Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	Definition of octets present in VLAN Convergence Sublayer.
Date Submitted	**2005-03-17**
Source(s)	Mike Geipel Axxcelera 1600 East Parham Road Richmond VA 23228 Voice: 804-864-4125 Fax: mai1to: geipel @ ieee,org
Re:	Working group letter ballot 17, call for comment on "P80216_Cor1_D1.pdf" dated 2005-02-11.
Abstract	Definition of Octets present in VLAN Convergence Sublayer.
Purpose	Available to support a comment in the commentary database. Adopt changes
Notice	This document has been prepared to assist IEEE 802.16. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein.
Release	The contributor grants a free, irrevocable license to the IEEE to incorporate material contained in this contribution, and any modifications thereof, in the creation of an IEEE Standards publication; to copyright in the IEEE's name any IEEE Standards publication even though it may include portions of this contribution; and at the IEEE's sole discretion to permit others to reproduce in whole or in part the resulting IEEE Standards publication. The contributor also acknowledges and accepts that this contribution may be made public by IEEE 802.16.
Patent Policy and Procedures	The contributor is familiar with the IEEE 802.16 Patent Policy and Procedures <http://ieee802.org/16/ipr/patents/policy.html>, including the statement "IEEE standards may include the known use of patent(s), including patent applications, provided the IEEE receives assurance from the patent holder or applicant with respect to patents essential for compliance with both mandatory and optional portions of the standard." Early disclosure to the Working Group of patent information that might be relevant to the standard is essential to reduce the possibility for delays in the development process and increase the likelihood that the draft publication will be approved for publication. Please notify the Chair <mailto:chair@wirelessman.org> as early as possible, in written or electronic form, if patented technology (or technology under patent application) might be incorporated into a draft standard being developed within the IEEE 802.16 Working Group. The Chair will disclose this notification via the IEEE 802.16 web site <http://ieee802.org/16/ipr/patents/notices>.

Definition of Octets Present in VLAN Convergence Sublayer

Mike Geipel
Axxcelera

Purpose

The purpose of this document is to contain diagrams needed to for discussion of VLAN format issues, in support of a comment made in response to a call for corrigenda comments, as noted above.

Proposed text changes are available at the end of this document.

Background

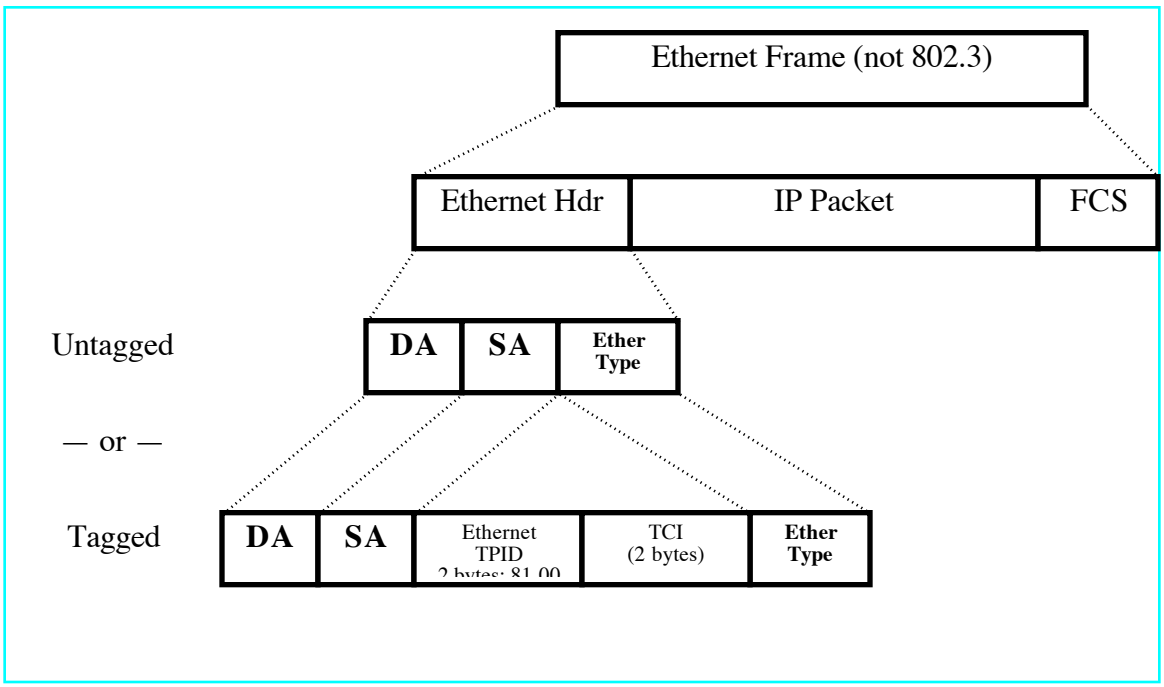
Presumably, the motivation for an IP CS was to provide for sources / destinations of IP traffic that do not necessarily exist on a LAN. One example of this might be a laptop with an IP stack , but no need for an independent MAC address. Another example could be an SS that is a NAT router. IP packets are well-defined, so in these cases, the overhead of Ethernet or IEEE802.3 encapsulation would be an unnecessary waste of bandwidth. The 802.16 PDU could simply be the IP packet.

There is no definition for a "VLAN" MAC layer, as one would expect from a CS name like IP-over-802.1Q/VLAN. VLANs are mapped onto each MAC layer to include the two byte TPID. (Such a mapping has not yet been defined for 802.16 messages over transport connections.) 801.1Q does, however, define a standard two-byte TCI that contains the user priority and VLAN identifier.

VLANs are used to limit the broadcast domain of traffic. Multiple IP CS services (for example) may legitimately be presented to different VLANs to limit their visibility. So I assume that the intent of the VLAN CS would be to remove the unneeded overhead of DA, SA and TPID.

Example

According to the 802.3 standard, an 802.3/Ethernet frame may be either tagged, or untagged. Here is the Ethernet example:



This is one of the reasons that I proposed in a previous comment that 802.3 / Ethernet CS should support VLAN classifiers.

IEEE 802.3

It bears repeating: The 802.3 standard specifies that 802.3/Ethernet frames may be tagged or untagged.

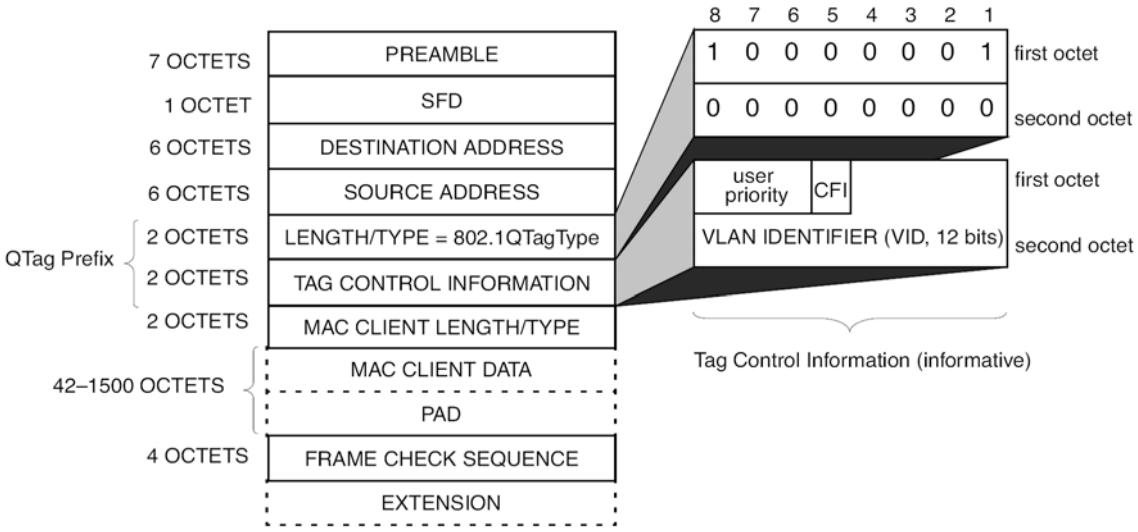


Figure 3–3—Tagged MAC frame format

This was snipped from the 802.3-2002 specification, for a tagged Ethernet frame.

Tagged Control Information (TCI)

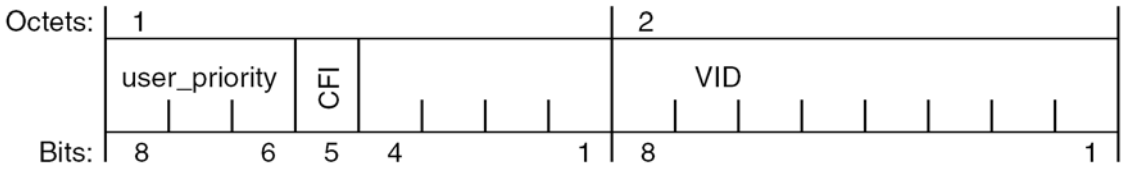
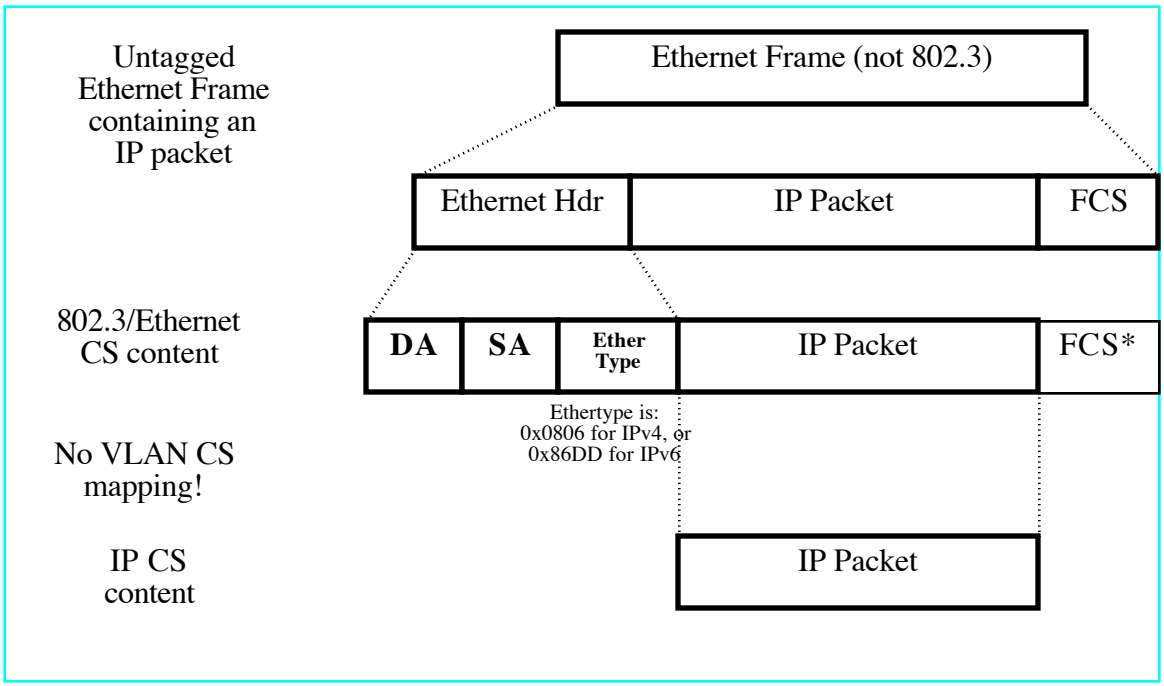


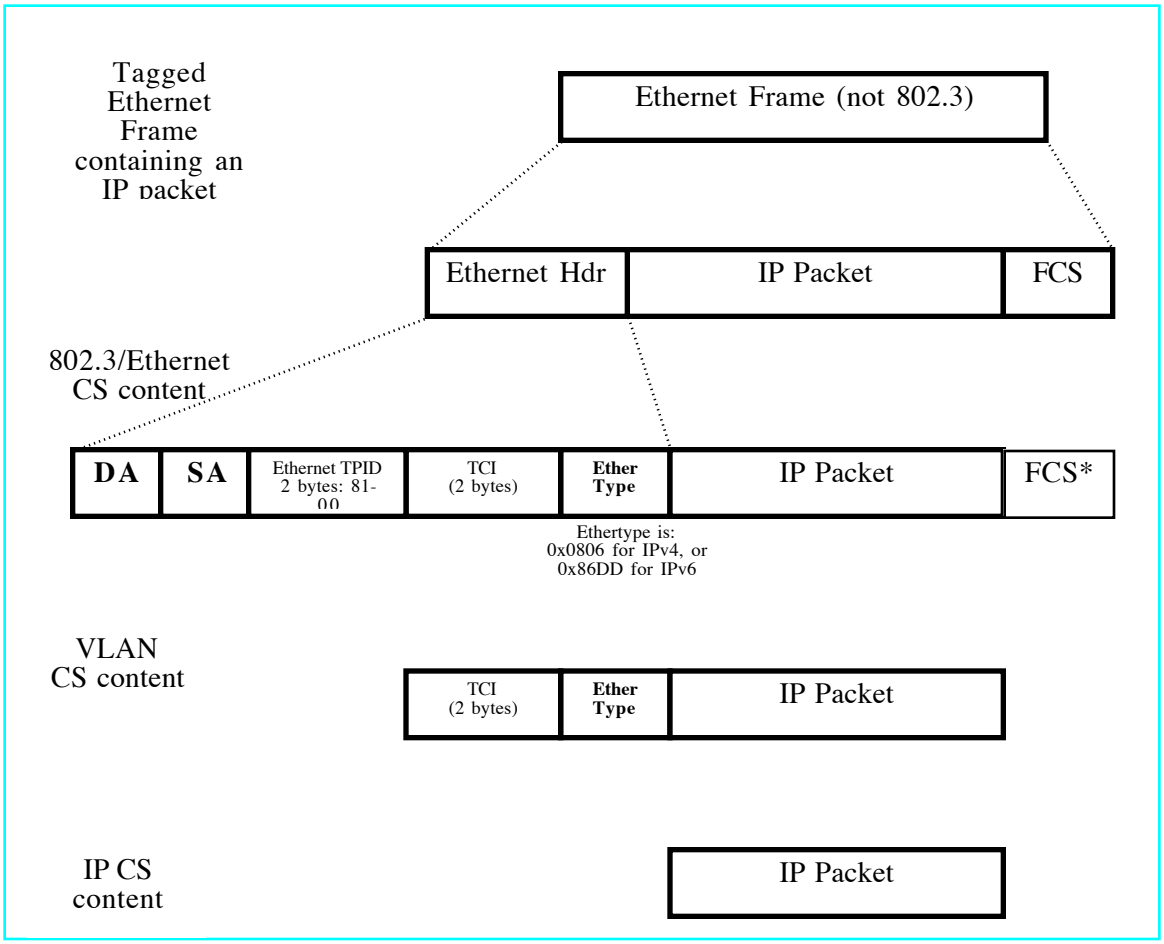
Figure 9-4—Tag Control Information (TCI) format

This two byte structure contains the additional information needed to support VLANs. It is the same format for all 802 mappings.

Untagged Frames

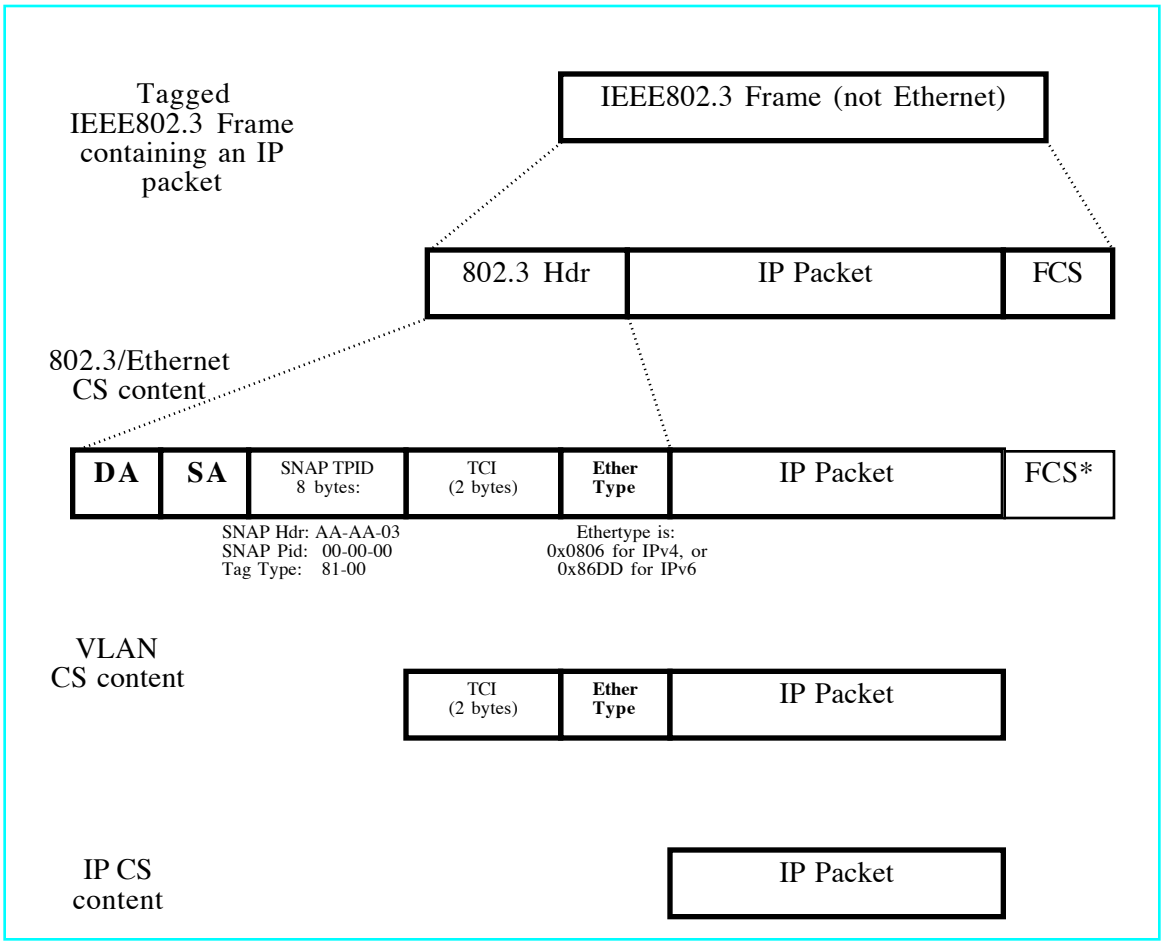
Note that the 802.16 VLAN classifiers are defined such that they cannot match untagged frames.





.The EtherType is still there as protocol discriminator. Of course, in the more likely cases may be IPv4-over-VLAN or IPv6-over-VLAN, where the encapsulated layer-3 protocol is already know.

802.3 Tagged Frames with LLC/SNAP Encapsulation



Note that the VLAN frame that is left over, after Ethernet's DA, SA and TPID were stripped off, is the same as in the previous example.

Non-Sequitur

Of course, there are other, related, formats used to encode 802.3…

Here is a diagram to show the intended use of the media-independent (LLC) encapsulation when frames are bridged between dissimilar MAC ports, without the involvement of VLAN tagging.

5.4 RFC1042 Encapsulation Protocol

RFC1042 specifies a translation for Ethernet frames, such that they can be exchanged with end stations on LANs that do not provide an Ethernet service. The RFC1042 Encapsulation is performed as shown in Figure 10. Table 2 shows the OUI assignment for use in RFC1042 protocol identifiers.

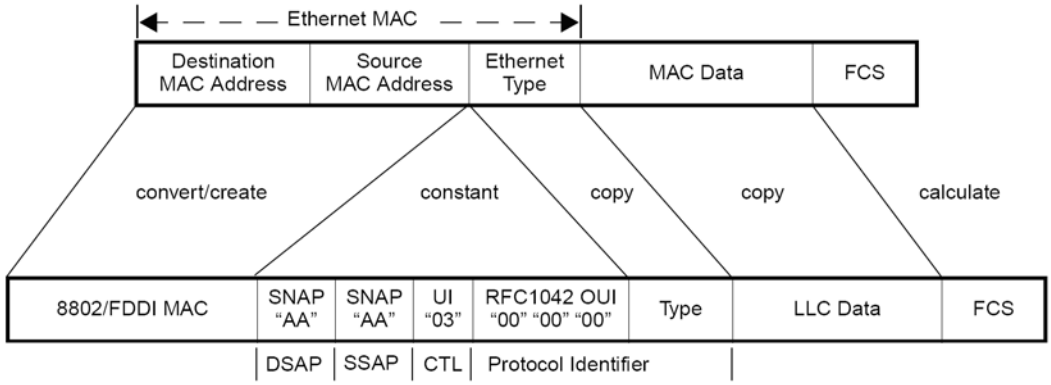


Figure 10—RFC1042 Encapsulation

This snippet came from an older 802.1 specification. Notice that the PID = (OUI, EtherType)!

Other 802 Formats

IEEE802.3 defines a length-encoded format for both:

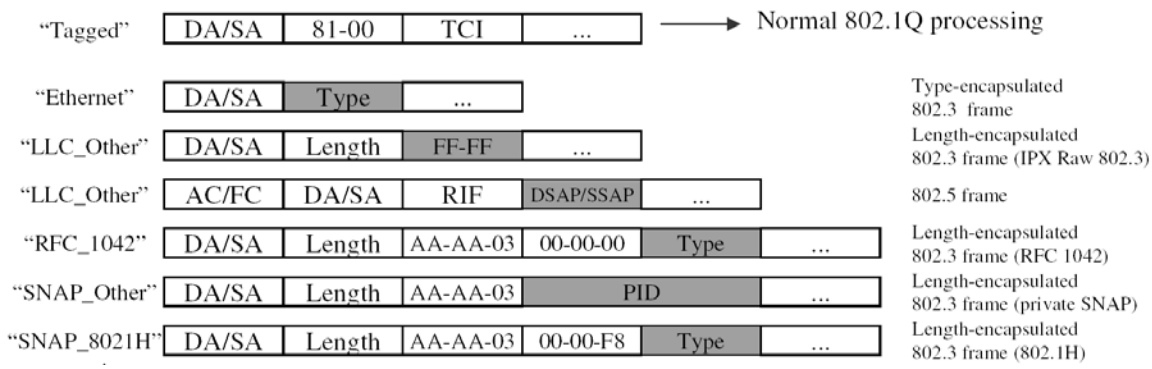
DA, SA, Length, PID=EtherType, Data, FCS

DA, SA, Length, SNAP=(DSAP, SSAP, UI), PID=OUI, Data, FCS

(The value of EtherType is constrained to be a value greater than 1500, so that it is easily distinguishable from the length-encoded format.)

There is also a "raw" format, no longer widely in use, which used DSAP and SSAP octets equal to 0xFF.

Consider this example from 802.1Q-2002 spec.: ☺



Whew!

Remaining Issues

So, how many of these cases should our Ethernet/VLAN classifiers support?

What further clarification is needed for both Ethernet and VLAN classifiers?

Closing Remarks

The current spec does not define what octets are delivered for VLAN CS frames. Given the current use of 802.3/Ethernet, a simple approach would be to prepend the IP frame with the TCI and the EtherType, as follows:

TCI (2 bytes)	**Ether Type**	MAC Payload

Suggestions?

Proposed Language Changes

Insert abbreviation at section 4 on page 6, line 6:

Insert the following abbreviations at appropriate location:

AMC	adaptive modulation and coding
FUSC	full usage of subchannels
PUSC	partial usage of subchannels
TCI	tag control information (as defined in IEEE 802.1Q-2003)

Change the text for section 5.2.5.1 found on page 8 at 16:

5.2.5.1 IEEE Std 802.1Q-1998 VLAN CS PDU format

Change the first paragraph as indicated:

The format of the IEEE Std 802.1Q-1998 VLAN CS PDU shall be as shown in Figure 14 (when header suppression is enabled at the connection, but not applied to the CS PDU) or Figure 15 (with header suppression). In the case PHS is not enabled, PHSI field shall be omitted. The MAC FCS is not included, but VLAN CS connections must enable the 802.16 CRC.

Replace figures 14 and 15 on page 28 of 802.16-2004 with the following diagrams:

PHSI = 0 (2 octets)	Tag Control Info (2 octets)	EtherType (1 octet)	LLC Payload (no MAC FCS) . . .

Figure 14—IEEE 802.1Q VLAN CS PDU format without header suppression

PHSI ≠ 0 (2 octets)	Tag Control Info (2 octets)	EtherType (1 octet)	LLC Payload (no MAC FCS) . . .

Figure 15—IEEE 802.1Q VLAN CS PDU format with header suppression

Please note that I did not attempt to fix the obsolete references to 802.1Q-1998 (with 802.1Q-2003). Another comment has already been approved to do this.