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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.
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Definition of Octets Present in VLAN Convergence Sublayer

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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.

Background

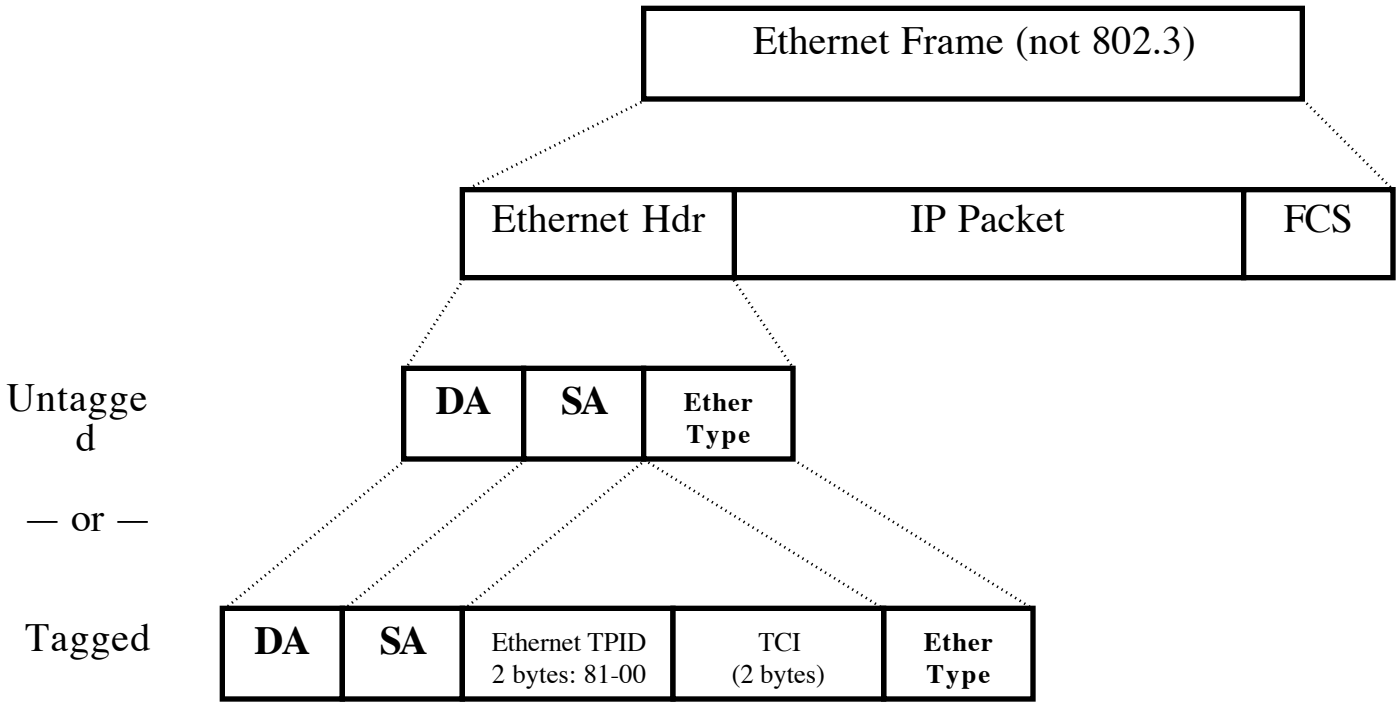
Presumably, the motivation for an IP CS was to provide for sources / destinations of IP traffic that do not necessarily exist on a LAN. One example of this might be a laptop with an IP stack , but no need for an independent MAC address. Another example could be an SS that is a NAT router. IP packets are well-defined, so in these cases, the overhead of Ethernet or 802.3 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.

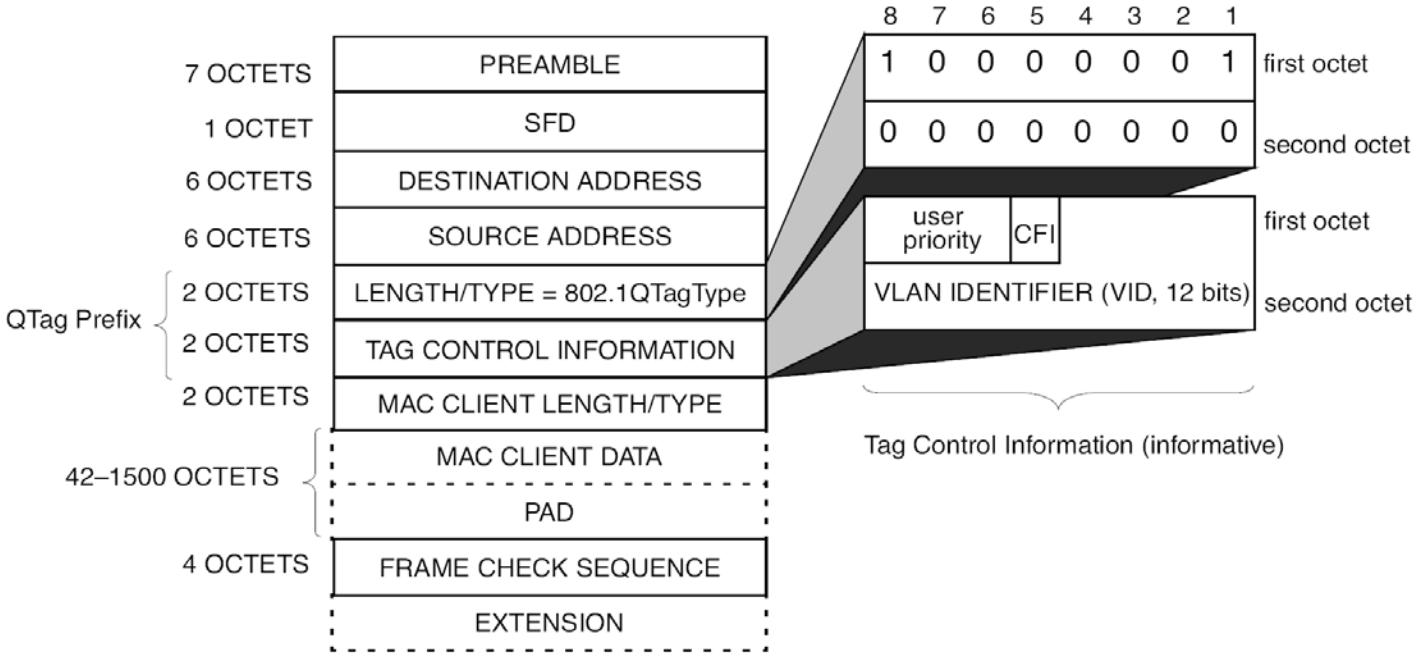


Figure 3–3—Tagged MAC frame format

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

Tagged Control Information (TCI)

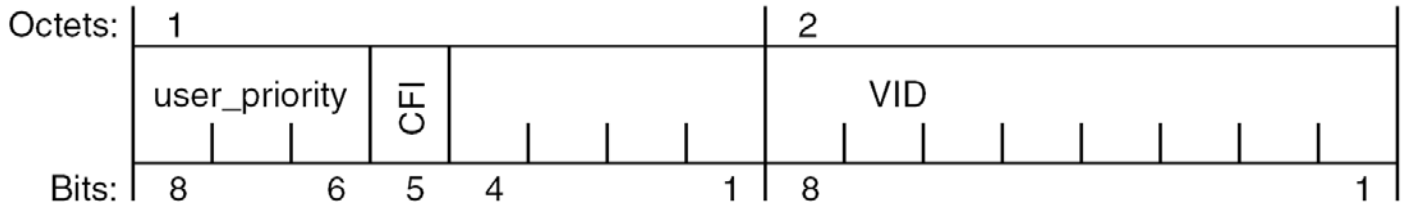


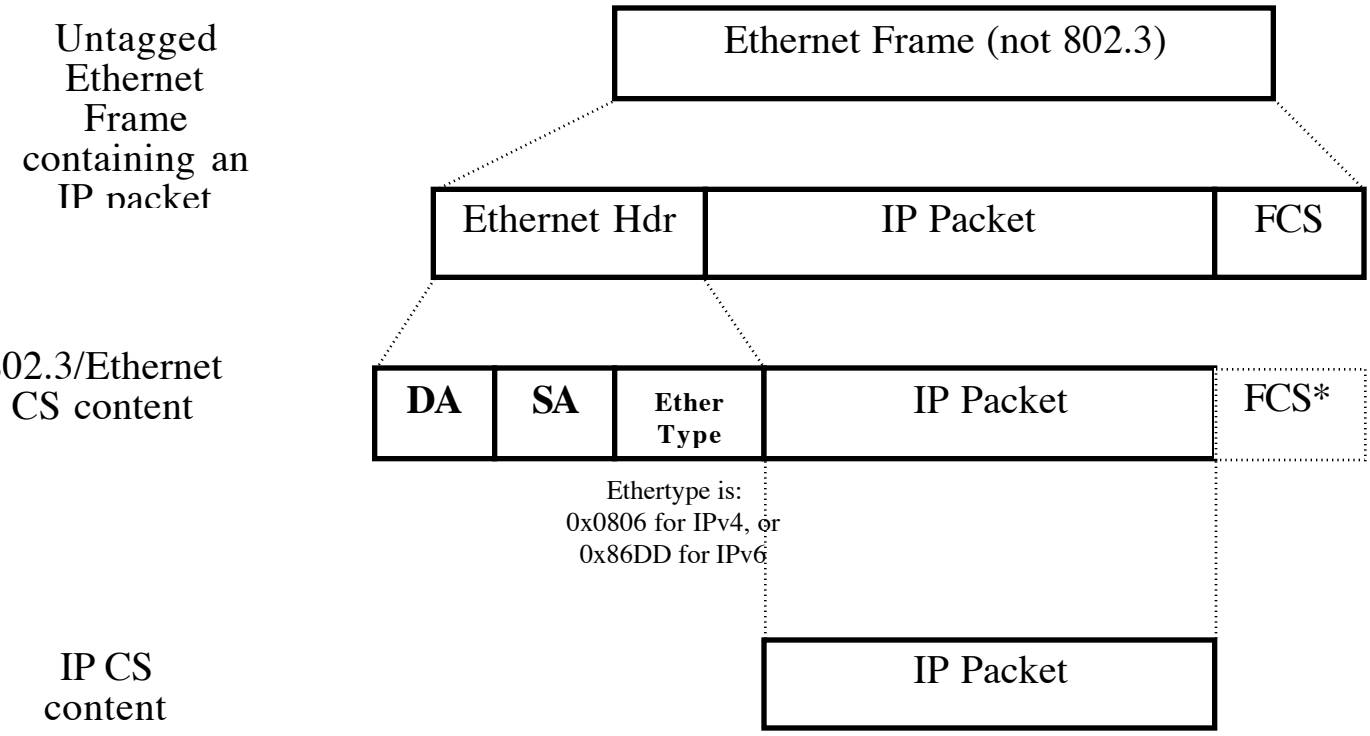
Figure 9-4—Tag Control Information (TCI) format

.

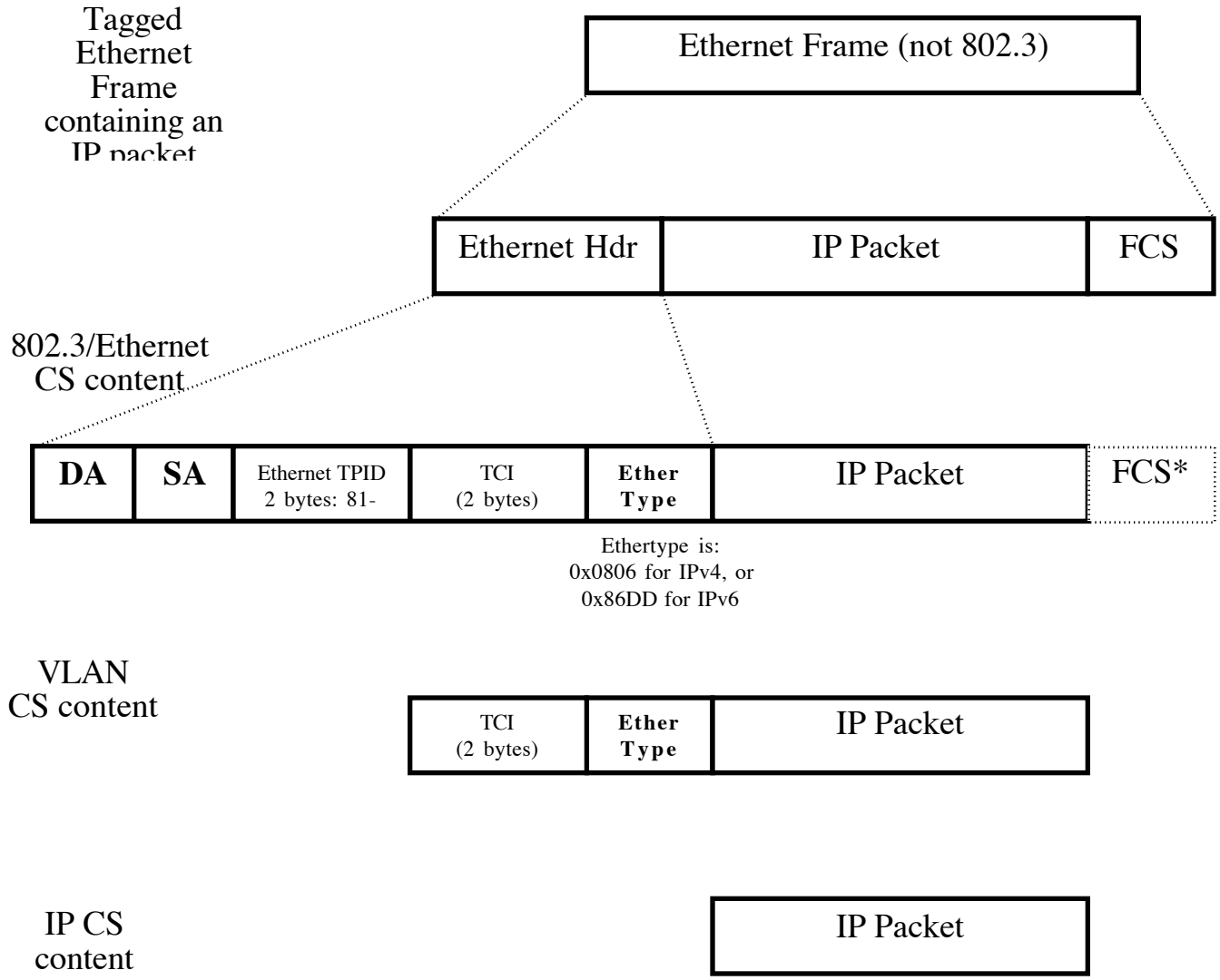
This two byte structure contains the additional information needed to support VLANs. It is the same format for all 802 mappings.

Untagged Frames

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

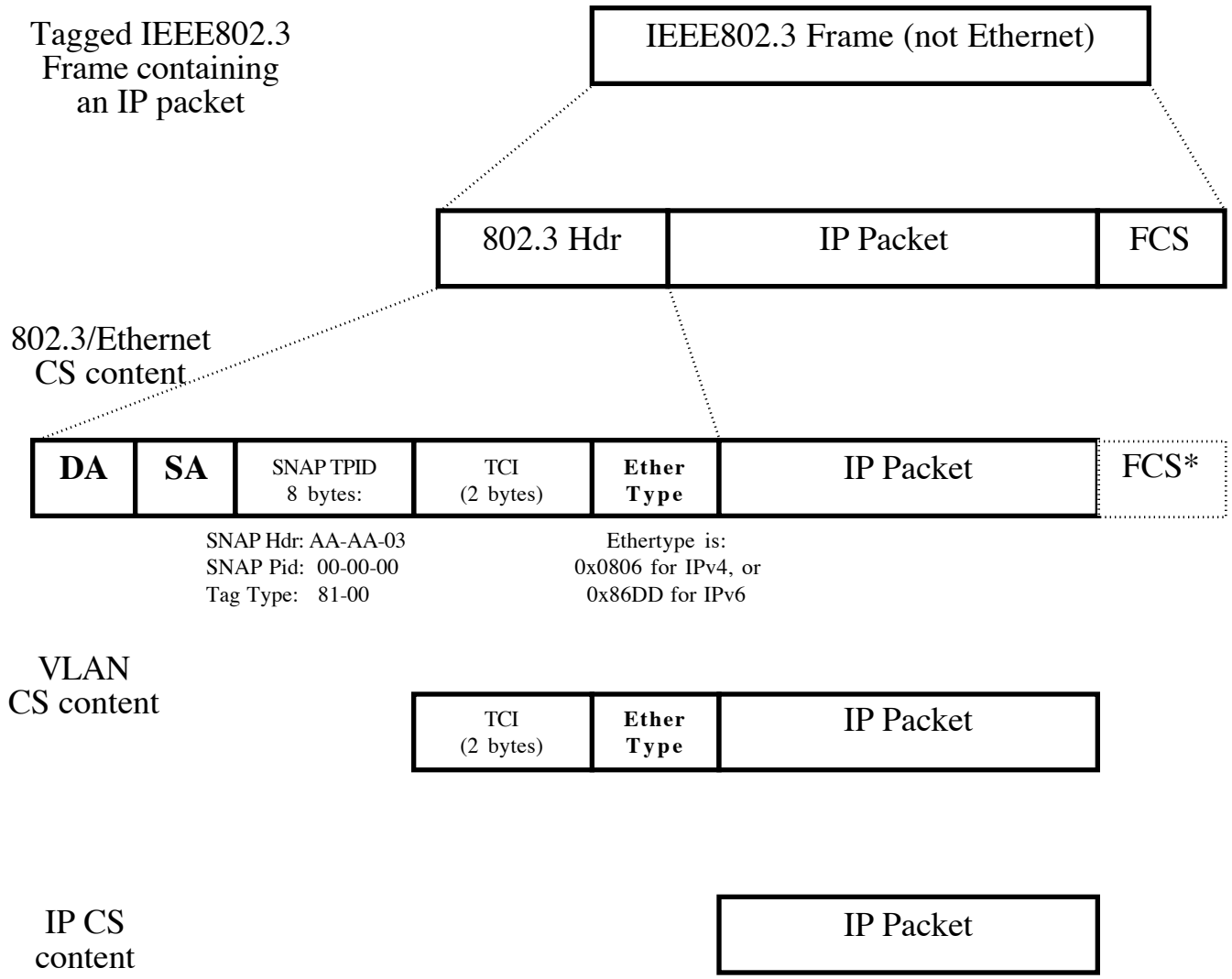


(The box labeled “FCS*” is drawn this way for 802.3/Ethernet CS, since we have not defined yet whether it is there or not. 802.16 has an equivalent CRC, but its use is optional).



.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.

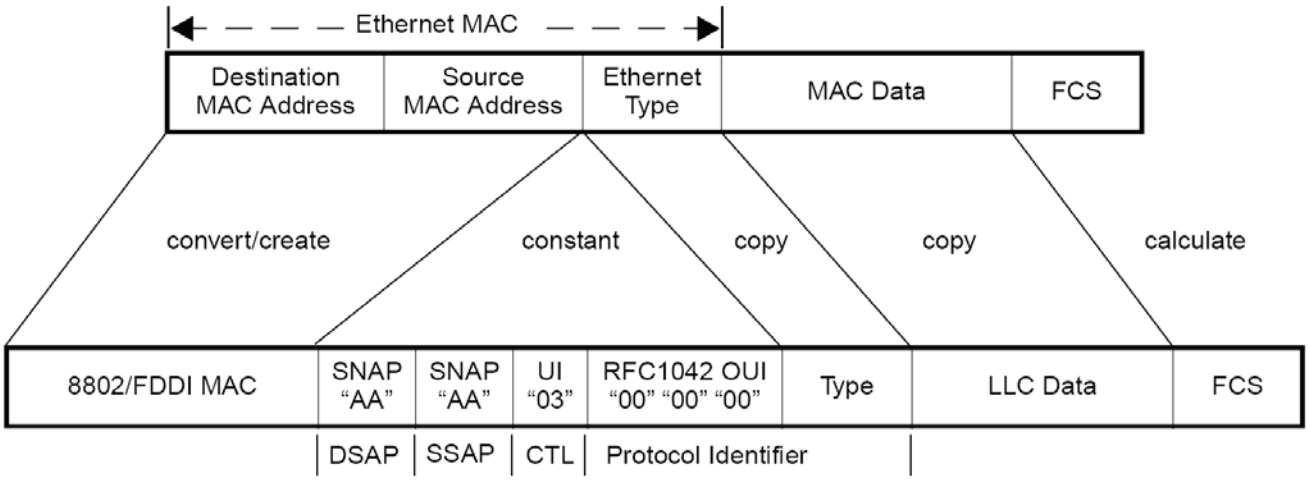


Figure 10—RFC1042 Encapsulation

This snippet came from an older 802.1 specification. Notice that the PID = (OUI, EtherType) !
I believe that this is the same approach that 802.11 has taken.

Other Old 802.2 Formats

The length-encoded versions may have been called the IEEE802.2 format, or something like that:

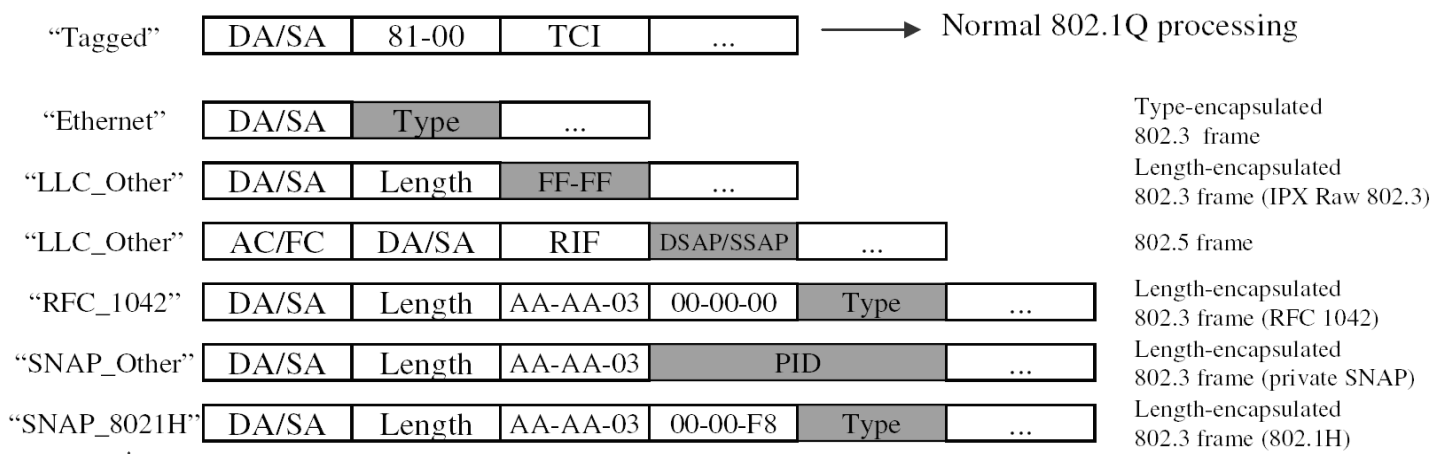
DA, SA, Length, PID=EtherType, Data, FCS

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

There is a "raw" format, no longer widely in use which used DSAP and SSAP octets equal to 0xFF.
There is other encoding too. Fortunately, most of them have fallen out of favor….

For Fun

I don't even pretend to understand all the cases in this example from 802.1Q-2002: ☺



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?

Note also that RFC1042 defined various mappings for ARP… Since the EtherType is available to us in the proposed mapping… We can define a mapping for ARP on 802.16 VLAN CS. (*No text provided at this time*.)

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:

This does not yet define an ARP mapping, but that can be handled later, once this is settled.

Suggestions?