802c Update

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Re: P802c/D1.1

Venue:
RAC Meeting, San Diego, USA, 2016-07-28

Purpose:
To provide an update on the 802c project.

Notice:
This document represents the views of the author.

802c Update

Roger B. Marks
Technical Editor, P802c

Abstract

This presentation provides an update on the status of Project P802c. It covers P802c/D1.1, which was developed during in Working Group Letter Ballot. This presentation updates the report of P802c/D0, which was presented to the RAC on 2015-11-12.

From a RAC perspective, the most basic elements of the draft have not changed significantly. The differentiated use of local space has been designated the Structured Local Address Plan (SLAP). A proposed update of the relevant RAC tutorial has not yet been completed.

Outline

- Project status and PAR highlights
- Draft status
- Draft structure and key features
- Draft to-do items
- RAC Points of Interest

P802c Project Status

- Draft Amendment to IEEE Std 802-2014
- PAR Approval Date: 2015-06-11
- 5.2.b. Scope of the project: *The amendment will provide an optional local MAC address space structure to allow multiple administrations to coexist. This structure will designate a range of local MAC addresses for protocols using a Company Identifier (CID) assigned by the IEEE Registration Authority. Another range of local MAC addresses will be designated for assignment by local administrators. The amendment will recommend a range of local MAC addresses for use by IEEE 802 protocols.*

P802c Draft Status

Draft	Date	Status
0	2015-11-01	Editor's Draft
0.1	2015-11-11	followed Task Group discussion
0.2	2016-02-14	followed Task Group discussion
0.3	2016-03-15	followed Task Group ballot and comment resolution
1.0	2016-06-20	followed Task Group ballot and comment resolution; subject to Working Group Letter Ballot all 802 WGs invited to comment 38 comments (21 from Bob Grow) comment resolution 2016-07-26
1.1	2016-07-28	of Working Group Letter Ballot recirculation; comment resolution 2016-09

Draft structure

- Frontmatter
- Scope and Purpose: unchanged vs. 802-2014
- 3. Definitions, acronyms and abbreviations
- 8.2.2 Assignment of universal addresses
- 8.4 Local MAC addresses (primary content)
  - replaces 8.4 in IEEE Std 802-2014
- 9 Protocol identifiers
- Bibliography: reference to RAC tutorial
- Annex E (informative): History

8.2.2 Assignment of universal addresses

- Removed most references to local MAC addresses and CID
  - kept a reference to make it clear that CID provides 0 EUIs.
  - added pointer to the new 8.4, which covers local MAC addresses and CID in detail

8.4 Local MAC addresses

- Replacement of existing subclause (four sentences and a note) with an entirely new subclause including:
  - 8.4.1 concept and overview
  - 8.4.2 assignment protocols
  - 8.4.3 Structured Local Address Plan (SLAP)
  - 8.4.4 SLAP local MAC address types
    - 8.4.4.1 Extended Local Identifier [ELI]
    - 8.4.4.2 Standard Assigned Identifier [SAI]
    - 8.4.4.3 Administratively Assigned Identifier [AAI]
    - 8.4.4.4 SLAP Quadrant 10
  - 8.4.5 SLAP Local MAC address summary

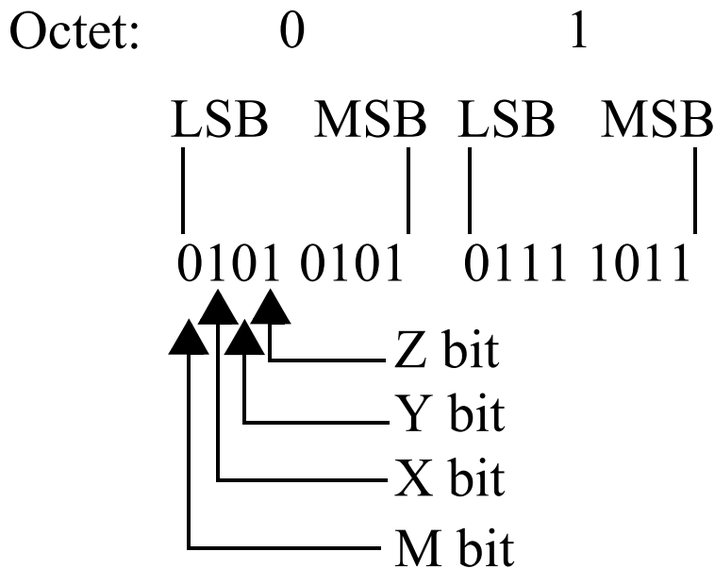
8.4.1 Concept and overview

- Introduction and address uniqueness
  - references Annex F.1.2 (“Duplicate MAC Addresses”) of 802.1Q, in regard to possibility of non-unique address assignments in distinct VLANs, when bridges support Independent VLAN Learning
- Introduces the SLAP:
  - *While a local administrator may assign addresses throughout the local range, the optional Structured Local Address Plan (SLAP) specifies different assignment approaches in four specified regions of local address space.*

8.4.2 Assignment Protocols

- *An address assignment protocol assigning local MAC addresses to devices on a LAN should ensure uniqueness of those addresses*
- *Any failure of such uniqueness invalidates the fundamental premises of IEEE 802 network operation and may lead to disruption.*
- *Multiple address assignment protocols can coexist on a LAN without interference if such protocols assign addresses from disjoint address pools.*
- *Administrators who deploy multiple protocols on a LAN in accordance with the SLAP will enable the unique assignment of local MAC addresses within the LAN as long as each protocol maintains unique assignments within its own address subspace.*

8.4.3 SLAP Quadrants and Address Types



SLAP Quadrant	Y bit	Z bit	SLAP local MAC address type
01	**0**	**1**	ELI
11	**1**	**1**	SAI
00	**0**	**0**	AAI
10	**1**	**0**	*reserved*

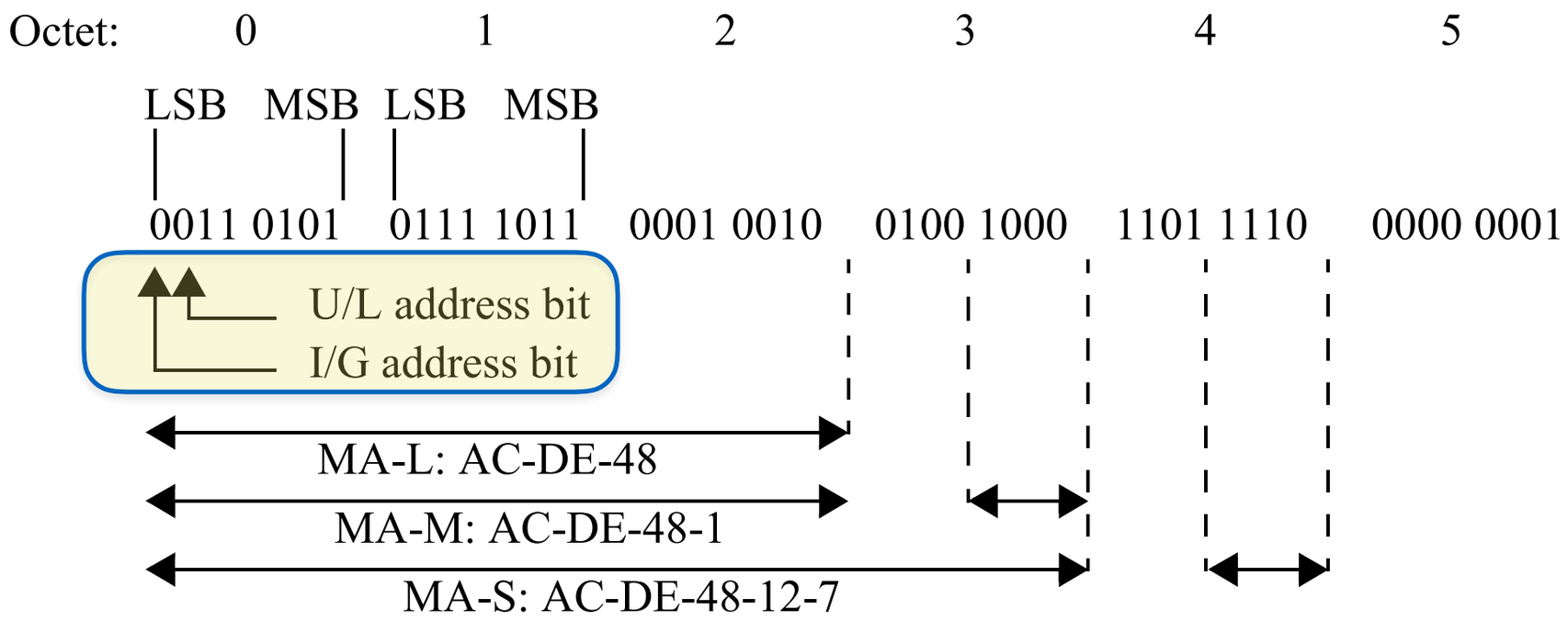
8.4.4.1 Extended Local Identifier [ELI]

- per PAR Scope: *designate a range of local MAC addresses for protocols using a Company Identifier (CID) assigned by the IEEE Registration Authority*
- ELI-48 and ELI-64: similar to EUI-48 and EUI-64
  - use CID instead of OUI
  - restricted to the SLAP Quadrant 01
    - this includes all pubic CIDs that have been assigned by IEEE RA
  - *protocol may assign the 24-bit extension of the ELI so as to convey specific information*
    - *Note, in contrast, the IEEE RA admonition against a similar usage in the global address space [B8]: "any application that calls for subdivision of the available number space… has the potential to rapidly exhaust the address space."*

EUI-48, per IEEE Std 802-2014

Hexadecimal representation: AC-DE-48-12-7B-80

Bit-reversed representation: 35:7B:12:48:DE:01



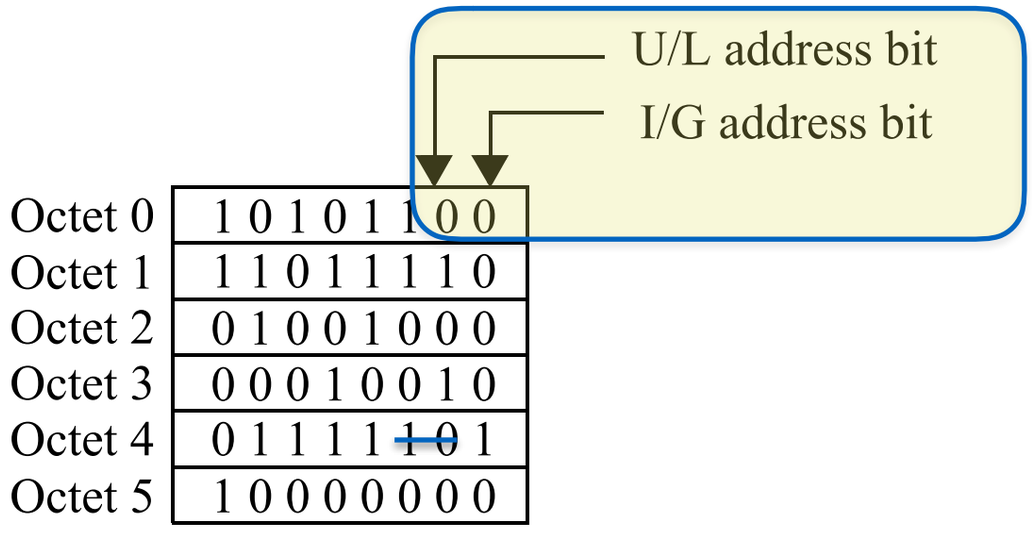
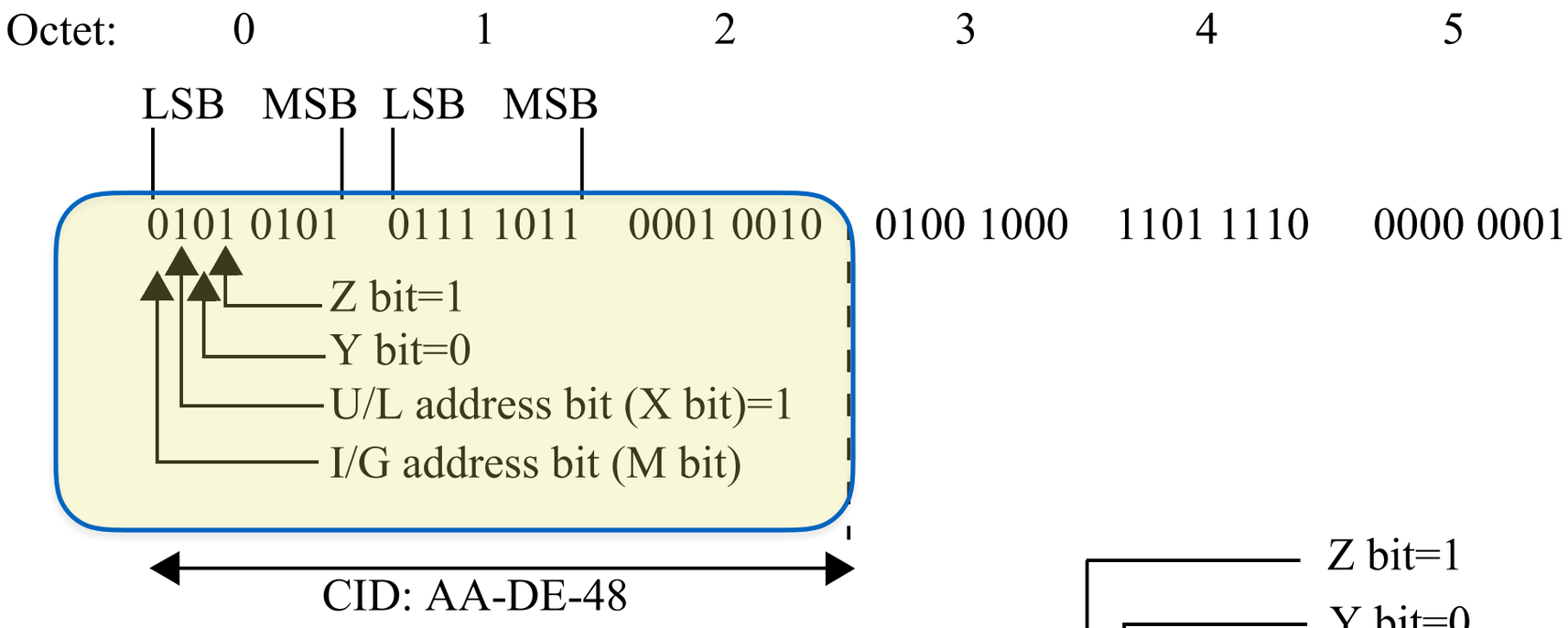
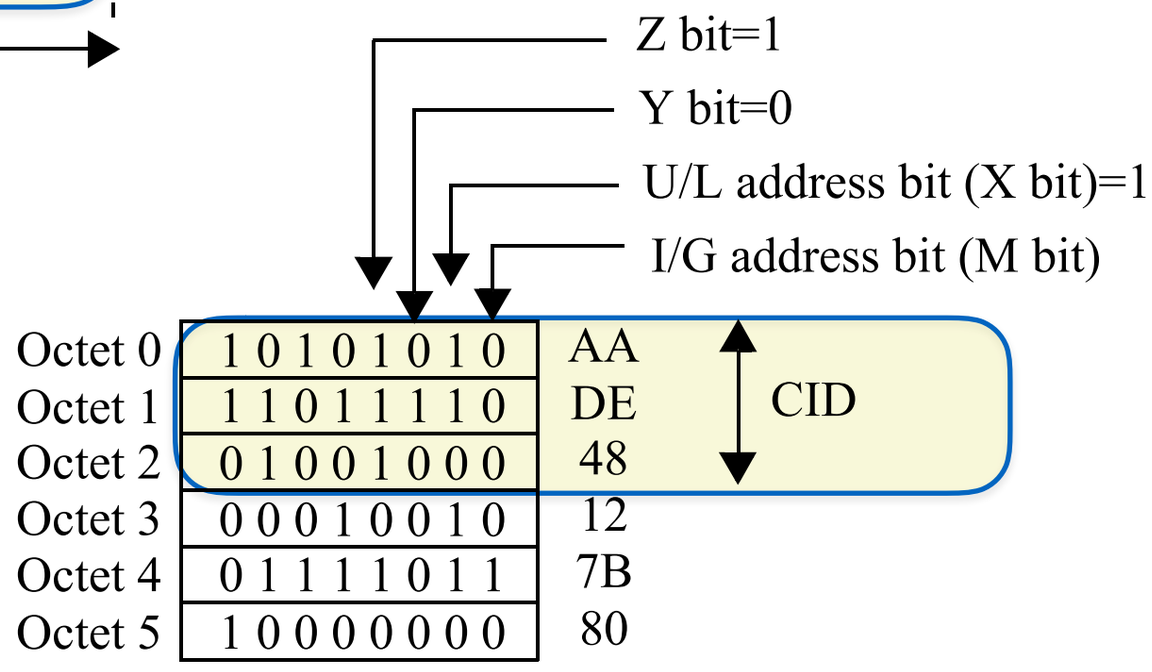


Figure 10—Example EUI-48

ELI-48, per P802c/D1.1

Hexadecimal representation: AA-DE-48-12-7B-80





8.4.4.2 Standard Assigned Identifier [SAI]

- per PAR Scope: *recommend a range of local MAC addresses for use by IEEE 802 protocols*
- SAI-48 and SAI-64
    - Y bit = 1
    - Z bit = 1
    - An SAI is assigned by a protocol specified in an IEEE 802 standard
    - additional differentiating protocol-specific bits may be specified in future assignment protocols

8.4.4.3 Administratively Assigned Identifier

- per PAR Scope: *Another range of local MAC addresses will be designated for assignment by local administrators.*
- AAI-48 and AAI-64
  - Y bit = 0
  - Z bit = 0

8.4.5 SLAP Summary

local MAC address type	M bit	X bit	Y bit	Z bit	SLAP Quadrant	Number of bits (including I/G and U/L) assigned by IEEE RA or IEEE Std 802
ELI-48	I/G	1	0	1	01	24 (CID)
ELI-64	I/G	1	0	1	01	24 (CID)
SAI-48	I/G	1	1	1	11	4
SAI-64	I/G	1	1	1	11	4
AAI-48	I/G	1	0	0	00	4
AAI-64	I/G	1	0	0	00	4
reserved	I/G	1	1	0	10	—

Annex E.3 (informative): History

- local MAC addresses: historical development, including history of CID registry

To Do: Tutorial Update

- Include draft amendment of RAC tutorial on EUI & CID (Reference [B8]) with packages circulated in Working Group ballot and Sponsor Ballot.
  - Amendment should target the sections entitled "Structure of OUI and CID" and "Company ID" (under "Use of Terms").
  - Define the Y and Z bits, the SLAP, and the four SLAP quadrants.
  - Indicate that RA CID assignments, forming the basis of ELIs, are limited to SLAP Quadrant 01.
  - Summarize how the SAI space is administered.
  - Summarize the usage of the AAI quadrant.
  - Specify status of SLAP Quadrant 10.

To Do: Protocol Identifiers

- P802c/D1.1 says:
  - *<<Editor's note: According to [B8], "In addition to being a globally unique 24-bit identifier, either an OUI or CID may also be used to create extended identifiers, protocol identifiers and context dependent identifiers. Depending on the rules used to create these derivative identifiers, they might be globally unique (e.g., EUI-48 and EUI-64) or only unique within the context in which they are used."IEEE Std 802 contains content relevant to CID usage as protocol identifiers; for example, 9.5 discusses "SNAP identifiers with the X bit set to one." Changes to 9.24, 9.3, 9.5, and 9.51 could be used to clarify ambiguity and bring IEEE Std 802 into alignment with this use of CID in a protocol identifier. Such changes might be considered out of the scope of the project.>>*
- Current direction is toward expanding PAR scope.

RAC Point of Interest #1: CID Limitation

- P802c/D1.1 says:
  - *IEEE 802 standards support the use of ELI-48 and ELI-64 based on CID only for CID values that specify 0 for the Y bit and 1 for the Z bit. The IEEE RA assigns CIDs only with 0 for the Y bit and 1 for the Z bit.*
  - *<<Editor's note: As of the date of this draft, each of the IEEE RA's publicly assigned CIDs <https:// regauth.standards.ieee.org/ standards-ra-web/pub/view.html#registries> specify 0 for the Y bit and 1 for the Z bit.>>*

RAC Point of Interest #2: Structured ELI

- P802c/D1.1 says:
  - *In some cases, an ELI assignment protocol may assign the 24-bit extension of the ELI so as to convey specific information. Such information may be used by receivers and bridges that recognize the CID and are cognizant of the protocol identified by the CID, without interfering with the functionality of receivers and bridges that do not recognize the CID. Such address formats, and their interpretation, are outside the scope of this standard but may be specified by the entity to which the specific CID is assigned by the IEEE RA.*
  - *Note, in contrast, the IEEE RA admonition against a similar usage in the global address space [B8]: "any application that calls for subdivision of the available number space, for block allocation to physical equipment without an identifiable physical instance per EUI-48 identifier, or for encoding functional capabilities within significant bits or bit patterns of the identifier, has the potential to rapidly exhaust the address space."*

RAC Point of Interest #3: SAI assignments

- Where will the registry of SAI protocols reside?
  - P802c/D1.1 says:
    - *Specification of the use of the SAI quadrant is reserved for IEEE Std 802.1CQ.*
      - “Multicast and Local Address Assignment”
  - Or should we have a more dynamic registry?
- Can non-802 standards specify SAI protocols?
  - the registry needs to include them as well

RAC Point of Interest #4:
I/G Bit Usage

- For the purposes of ELI assignment, is the holder of the CID deemed to administer the CID with the I/G bit flipped to 1?
- Is the same true of the OUI holder, for the assignment of EUIs?