efficiency: Since source address based consistency checking, inherent efficiencies (i.e., 802 MAC and ring bandwidth utilization) resulting from processing multicast and broadcast *destinationMACAddress* are maintained, for both bidirectional and unidirectional floods

Benefits (2)

- Uniformity: Can support all local frame transmissions (e.g., unicast, multicast, broadcast, unknown unicast)
  - With the same (non-extended) frame format
  - For both strict and relaxed transmissions
  - For unidirectional or bidirectional transmissions
- Efficiency: All relaxed transmissions can use the non-extended frame format; only exception is enhanced bridging

Benefits (3)

- Extendibility: Capable of supporting additional transmission requirements without complicating or compromising frame encoding scheme
- Implementation impact: Source consistency checking have no CAM lookup requirements and always check against the *frame.sourceMACAddress* field

BACK UP

Context containment

- Constraints the number of context on the ring (to one)
- This mechanism removes (i.e., purges) strict data frames on the ring when a change in the topology and status database is detected
- The purge of strict data frames occur for a specified duration
- Purge in-flight strict data frames transmitted using an outdated context from the ring before transmission of strict data frames transmitted using a new context

Source consistency checking

- Steering and wrapping systems use source based consistency checks to prevent duplication and reorder of strict frames

```
SRC[hops]!=frame.SA
```

- On a primary ringlet, hops is computed as

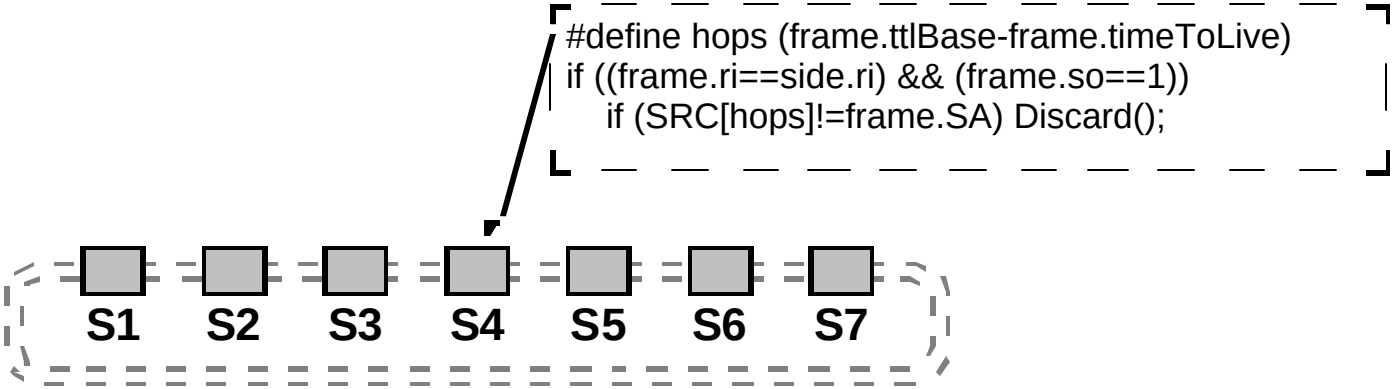
```
frame.ttlBase-frame.timeToLive
```

- On a secondary ringlet (i.e., ringlet wrapped packet travels), hops is computed as

```
(NoOfStations-2)-(frame.ttlBase-frame.timeToLive)
```

Source consistency check

- Data frames on primary ringlet with a strict indication are discarded if source consistency rule fails



Wrap and return-wrap rules

- Wrap related checks are illustrated below