



Spatially aware bridging interworking

Marc Holness, Nortel Networks
IEEE 802.17 WG — 802.17b SG
Ottawa, Ontario
October, 2004



Agenda

- Objectives
- Problem overview
- Solution overview
- SAS interworking packet walk-thrus



Objectives

- Outline procedures by which RPR spatially aware bridging MACs will interwork with 802.17-2004 RPR MACs



Terminology and terms

- Directed transmissions – Refers to a RPR source station transmitting to a designated (unicast) destination address on the ring
- Undirected transmission – Refers to a RPR source station flooding a frame over the ring
- Remote address – A MAC address of a client that is not resident on the ring



Problem overview

- RPR needs to adhere to IEEE 802.1D/Q compliance on a ring containing basic RPR MACs (i.e., those without spatially aware shim) and enhanced RPR MACs (i.e., those with spatially aware sublayer/shim)

Solution overview

- Spatially aware sublayer/shim (SAS) is not specific to bridge clients
 - Any RPR MAC client can be serviced by the SAS
 - For example, router or host clients of an RPR MAC (that interact with other RPR MACs serving a bridge client) may support a SAS in order to achieve spatial reuse over the ring

Spatially aware shim (SAS)

- SAS is below MAC service interface (and within data link layer)
- An optional sublayer of RPR MAC

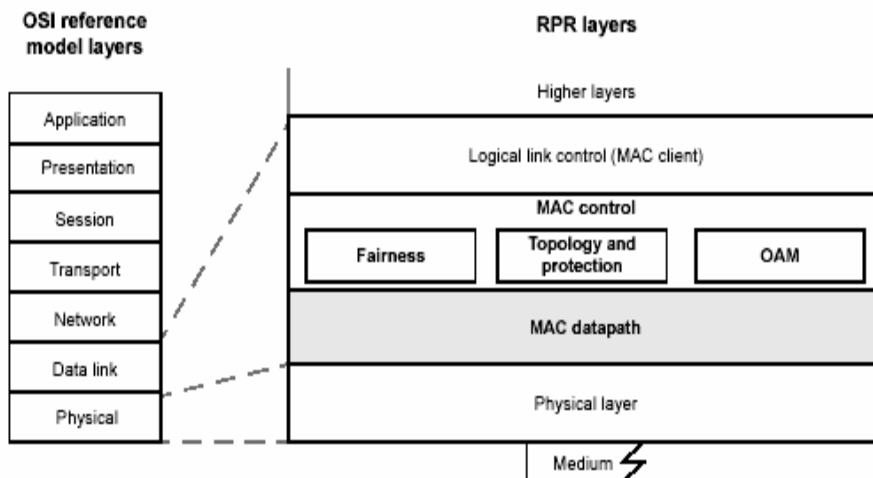
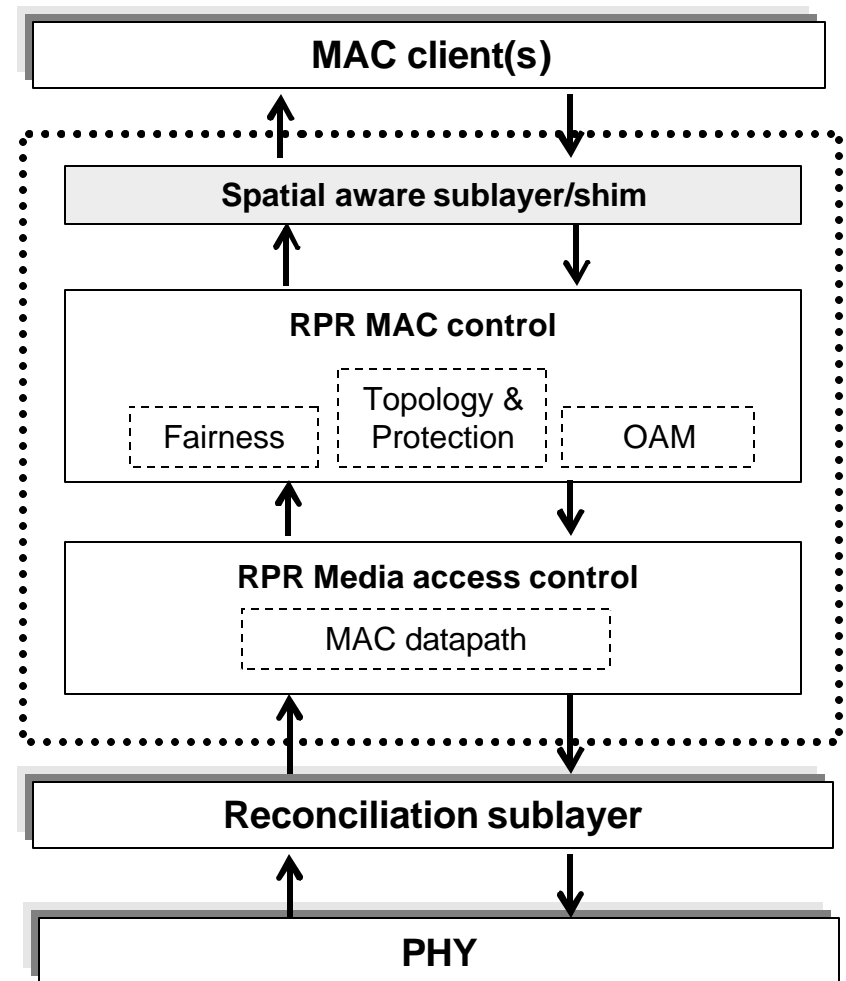


Figure 7.1—MAC datapath sublayer relationship to the ISO/IEC OSI reference model



Solution overview

- Spatial reuse over RPR is only achievable when the source RPR MAC is served by a SAS and the destination RPR MAC is served by a SAS
- Otherwise, the ring is treated as a broadcast media, when frame transmissions over RPR involve a bridge client

Source RPR MAC	Destination RPR MAC	Spatial Reuse
SAS	SAS	✓
SAS	No SAS	✗
No SAS	SAS	✗
No SAS	No SAS	✗

Solution overview

- Spatially aware shim only learns/associates remote source MAC addresses (and optional client VID) with local RPR source station MAC addresses if:
 - a) The destination address found in the RPR header is the special RPR reserved group address, or
 - b) The destination address found in the RPR header is a unicast MAC address and the flooding indicator field is set to *fi_none*

Consider refining the wording of b) to be only applicable to remote unicast MAC address

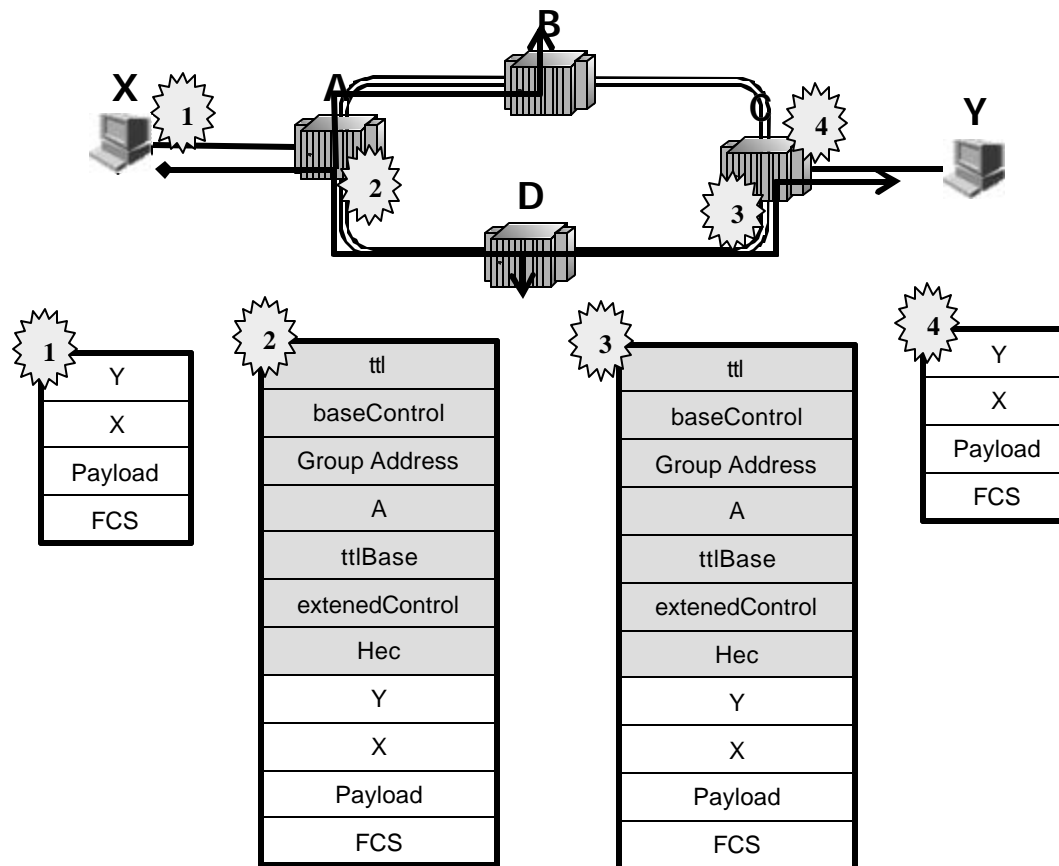


Solution overview

- If a client destination MAC address is not found in the SAS DB, then the client frame is dispatched using undirected transmission
 - The frame is flooded over the ring by setting the destination address within the RPR header to the RPR reserved group address, and setting the flooding indicator appropriately

SAS Interworking #1a

NOTE: RPR MAC A and C have spatially aware shim. RPR MAC B and D does not have a spatially aware shim.



Step #2

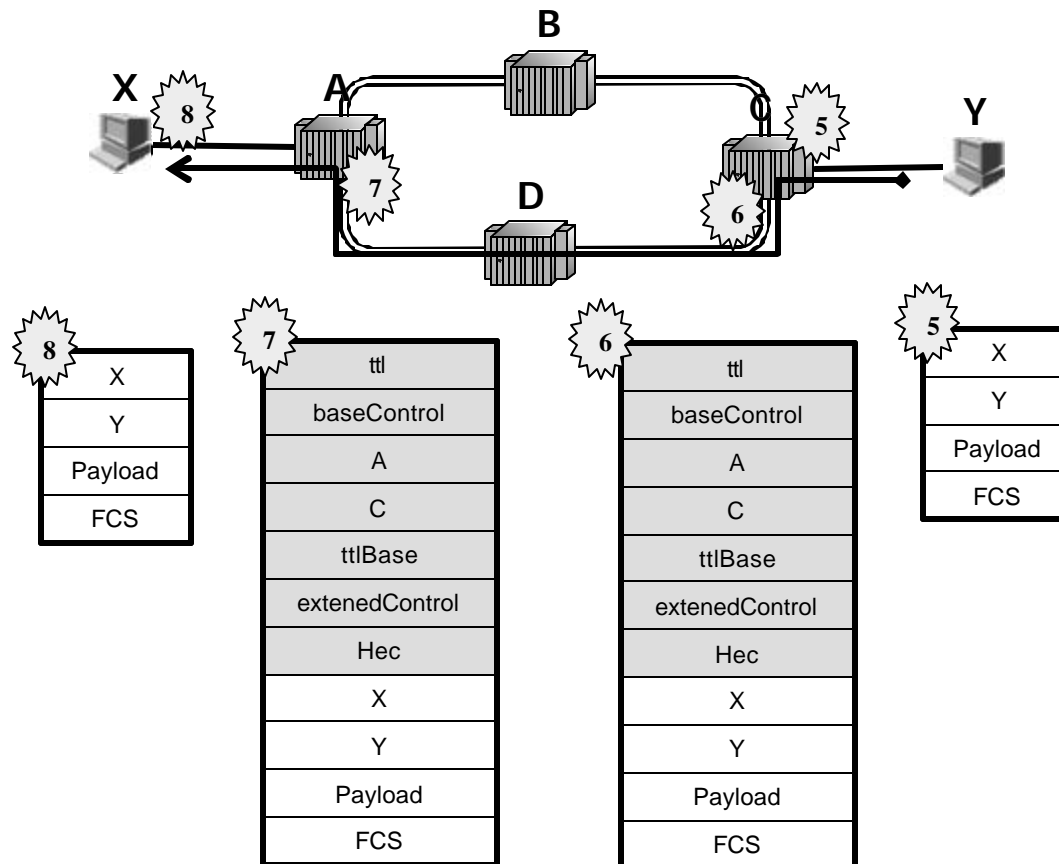
- SAS FDB is indexed by the client destination address Y
- No entry found, thus *rprGroupAddress* placed in *rprHeader da*
- Undirected transmission occurs


Step #3

- SAS FDB associates client MAC source address X with source RPR MAC address A, since *rprHeader da* is *rprGroupAddress*

SAS Interworking #1b

NOTE: RPR MAC A and C have spatially aware shim. RPR MAC B and D does not have a spatially aware shim.



 RPR station with bridge client

Step #6

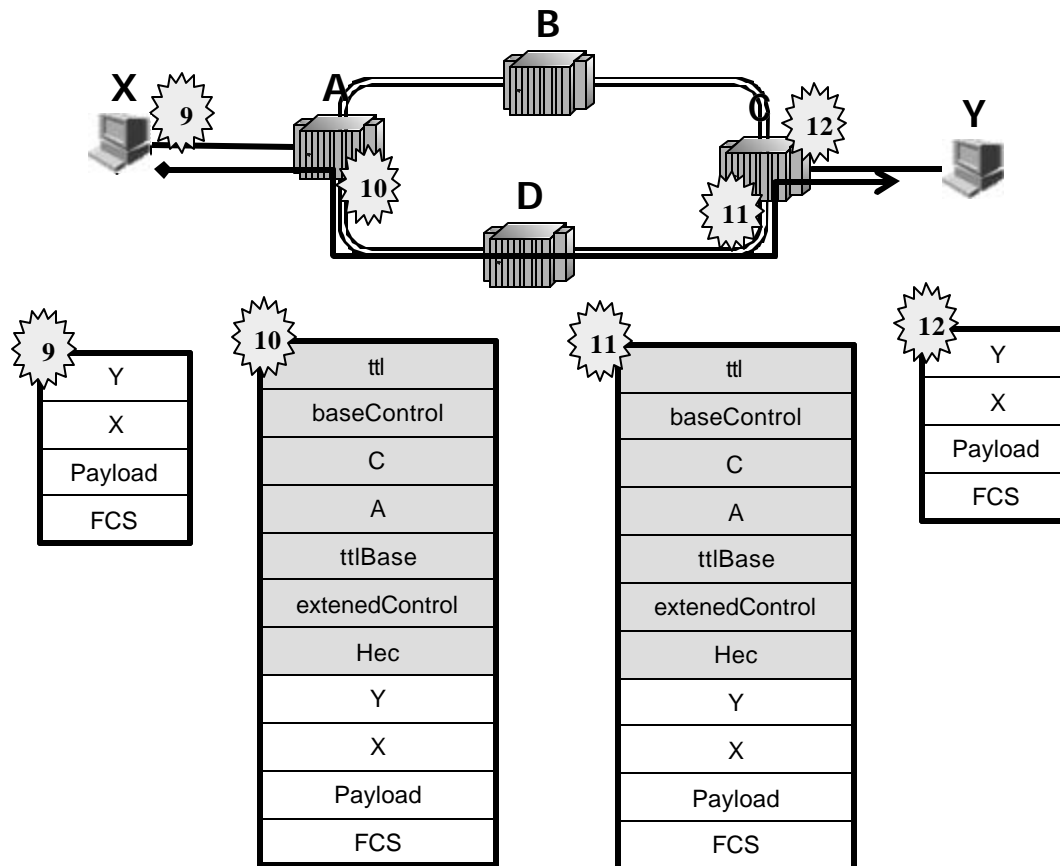
- SAS FDB is indexed by the client destination address X
- *rprMACAddress* A is found and inserted in *rprHeader da*
- Directed transmission occurs


Step #7

- SAS FDB associates client MAC source address Y with source RPR MAC address C, since directed transmission (i.e., *rprHeader da* is unicast, and flooding indication is none)

SAS Interworking #1c

NOTE: RPR MAC A and C have spatially aware shim. RPR MAC B and D does not have a spatially aware shim.



 RPR station with bridge client

Step #10


- SAS FDB is indexed by the client destination address Y
- *rprMACAddress* C is found and inserted in *rprHeader da*
- Directed transmission occurs

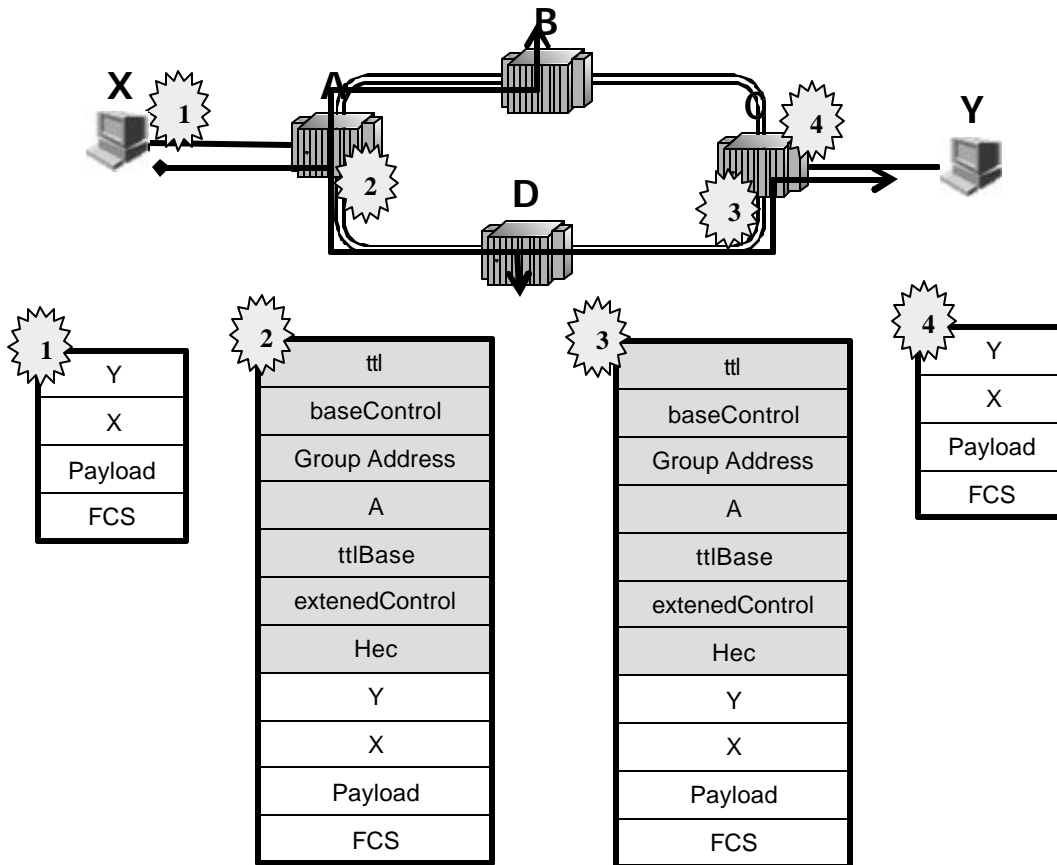
Step #11

- SAS FDB associates client MAC source address X with source RPR MAC address A, since directed transmission (i.e., *rprHeader da* is unicast, and flooding indication is none)

SAS Interworking #2a

NOTE: RPR MAC A has spatially aware shim. RPR MAC B, C, and D does not have a spatially aware shim.

 RPR station with bridge client



Step #2

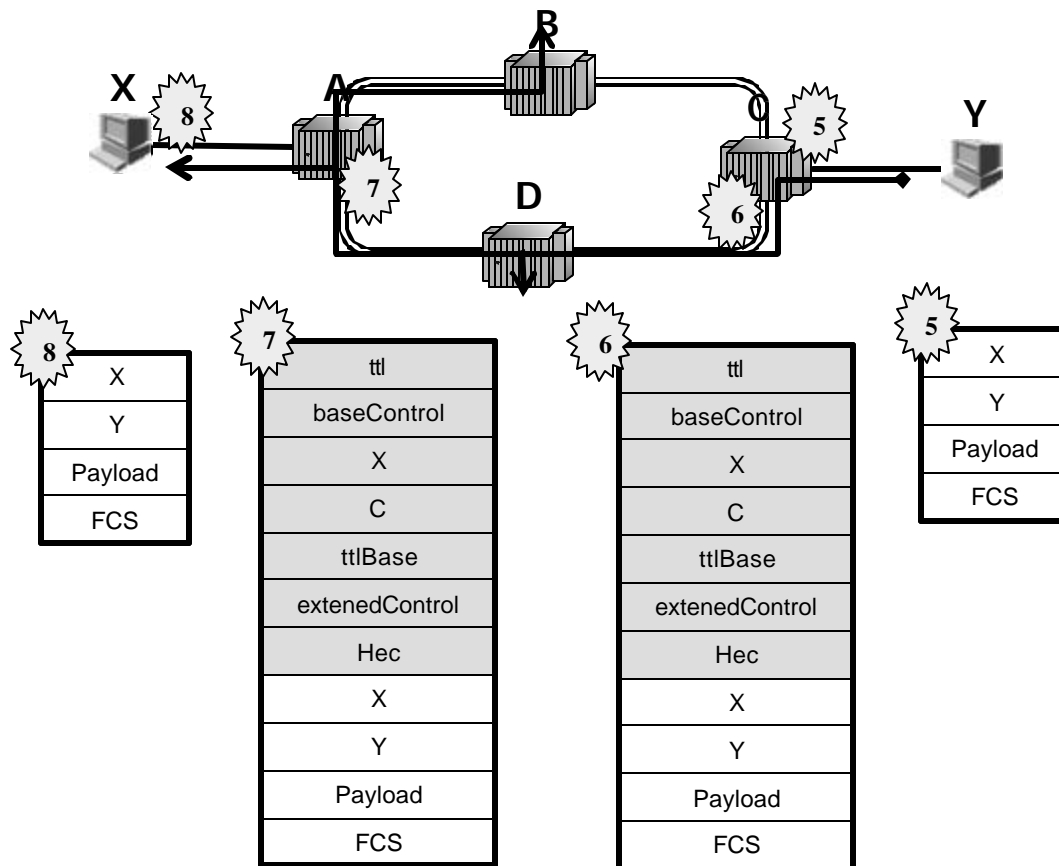
- SAS FDB is indexed by the client destination address Y
- No entry found, thus *rprGroupAddress* placed in *rprHeader da*
- Undirected transmission occurs


Step #3

- SAS not present

SAS Interworking #2b

NOTE: RPR MAC A has spatially aware shim. RPR MAC B, C, and D does not have a spatially aware shim.



 RPR station with bridge client

Step #6


- SAS not present
- Undirected transmission occurs

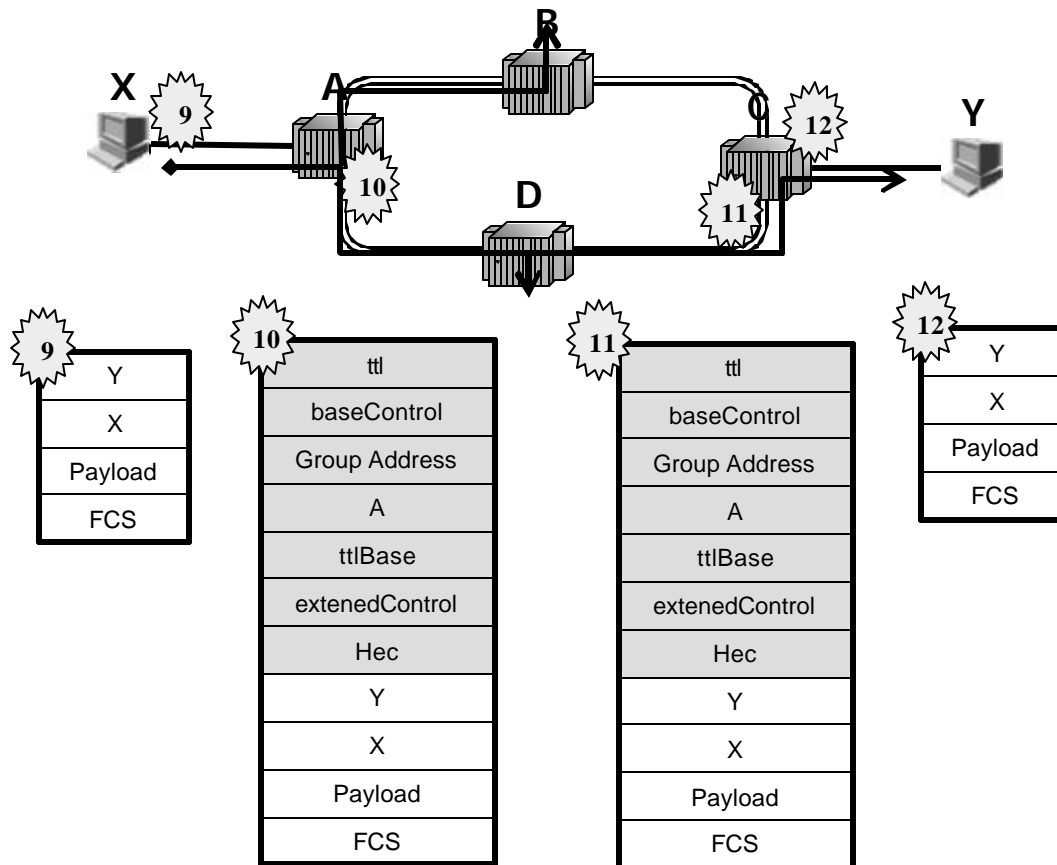
Step #7

- SAS FDB does not perform any learning/associates, since undirected transmission and *rprHeader da* is not *rprGroupAddress*

SAS Interworking #2c

NOTE: RPR MAC A has spatially aware shim. RPR MAC B, C, and D does not have a spatially aware shim.

 RPR station with bridge client



Step #10

- SAS FDB is indexed by the client destination address Y
- No entry found, thus *rprGroupAddress* placed in *rprHeader da*
- Undirected transmission occurs

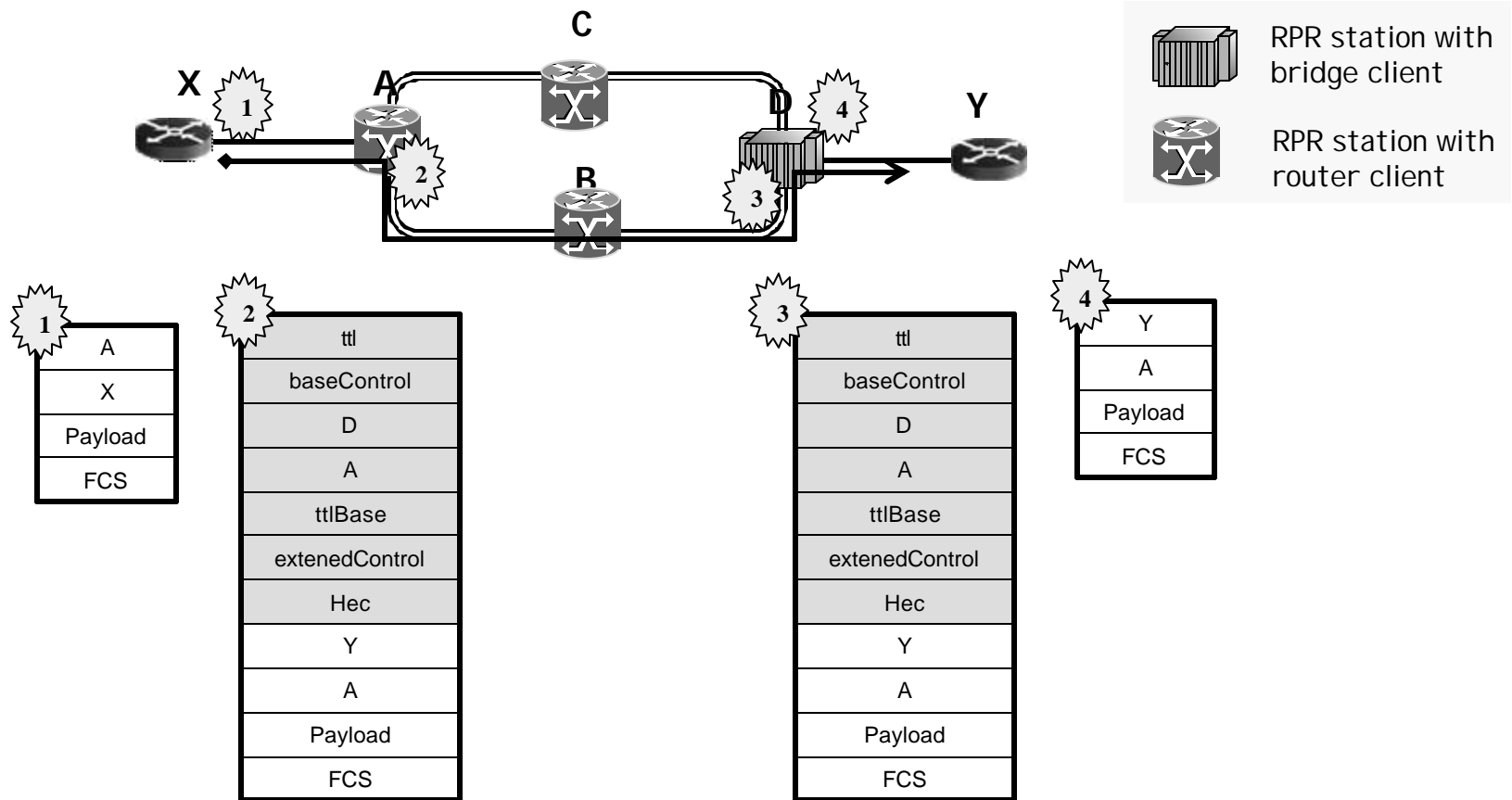
Step #11

- SAS not present



Back Up

Bridging over RPR



NOTE: SAS FDB at station A has learnt that client MAC address Y is located behind RPR MAC address D. In RPR frame header: extended frame (ef) bit = 1, flooding indication bit = no flood, source address = source RPR MAC address, and destination address = destination RPR MAC address (D).