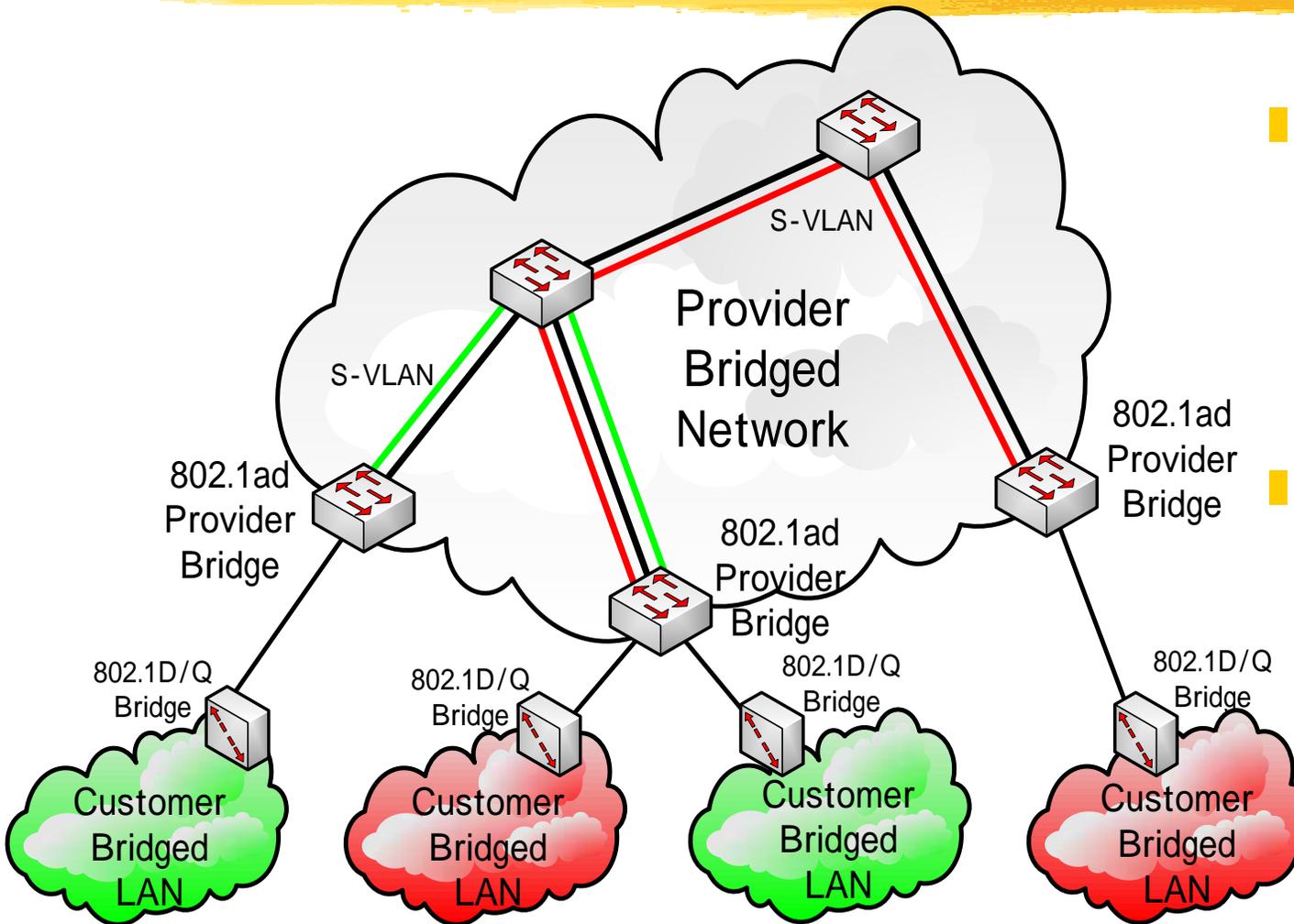# Backbone Provider Bridge Frame Format Issues

October 2004

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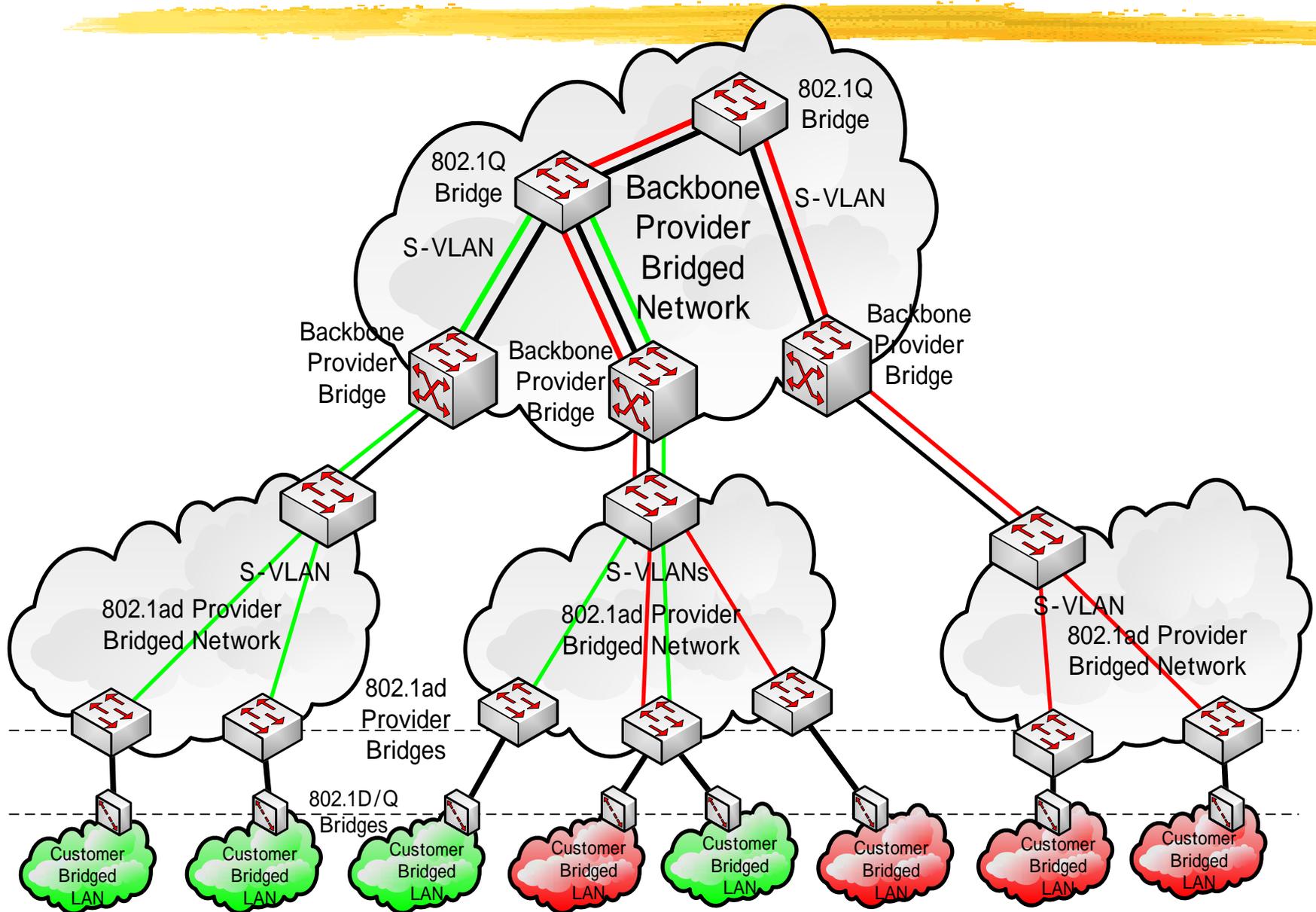
802.1ad Provider Bridge

An S-VLAN (Service VLAN) is a subset of active topology of a Provider Bridged Network

An S-VLAN is uniquely identified by S-VID (Service VLAN ID) in the S-TAG (Service Tag)

S-VLAN

Provider Bridged Network

S-VLAN

802.1ad Provider Bridge

802.1ad Provider Bridge

802.1ad Provider Bridge

802.1ad Provider Bridge

802.1D/Q Bridge

802.1D/Q Bridge

802.1D/Q Bridge

802.1D/Q Bridge

Customer Bridged LAN

Customer Bridged LAN

Customer Bridged LAN

Customer Bridged LAN

| 802.1ad Frame	DA	SA	S-TAG		C-TAG		L/T	User Data	FCS
			TPID	S-VID	TPID	C-VID			

Backbone Provider Bridged Network

Service VLAN Identification

- Backbone Provider Bridged Network interconnects 802.1ad Provider Bridged Networks (802.1ad islands)
    - S-VLAN ID space is extended to 20-28 bit
- An S-VLAN in Backbone Provider Bridged Network is uniquely identified by ES-VID (Extended Service VLAN ID) in the B-TAG (Backbone Tag)
    - An S-VLAN in 802.1ad island is uniquely identified by S-VID
    - However, the S-VID is not globally unique and therefore is not significant in the Backbone Provider Bridge Network
- Thus, Backbone Provider Bridge interchanges S-VID and ES-VID
    - Ingress: S-VID -> ES-VID
    - Egress: ES-VID -> S-VID
- There is no need to transport S-VID across the Backbone Provider Bridge as S-VID only has significance and uniqueness within a particular 802.1ad island
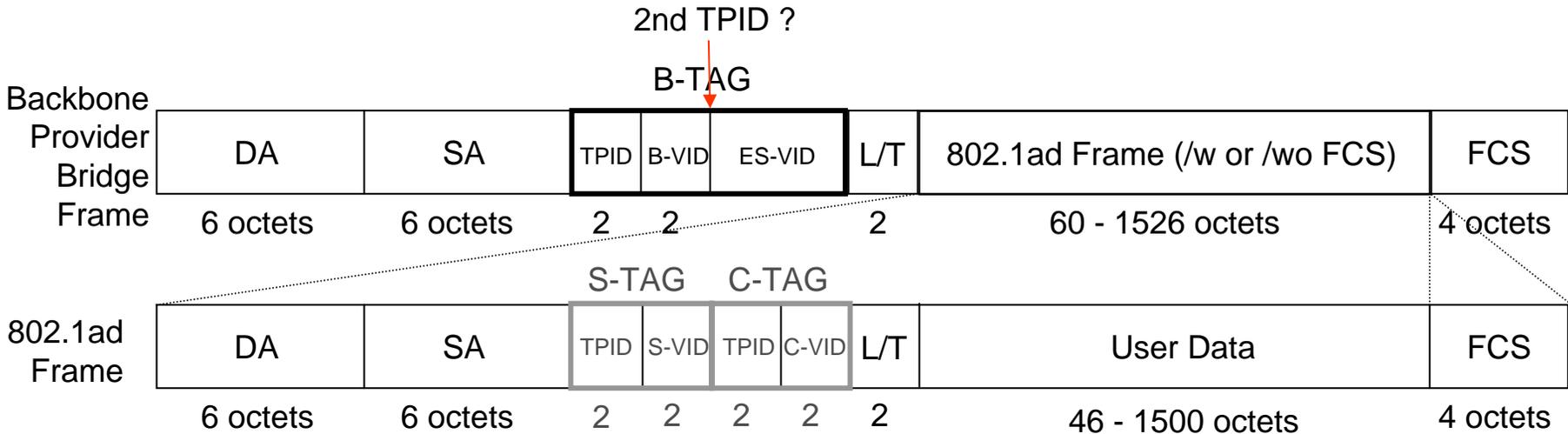
Hierarchical VLANs Architecture in Backbone Provider Bridged Network
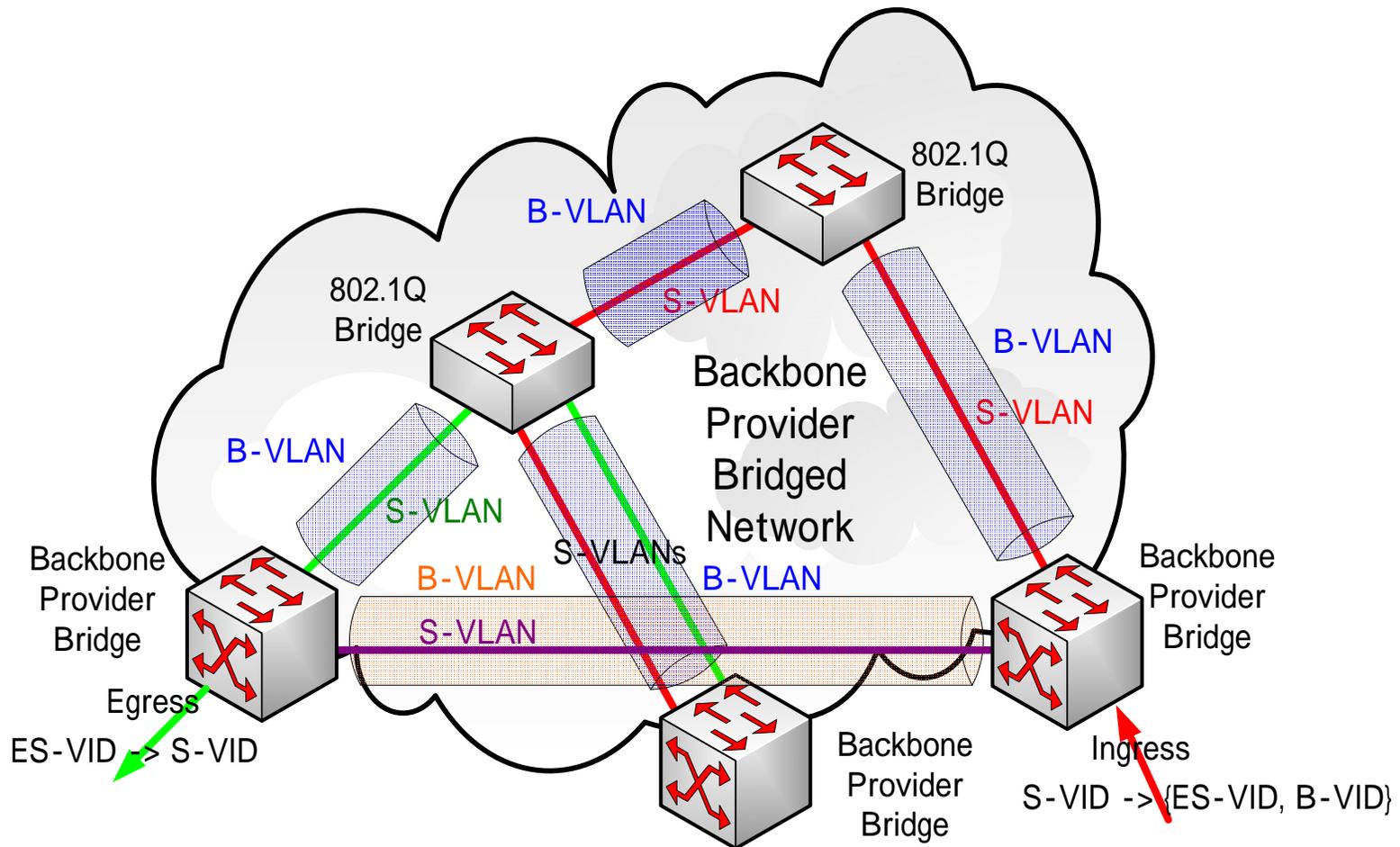
Backbone VLAN

- Frame format in Backbone Provider Bridged Network should be compatible with 802.1Q format for:
    - seamless deployment
    - scalability
- Thus, interior 802.1Q Bridges in Backbone Provider Bridged Network should not directly refer ES-VID value
- B-VLAN (Backbone VLAN) is introduced for backward compatibility
    - B-VLAN hierarchically bundles S-VLANs
    - A B-VLAN is a subset of active topology of a Backbone Provider Bridged Network
    - A B-VLAN is uniquely identified by B-VID (Backbone VLAN ID) in the B-TAG (Backbone Tag)
    - B-VID value for incoming frame into the Backbone Provider Bridged Network is based on ES-VID value in the frame

Example of Frame Format and B-TAG Issues

2nd TPID ?

B-TAG

Backbone Provider Bridge Frame

DA	SA	TPID	B-VID	ES-VID	L/T	802.1ad Frame (/w or /wo FCS)	FCS
6 octets	6 octets	2	2		2	60 - 1526 octets	4 octets

S-TAG   C-TAG

802.1ad Frame

DA	SA	TPID	S-VID	TPID	C-VID	L/T	User Data	FCS
6 octets	6 octets	2	2	2	2	2	46 - 1500 octets	4 octets

■ At least, the above fields and encapsulation scheme are required for Backbone Provider Bridge Frame (BPB Frame)

■ B-TAG issues

 ■ Bit length of ES-VID (20-28 bit)

 ■ TPID value for B-TAG

  ▎ C-TAG value (0x8100) for 802.1Q compatibility; in this case, 2nd TPID is required to identify ES-VID and BPB Frame

  ▎ A new value that identify B-TAG; in this case, 2nd TPID may not be required

S-TAG Issues

- S-VID value is not globally unique and typically requires translation between 802.1ad islands

- Thus, there is no need to transport S-TAG across the Backbone Provider Bridge in typical case

- Option 1: Remove S-TAG and FCS from 802.1ad frame
  - In the case of needing S-VID translation between 802.1ad islands
    - Both the S-TAG and FCS in the 802.1ad frame will need to be regenerated anyways
    - Thus, there is no need to transport the S-TAG and FCS within Backbone Provider Bridge domain
    - Note: Ingress can re-calculate FCS value in 802.1ad frame, but it does not make sense if egress does not verify it, and this scheme requires extra hardware
  - In the case of no S-VID translation between 802.1ad islands
    - FCS in the 802.1ad frame cannot be maintained using this option

S-TAG Issues (continued)

- Option 2: Retain S-TAG in 802.1ad frame
  - In the case of needing S-VID translation between 802.1ad islands
    - S-TAG in 802.1ad frame is unchanged at ingress, then updated at egress
    - FCS in 802.1ad frame may or may not be removed
    - In this option, BPB frame contains unnecessary 4 octets S-TAG fields, so it is not efficient
    - If FCS is not removed, it wastes further 4 octets
  - In the case of no S-VID translation between 802.1ad islands
    - FCS in the 802.1ad frame is maintained using this option, if FCS is not removed
- Which option is desired (or both) ?