

# Spatially aware sublayer interworking options

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# Agenda

- Objectives
- Operations overview
- Transmission rules
- Reception rules
- Method comparison
- General issues

# Objectives

- Provide operations overview between the 3 proposed mechanisms to support SAS interworking
- Explore transmission and reception rules associated with the 3 proposed SAS interworking mechanisms

# Terminology

- SAS – Spatially aware sublayer
- Local - implies ring local addresses of RPR station address and/or secondary MAC address associated with local RPR stations
- targetAddress - denotes the destination RPR station MAC address associated with the client *da*.

# Operations overview

	SAS Rx operations	SAS Tx operations
<b>Reserved group address</b>	1. SDB update ( $\{saExtended, [vid]\} \leftrightarrow sa$ ), if ( $da == RPRGroupAddress$ )    ( $ef == 1$ && $fi == fi\_none$ )	1. If ( $sa == myAddress$ ) && local( $da$ ) Pass to RPR MAC for Tx 2. Otherwise, Set $ef$ bit If $da$ [& $vid$ ] found, RPR header $da$ = target RPR MAC Else RPR header $da$ = RPRGroupAddress
<b>Topology DB and ATD</b>	1. SDB update ( $\{saExtended, [vid]\} \leftrightarrow sa$ ), if (TopoDB( $sa$ ) indicates SAS) && ( $ef == 1$ ) 2. SDB update ( $\{sa, [vid]\} \leftrightarrow sa$ ), if (TopoDB( $sa$ ) indicates SAS) && ( $ef == 0$ )	1. If ( $sa == myAddress$ ) && local( $da$ ) Pass to RPR MAC for Tx 2. Lookup $da$ [& $vid$ ] in SAS DB If found, RPR header $da$ = target RPR MAC Else pass to RPR MAC for Tx
<b>Explicit bit in RPR header</b>	1. SDB update ( $\{saExtended, [vid]\} \leftrightarrow sa$ ), if ( $sas == 1$ && $ef == 1$ ) 2. SDB update ( $\{sa, [vid]\} \leftrightarrow sa$ ), if ( $sas == 1$ && $ef == 0$ )	1. Set $sas$ bit in RPR header 2. If ( $sa == myAddress$ ) && local( $da$ ) Pass to RPR MAC for Tx 3. Lookup $da$ [& $vid$ ] in SAS DB If found, RPR header $da$ = target RPR MAC Else pass to RPR MAC for Tx

# Local station identification

- Local station identification can be determined by direct access of the topology DB
- Alternatively, local address determination may be made by populating the SAS DB (or other DB) with static managed entries that are configured by a RPR management entity, which are typically derived from topology DB information

# Group address method Tx rules

Conditions			Row	Frame fields					Action
MA_UNITDATA.request		destAddr [& vid] in SAS DB		RPR frame header			frame payload		
srcAddr	destAddr			ef	da	fi	daExtended	saExtended	
myAddress	Local	-	1						Pass to RPR MAC for Tx
	!Local	Yes	2	1	targetAddress		da	sa	
		No	3	1	RPRGroupAddress		da	sa	
!myAddress	Local	Yes	4	1	targetAddress		da	sa	
		No	5	1	RPRGroupAddress		da	sa	
	!Local	Yes	6	1	targetAddress		da	sa	
		No	7	1	RPRGroupAddress		da	sa	

**Legend:** srcAddr represents source\_address parameter, destAddr represents destination\_address parameter

■ SAS does not change these fields

# Topology DB method Tx rules

Conditions			Row	Frame fields					Action
MA_UNITDATA.request		destAddr [& vid] in SAS DB		RPR frame header			Frame payload		
srcAddr	destAddr			ef	da	fi	daExtended	saExtended	
myAddress	Local	-	1						Pass to RPR MAC for Tx
	!Local	Yes	2	1	targetAddress	fi_none	da	sa	
		No	3						
!myAddress	Local	Yes	4	1	targetAddress	fi_none	da	sa	
		No	5						
	!Local	Yes	6	1	targetAddress	fi_none	da	sa	
		No	7						

**Legend:** srcAddr represents source\_address parameter, destAddr represents destination\_address parameter


SAS does not change these fields



# Explicit SAS bit method Tx rules

Conditions			Row	Frame fields						Action
MA_UNITDATA.request		destAddr [& vid] in SAS DB		RPR frame header				Frame payload		
srcAddr	destAddr			sas	ef	da	fi	daExtended	saExtended	
myAddress	Local	-	1	1						Pass to RPR MAC for Tx
	!Local	Yes	2	1	1	targetAddress	fi_none	da	sa	
		No	3	1						
!myAddress	Local	Yes	4	1	1	targetAddress	fi_none	da	sa	
		No	5	1						
	!Local	Yes	6	1	1	targetAddress	fi_none	da	sa	
		No	7	1						

**Legend:** srcAddr represents source\_address parameter, destAddr represents destination\_address parameter, sas represents to be defined bit in RPR header

 SAS does not change these fields

**NOTE:** Are there issues with current RPR MAC silicon setting one of the undefined extendedHeader reserved bits to 1?

**NOTE:** SAS bit may either be set by the SAS for each Tx data frame, or by the MAC. If the MAC has SAS, then the MAC would set the SAS bit for all Tx frames. Setting the SAS bit to 1 is done for every data frame Tx by the MAC.

# Group address method Rx rules

Conditions			Row	Result	
MA_UNITDATA.indication		RPR header		SDB update	Action
destination_address	extended_frame	<i>fi</i>		$sa \leftrightarrow \{saExtended, [vid]\}$	
RPRGroupAddress	0	-	1	No	Pass to MAC client
	1		2	Yes	
!RPRGroupAddress	1	!fi_none	3	No	
		fi_none	4	Yes	
	0	!fi_none	5	No	
		fi_none	6	No	

Row 2, 4: For this method, SAS will always generate an extendedFrame. Consequently, SDB update will uniformly be performed based upon *sa*, *saExtended*, and optional *vid*.

# Topology DB method Rx rules

Conditions		Row	Result		
TopoDB(sa) indicates SAS	MA_UNITDATA.indication		SDB update		Action
	extended_frame		$sa \leftrightarrow \{saExtended, [vid]\}$	$sa \leftrightarrow \{sa, [vid]\}$	
Yes	1	1	Yes	No	Pass to MAC client
	0	2	No	Yes	

Row 1: SDB update will be performed based upon *sa*, *saExtended*, and optional *vid*.

Row 2: SDB update will be performed based upon *sa*, and optional *vid*.

# Explicit SAS bit method Rx rules

Conditions		Row	Result		
RPR header	MA_UNITDATA.indication		SDB update		Action
<i>sas</i>	extended_frame		$sa \leftrightarrow \{saExtended, [vid]\}$	$sa \leftrightarrow \{sa, [vid]\}$	
1	1	1	Yes	No	Pass to MAC client
	0	2	No	Yes	

**Legend:** *sas* represents a to be defined bit in RPR header

Row 1: SDB update will be performed based upon *sa*, *saExtended*, and optional *vid*.

Row 2: SDB update will be performed based upon *sa*, and optional *vid*.

# Methodology comparison list

	Reserved group address method	Topology DB method	Explicit RPR header bit method
Rx Rules	On a per Rx frame basis, requires 1. Requires MAC address match or RPR frame header bits (i.e., <i>ef</i> and <i>fi</i> )	On a per Rx frame basis, requires 1. Topology DB access using <i>sa</i> (or <i>TTL</i> math) and extraction of resulting SAS attribute	On a per Rx frame basis, requires 1. RPR header (reserved) <i>sas</i> bit match
SDB Update	Uniformly based upon 1. <i>sa</i> , <i>saExtended</i> , and <i>vid</i> basis	Based upon 1. <i>sa</i> , <i>saExtended</i> , and <i>vid</i> basis, or 2. <i>sa</i> , and <i>vid</i> basis	Based upon 1. <i>sa</i> , <i>saExtended</i> , and <i>vid</i> basis, or 2. <i>sa</i> , and <i>vid</i> basis
Tx Rules	1. Requires local-to-local Tx determination 2. Setting of <i>ef</i> bit in RPR header 3. SDB lookup to determine target RPR destination address	1. Requires local-to-local Tx determination 2. SDB lookup to determine target RPR destination address	1. Setting RPR header (reserved) <i>sas</i> bit setting 2. Requires local-to-local Tx determination 3. SDB lookup to determine target RPR destination address

**NOTE:** How are the Rx rules impacted when context containment is active? What should we do when topology/context containment is active?

# Option comparison list

	Reserved group address method	Topology DB method	Explicit RPR header bit method
Tx Frame Basic	1. Source myMacAddress to local destination always use basic	1. Source myMacAddress to local destination always use basic 2. Source myMacAddress to (non-SAS) remote use basic 3. Source myMacAddress (SAS) to (SAS) remote use basic for unknown unicast until learnt	1. Source myMacAddress to local destination always use basic 2. Source myMacAddress to (non-SAS) remote use basic 3. Source myMacAddress (SAS) to (SAS) remote use basic for unknown unicast until learnt
Tx Frame Extended	Otherwise	Otherwise	Otherwise
RPR Header Definition	No change	No change	Yes. Definition of sas bit from reserved field in extendedControl subfield

# General observations, concerns, comments

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1. What should SAS learning logic do if
  - a) Static entry ( { saExtended, [vid] }  $\leftrightarrow$  source\_address ) found in SAS DB does not match the { source\_address, saExtended, [vid] } fields found in the Rx frame? or
  - b) Static entry ( { source\_address, [vid] }  $\leftrightarrow$  source\_address ) found in SAS DB does not match the { source\_address, [vid] } fields found in the Rx frame?
2. Mechanism is required to purge SDB entries that are associated to RPR MAC addresses that moved from a SAS capable to SAS non-capable state

**NOTE:** Static entries take precedence over dynamic entries for Tx operations. Need to state SAS DB dynamic entry update and purge rules.



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3. Interactions between 802.17-2004 MAC and bridging clients can result in 802.1 network violations when MAC client provides service request with source\_address, destination\_address, source\_address\_extended, and destination\_address\_extended parameters
4. 802.17b MACs (i.e., those with SAS) can not support MAC clients that provide service requests with source\_address, destination\_address, source\_address\_extended, and destination\_address\_extended parameters

**NOTE:** We could consider SAS bypassing its logic if a MAC client does provide all four address parameters in the service request primitive.

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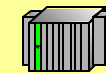
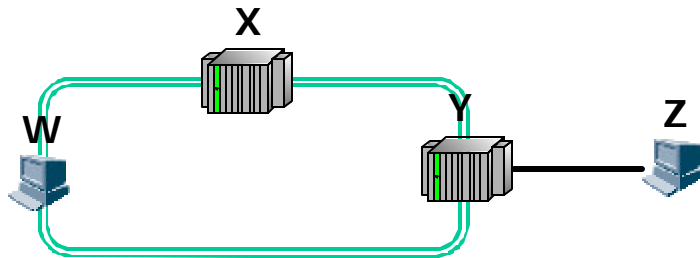
5. The reserved group address method does not support MAC clients that provide service requests with source\_address, destination\_address, source\_address\_extended, and destination\_address\_extended parameters
- Specification guidance will be provided to state that MAC clients that provide aforementioned address parameters, should set flood

**NOTE:** We could consider SAS bypassing its logic if a MAC client does provide all four address parameters in the service request primitive.

# Back Up

# SDB update $\{sa, [vid]\} \leftrightarrow sa$

**Assume:** All RPR MACs have SAS using Topology DB methodology.

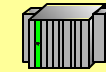
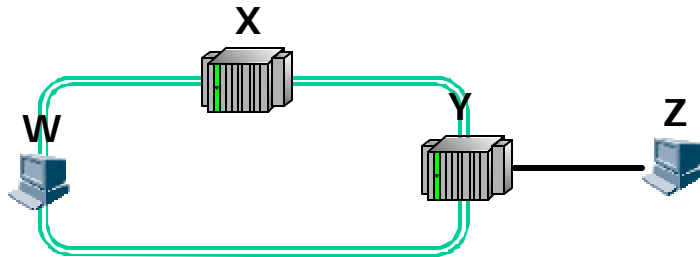


RPR station with  
bridge client

- a) MAC client at station W, provides service request primitive with following parameters
  - Source\_address = W
  - Destination\_address = Z
- b) MAC W dispatches RPR frame using undirected transmission (assuming empty SAS DB)
  - RPR header  $sa = W$
  - RPR header  $da = Z$
  - RPR header  $fi \neq fi\_none$
  - RPR header  $ef = 0$
- c) At station Y, RPR MAC Y will update SAS DB using  $\{sa, [vid]\} \leftrightarrow sa$ , since the Topology DB indicates that station with address  $sa$  is a SAS capable station.

# SDB update $\{sa, [vid]\} \leftrightarrow sa$

**Assume:** All RPR MACs have SAS using Topology DB methodology.



RPR station with  
bridge client

- d) Station Z Tx Ethernet frame to destination address W
- e) SAS of RPR MAC as station Y receives a service request from the bridging client with the following parameters
  - Source\_address = Z
  - Destination\_address = W
- f) Since this is not a myMACAddress source to local destination transmission, the SAS function performs a lookup in the SAS DB based on destination\_address of W (and optional vid), and retrieves a target RPR MAC address of W, resulting in a directed transmission
  - RPR header  $sa = Y$
  - RPR header  $da = W$
  - RPR header  $fi = fi\_none$
  - RPR header  $ef = 1$
  - saExtended = Z
  - daExtended = W