IEEE 802-1-24-0034-00-Mntg

**Proposal to revise bit-ordering material in P802REVc D2.0**

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**Comment: (p21 l15 §3.1)**

The definition of "canonical format" is problematic. It specifies the order in which the bits are "conveyed" as "the same bit ordering as in the hexadecimal representation." However, the hexadecimal representation is NOT an indication of bit ordering at all. Hexadecimal representation (per 8.1) specifies how a bit string in represented in a string of hexadecimal digits. That doesn't limit the order in which bits may be transmitted. 8.6 describes the bits of an octet being transmitted either LSB-first or MSB-first; that's a separate issue from how the set of bits is transcribed in hexadecimal characters. Furthermore, 8.6 confuses issues by referring to LSB as "canonical order"; here the intent seems to be that "canonical order" may represent a different concept from "canonical format", but readers are likely to be confused. Likewise, the draft refers to both "bit-reversed representation" and bit-reversed order"; with some confusion. And, yet furthermore, the relevance of some of this "bit-reversed" material is obsolete; consider, for example, this note in 8.1: "The bit-reversed representation is of historical interest only and is no longer applicable to any active IEEE 802 standard." It is appropriate to review the entire draft, unifying the language and removing obsolete material, considering also Annex C ("Examples of bit ordering for addresses").

**Suggested remedy:**

Adopt remedies in "Proposal to revise bit-ordering material in P802REVc D2.0" <https://mentor.ieee.org/802.1/documents?is_dcn=0034&is_group=Mntg&is_year=2024>

1. **Hexadecimal and bit-reversedrepresentation**

**§8.1 Terms and notational conventions**

…

*Hexadecimal representation is a sequence of octet values in which the values of the individual octets are displayed in order from left to right, with each octet value represented as a 2-digit hexadecimal numeral and with the resulting pairs of hexadecimal digits separated by hyphens. The order of the hexadecimal digits in each pair, as well as the mapping between the hexadecimal digits and the bits of the octet value, is derived by interpreting the bits of the octet value as a binary numeral using the normal mathematical rules for digit significance.*

*Bit-reversed representation is a sequence of octet values in which the values of the individual octets are displayed in order from left to right, with each octet value represented as a 2-digit hexadecimal numeral and with the resulting pairs of hexadecimal digits separated by colons. The order of the hexadecimal digits in each pair, as well as the mapping between the hexadecimal digits and the bits of the octet value, is derived by reversing the order of the bits in the octet value and interpreting the resulting bit sequence as a binary numeral using the normal mathematical rules for digit significance.*

*NOTE—The bit-reversed representation is of historical interest only and is no longer applicable to any active IEEE 802 standard.*

[No change proposed.]

Reasoning: This material covers hexadecimal notation and its opposite: bit-reversed notation. It is self-consistent and unrelated to separate discussions about bit ordering in bit-serial transmissions. No change is needed with regard to the comment.

**Add a second note**

*NOTE–Many representations of MAC addresses outside of IEEE 802 standards use hexadecimal digits ordered as in the hexadecimal representation but with colons separating octet numerals.*

Reasoning: This colon-separated notation is very common in products and product documentation. The note lets the standard recognizes that reality and may aid readers to more easily interpret industrial materials.

**§8.2.2 Assignment of universal addresses**

[No change.]

Reasoning: This material illustrates **§**8.1 and is consistent with it.

1. **Bit-order transmission**

**Annex C “Examples of bit ordering for addresses”**

Replace with “This annex was deleted during the development of IEEE Std 802-202x.”

Reasoning: As explained in the introduction to Annex C, “This annex illustrates the various bit- and octet-transmission scenarios that can occur, and it is intended as a basis for clarifying the issue of bit-ordering for EUI-48s across different MACs.” It proceeds to describe and contrast canonical and noncanonical formats.However, the concept of canonical format is rendered obsolete by this sentence in 8.6: “However, if MSB (bit-reversed) serial transmission order is used, the standard shall assure that a MAC address will be the same at the MSAP whether it is a MAC address field or an address appearing in the information field.” This specifies the bit order as mandatory. If only one ordering is allowed, there is no point in describing others. Therefore, Annex C is obsolete and should be deleted. This contribution proposes to significantly revise 8.6 and delete that sentence. However, the revision nevertheless leaves Annex C obsolete.

**§3.1**

Reasoning for deleting both definitions: (a) These confuse bit ordering with hexadecimal representation [which does not indicate bit order]. (b) The definitions diverge from the description of the same terms in Annex C. (c) The concept of canonical format is used only in Annex C, which is obsolete and should be deleted, leaving no purpose for defining the terms.

**§8.6 Bit-ordering within octets**

Clause 5 describes the reference models for IEEE Std 802 networks. Regarding interoperability at the MAC Service Access Point (MSAP), IEEE Std 802 network standards specify how octets from the LLC are transmitted and received. Though most IEEE 802 network Physical Layers encode multiple bits or multiple octets of the MAC frame for transmission on the medium, a few IEEE 802 network Physical Layers have a one-to-one mapping of a bit in the MAC frame to an encoded bit on the medium.

In this case of bit-serial transmission, some MAC standards have specified serial transmission of the bits of an octet LSB first, and other MAC standards specify transmission of the MSB first.

For frames transmitted in bit-serial fashion, IEEE 802 standards shall specify LSB-first transmission for each octet of a source or destination address field.

Reasoning: The draft is softly implying that bit-serial address fields are always sent LSB-first (it suggests that only for the very first bit; the reader needs to generalize that to the rest of the address). To my knowledge, all bit-serial 802 standards have always sent each octet of each address LSB-first. The standard should plainly mandate this.

For frames transmitted in bit-serial fashion, IEEE 802 standards should specify LSB-first transmission for each octet of the frame.

Reasoning for deletion of last sentence: This is asking the higher-layer protocol to adjust the content of its PDU based on the nature of the MAC that will be carrying that PDU; or, otherwise, for the 802 network to modify the content of some MSDUs depending on the content. Either is a protocol violation that is impossible to mandate in this standard. Per 5.2.3, a function of the MAC is “Transparent data transfer of PDUs from the next higher sublayer.”

Furthermore, if we try to specify a solution to this problem, why stop at MAC addresses? Why not other similar non-reversible data that might be carried in a PDU? What about an EtherType? An OUI? An LSAP address? Or any other data, for that matter?

Even considering the PIF, which is subject to specification here, there is difficulty in mandating bit order at the PHY layer. The PHY is not described in IEEE Std 802 and, furthermore, does not affect interoperability at the MSAP.