RSVP Refresh Overhead Reduction - rfc 2961 Support

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Layout

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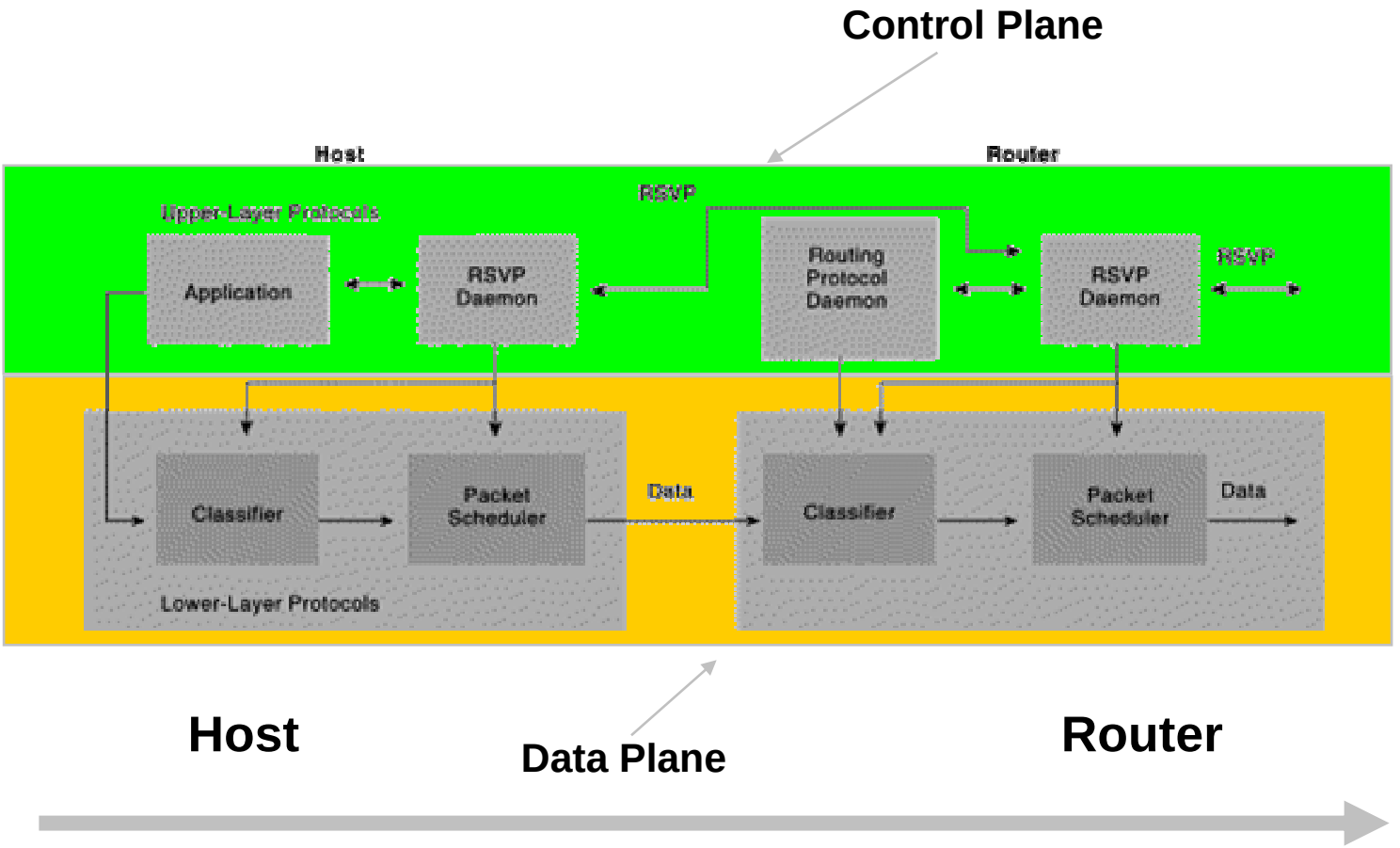
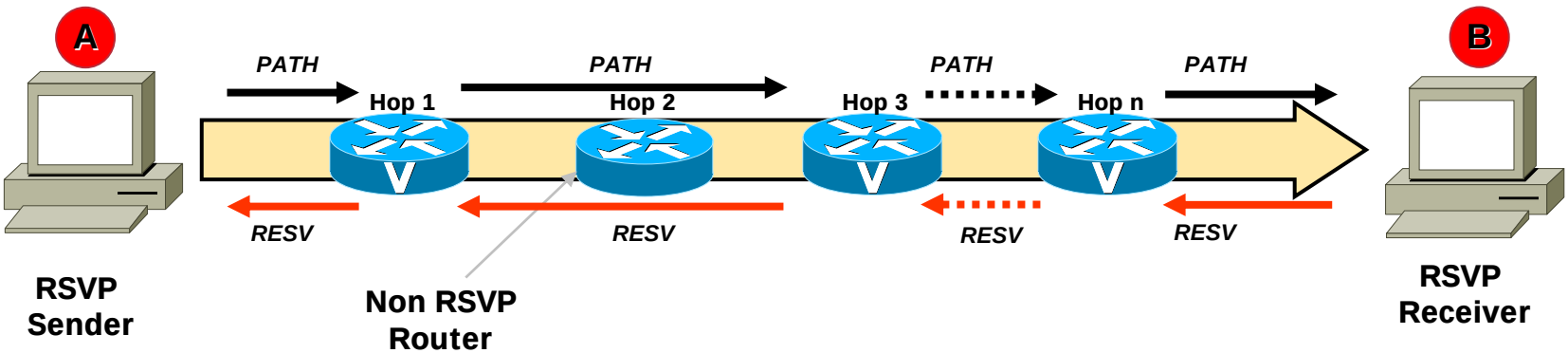
RSVP Architecture



RESV and PATH Messages

- **Path messages**

A *Server generates PATH message toward requested receiver. PATH messages are fwd'ed to each hop*

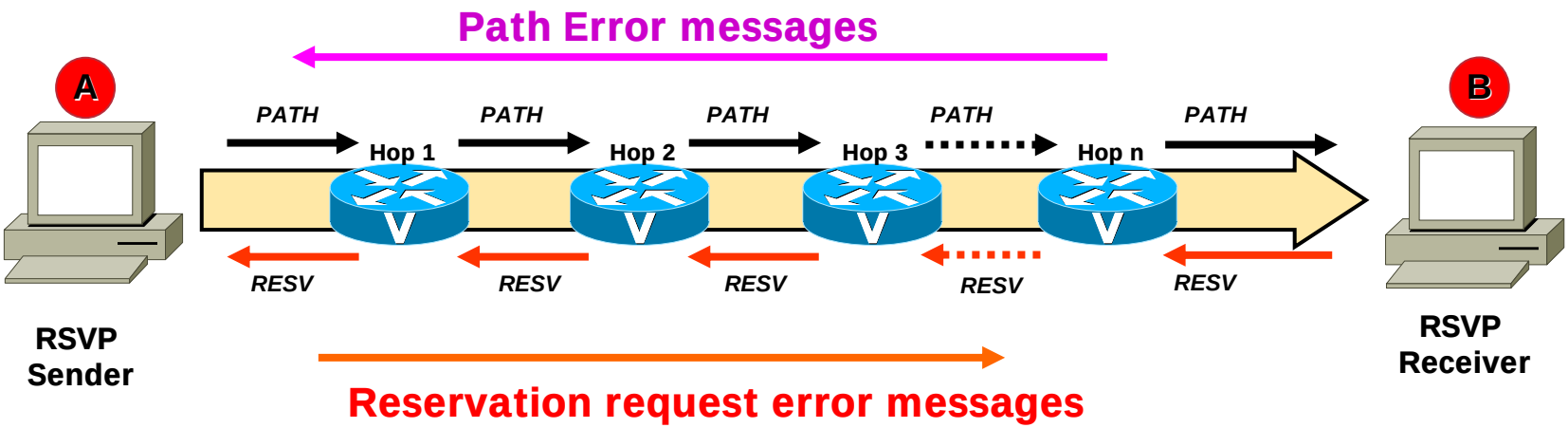


B *Receiver generates RESV message which inversely traverses the path.*

- **Reservation request messages**

ERROR Messages

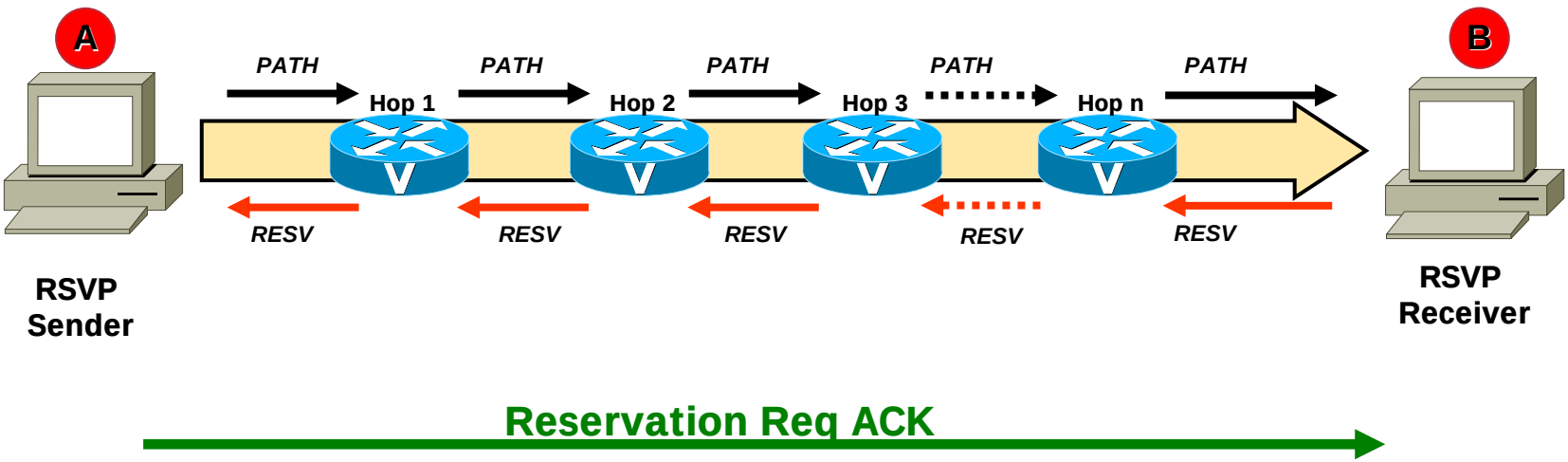
- Path Error messages result from path messages and travel toward senders



- Reservation request error messages →
  - Admission failure
  - Bandwidth unavailable
  - Service not supported
  - Bad flow specification
  - Ambiguous path

Confirmation Messages

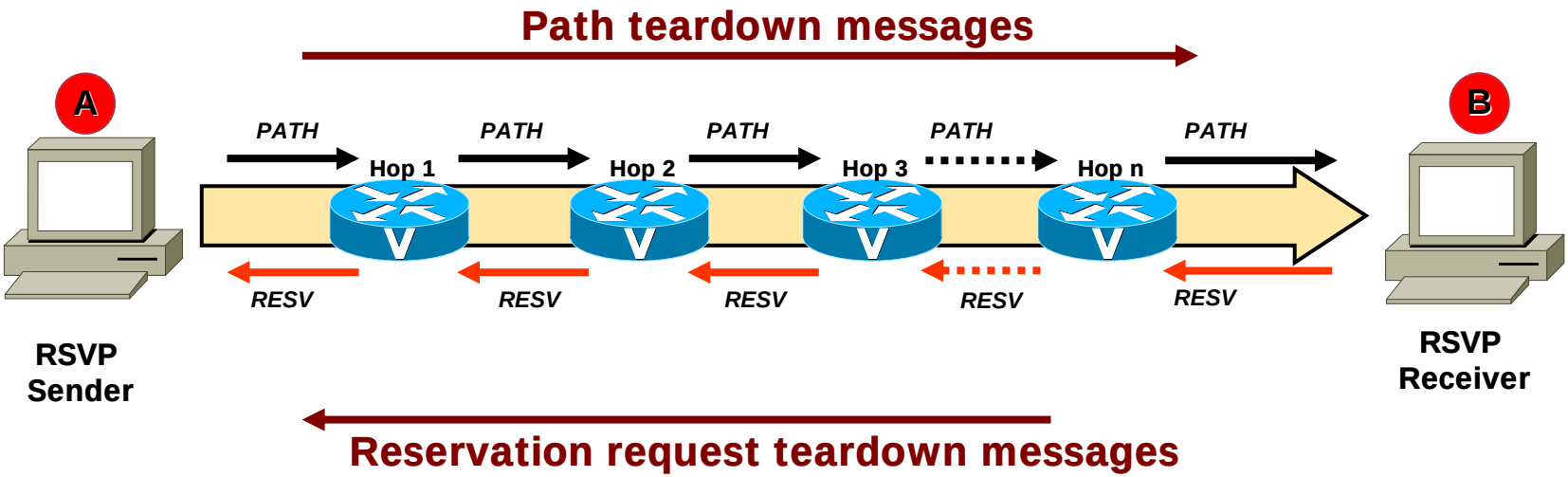
- Reservation request acknowledgment messages



- These messages travel towards the receiver.

Teardown Messages

Two Types →
- Path teardown messages
- Reservation request teardown messages



Both types travel from the point of initiation

Issues with RSVP Refresh signaling

- **RSVP is a "soft state" protocol; i.e., it maintains state in each router or host**
- **State needs to be periodically refreshed – thus Refresh Messages are required**
- **Refresh Messages are used for:**

  State Synchronization between RSVP neighbors

  Recover from Lost RSVP Messages

- **Operational problems with Refresh Signaling**

  Scaling **– Number of RSVP sessions $\propto$ Overhead refresh traffic $\propto$ Resource Requirements (processing/memory)**

  Reliability and Latency **– Based on Refresh Period:**

  Greater Refresh Period $\Rightarrow$ Longer time to synchronize state

  Lower Refresh Period $\Rightarrow$ Greater refresh signaling volume

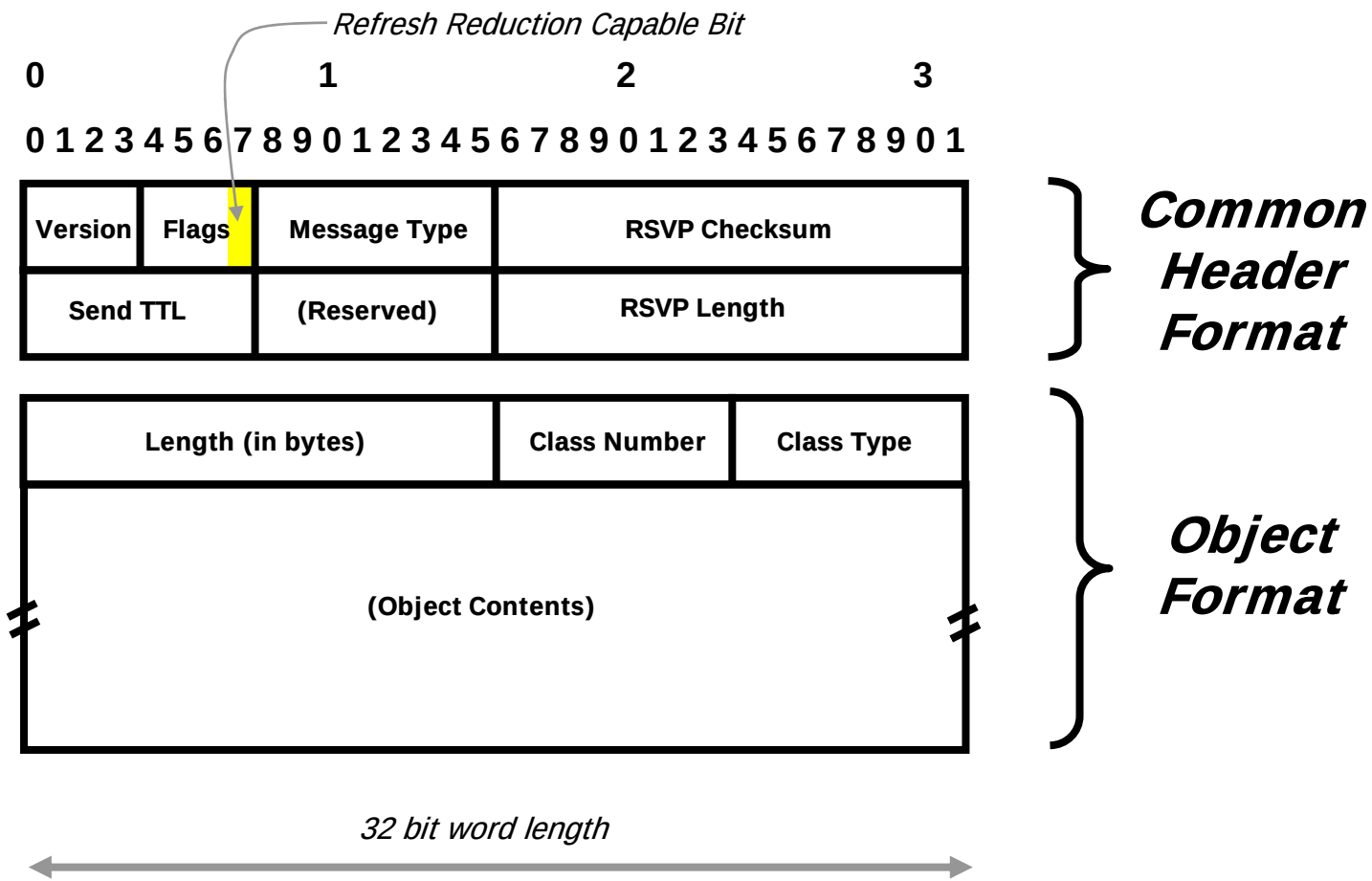
What is Refresh Reduction?

Refresh Reduction Extensions are defined in IETF RFC - rfc2961.

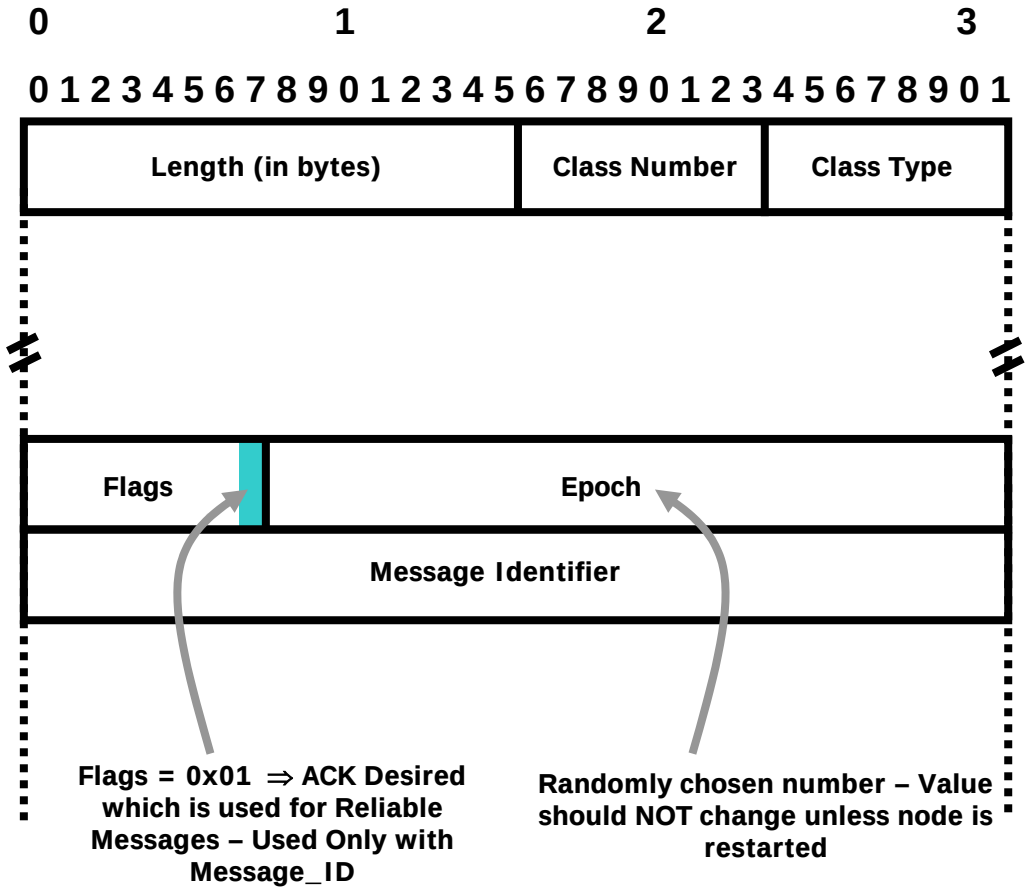
The following have been implemented as part of Reliability Enhancements for RSVP in Cisco IOS:

- **Add a "refresh-reduction-capable-bit" in RSVP message headers – indicates whether node is Refresh Reduction capable.**
- **Support for Message IDs – RSVP session "identifiers"**
- **Reliable Messages – Using Message IDs with explicit Acknowledgements and rapid retransmission**
- **Summary Refresh Messages – Uses Message IDs to refresh state rather than using PATH/RESV refresh messages.**
- **Bundle Refresh Messages – Ability to "Receive Only" is being implemented.**

RSVP Headers/Objects – A recap



Message ID Object Formats



Message_ID

Class Number = 23

Class Type = 1

Message_ID_ACK

Class Number = 24

Class Type = 1

Message_ID_NACK

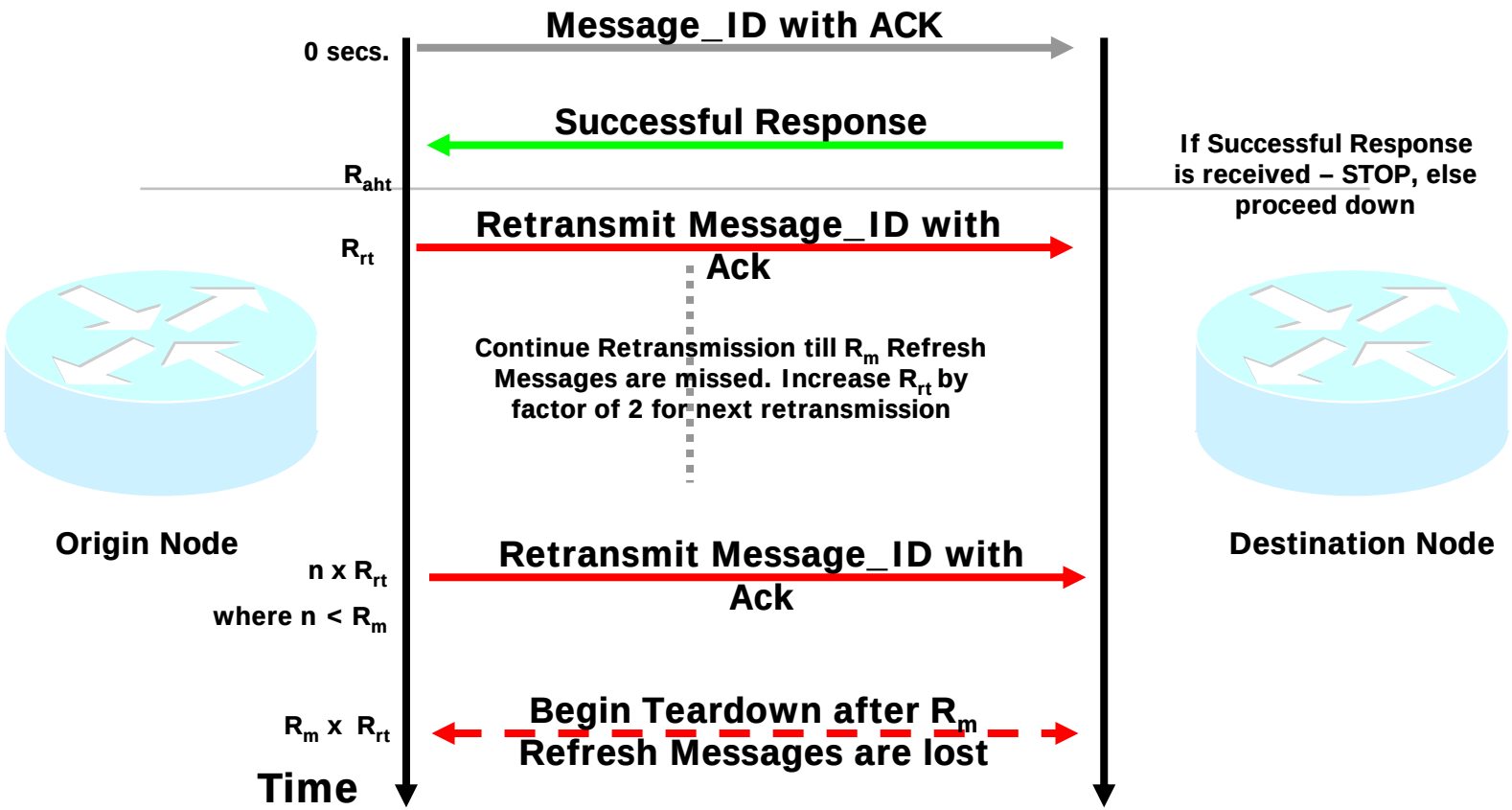
Class Number = 24

Class Type = 2

Reliable Messages

R_{rt} = Retransmit Time; R_{aht} = Acknowledgement Hold Time;

R_m = Successive Refresh Messages Missed



Summary of IOS Commands for Reliable Messages

ip rsvp signalling refresh reduction

Enables Refresh Reduction on interface

ip rsvp signalling refresh reduction reliable ack-hold-time

Time to wait for Acknowledgement – should be less than retransmit time

ip rsvp signalling refresh reduction reliable ack-max-size

Controls size of Ack messages – lower size means fewer acks per message, higher size means more acks per message

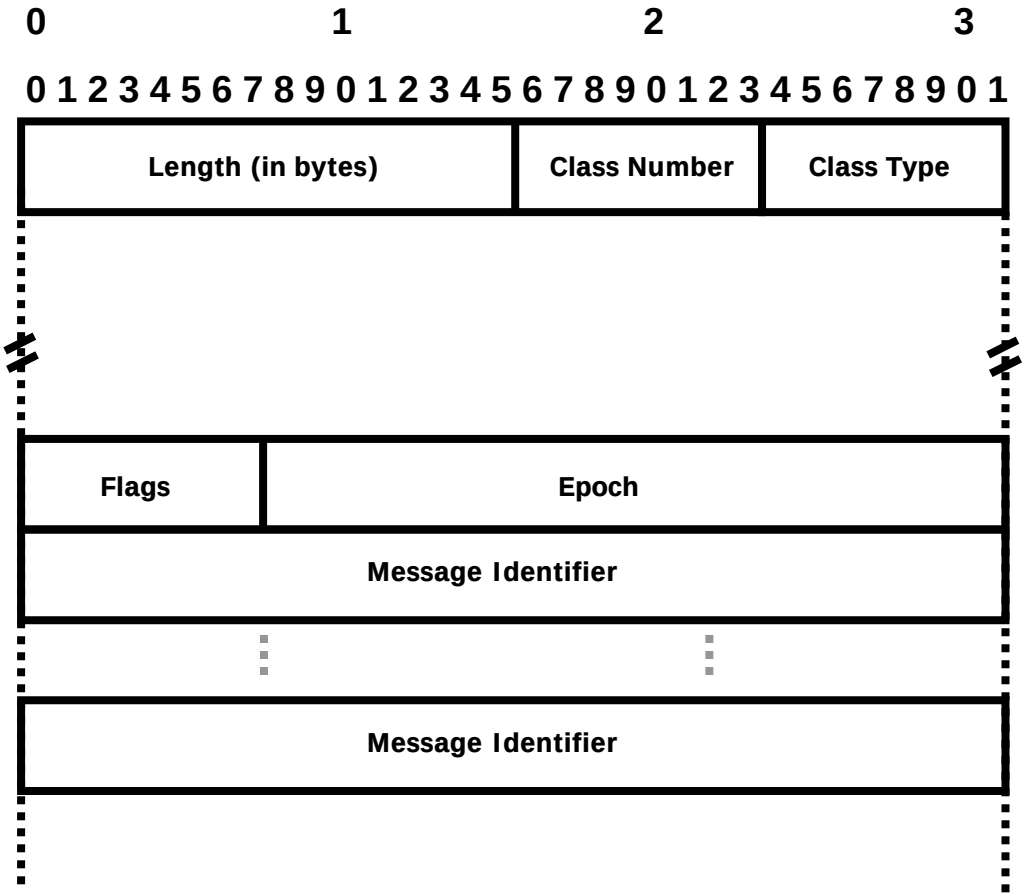
ip rsvp signalling refresh reduction reliable retransmit-time

Specifies Retransmit Time for messages

ip rsvp signalling refresh missed

Specifies number of successive Refresh messages are missed before RSVP initiates teardown of session

Summary Refresh Message Format



Summary Refresh Messages:

- Contains Message IDs of RSVP sessions that need to be refreshed
- Length of Summary Refresh message is configurable. Smaller size will increase SRefresh volume – however larger size may result in inefficient filling of SRefresh message
- If a Refresh failure occurs – a Message_ID_NACK is returned to sender

IOS Command for Summary Refresh

ip rsvp signalling refresh reduction

Enables Summary Refresh messages to be exchanged between RSVP neighbors – Summary is switched on by default with this command.

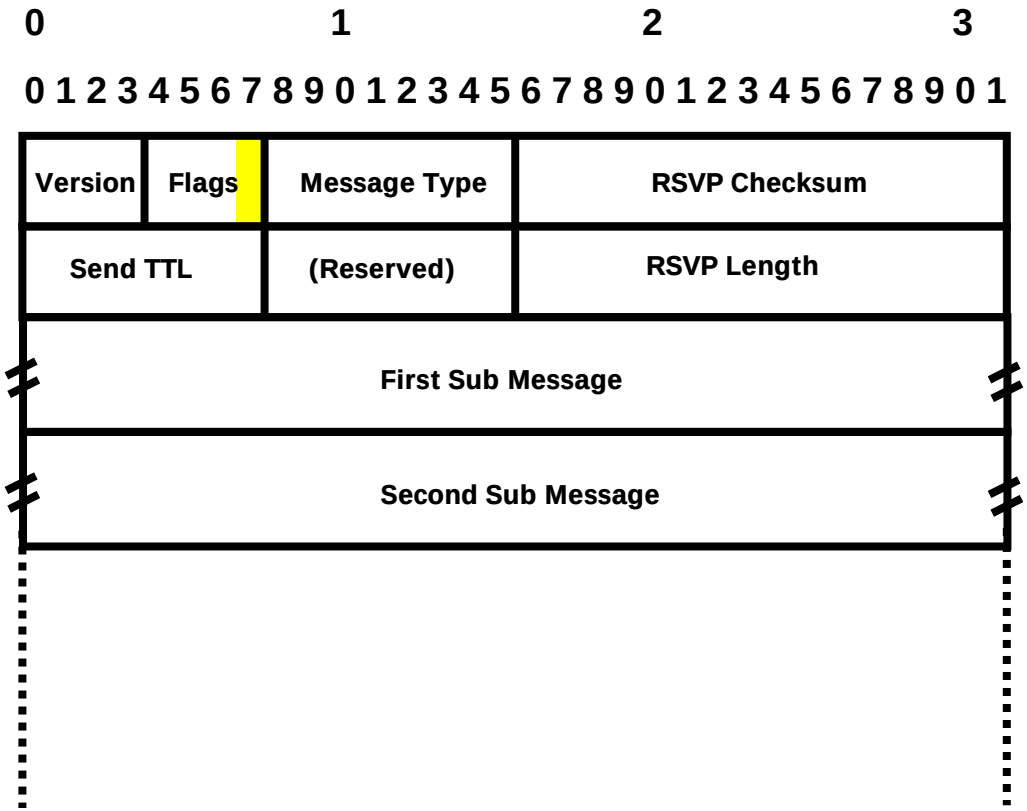
ip rsvp signalling refresh reduction summary

Enables Summary Refresh messages to be exchanged between RSVP neighbors – Explicitly switches on Summary, used especially after the below command

no ip rsvp signalling refresh reduction summary

Disables Summary Refresh messages to be exchanged between RSVP neighbors

Bundle Messages



Bundle Messages ⇒

Message Type = 12

"Bundling" of Messages

Cisco supports "receive only" of Bundle Messages. Bundle messages is NOT recommended for achieving true Refresh Reduction

Availability

- **Rfc2961 – Refresh Overhead Reduction will be available in 5th release of 12.2T and 12.0(24)S**