Spatial Aware Sublayer
Interop via Explicit Header Bit

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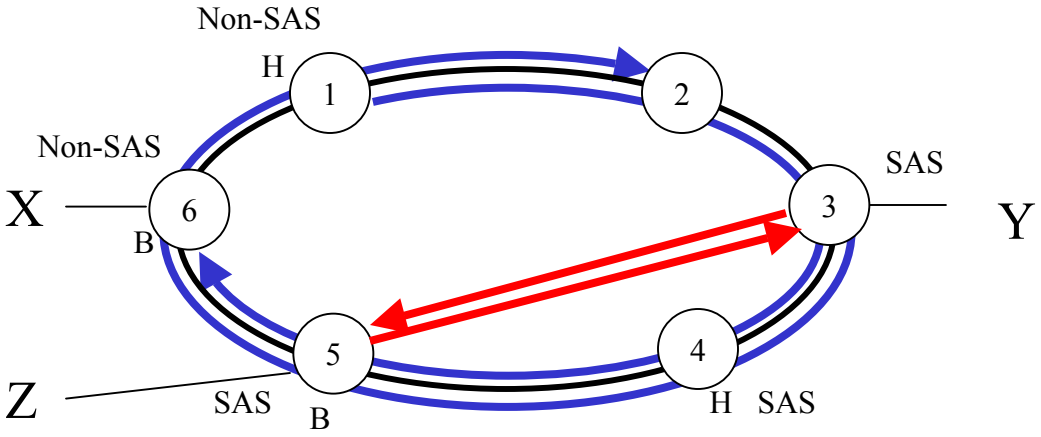
Introduction

- Spatially Aware Sublayer performs spatial reuse enhancements by selectively directing (not flooding) remote unicast and multicast traffic. Remote unicast and multicast traffic are flooded in 802.17 per current transmission rules.

- Spatially Aware Sublayer needs to be backwards compatible with 802.17 implementations which do not implement SAS

Backward Compatibility Requirements

- When SAS transmits to an 802.17 station, SAS must flood all remote and multicast traffic.
- Example below
  - Station 1 and 6 are non-SAS. Station 3, 4 and 5 have SAS.
  - Station 3 must flood all remote unicast traffic (either remote SA or DA) that is not transmitted to a remote SAS.
  - If station 3 does not flood remote frames to station 1 then persistent flooding on the extended L2 network occurs.



SAS Interoperability

- SAS needs to know when it is sending unicast frames to a SAS entity vs. a non-SAS entity.
  - Current thinking is SAS will make this determination via SDB during transmission.
  - Addresses not in SDB are treated as non_SAS entries until the source is identified as SAS capable.
  - Local station with VID associations should also be learned into SDB to address the VLAN issues discussed in rc_SASlocal and rc_SASvlan.
  - SDB entries are selectively populated (learned) during reception based on whether the sending station is SAS capable (or local) or not. Frames from SAS capable (or local) sources are learned into SDB. Frames from non-SAS sources (or local) are not learned into SDB.
  - SDB supports Independent VLAN Learning (IVL) entries for both local and remote stations. IVL means there are separate entries for each MAC address for each VLAN in which it is supported.
  - SAS should follow normal MAC tx rules for local only frames (local SA & local DA).

Selective SDB entry learning

- SDB selective entry learning triggered by one of three methods:
  - MAC Address Method
  - Topology Discovery Method
  - Explicit Header Bit Method

Explicit Header Bit Method (EHB)

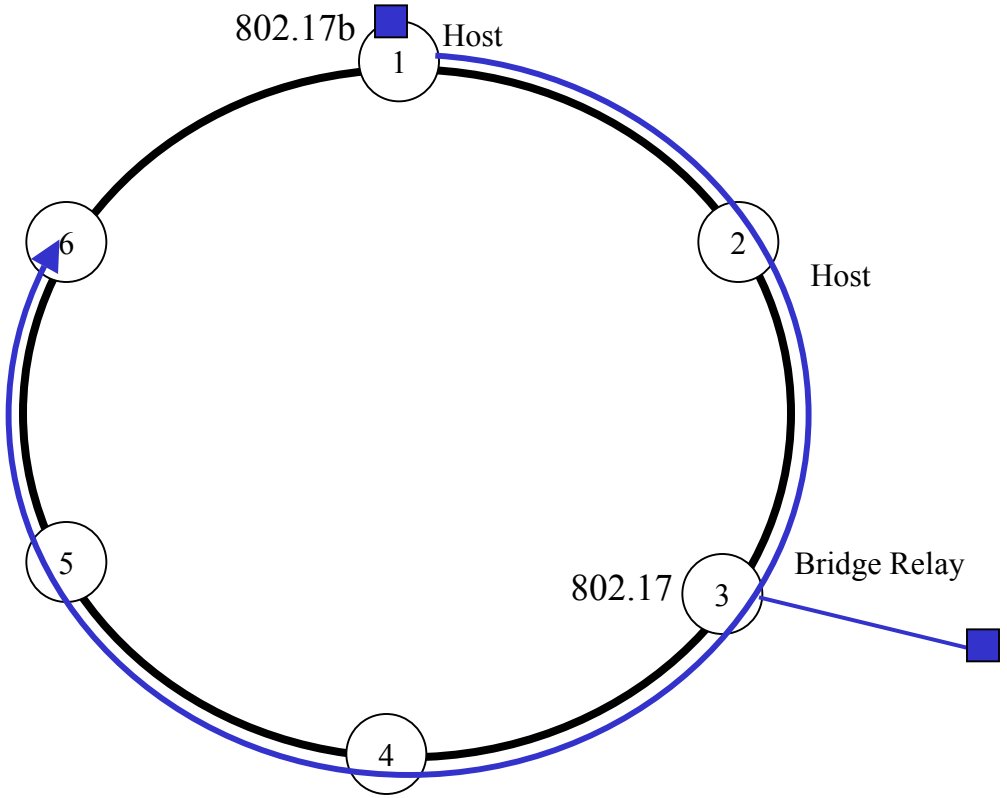
- Define one of the 3 reserved bits in the extended frame header to indicate whether a frame originated from a SAS capable station or not. (aka. frame.SAS bit)
  - frame.SAS == 1 indicates frame originated from SAS capable station
  - frame.SAS== 0 indicates frame originated from non-SAS capable station
  - frame.SAS is always set by the MAC when it is using SAS.
  - Alternatively, SAS could be exposed to the client as part of the MAC service allowing the client to invoke SAS on a PDU basis. (further study)
- 802.17 currently defines these reserve bits as 0.
  - Use of one of the reserve bits is both backwards compatible and interoperable with 802.17 MACs.
  - Frame.sas from 802.17 MACs will always be interpreted as non-SAS
  - 802.17 MACs can ignore the frame.SAS bit in frames received from SAS MACs

Explicit Header Bit

- The explicit header bit method enables 802.17b to have the following advantages.
  - Transmit using basic frame format to any local or remote station for all frames originating from its local MAC (non-bridge relay) client. (i.e. MAC_address == myMACaddress)
  - Properly resolving unicast frames received in extended frame format that may have originated from a non-SAS capable station. (i.e. These frames are properly designated as non-SAS capable.)
  - Ability to update SDB during reception of basic frames to properly handle associative VID learning from local hosts.
  - Determining SAS capability of RPR sources from received frames is simplified by eliminating the need for an associative lookup on the SA.

Support of basic frame format from locally originated 802.17b hosts

EHB gives SAS the ability to transmit using basic frame format from local hosts to a remote station as is currently supported by 802.17.

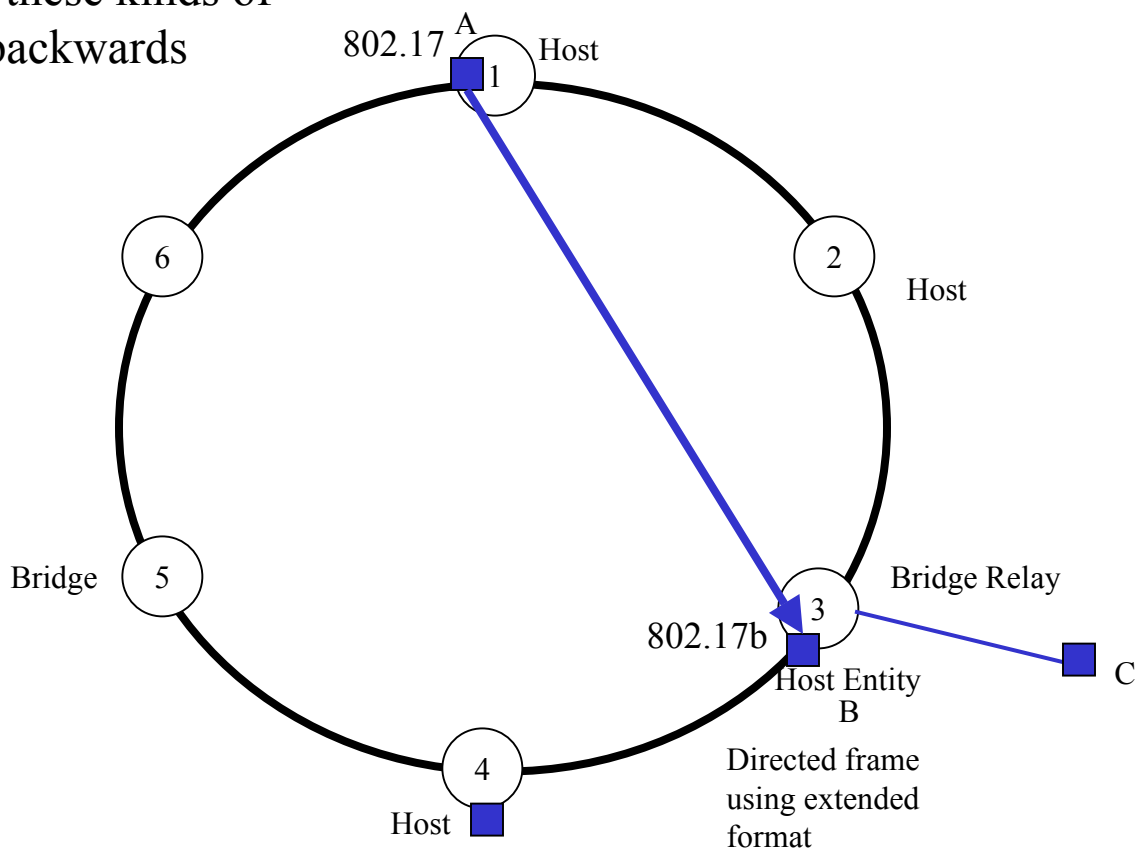


The MAC address method requires these host originated frames to be transmitted using extended frame format.

Resolve unicast extended frames from non-SAS hosts

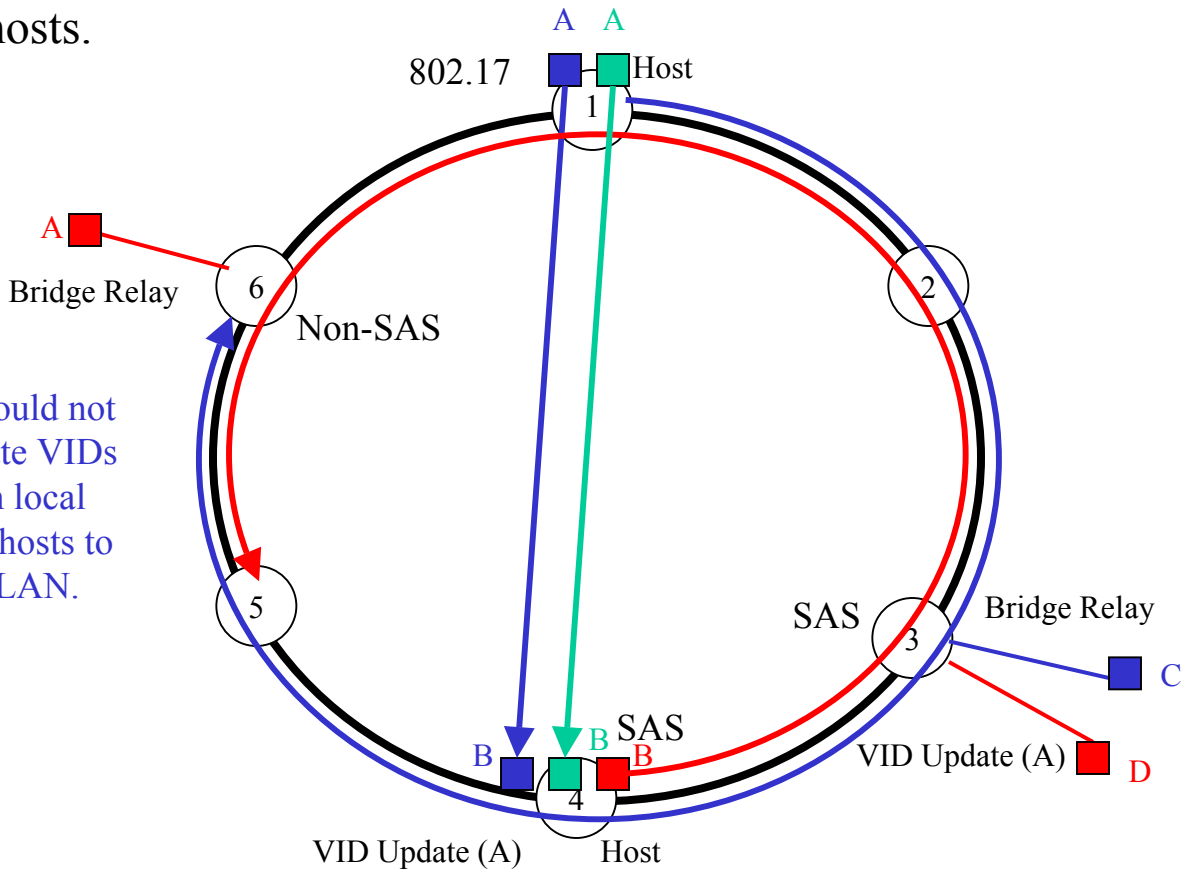
EHB gives SAS the ability to properly identify extended unicast frames originating from Non-SAS hosts. Proper handling of these kinds of transmissions are required for backwards compatibility with 802.17.

The MAC address method incorrectly registers the Non-SAS host A as SAS capable. This causes the SAS entity at 3 to misdirect frames from C transmitted to A.



Update VID associations from local frames

EHB gives SAS the ability to update VID associations from frames transmitted by local hosts. SAS extends the number of VLANs supported by 802.17 hosts.



The MAC address method would not be able to automatically update VIDs received in basic frames from local 802.17 hosts limiting 802.17 hosts to supporting a single default VLAN.

Conclusion

- Explicit Header Bit method has the following benefits
  - Addresses the learning issues associated with the MAC address method
  - Provides dynamic learning of VID associations fixing some of the VLAN issues with 802.17.
  - Shares the benefits of the topology discovery method without requiring an extra associative lookup on frame.SA during frame reception.
  - Could enable the client to dynamically invoke the MAC SAS layer on a PDU by PDU basis. (further study)