RPR MAC and bridging interaction issues

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IEEE 802.17 WG — 802.17b SG

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Agenda

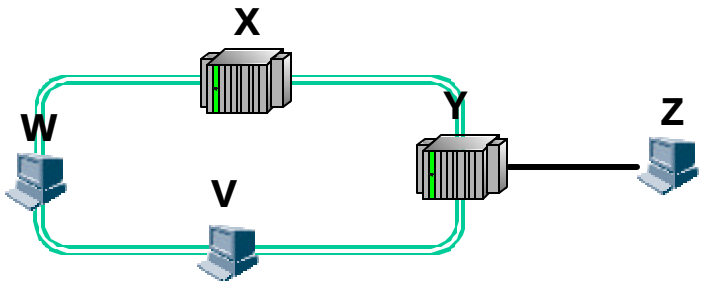
- Objectives
- Scenarios demonstrating the problems
- Solution proposal

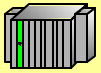
Objectives

- Demonstrate that RPR MAC clients that provide all 4 address parameters in a service request primitive (i.e., source_address, destination_address, source_address_extended, and destination_address_extended) can result in bridged (802.1) network violations and network malfunctions

Scenario #1 – step 1

NOTE: All RPR MACs are as defined by IEEE 802.17-2004. Bridge client are basic bridges.




RPR station with bridge client

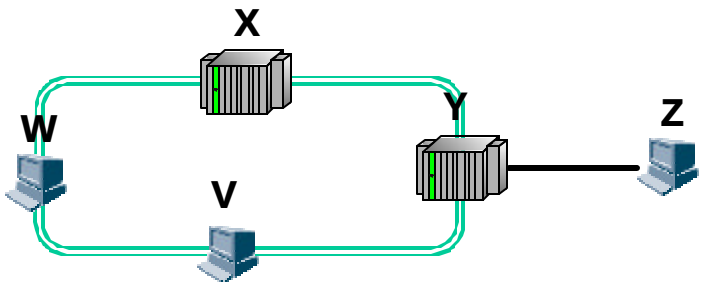
a) MAC client at station W, provides service request primitive with following parameters
   - Source_address = W
   - Destination_address = Y
   - Source_address_extended = W
   - Destination_address_extended = Z
   - flooding_form = fi_none

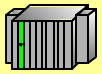
b) MAC W dispatched RPR frame using directed transmission to target RPR MAC address Y

c) At station Y, RPR MAC Y passes indication service primitive to bridging client

Scenario #1 – step 2

NOTE: All RPR MACs are as defined by IEEE 802.17-2004. Bridge client are basic bridges.



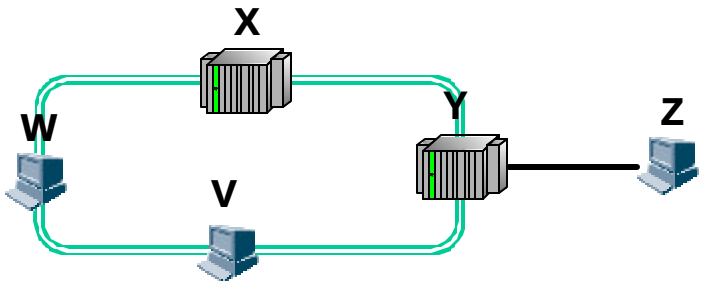

RPR station with bridge client

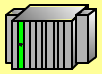
d) At station Y, RPR MAC Y passes indication service primitive to bridging client, where
   - Source_address = W
   - Destination_address = Z

e) Station Z receives Ethernet frame

Scenario #1 – step 3

NOTE: All RPR MACs are as defined by IEEE 802.17-2004. Bridge client are basic bridges.




RPR station with bridge client

e) Station Z send Ethernet frame destined to W

f) At station Y, RPR MAC Y receives request service primitive from bridging client, where
- Source_address = Z
- Destination_address = W

g) At RPR MAC Y, since the source_address parameter is a remote address, the MAC will dispatch an extended frame using an undirected transmission, where
- Source_address = Y
- Destination_address = W
- Source_address_extended = Z
- Destination_address_extended = W
- Flooding_form != fi_none

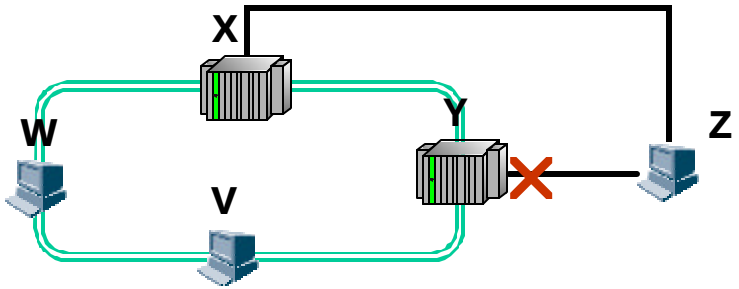
Scenario #1 - observations

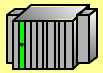
802.1 network violation result due to asymmetric transmissions. There is persistent off ring broadcasting.

- RPR MAC client at station W provides all 4 address parameters in service request primitive and requests a directed transmission (via fi_none)
- The RPR MAC serving the bridge client at station Y however only supports undirected transmission (e.g., to station W)

Scenario #2 – step 1

NOTE: All RPR MACs are as defined by IEEE 802.17-2004. Bridge client are basic bridges.




RPR station with bridge client

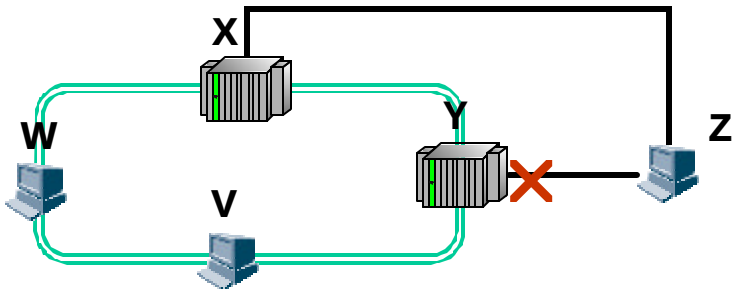
a) Spanning tree breaks link between Y and Z

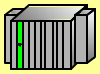
b) MAC client at station W, provides service request primitive with following parameters
- Source_address = W
- Destination_address = Y
- Source_address_extended = W
- Destination_address_extended = Z
- flooding_form = fi_none

c) MAC W dispatched RPR frame using directed transmission to target RPR MAC address Y

Scenario #2 – step 2

NOTE: All RPR MACs are as defined by IEEE 802.17-2004. Bridge client are basic bridges.




RPR station with bridge client

d) At station Y, RPR MAC Y passes indication service primitive to bridging client, where
   - Source_address = W
   - Destination_address = Z

e) Bridging client at station Y drops frame since port is blocked by spanning tree protocol

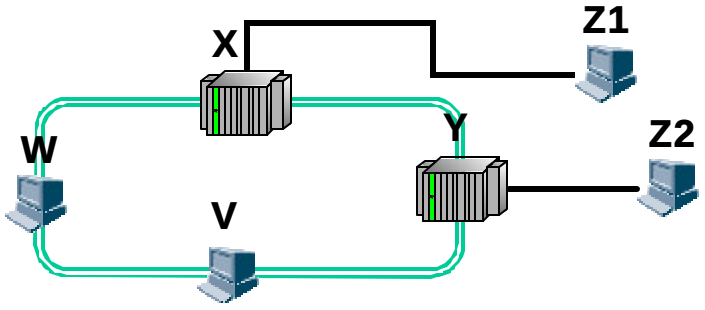
Scenario #2 - observations

Although there is no problem within the network, unbeknown to station W, sourced packets persistently do not get delivered to station Z

- RPR MAC client at station W provides all 4 address parameters in service request primitive and requests a directed transmission (via fi_none)
- The RPR MAC serving the bridge client at station Y is participating in spanning tree and blocks port to station Z

Scenario #3 – step 1

NOTE: All RPR MACs have a SAS and the SAS DBs are at a steady state.



RPR station with bridge client

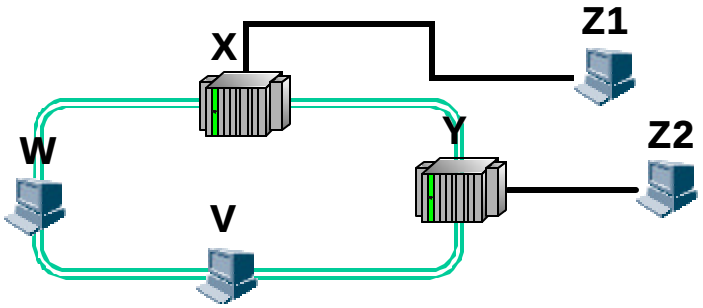
a) MAC client at station W, provides service request primitive with following parameters
   - Source_address = W
   - Destination_address = Z1
   - Source_address_extended = W
   - Destination_address_extended = Z2
   - flooding_form != fi_none

b) SAS entity at MAC W will override service request primitives as follows:
   - Source_address = W
   - Destination_address = X
   - Source_address_extended = W
   - Destination_address_extended = Z1
   - flooding_form = fi_none

NOTE: SAS handling of 4 addresses from the client is as yet undefined.

Scenario #3 – step 2

NOTE: All RPR MACs have a SAS and the SAS DBs are at a steady state.



RPR station with bridge client

c) MAC W dispatched RPR frame using directed transmission to target RPR MAC address X

d) At station X, RPR MAC X passes indication service primitive to bridging client

e) At station X, RPR MAC X passes indication service primitive to bridging client, where
- Source_address = W
- Destination_address = Z1

f) Station Z1 receives Ethernet frame

Scenario #3 - observations

- SAS should improve the spatial reuse properties of the ring, and should ***not*** change forwarding results to network remote stations
  - When SAS is enabled the destination station is Z1, while without SAS the destination station is Z2

Solution proposal

1. SAS enabled MACs shall not support MAC clients that provide all 4 address parameters in the service request primitive

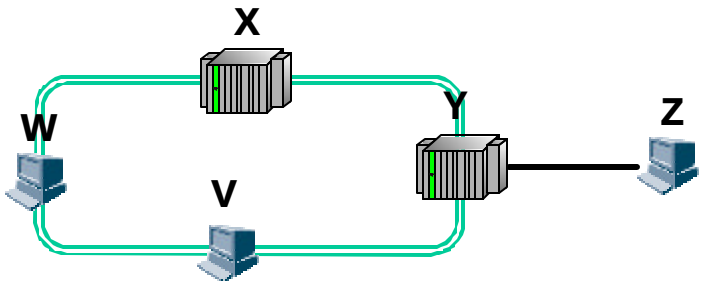
Observation

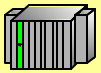
1. In general, RPR MAC clients, that provide all 4 address parameters in the service request primitive, can violate (802.1) bridged network architecture. Consequently
   - 802.17-2004 MACs can not guarantee there are no bridged network violations when a MAC client provides all 4 address parameters in the service request primitive
   - 802.17b MACs can not guarantee that there are no bridged network violations when a MAC client provides all 4 address parameters in the service request primitive

Back Up

Scenario #4 – step 1

NOTE: All RPR MACs are as defined by IEEE 802.17-2004. Bridge client are basic bridges.




RPR station with bridge client

a) MAC client at station W, provides service request primitive with following parameters
   - Source_address = W
   - Destination_address = V
   - Source_address_extended = W
   - Destination_address_extended = Z
   - flooding_form != fi_none

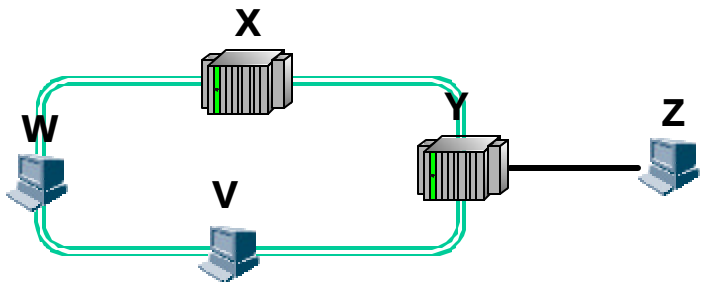
b) MAC W dispatched RPR frame using undirected transmission

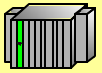
c) Bridging clients at station X and station Y flood frame out ports

d) Station V receives frame

Scenario #4 – step 2

NOTE: All RPR MACs are as defined by IEEE 802.17-2004. Bridge client are basic bridges.




RPR station with bridge client

e) MAC client at station V, provides service request primitive with following parameters
   - Source_address = V
   - Destination_address = W

f) MAC V dispatched RPR frame using directed transmission

Scenario #4 - observations

802.1 network violation result due to asymmetric transmissions. There is persistent off ring broadcasting.

- RPR MAC client at station W provides all 4 address parameters in service request primitive and requests a undirected transmission (via !fi_none)
- RPR MAC client at station V requests a directed transmission to station W